TASKS FOR THE VETERINARY ASSISTANT

Edited by
Paula Pattengale and Teresa Sonsthagen









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To all those who have left footprints on my heart.



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PREFACE

A usual day in most veterinary practices is often fast paced and demanding. As a new person, it is sometimes difficult to find someone that is free to answer a question or to clarify an instruction. The amount of information an assistant needs to know can be staggering, and it seems like you have to know it *all* on the first day!

A technique used in many veterinary technology programs is to have the students put together a reference book and a task card box. The idea is to put key activities and information at your fingertips or in a central location for quick reference. The information in the reference book is usually common information or standard operating procedures and the task card box is usually reminders for tasks that need to be performed weekly, monthly, or yearly. This information can be tailored to the practice in which you work or can be used right from this book as a means to study for exams. The information you gather from this textbook should be close to the standards of care maintained at any veterinary clinic in which you find employment and just needs to be modified to the "way they like things."

The reference book and task card box can be made very simply with prehole punched index cards that can be kept bound together with "D-rings" or a binder made for index cards. The index card fits nicely into scrub or lab coat pockets and can be changed out as duties change or procedures change. The task card box also utilizes index cards kept in a recipe box with dividers for weekly, monthly, and yearly tasks. However you put your reference book and task card box together, make it yours! Be as creative as you wish; just try to keep in mind that as you grow in your job, you will be given more or at least different tasks, which in turn will require more or different information. So keep it flexible and changeable.

Paula Pattengale
Teresa Sonsthagen

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A huge thank you goes out to all of the authors who have put forth this body of work. It is educators like these that carry the profession of veterinary medicine into the future. A special thank you also goes out to Oreta Samples. Her offer of help came at a much needed time!

Teresa Sonsthagen

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This book is accompanied by a companion website:

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The website includes:

* Figures from the book in PowerPoint
* Downloadable flash cards
* Lesson plans
* Exams
* A competency checklist
* Concept maps

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CHAPTER

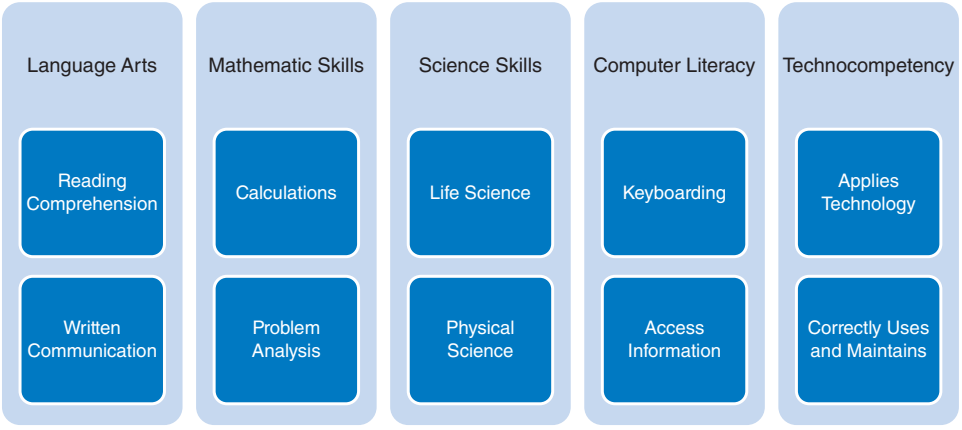
1

FOUNDATION SKILLS

TREGEL COCKBURN

Foundation Skills

(Mastery: Minimum Eighth Grade Level)



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Assess personal levels of language (written and spoken) arts and mathematical skills.
2. Strengthen foundation skills in language arts, math, and life science to the eighth-grade level.
3. Analyze basic medical terminology.
4. Approximate the literal meaning of veterinary medical terms based on the analysis of medical word parts.
5. Analyze medical math problems.
6. Solve medical math problems based on the analysis of the problem's components.
7. Assess the level of keyboarding and computer literacy skills.
8. Use veterinary software to correctly input and access information into a veterinary computer database.
9. Properly approach and use equipment found in the veterinary environment.
10. Follow equipment troubleshooting and maintenance procedures.

INTRODUCTION

Becoming a veterinary assistant can prove to be a very rewarding career choice with proper preparation to attain the prerequisite knowledge and skills. Today's veterinary employers hire for more than enthusiastic, personable, self-motivated employees with a positive "can-do" attitude. They also seek trained members of the veterinary health-care team who can masterfully apply their reasoning in various situations and competently adapt learned techniques. Both employers and clients value doers and thinkers. In this chapter, general skills such as reading, problem solving, and self-management will be presented as a starting point for what is hoped to be a desire for lifelong learning.

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TASK 1.1 SELF-ASSESSMENT AND UNDERSTANDING OF FOUNDATION SKILLS

Concept: The learner needs appropriate foundation skills before learning task-specific skills.
Discussion: Learning or taking in new information is much like a sailing ship. A strong watertight keel and hull are necessary for a ship to remain buoyant and to float. If there are holes in the bottom or sides of the ship, it will take on excess water and perhaps sink. There is risk of the sailing occupants having to abandon the vessel as well as the loss of time, gear, and money.

Learning new skills is similar. There must be a solid watertight understanding before taking on new information and sailing your ship, which is equivalent to performing applied knowledge of tasks.

A firm foundation or base knowledge must exist prior to attempting to learn any job-specific tasks. The U.S. Department of Labor published a report, "Skills and Tasks for Jobs: A Secretary's Commission on Achieving Necessary Skills (SCANS) Report for America 2000," in which eight categories of Foundation Skills and SCANS Competencies are identified for the workforce to possess (Appendix A). In self-evaluation of the basic skills, anyone wishing to work within the veterinary environment must have skills at or above the eighth-grade level. These primary education skills include language arts such as grammar and reading, mathematical skills such as algebra and measurements, along with basic life and physical science knowledge. Important SCANS competencies include those listed under "Information" and "Technology." Foundation skills are used in everyday life and in multiple areas of the veterinary environment.

Tip Box 1.1: **In striving to become a lifelong learner, develop the firm habit of checking your own base or foundation for knowledge gaps to avoid the risk of sinking in a sea of information like a leaky sailboat!**

Procedure

Location used: Everywhere

PREPARATION

1. Obtain a notebook and tab a section for this chapter. Keep a pen or pencil ready for taking notes.
2. Using an Internet-connected computer or device, access the following websites:
   Language Arts Skills: http://www.internet4classrooms.com/skills_8th_lang_new.htm
   Mathematic Skills: http://www.internet4classrooms.com/skills_8th_math_new.htm
   Science Skills: http://www.internet4classrooms.com/skills_8th_science_new.htm.

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PROCEDURE

1. Scroll down and review several of the listed sites.
2. Access each and follow the directions.
3. Complete all activities.

FOLLOW-UP

1. Review any of the self-assessment activities you found difficult to understand or were unable to complete correctly. Access the following sites for strengthening knowledge:
   Language Arts Skill Builders: http://www.internet4classrooms.com/skills-8th-langbuilders.htm
   Mathematics Skill Builders: http://www.internet4classrooms.com/skills-8th-mathbuilders.htm
   Grade-Level Science Resources: http://www.internet4classrooms.com/science_elem.htm.
2. Repeat this process for all three of the eight-grade levels.

TASK 1.2
ANALYSIS OF VETERINARY MEDICAL TERMINOLOGY

Veterinary communication is based on the use of medical and scientific terminology, which new learners may view as a foreign language. Proper use of medical terminology comes under the SCANS competency for "Information" and "Foundation Skills."

Concept: The literal meaning of medical terms can be approximated by dissembling each word into its prefix (beginning), root (middle), and suffix (end).

Discussion: Approach word dissections like reading a personal greeting card with a bit of curiosity and a positive anticipation. There is the greeting card sender who is like the suffix of a medical term providing context to the body of the message. The card's opening salutation qualifies its meaning similar to the prefix. Most medical word roots are derived from Greek and Latin with exceptions such as the country in which the word originated. Recognizing and memorizing definitions of frequently occurring word roots is essential to deciphering a word's meaning.

Concept: The prefix and/or suffix are attached to the word root by a connecting vowel.

Discussion: Connecting vowels are customarily "o" or "i" and sometimes an "a." The connecting vowel is not used and is thereby eliminated when the root begins or ends in a vowel. An example is the veterinary directional term *dors-al*, meaning relating to the animal's back. The root word is "dorso" followed by the suffix *–al*; the "o" is dropped when the two parts are combined. Every year, new words appear in medical journals, textbooks, and manuals and are then updated in medical dictionaries. Be ever aware and seek out new terminology.

Concept: To begin, first analyze the suffix that occurs at the end of a root.

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Discussion: This is denoted with a dash (–) preceding it, as in *–ology*, meaning "study of." The suffix modifies the root or makes it a noun. For instance, *–itis* means "inflammation of," as in *arthritis*, meaning "inflammation of the joint."
Concept: Prefixes are small groups of letters that modify the meaning of the root, which in this example is cardi for "heart."
Discussion: Many prefixes can be grouped into similar meanings or ideas such as numbers, colors, size, position, and time. Next, analyze the prefix indicated by the dash (–) that follows it, such as *endo–*, meaning "inside," as in *endocarditis*, meaning "inflammation of the inside layer of the heart."
Concept: Lastly, word roots are often related to body systems, but note that they are not designated with a dash neither in front nor behind.
Discussion: Two or more roots can be joined to form a word. For example, the root word encephal means "brain" or "inside the skull," and myel means "spinal cord" or "marrow." *Encephalomyelitis* literally means an inflammation of the brain and the spinal cord. The two root words are joined by the connecting vowel "o" for ease of pronunciation. The suffix *–itis* begins with a vowel, so there is no other vowel necessary to connect it to the root.

While memorizing word parts is daunting, once they are grouped with those having similar meanings, the task becomes more manageable. In Appendix B, there is a list of frequently occurring word parts with their meanings divided in categories; Appendix C contains the directional vocabulary. The appendices are not meant to be comprehensive but serve as an abbreviated starting point.

There may be several word parts having the same or similar meanings. This requires careful reading and analysis by any person working in a medical environment as terminology skills are used throughout the workday. There are many subtleties in any language with medical terminology being no different. It is advised to master the basics for proper understanding and communication to members of veterinary medical health-care teams then to move on to the exceptions.

Procedure

Location used: Everywhere in a veterinary facility

PREPARATION

1. Have a medical dictionary at hand, preferably a veterinary comprehensive one or have ready access to a free medical dictionary on the Internet.
2. Have Appendix B, Appendix C, and the Glossary of this textbook marked and available.
3. Tab a section of your reference book as "Terminology." Set up a table with the following headings: Word/Prefix/Root/Suffix—Approximate Meaning—Confirm Meaning.

PROCEDURE

1. Learn a new word part each day. Write a chosen medical term in the table in your reference book.
2. Place each word part in the appropriate order under prefix, each root, and suffix.
3. Identify the meaning of each part using appropriate textbook appendices or medical dictionary to assist.

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Table 1.1
Exercise Example for Word Analyzing Medical Terminology

Medical Terms	Prefix	Root	Suffix	Literal or Approximate Meaning
Abdominal				
Antibiotic				
Antrum				
Cytology				
Dorsal				
Frontal				
Hemiparesis				
Nephrology				
Ventral				
Virucide				
Xanthoma				
Zygote				

Source: Modified from Pattengale, P. A. *Tasks for the Veterinary Assistant,* 2nd ed. Wiley-Blackwell Publishing.

4. Approximate the meaning of the whole word starting with the prefix, then root parts followed by the suffix in the order of their appearance, from left to right.
5. Combine the literal meaning of word parts together and record in a table.
6. Try the dozen terminology examples in Table 1.1. The answers are given at the end of Appendix B.

FOLLOW-UP

1. Locate the word in a medical dictionary (review pronunciation key) or in the Glossary of this book.
2. Compare the dictionary definition with the one approximated. Correct the meaning if your approximation is incorrect.
3. Analyze and reflect on any differences. Consider how you might modify your word dissections and literal meanings each day to improve language skills.
4. Repeat this process for any new and familiar medical terms to make this a learning habit.
5. Review terminology words for several minutes each day until firm in memory and understanding.

Tip Box 1.2: **Some learners find it useful to add journal reflections to their daily notebook exercise entries such as what went well or did not go well with a plan for improvement, which includes active review.**

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TASK 1.3
REVIEW OF BASIC MATH SKILLS

Math and problem solving are essential foundation and thinking skills. An ability to apply various basic mathematical concepts such as addition, subtraction, multiplication, and division to both whole and negative numbers in real-world problems is assumed by veterinary employers. Additionally, the SCANS foundational skill in arithmetic includes mathematical computations without the use of a calculator; reasonable estimations; and conveyance of results in a table, graph, or diagram. This important skill would be periodically used throughout the day in the veterinary environment for such activities as product sales; inventory management; preparation of stock solutions for cleaning, disinfecting, or patient bathing; analyzing patient objective exam data; medical recordkeeping; and preparation of medications for dosing or medication dispensing.

Concept: Basic math knowledge continues with decimals and fractions.

Discussion: Both of these notations represent less than a whole number. For decimals, any number to the left of it is a whole number, while the first number to right is in the tenth position, the second number is the hundredth, and the third number is the thousandth. For fractions, the top number is called the numerator and the bottom the denominator. Seek to reduce fractions to the lowest common multiple or the lowest common denominator.

Concept: Converting fractions to decimals makes math processes simpler to perform.

Discussion: To covert fractions to decimals, divide the numerator by the denominator. Example: $2 \div 5 = 0.40$. Note the leading zero to the left of the answer, helping to justify the decimal point position so that it is not mistakenly overlooked or forgotten; multiply the numerator by the same factor; eliminate the denominator then move the decimal point two spaces to the right. Example: Convert the fraction 2/5 (can be stated as 2 divided by 5) to a decimal (denominator: $5 \times 20 = 100$; numerator: $2 \times 20 = 40$). Eliminate the new denominator and the number is 0.40. Note the leading zero to the left of the answer, helping to justify the decimal point position so that it is not mistakenly overlooked or forgotten.

Concept: Percentages are used in many situations especially because they can be readily converted to a decimal answer when solving a math problem.

Discussion: A percent is a certain fraction with the denominator always being 100. In the previous example, the fraction of 40/100 can be stated as 40 per 100 or notated as 40% with the denominator eliminated and the percentage sign added.

Concept: An understanding of ratios is important for comparing portions between two quantities.

Discussion: Ratios are expressed as two numbers separated by a colon but can also be expressed as fractions, decimals, or percentages to make it easier to obtain their meaning. Concentrated solutions are often diluted with water based on certain portions to each. All of the following express the same ratio:

Ratio—2:5
Fractions—2/5, 20/50, 40/100
Percentage—40%
Decimal—0.40

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Procedure

Location used: Everywhere in a veterinary facility

PREPARATION

1. Review the following website:
   Mathematics Skill Builders: http://www.internet4classrooms.com/skills-8th-mathbuilders.htm

PROCEDURE

1. Create a reference book card entitled "Math Equations": fractions/ratios/decimals/percentages, unfamiliar mathematical terms with definitions, conversion formulas with proper math notations (symbols), and any rules for order of mathematical operations.
2. Review the math cards for several minutes each day until firm in memory and understanding.

FOLLOW-UP

1. Add equations to your card(s) as you come across unfamiliar equations. Use the website to figure out how to solve the equations.
2. Confirm your work with your supervisor or coworker.

TASK 1.4
SOLVING COMMON VETERINARY MEDICAL MATH PROBLEMS

Basic math skills are used to convert between the various systems of measurement used in medicine. The metric system is the most frequently used of these systems. Conversions from the English and the older apothecary (chemists or pharmacist) systems are also used. You would anticipate the need to perform such mathematical conversions when recording patient objective exam for medical records and preparing medications for dosing or medication dispensing.

Concept: To convert between the metric and English systems, add these four formulas and symbols for their units to your math equations:

Weight conversion: 1 kg = 2.2 lb
Length conversion: 1 in. = 2.54 cm
Temperature conversion: Fahrenheit (F) to centigrade (°C) or °C to F: (a) °C = (5/9) × (°F − 32) and (b) °F = (9/5) × (°C + 32)
Dose calculation formula: body weight (BW) × dose ÷ concentration = ___ (mL or mg)

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Table 1.2
Information Required to Fill a Prescription

What I Want To Know	Metric	English	Others (Such as Hands, Drops, Apothecary)	Possible Functions (Such as Addition, Subtraction, Multiplication, Division)
Answer in desired units. (Mark column of desired units.)				
What I Know				
About the patient				
About the dose				
About the drug				
Others as needed, such as time				
Add as many rows as needed				

Discussion: Review the terminology used in the metric, English, and apothecary systems for liquid, weight, and distance found in Appendix D. To convert from one system to the other requires multiplication and division. Weight is given in grams (g). Linear measurement is in meters (m). Volume is measured in centimeters cubed (cc) or milliliters (mL).
Concept: Medical problems often require several steps.
Discussion: Just as medical terms must be dissembled into their parts, so do medical math problems. Learn to analyze a problem by developing a simple chart or table with rows labeled "What I Want to Know" and "What I Know." Label each column according to the various measures in the problem going from left to right. The last column is used for possible mathematical rules such as multiplication, division, and addition. See Table 1.2 for an example.

Using Table 1.2, fill in the table using this example of a word problem:

1. A hospitalized patient weighs 60 lb; the medicine prescribed is marked in milligram per kilogram; the dose needed is 3 mg/kg; and the drug comes in a concentration of 10 mg/mL. What are you going to do to determine how much medicine in milliliters to give to the patient?
   Set up a solution table in the following manner:
   a) First, convert the patient's weight from the English system of pound to the metric system of kilogram, because the answer desired is in the metric system. Do this by using the 2.2 factor for converting pounds to kilograms. This is a division problem. 60 lb/2.2 lb = (X) kg. The answer is 27.28 kg. Round off to the nearest tenths of a whole number to simply. The patient weighs 27.3 kg. Enter the weight into the table.
   b) Now determine the milligram per kilogram dose. This information is usually found in the prescription. This patient is supposed to receive 3 mg/kg of body weight (BW). This becomes a multiplication problem: 3 mg $\times$ 27.3 kg. The total dose is 81.19 mg. Enter the dose into the table.

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Table 1.3
Weight and Drug Conversion Formulas

What I Want To Know	Metric	English	Others	Possible Functions
Answer in desired units. (Mark column of desired units.)	$X = 8.19$ or 8.2 mL (rounded up to the nearest tenths)			
What I Know				
About the patient	27.28-kg BW (body weight) or 27.3 kg	Weight = 60 lb		(Step 1) Division: 2.2 lb = 1 kg 60 lb ÷ 2.2 lb/kg = 27.28 kg round up to the nearest tenths = 27.3 kg
About the dose	3 mg/kg BW			(Step 2) Multiplication: BW × dose = ____mg 27.3 kg × 3 mg/kg = 81.9 mg
About the drug	10 mg/mL			(Step 3) Division: 81.9 mg ÷ 10 mg/mL (concentration) = 8.19 mL

c) The concentration of the medication in the vial is 10 mg/mL. Determine how many centimeters cubed are needed for this dose for the patient. This is a division problem: 81.9 mg/10 mg/mL = 8.19 mL. Enter the result into the table under "What I Want to Know." Again, round off the number to the nearest tenths of a whole number. This becomes your answer: 8.2 mL of the prescribed medication. Place the answer after the $X =$ in the chart. Check your work by comparing it with Table 1.3.

2. A patient on a diet program comes in weekly for a weight check. Medical records are kept in the metric system. The scale records in both metric and English systems. The patient is first weighed by the metric scale and is recorded as 19 kg. Now you press the English system button and the scale displays 41.8 lb. The owner requests to know the original weight in pounds. According to the patient's record, the original weight was 20 kg. What is the original weight in pounds? The owner also wants to know how much weight, in pounds, her pet has lost since starting the diet. Set up a new solution table.
   a) The formula is 20 kg × 2.2 lb (the equivalent weight of 1 kg) = weight in pounds. The patient originally weighed 44 lb. Enter the weight into the table.
   b) The patient's weight loss is a subtraction equation of previous weight minus current weight, so 20 kg − 19 kg = 1 kg. Convert the metric system to the English system of pounds: $(X) = 1 \times 2.2$ lb. Enter the weight into the table. The patient has therefore lost 2.2 lb. This is nothing more than using the conversion factor 2.2 from the known conversion formula.
   c) Compare your table with Table 1.4.

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Table 1.4
Conversion from Pounds to Kilograms

What I Want To Know	Metric	English	Others	Possible Functions
Answer in desired units. (Mark column of desired units.)		$X = 2.2\,lb$		(Step 3) Subtraction: $44.0\,lb - 41.8\,lb = 2.2\,lb$ or combination of subtraction and multiplication: $20\,kg - 19\,kg \times 2.2\,kg/lb = 2.2\,lb$
What I Know				
About the patient, originally	20 kg (BW)	44.00 lb rounded off to the nearest tenths = 44.0 lb		(Step 2) Multiplication: $20\,kg \times 2.2\,lb/kg = 44.00\,lb$
About the patient, currently	19 kg (BW)	41.80 lb rounded off to the nearest tenths = 41.8 lb		(Step 1) Multiplication: $19\,kg \times 2.2\,lb/kg = 41.80\,lb$

Table 1.5
Conversion from Inches to Centimeters

What I Want To Know	Metric	English	Others—Hands (1 hand = 4 in.)	Possible Functions
Answer in desired units	$X = 152.4\,cm$ or 15.2 m (rounded off to the nearest tenths)			(Step 3) Conversion factor: $1\,m = 100\,cm$ Division: $152.4\,cm \div 100\,cm = 15.24\,m$
What I Know				
About the patient's total height		60 in.	15 hands	(Step 1) Multiplication: $15\,hands \times 4\,in./hand = 60\,in.$
Conversion formula: $1\,in. = 2.54\,cm$				(Step 2) Multiplication: $60\,in. \times 2.54\,cm/in. = 152.40\,cm$

3. A horse stands at a height of 15 hands. One hand equals 4 in. How tall is the horse in centimeters? (See Table 1.5.)
   Fill in your solution table with the following examples:
   a) First, determine the height in inches: $(X) = 15 \times 4\,in.$, so height = 60 in.
   b) Then calculate the height in centimeters: $60\,in. \times 2.54\,cm$ = height, which is 152.4 cm. Enter the result into the table and convert the final answer also to

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meters to simplify. One hundred centimeters is equal to 1 m. This horse would be 1.52 m.

4. Practice this word problem on your own. The instruction label on a concentrated disinfectant says to dilute product 1:30 parts with tap water. You need to fill four spray bottles with 250 mL of the diluted disinfectant. How much concentrate and how much water do you need to mix the desired dilution in the desired total quantity? Create your solution table and calculate your answers stepwise. (If you need help, the answer is at the end of Appendix D.)

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Have a pencil with an eraser and a calculator at hand.
2. Add the formulas in the preceding section to the math equation card in your reference book.
3. Select a math problem from your daily work.
4. Draw a solution table with rows that correspond to what you want to know and what you already know. Fill in cell labels.
5. Draw columns, one each for the systems represented in the problem and one for possible solutions with desired units. Fill in cell labels.

PROCEDURE

1. Fill in the rows with the values and the measures in the systems they represent.
2. Convert all measures into the system required by the answer. See "Answer" cell marked with an "$X =$" representing the unknown final answer.
3. Solve the problem in a stepwise fashion.

FOLLOW-UP

1. Always check your work by repeating each calculation by hand.
2. Recheck your manual calculations with a calculator and compare.
3. Be aware of decimal point locations and units of measure. Does the answer make sense?
4. If the answer does not make sense, recheck the info placed in all rows and columns of the solution table for accuracy.
5. Show your work to your supervisor or coworker to check that you are doing the math calculations correctly.

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TASK 1.5 COMPUTERS AND INFORMATION LITERACY

Concept: Expect to use computers for some tasks.
Discussion: Review the SCANS Competencies in Appendix A. Note under "Information" that an employer expects from every employee an ability to use "computers to process information." The current assumption is that every employee has keyboarding skills and basic computer literacy. The necessary proficiency level varies from site to site and from task to task.

Some practices have achieved a nearly paperless status with most departments computerized and integrated into a single interactive database. These departments include the laboratory, radiology and patient imaging, medical records, prescriptions, client billing, and hospital management software. Some practices are partially computerized with only some functions automated such as vaccination certificates, invoicing, and client reminder labels. Computing and information retrieval skills occur throughout the day and usually most frequently when veterinary products and/or services are being recorded for medical, business, and legal purposes.

Concept: Software comes in individual modules that reflect the various hospital activities.
Discussion: A specific module can be found on a computer terminal in the area of the facility in which it is used. For example, the pharmacy module is accessed in the pharmacy, where prescriptions are filled. When filling the prescription, the assistant can enter data necessary to generate the prescription label, including date, drug, quantity, and patient name.

Concept: All modules are linked to each other as part of a primary interactive database providing information to other modules located throughout the hospital.
Discussion: Information about the prescription goes into a central database that can then generate information for the individual patient record, hospital inventory, client invoice, and so on.

Concept: The person entering any information is responsible for accurately adding the information to the database regardless of the module into which the information is first entered.
Discussion: The technician and veterinarian can see the date the prescription has been filled; the receptionist can determine how much to bill the client for the prescription; and the hospital manager can determine how much of a specific drug is still in inventory. However, the information they access is only as useful as the accuracy of the initial data typed into the computer terminal, computer station, or digital display panel present in the veterinary environment. Consider how a misspelled client's name could lead to a lost computer billing record if the file cannot be retrieved. In this same example, poor client communications and marketing results will occur due to inaccurate mailing label for reminders and practice newsletters. The "GIGO effect" is an old computer science acronym meaning "garbage in, garbage out." Strive not to contribute to the GIGO effect.

Tip Box 1.3: **The GIGO effect can be viewed as universally self-evident not only in computing skills but also in the integrity of all personal work.**

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Procedure

Location used: Everywhere in a veterinary facility

PREPARATION

1. Prepare a task card entitled "Computer Literacy."
2. Using an Internet-connected computer with a full keyboard, type "free online typing test" into the search engine box.
3. Select two to three websites from search results and follow the directions for the typing test.
4. Record the results for each test on your task card. Compare and average the results of self-assessments to determine a skill baseline.
5. Obtain and maintain basic keyboarding skills. A typing rate goal of 30–45 correctly typed words per minute is highly recommended.
6. Know basic computer terminology and correctly identify equipment. Use the Internet to locate an online computer dictionary such as http://www.merriam-webster.com/
7. Computer literacy skills include distinction between hardware and software. Use the Internet search box and locate "free online computer literacy test."
8. Select one to two websites from search results and follow the directions for the test.
9. Record results in your task card as baseline self-assessment.
10. Know basic computer mechanics. Be able to connect a CPU to a monitor and change the ink or laser cartridge in a printer.
11. Know how to use a basic word processing program.

PROCEDURE

1. Create a task card entitled "Management Software—Checklist of Things to Learn":
   a) Which of your job responsibilities are computer based?
   b) Which modules within the software program are you expected to use?
   c) How to access these computer modules
   d) How to use the printer and/or scanner
   e) How computer training is provided in the facility
   f) Pay close attention and record your own notes during training sessions.
   g) Create a reference book card entitled "Computer Shortcuts to Help You Remember."
2. Develop general computing speed and accuracy.
3. Practice computing and typing skills daily; track progress.
4. Utilize the Internet to research veterinary resource information and tutorials.

FOLLOW-UP

1. Always double-check data entry for accuracy including numbers, letters, capitalization, spelling, and spacing.
2. Utilize word processing grammar and spell-check programs, if available.
3. Develop mastery of the software to speed utilization.
4. Check the credibility of Internet sites—author, association, references, and if current (look for the date at the bottom of each webpage or website homepage to determine when it was last updated).

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TASK 1.6 DEVELOPING TECHNOCOMPETENCY

Technocompetency or technology competency is no more than two root words combined that refer to a certain essential workforce skill. The veterinary employer expects an employee to select the correct equipment (technology) for a specific situation, to use (apply) the equipment correctly for the task at hand, and to properly maintain and troubleshoot the equipment used for each task (competency). The use of technology is one of the five SCANS competencies.

Concept: A range of equipment that is used in special circumstances is found throughout the veterinary facility.

Discussion: For example, a patient's vital signs are monitored throughout anesthesia using equipment that can graph or provide readings of basic vital signs such as heart rate (HR), respiratory rate (RR), electrical impulses within the heart (ECG or *electrocardiogram*), strength of blood flow through the blood vessels (BP or blood pressure), and readings of core body temperature (*T*, temp., or temperature). These functions can be measured by a single piece of equipment called a multiparameter patient monitoring unit or found in several separate units that only monitor one parameter each.

Concept: An ability to choose and locate the right equipment for the right circumstance is critical to patient health and even survival.

Discussion: Once the equipment is chosen, the equipment must be properly used. Using patient anesthesia as an example, the anesthetic machine must be correctly connected while the amount of gases delivered to the patient must be accurately calibrated. If the anesthetic machine is not working properly, the patient will not be anesthetized safely (correctly).

Concept: Equipment should be kept close where it is most frequently used for efficiency.

Discussion: Learn the correct name, location, and purpose for each piece of equipment in the facility including the office and kennel areas. Both medical and nonmedical equipment are routinely used throughout the day in the veterinary environment.

Concept: After locating each piece of equipment in the hospital, find its accompanying user's or operations manual.

Discussion: This manual may come in the form of a booklet, spiral-bound manual or a three-ring binder found near or with the equipment. It contains instruction for use, maintenance, troubleshooting, and contact procedures for repairs. If there is no manual near the equipment, it might be found in a centrally located file cabinet or bookshelf that contains the operation's manuals for all the equipment in the facility. If the manual is away from the instrument, prepare task cards for each piece of equipment containing essential user and maintenance information. Always refer to the full manual for additional details.

Know what is contained within any user's or operations manual and how it is organized. Start off with the "Table of Contents" at the front of the manual followed by the alphabetical "Index" located at the back. These aids will tell you where to locate information more quickly. Next, study the diagram of the equipment to name and locate its parts. Read the "How to Use" section to learn when and how to correctly use the equipment.

Concept: Follow maintenance procedures along with any suggested time schedule for performing them.

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Discussion: Depending on the device, a piece of equipment might need cleaning after each use, calibration and/or warm-up cycle, and periodic factory service.
Concept: Always make certain every piece of equipment is working correctly before using it.
Discussion: The equipment may have visual indicators such as small control panel lights that change colors to alert the user of the equipment's status. Such indicator lights inform the user that the equipment is turned on (amber or flashing green light), ready for use (steady green light), or if any error or problem has occurred (red light). Equipment with digital control panels may inform the user with error codes or symbols. Use the troubleshooting section of the manual to determine what the lights, codes, or symbols mean.

Tip Box 1.4: **Incorrect use or any improperly working equipment part may put a patient's life in jeopardy.**

Every piece of veterinary medical equipment must be maintained, at a minimum, according to the manufacturer's recommendations. Improperly working medical equipment must be recognized and immediately corrected or a patient's well-being may be jeopardized. Something as simple as calibrating a *refractometer* to scale zero before determining a patient's urine specific gravity is essential. If this quality control step is not done, the measurement will be read inaccurately. This seemingly small error leads to a larger incorrect conclusion. This, in turn, leads to a much bigger problem with an inappropriate diagnosis, treatment plan, and prognosis. Veterinary medicine is not an "Oops!" profession where you can change errors easily. Inaccuracies and incorrect actions have a domino effect that can lead to serious patient harm including death.

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Prepare a reference book care entitled "Equipment" and, as already mentioned, task cards for each piece of equipment you are responsible to maintain.
2. Determine what tasks need to be accomplished.
3. Determine which piece of equipment is used in the clinic.
4. Confirm with your supervisor the equipment chosen for each task.
5. Locate the appropriate equipment for task; mark the storage location.
6. Locate the current user's or operations manual for equipment.

PROCEDURE

1. Mark procedure for which each piece of equipment is required.
2. Ensure the chosen equipment is working properly.
3. With the aid of the operations manual, follow the directions for use.

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FOLLOW-UP

1. Clean the equipment per manufacturer's directions and the surrounding area if dirty.
2. Properly power-down the piece of equipment or be sure it is placed on standby.
3. Return the equipment to the designated location and apply dustcovers when applicable.
4. If chemicals, test reagents, or other consumables are used with the equipment, check use-by or outdate to determine if the product is still safe to use; make certain to refill and check the inventory supply for future use. If supplies are low, promptly inform the facility inventory manager.
5. Are there maintenance procedures? Make a task card for each if there are. Include the frequency and summary of procedure and place these in the "Daily/Weekly/Monthly/Yearly" section of your task box.

RESOURCES

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

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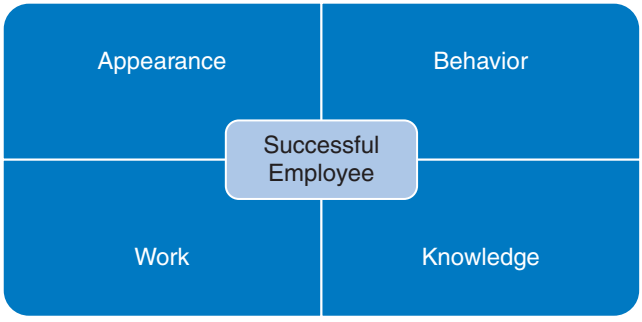
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CHAPTER

2

PROFESSIONAL CONDUCT

ORETA M. SAMPLES



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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Companion website: www.wiley.com/go/pattengale/tasks

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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Behave in a manner compatible with the standards of a successful veterinary practice.
2. Use good manners with all persons encountered in the veterinary environment (i.e., clients, coworkers, industry representatives).
3. Apply knowledge of the human–animal bond to improve patient care.
4. Differentiate the tasks of the various veterinary team members.
5. Govern actions based on the principles of veterinary ethics.
6. Coordinate the role/tasks of a veterinary assistant within the veterinary team.
7. Dress in a manner appropriate for work as a veterinary assistant.
8. Speak in a professional manner.
9. Anticipate work flow to facilitate and assist other team members in meeting their responsibilities.
10. Complete work and do so in a flexible manner so as to be readily available for other tasks.
11. Develop routines for efficiently completing assigned tasks.
12. Use "Moments of Time" to complete all assigned and unassigned tasks.

INTRODUCTION

Concept: Although skills are job specific, today's workplace has basic expectations for all employees.
Discussion: Employers in all professions demand behaviors that reflect knowledge and attitudes (see Appendix A). Veterinary medicine is no exception. This chapter introduces the veterinary assistant to the additional professional contact and behaviors specific for success within a veterinary practice.
Concept: A veterinary practice consists of many staff members. It takes the specialized skills of each to provide the sophisticated and complex care that pet owners expect for their pets.
Discussion: The veterinary assistant is just one member of the veterinary team. Synchronization of the duties with those of other members of this specialized team requires an awareness of the responsibilities of each. Understanding how the assistant fits into the complex pattern is crucial to successful coordination of patient care and implementation. By completing tasks in a timely manner, it frees the assistant to aid in other areas.

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TASK 2.1
MEETING EMPLOYER EXPECTATIONS

Concept: All employers have basic expectations for every employee.
Discussion: Expectations include the following:

1. punctuality, without excuses
2. presence, every day for the times scheduled to work
3. willingness to take, then act upon constructive criticism without anger or defense
4. willingness to learn now and for a lifetime
5. flexibility
6. ability to work with others
7. loyalty
8. problem-solving skills
9. ability to follow directions
10. ability to work independently
11. adherence to the policies and procedures of the workplace
12. focus on customer satisfaction and product quality
13. honesty
14. commitment to client–patient confidentiality.

Concept: Job-specific responsibilities must be carried out in full.
Discussion: Veterinary medicine includes additional, ever-changing expectations. Since the very survival of a patient depends on all team members fulfilling their responsibilities, veterinary employers include the following expectations:

1. emphasizing patient comfort, safety, and care
2. minimizing the potential for disease transmission; this translates into a fetish for cleanliness
3. differentiating between sterilizing and disinfecting and understanding when to apply the correct method of cleaning to a situation
4. maintaining premise security to prevent patient escapes
5. maintaining correct patient identification at all times
6. being accurate and thorough in the completion of animal care as errors compromise patient health
7. completion of charts, records, and treatment board entries in a timely and correct manner
8. completing tasks on time as assigned (i.e., giving medications at the time prescribed)
9. not leaving until all tasks are completed; even though it is your scheduled time to leave, a patient cannot wait until tomorrow to be fed or to receive the prescribed treatment
10. immediately notifying the veterinarian or technician of any unexpected or negative changes in a patient's condition
11. maintaining a patient record, making prompt and complete entries in ink; these are legal documents
12. maintaining patient and client confidentiality both within and outside of the clinic environment
13. reporting any errors in patient treatment immediately; if a patient is given the wrong medication or the wrong dose, the veterinarian must be told without delay

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14. focusing on customer service; in veterinary medicine, the customer is defined as everyone encountered in the workplace including the patient, the client, and all veterinary staff members.

Concept: As a new employee, review your job description with the practice manager.
Discussion: Have the administrator review any additional employee expectations. Know that these are *minimal* expectations. To succeed in the workplace, these expectations must be exceeded at all times. A positive, cheerful attitude sets the tone for your workday. Leave problems at home. When you are at work, work; do not socialize nor gossip. Do not complain about the type or amount of work. Without the need, you would not have a job or a paycheck. If you have issues with another employee, discuss them with the employee involved, not with other staff members. Do so as soon as a discussion can be discreetly held. Do not let problems linger; if they cannot be resolved, seek out the aid of your supervisor, not your coworkers. Professionalism is an attitude and a behavior; maintain it at all times. Professionalism is not something you shed as you leave the workplace; be cognizant of your behavior and how others perceive you outside the workplace.

Tip Box 2.1: **Professionalism is a way of life; practice it continuously.**

Procedure

Location: Everywhere in the working environment

PREPARATION

1. Review the list of expectations of a veterinary employee.

PROCEDURE

1. Meet the expectations of the employer in full.

FOLLOW-UP

1. Assess yourself as to how well you have met each of these expectations.
2. Improve on any and all weaknesses.
3. Once all expectations are met, continue to improve.

TASK 2.2
USING COMMON COURTESIES

Concept: Good manners and common courtesies are expected in the workplace at all times and in every interaction with clients, team members, and other visitors to the clinic.
Discussion: Good manners are nothing more than making social interactions comfortable for everyone involved, which puts those with whom you interact at ease. They are like the rules for driving. If everyone follows them, traffic will move smoothly and drivers are happier.

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Concept: Consider your physical actions.
Discussion: Do you offer assistance to others? Think how grateful a young mother would be if you held open the door for her as she entered the reception area with a stroller in one hand and a reluctant dog in the other. Offer assistance to the client with a just discharged pet, whose hands are now filled with a bag of prescriptions and sheets of discharge orders. Having someone on hand to carry out large items such as bags of dog food or cases of canned prescription diets is a way to be proactive for the client. The client who must wait because of an emergency will appreciate knowing why there is a wait and how long they might be waiting as well as being offered the opportunity to reschedule the appointment. Put yourself in the client's shoes. What would make you feel better about a visit to the practice? What could someone do to make the experience easier and more pleasant for you?
Concept: Assess each situation from the client's perspective.
Discussion: Do whatever is necessary to make each visit a positive experience for both the client and the patient. Take time to actually sit down in the reception area. What does it look like from that perspective? Is it clean and tidy? Does it smell good? Is there something to read or look at while waiting?
Concept: The attitude and behavior should be expanded beyond the client and patient to others on the veterinary team.
Discussion: Think how you can make your team members' job easier and more pleasant. Getting your work done on time accurately allows others to meet their timelines with less delay or repetition of their tasks. It also allows you the opportunity to participate in functions within other areas of the clinical setting, hence more valuable training.
Concept: Not all manners are physical behaviors.
Discussion: "Please" and "Thank you" go a long way toward putting others at ease as does a pleasant demeanor. A cheerful greeting can set the tone for any interaction. Let others know that you appreciate their efforts. An appropriate compliment brightens anyone's day.
Concept: Patience, not abruptness, prevents miscommunications.
Discussion: A willingness to consider another's perspective can avert anger. Learn to listen. Then reflect what you understand the other person saying, for example, "So what I'm hearing is. . . ."
Concept: Body language makes a powerful statement.
Discussion: Be cognizant of what your body language is saying. Crossed arms, weight shifted to one hip and a raised eyebrow gives the appearance of defensiveness. Avoid postures that imply anger or aggravation. Stand with your weight evenly distributed on both feet, avoid tightly crossed arms, and always meet a client with a smile and a professional yet relaxed attitude.

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Start with a self-evaluation—how good are your manners?
2. Determine how to facilitate the work of others by your own actions.
3. Determine how to make clients and patients feel welcomed and comfortable.
4. Evaluate your posture—does it convey professionalism and a cheerful attitude?

PROCEDURE

1. Practice improving your manners. Remember to use "Please" and "Thank you."
2. Fulfill your tasks in such a way as to facilitate the work of others.

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3. Make every encounter with a client and patient a positive experience for them.
4. Practice smiling with your face, voice, and actions.
5. Practice speaking in a calm, normal tone of voice in all situations both to people as well as their pets.
6. Practice active listening. This conveys interest.
7. Practice standing and adjustment of posture in front of a mirror, imagining a variety of client interactions. Take note of how to best convey a professional attitude in every situation.

FOLLOW-UP

1. When did you fail to use good manners? Why?
2. Under stress, were you still able to calmly use good manners?
3. Were you a good listener?
4. Keep working to improve your interactions with everyone.
5. Has improved body posture improved client relations?

TASK 2.3
USES AND MISUSES OF SOCIAL MEDIA

Concept: Social media is never appropriate in the context of discussing work.
Discussion: The use of social media has become as routine as talking on the telephone for many people. Unfortunately, there is a total lack of privacy to this method of communication.
Concept: "Tweeting" and Facebook status updates, once posted, can never be removed and become part of the public domain.
Discussion: Tweeting and other forms of social media interactions are never appropriate forums for discussing employee relations, patient and client data, or workplace difficulties. One should never "vent" about their job, coworkers, or employer within a social media outlet as this information has a way of traveling to places it may not have been meant to go. Stories about clients and patients, even without identification, should never be posted or discussed. This is a violation of privacy.
Concept: Social media may be utilized as part of the interview process.
Discussion: Potential employers may utilize social media to "assess your potential" to fit in within their practice environment. Pictures and stories of your wild night at the bar doing shots until midnight does not paint a professional picture. Review your social media page and assess from a professional standpoint. Would you hire this person?
Concept: Computers and the Internet at work are for work-related use only.
Discussion: The modern practice will have multiple workstations with computers and Internet capabilities throughout the facility. It is inappropriate to use these computers for anything other than work, even if you are on a break.
Concept: Cell phones should not be used during work hours.
Discussion: Cell phones are a distraction and should be turned off and left in your locker during working hours. During breaks and at lunch are the appropriate times to check for messages. Be aware of how loud you are speaking on the cell phone if doing so in a break room. Voices carry and no one else needs or wants to hear your conversations!

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Tip Box 2.2: **Social media must be avoided at the workplace in the context of possible breaching of client confidentiality.**

Procedure

Location used: Whenever using social media

PREPARATION

1. Do you participate in social media? What is on it?
2. Never tweet or text during working hours.
3. Save updating your social media when not at work.

PROCEDURE

1. Examine your Facebook page with the eye of a prospective employer. What type of person do you appear to be based on pictures and language used?
2. If your Facebook page is less than complementary, consider closing it down and starting over in a more professional aspect.
3. Make a conscious decision not to tweet at work, not even on a lunch hour and definitely not about your work.
4. If you are adept at social media, consider offering to create a Facebook page or website for the clinic where you work. This is not something to be undertaken without prior approval from the veterinarian.

FOLLOW-UP

1. What did you discover about yourself when analyzing your Facebook page from the perspective of an employer?
2. Is your image a positive one when projected in social media?
3. Continue seeking to identify ways to improve your professional image as a veterinary assistant.

TASK 2.4 APPLYING THE HUMAN–ANIMAL BOND

Concept: The human–animal bond is the relationship between a person and an animal.
Discussion: The bond is based on emotional attachment, which leads to physical changes in the limbic system of the brain. The intensity of the bond varies from time to time within a person. The bond varies in nature between individuals and between an individual and a specific animal. It is real.

Relationships between animals and people have evolved from predominantly the utilitarian model in an agrarian environment to a companionship model in an urban environment.

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In either instance, the bonds between people and animals are complex. Each human–animal relationship is unique and may change over time and circumstance.
Concept: Veterinary medicine can improve the human–animal bond.
Discussion: The assistant's attitudes and actions can either encourage or discourage positive client behaviors toward their pets. For that reason, the bond should be understood, respected, and encouraged in positive ways.
Concept: Each pet has a role in the owner's life.
Discussion: Pets provide companionship. For a young child, a pet can be a playmate. For an elderly person, it can be an excuse for a walk and shopping as well as companionship. For a childless couple or a single adult, the pet might represent an additional family member. A pet provides unconditional love, which improves a person's outlook. A pet is calming and relieves stress, which benefits health and general feelings of well-being.
Concept: In all dealings with clients and their pets, the complexity of the bond must be considered and respected.
Discussion: The human–animal bond will influence owners' reactions to their pets' illnesses, injuries, and even death. While financial ability to pay for veterinary care is a factor in a client's choice for service, it is often secondary to the human–animal bond.
Concept: Listen to clients as they speak about their pets.
Discussion: As a way of gauging the human–animal bond between a client and patient, answer the following about a specific case:

1. When was the pet acquired?
2. How was the pet acquired?
3. Why was the pet acquired?
4. Who are the other members of the household?
5. What role does the pet play in that household?
6. What does the client say about the pet?
7. What activities in the household include the pet?
8. Who makes the decisions regarding the pet?
9. Who actually provides for the pet's physical care?
10. Where does the pet sleep?

Concept: Observe a client's interactions with the pet.
Discussion: "Actions speak louder than words" applies as much to clients and their pets as to interactions between people. Think of the case previously examined and consider the following questions:

1. Does the owner talk to the pet?
2. How does the owner speak to the animal (tone of voice)?
3. How does the owner touch the pet?
4. Is the owner attentive to the pet's reactions or indifferent to its behavior?
5. Is the pet trained?
6. Is it safely restrained?
7. How well is it fed and groomed?
8. Does the pet appear "happy" when interacting with the owner?

Concept: Try to determine if owner behaviors are due to a lack of knowledge of pet care or an aberration in the human–animal bond.
Discussion: By applying knowledge of the human–animal bond, you can more effectively interact with clients, influencing their choices for improved pet care and compassionately support clients during times of crisis and loss.

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Procedure

Location used: Whenever in the presence of a client and a patient

PREPARATION

1. Observe the owner's interaction with the pet.
2. Observe how the pet interacts with owner.
3. Analyze the interactions. Identify the positive and negative interactions as they occur and note the reason.
4. What is the relationship between the client and the patient? (companion, family member, working, another duty, etc.)
5. How can you in your position improve their relationship?

PROCEDURE

1. Given the opportunity, compliment the owner on positive actions. Positive reinforcement is a great way to teach others. Think of it as "catch 'em being good" moments.
2. Model positive interactions with the patient. Modeling as a teaching method has greater effects than all the listings of "what to do's."

FOLLOW-UP

1. Were you able to determine the relationship between the client and the patient?
2. Did you model a good relationship in your interactions with the patient?
3. If given the opportunity to teach an owner better ways to care for the patient, did you do so in a positive manner? If not, what could you have done differently?

TASK 2.5
PROFESSIONAL APPEARANCE

Concept: "First impressions are lasting impressions."
Discussion: This saying is as important in veterinary medicine as in any other business. Clients have no way of knowing the skill of the veterinarian in surgery; they are not present. They do judge the quality of patient care not only on how well their animal recovers but judgments are based also on the appearance of the facility and staff as well. It may seem hard to believe, but it is true.
Concept: Personal grooming includes commonsense rules with special adaptations for the work and environment involved.
Discussion: The assistant must consider the following:

1. patient safety
2. personal safety
3. potential for disease transmission
4. highly physical nature of veterinary medicine
5. practice's image and client appeal.

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Clothing: All clothing must be washable in hot water and cleaned daily to reduce the risk of disease transmission. It should be a durable, smooth fabric in a simple style. Check with your practice manager for any requirements and appropriateness. This often includes wearing scrub top and pants. Sleeves should be from one-half to three-quarters in arm's length to provide protection to the arms but should not be in contact with dirty work surfaces. The neckline must be modest when bending. Pants should allow for easy bending and free movement. Pant also must stay in place when bending over and walking. Dark colors or prints are preferred. An extra set of scrubs should be kept at work; clothes often become soiled during the day and need to be changed. Scrubs are designed with pockets for a purpose. Usually, there are two or three pockets on the scrub top and two or more on the pants. Use them!
What to Carry in Pockets: All staff members should carry the following:

- nylon leash
- approximately 30- to 40-in. length of 1- or 2-in. gauze for a muzzle
- bandage scissors, roll of 1-in. adhesive tape
- functional pen and reference book
- stethoscope draped over the neck, marked to denote ownership
- clean tissue and breath mints are highly recommended, especially for smokers and coffee drinkers
- digital thermometer
- hemostat.

Shoes: The shoes must have enclosed toes and nonskid soles, and must be kept clean. Avoid white shoes as they tend to show dirt more readily than dark ones. Athletic shoes with a well-cushioned sole enable you to be on your feet on hard surfaces for long periods of time. In large animal practices, rubber boots that fit over steel-toed boots or shoes are used and must be scrubbed to prevent transmission of disease from one farm to the next.
Jewelry/Tattoos: All jewelry should be left at home. Do wear an inexpensive wristwatch with a second hand and a band that can be pushed up on your arm to avoid water. Loop earrings, rings, and necklaces are not appropriate as they may be snagged by a struggling animal. The practice may have a policy on facial jewelry and tattoos; check with the practice manager before getting any of these things done. It is usually required that tattoos be covered by clothing during work hours and facial jewelry and tongue rings removed or discreetly worn. These recommendations are for personal safety as well as esthetics.
Hair: Hair should be clean and worn in a simple style suitable for your work. If your hair is long, it should be pulled back at all times, not falling over the face or obscuring vision.
Fingernails and Hands: Unpainted fingernails should not extend beyond the tips of fingers as long nails harbor dirt and infectious materials. Nails may be polished and buffed with buffing cream for a high sheen, therefore avoiding chipped paint that looks unkempt. Use hand cream to prevent chapping of hands and the development of hangnails. Nail biting and cuticle picking is discouraged due to possibility of disease transmission and infection.
Face and Mouth: Do not chew gum. Teeth are brushed or mouthwash is used after a meal, drinking coffee, or smoking. If you are in doubt of your breath, carry and use breath mints regularly. Makeup should be sparingly applied. Men should shave daily; beards and mustaches are to be neatly trimmed.
Body: Bathe and shampoo daily. Avoid heavy perfumes or aftershave lotions as some clients may be allergic to these scents. Use deodorants with light fragrances; powder may aid in decreasing perspiration. Wear clean clothes daily and keep a change of clothes at work for emergencies. Remember that you are one of the first visual representatives of the clinic; aim for a positive impact.
Coworkers: Kindly tell coworkers if something is amiss in their personal appearance or smell. A chunk of spinach lodge on a front tooth, an unzipped zipper, and anal gland or

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feces smell are not only embarrassing but can leave an unfavorable lasting impression with clients!

Smokers: If you are allowed a smoking break, make sure to remove your lab coat or scrub top before lighting up. Smoke infiltrates cloth fibers and is carried around with you long after putting out the cigarette. The smell of smoke is offensive or even allergenic to some people.

Procedure

Location used: Appearance is developed at home prior to entry into the veterinary environment. It is maintained throughout the day while at work.

PREPARATION

1. Plan your personal schedule to allow adequate time for personal grooming.
2. Shower or bathe using products that are unscented or lightly scented.

PROCEDURE

1. After you are clean and dry, dress accordingly to hospital standards.
2. Comb your hair simply and, if it is long, pull it back securely.
3. Leave jewelry at home.
4. Fill your pockets with required items.
5. Put your stethoscope around your neck.
6. Arrive at work early enough to check in before actually beginning work.
7. Remember the smile on your face and in your heart speaks volumes.

FOLLOW-UP

1. Review your appearance at the end of the day.
2. Plan for additional or appropriate changes the following day such as filing your nails and polishing/cleaning your shoes. Laying out clothes the night before reduces a stressful beginning to your day.

TASK 2.6
USING APPROPRIATE LANGUAGE

Concept: Not only are people judged by their appearance but they also are judged by how they speak.

Discussion: Clients make assumptions about the education and quality of work by the veterinary staff based on their use of language. Although you do not need to speak like a Harvard graduate, your language and grammatical context should be professional, enhancing the practice image. Swearing, vulgarities, and use of slang are not appropriate in any situation.

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Concept: Listen carefully to the veterinarian's manner of speaking as you expand your vocabulary. Imitation is truly the sincerest form of flattery.
Discussion: Veterinary medical terminology and correct sentence structure serves as the practice standard. Learn through example.

Procedure

Location used: Throughout the veterinary environment

PREPARATION

1. Listen to yourself speak. What words do you use?
2. Review the Task 1.2, "Analysis of Veterinary Medical Terminology," in Chapter 1.
3. Pay attention to medical vocabulary as utilized by the veterinarian and technicians during discussions with clients to learn appropriate use (see Table 2.1).

Table 2.1
Appropriate and Inappropriate Language

Appropriate	Inappropriate
Client	Customer
Patient	Animal
Reception room	Waiting room
Examination	To look at
Surgical procedure	To cut
Radiograph	To X-ray or the X-ray
Injection or vaccination	Shot
Anus	Butt, butt hole, ass
Penis	Dick, weenie
Urination, micturition	To piss or pee
Urine	Pee, piss
Defecate, defecation	To poop or crap, dump
Feces	Poop, crap
Nipple	Tit, boob
Pinna	Ear flap
Front leg, hind leg	Arm, leg
Spay	Spade, spaded
Neutered	Castrate, castrated
With another patient	Busy

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FOLLOW-UP

1. Stop to think about the way you communicate with all members of the veterinary team. Was it professional and courteous?
2. How did you communicate with clients and patients? Baby talk is okay with most pets, but never use this with clients. Be mindful of what clients perceive as respectful. Different age groups may regard professional respectfulness in a variety of ways. What is acceptable to a 30-year-old may be considered "being smart" to someone older.

TASK 2.7
THE ROLE OF THE VETERINARY ASSISTANT

Concept: The veterinary assistant is part of a team.
Discussion: The veterinary team is like a jigsaw puzzle. Each part is needed to complete the picture. The veterinary assistant is one piece of the complex puzzle that completes patient care. Be sure to understand your role and strive to exceed all expectations.
Concept: The practice of veterinary medicine consists of two divisions: medicine and business.
Discussion: The tasks of the veterinary assistant are oftentimes intermingled between the two categories.
Concept: The veterinarian is held legally responsible for the safety of all employees and all actions of each employee within the practice. Your actions ultimately are his responsibilities.
Discussion: The final word on any matter is that of the veterinarian. The veterinarian's responsibilities include the diagnosis of disease and the planning and management of patient care. Some of these duties include performing surgery, prescribing medications, interpreting laboratory results, radiographs and other tests, as well as predicting outcomes—known as the prognosis.
Concept: The day-to-day business aspects of a practice are often delegated to a business/practice manager.
Discussion: Outside resources such as attorneys and tax specialists are consulted for specialized services to the practice. The business manager is responsible for overseeing the day-to-day business activities within the practice, freeing the veterinarian to address the medical needs of patients. The business manager is the person responsible for scheduling employees, overseeing inventory, paying bills, handling bank deposits, and supervising employees. This is usually the first person contacted by a potential member of the staff when seeking employment. Ultimately, however, the veterinarian has the final authority over all business practices.
Concept: The receptionist is the person responsible for patient records, answering the telephone, scheduling appointments, patient intake, and discharge.
Discussion: This person is vital to the practice's image as this is the first and last contact a client has with the practice. The receptionist is also critical to scheduling a smooth flow of work within the practice. This staff member should possess excellent office and

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communication skills and the ability to remain calm in all situations. Occasionally, it may be necessary for the veterinary assistant to cover this area. Use "Moments of Time" to learn how the reception area functions before being thrust into this area.

Concept: To increase efficiency, use "Moments of Time."

Discussion: Clean a drawer, rearrange a shelf, observe others doing their jobs, do something! By making moments count, you will remain focused and useful.

Concept: Veterinary technicians are comparable to a registered nurse and the many technicians in a medical practice or human hospital setting and as such are charged with certain ethical and practical responsibilities.

Discussion: Veterinary technicians have specialized education and training at an American Veterinary Medical Association (AVMA)-accredited educational facility. This training may take from 2 to 4 years to complete. Following graduation, they must sit for national and state board credentialing examinations given in each state as required by the state in which they plan to work. After successfully passing the examination, they are considered to be licensed veterinary technicians (LVTs), registered veterinary technicians (RVTs), or certified veterinary technicians (CVTs) according to their state designation. They maintain their credential through verified continuing education, which includes legal, ethical, and professional standards.

Concept: Veterinary technicians may pursue specialty status within fields of interest.

Discussion: Some veterinary technicians opt to work toward the attainment of specialty status after credentialing through committed employment within specialized areas of veterinary medicine such as dentistry, behavior, or emergency and critical care. There are currently 11 academy specialties and 4 societal specialties that are sanctioned by the National Association of Veterinary Technicians of America (NAVTA) for credentialed veterinary technicians.

Concept: Credentialed veterinary technicians work under the direct and indirect supervision of the veterinarian.

Discussion: Responsibilities of veterinary technicians are defined by the veterinary practice act of the state in which the veterinary technician is employed.

Concept: Although veterinary assistants are not licensed or required to attend an accredited program, the NAVTA has created a veterinary assistant approval program.

Discussion: On-the-job training is often supplemented with online assistant programs. Assistants can also receive formal training through vocational technical programs. Veterinary assistant programs are encouraged to use the NAVTA-approved guidelines. Graduates of NAVTA approved programs are eligible to take a national exam. Successful completion of the exam grants an individual the Approved Veterinary Assistant (AVA) designation.

Concept: Assistants work under the *direct* supervision of the veterinarian and the veterinary technician.

Discussion: Assistants often serve as the "right hand" of the technician. For this reason, they are sometimes referred to as veterinary technician assistants (VTAs).

Concept: Veterinary assistants do not diagnose, prescribe, or do surgical procedures.

Discussion: Similar to the expectations for a veterinary technician, a veterinary assistant should never offer a diagnostic opinion to a client, prescribe medication, or perform a surgical procedure.

Concept: The veterinary assistant's role is to enable the veterinarian and technician to complete their tasks in an efficient and timely manner.

Concept: It is the veterinary assistant's responsibility to get to know the other team members, what they do, and what the assistant's obligation to each is.

Discussion: An understanding of the flow of activities within a practice and how other staff members accomplish their tasks is needed. This knowledge enables assistants to prepare materials and patients in anticipation of work to be done. This creates the efficient sequence

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of work desired within the veterinary site. It is in the preparation and follow-up phases of patient care, as much as the simultaneous help, that makes assistants so valuable to the professional staff.

Concept: The ability to work across various departments, anticipate work, coordinate and deliver patient care with others, and serve as the right hand to the professional staff are the hallmarks of a first-rate veterinary assistant.

Concept: Another essential member of the team is the kennel staff whose work is primarily in the patient wards.

Discussion: Kennel staff keeps the facility and patient quarters clean. They may be responsible for feeding and watering patients as prescribed by the veterinarian. Sometimes, they are responsible for exercising patients and bringing them back and forth between the examination and treatment rooms and the patient quarters. Kennel staff record patients' bodily functions and report any conditions noted in behavior. They may be responsible for keeping the patients clean and groomed. The assistant may find they are working closely with the kennel staff and should develop a good rapport and understanding of kennel care procedures.

Concept: Many practices cross-train their staff members, which enables each team member to do the tasks of other team members or functions in a dual role such as technician/manager.

Discussion: Cross-training allows for greater flexibility in staff scheduling. It also guarantees that, when a practice is short-staffed, employees can effectively help each other complete their work. Dual roles are often needed in small facilities with fewer employees. An employee should never assume that he or she is "just an assistant." Each employee is valued on the merit of his or her capabilities and should strive to learn as much as possible so as to be multifunctional.

Procedure

Location used: Throughout the veterinary environment

PREPARATION

1. Come to work properly dressed with all the materials you will need.
2. Arrive on time with a positive attitude toward work.
3. Know the responsibilities of other staff members and your obligations to each.
4. Know your responsibilities and arrive ready to begin work. Review your daily, weekly, and monthly task cards.
5. Review the treatment board for tasks that you will do alone and those you will be needed for in assistance to others.
6. Note approximate times you will be needed for assisting others.
7. Practice good time management; avoid gossip and idle chitchat as time eaters.

PROCEDURE

1. Walk in the door with a plan of work and start working.
2. Never come to work and wait to be told what to do. Jump in; everyone loves a self-starter.
3. Complete your tasks around the schedules of those you will assist.

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4. Patients come first. Fulfill your responsibilities to patients as soon as you arrive. It is a good practice to simply walk through all wards and note patient conditions before starting the day, reporting any changes in patient condition to the veterinarian and/or veterinary technician for follow-up.
5. When assisting others, lay out *all* materials to be used, including the patient record, before you bring animals up for treatment. Anticipate the need for extra materials and have them on hand.

FOLLOW-UP

1. Did you anticipate the work of others by having everything on hand before the patient was treated?
2. Did you clean up and put away all equipment after each procedure?
3. Were the patients in your charge promptly and properly cared for? Were they made as comfortable as possible, keeping in mind the special needs of the individuals?
4. Review all of your task cards at the end of the day, making certain you completed all assigned tasks.
5. Did you use "Moments of Time"? If so, how?

TASK 2.8
ANTICIPATING WORK FLOW

Concept: Anticipate what will be required for each task and which tasks will be performed in what order.
Discussion: Review the treatment board throughout the day. Know who has scheduled work to be done, whether it is the veterinarian or technician, and be prepared to help. Know their routine, know how they coordinate work and use their time. Have everything ready to begin procedures without being asked. The veterinarian and technician should be able to walk into a room and have everything on the counters ready to go to work. Be especially mindful of supplies and equipment needed and have everything on hand.
Concept: Know what needs to be done and when.
Discussion: Set priorities for accomplishing all tasks and work efficiently to stay ahead. Remember the old adage "time is money" governs veterinary economics.

Procedure

Location: All through the workday

PREPARATION

1. Review the appointment schedule as soon as you enter the door each workday. Know what to expect.

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2. Review the treatment board frequently throughout the day.
3. Review Task Box cards for the day, week, and month at the beginning and end of the day.
4. Know who does what and when. Be prepared to help.
5. If new to the clinic, make a reference book card entitled "Procedures and Supplies"; mark down what each procedure requires for supplies and any personal likes for each veterinarian and technician.

PROCEDURE

1. Determine your tentative schedule throughout the day and avoid rigid scheduling.
2. As new cases are hospitalized during the day, modify your schedule to accommodate.
3. Anticipate procedures and the order in which they will be performed and be ready to help.
4. Set up all materials and equipment prior to need.
5. Restrain a patient during each procedure, adjusting for each procedure as needed.
6. Be ready for the unexpected.

FOLLOW-UP

1. Once procedures are completed, clean equipment, put everything away, and mark the treatment board appropriately.
2. Never leave an area dirty or in a state of chaos. Clean as you go.
3. If a technician or a veterinarian directs, enter the procedure into the patient record. Review the treatment board and determine the next procedure and ready the appropriate area. Be proactive.
4. Perform one last walk-through of your area of responsibility and ensure all tasks are done as shift ends.

TASK 2.9
APPLYING VETERINARY ETHICS

Concept: In veterinary medicine, professional ethics governs the conduct of veterinarians and their staff.

Discussion: *Ethics* are defined as "the rules or principles that govern right conduct." What is considered to be right or correct varies within a culture and society and changes over time.

The AVMA publishes their "Principles of Veterinary Medical Ethics" annually in their *Directory and Resource Manual* and on their website (www.avma.org) providing the standard for behavior within all veterinary practices. Also included in the directory are "Policy Statements and Guidelines" on a variety of subjects ranging from "abandoned and feral cats" to "wolf-hybrids, vaccination of." Veterinarians and their staff refer to these policy statements as more detailed guidelines for decision making regarding veterinary conduct. For more complex information on ethics, refer to the most recent AVMA directory.

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Procedure

Location used: Throughout the veterinary environment

PREPARATION

1. Take time to locate the current AVMA directory. There are two policies that deal with animal welfare and veterinary ethics and are labeled Animal Welfare Policy Statement, located at https://www.avma.org/KB/Policies/Pages/AVMA-Animal-Welfare-Principles.aspx.
2. Read the section "AVMA Policy: Principles of Veterinary Medical Ethics of the AVMA located at https://www.avma.org/KB/Policies/Pages/Principles-of-Veterinary-Medical-Ethics-of-the-AVMA.aspx.
3. Read the Veterinary Technician Code of Ethics located at http://www.navta.net/files/navta_vt_code_of_ethics_07.pdf.

PROCEDURE

1. Patient needs come first, with the goal of reducing disease, suffering, and pain.
2. All interactions are based on integrity and honesty.
3. All laws are obeyed.
4. The veterinarian makes all decisions regarding patient care.
5. A veterinarian–client–patient relationship (VCPR) must be established. This means the veterinarian physically examined the patient before making or providing any diagnosis, treatment, surgery, prescription, or prognosis. The relationship is maintained through reexamination of the patient as often as needed for the veterinarian to provide an informed and knowledgeable standard of care.
6. A VCPR is needed to dispense medications.
7. Once a patient is accepted for care, the veterinarian is responsible for its continuing care until otherwise relieved.
8. Emergency services are available at all times.
9. Medical records are confidential. Information is not shared except in the conduct of patient care. Personal information revealed during patient care is not disclosed.

FOLLOW-UP

1. Can you identify procedures that incorporate each of these principles?
2. Review the procedure sections of this task and practice them.

These basic principles become a part of the policies and procedures within a veterinary practice. They govern interactions among staff, patients, and clients.

RESOURCES

AVMA. Principles of Veterinary Medical Ethics of the AVMA. Retrieved from: https://www.avma.org/KB/Policies/Pages/Principles-of-Veterinary-Medical-Ethics-of-the-AVMA.aspx.

Ball, James R. Professionalism Is for Everyone; The Goals Institute. Retrieved from: http://www.goalpower.com/.

Rollin, Bernard. *An Introduction to Veterinary Medical Ethics: Theory and Cases*, 2nd ed. Ames, IA: Wiley-Blackwell.

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

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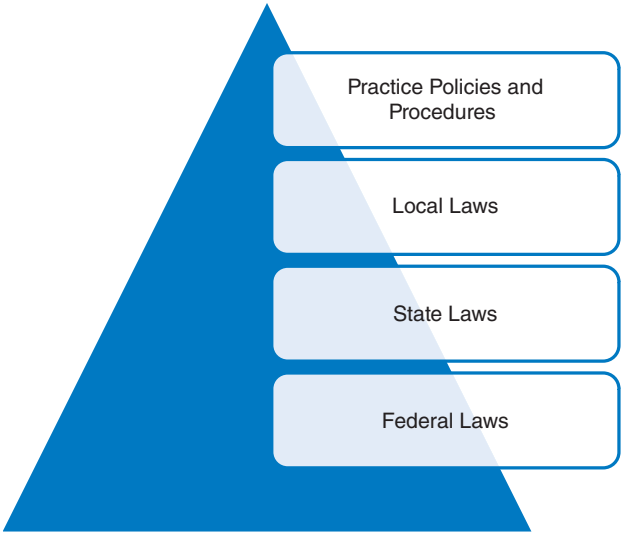
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CHAPTER

3

LAWS AFFECTING VETERINARY PRACTICE

BARB BURRI



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Differentiate between the types of laws.
2. Complete tasks in compliance with common and statutory laws.
3. Work within the constraints of federal law.
4. Comply with Occupational Safety and Health Administration (OSHA) standards for personal safety.
5. Analyze material safety data sheets (MSDSs) to complete secondary product safety labels correctly.
6. Use personal protective equipment (PPE) appropriately.
7. Deglove and wash hands according to standards of the "Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel."
8. Conduct tasks in compliance with the appropriate state veterinary practice act.
9. Conduct tasks in compliance with state public health and vaccination laws.
10. Determine local ordinances as they affect pet ownership in the location of the veterinary facility.

INTRODUCTION TO LAWS AND STANDARDS OF PRACTICE

Concept: In a veterinary practice, the policies and procedures are affected by various laws.
Discussion: Laws represent the *minimum* standard to which a veterinarian and a veterinary practice must comply. A single agency can control a single aspect of veterinary practice, such as the handling of controlled substances as dictated by the Drug Enforcement Agency (DEA). In some instances, multiple laws and agencies govern a single issue. The governing of waste management and disposal takes this kind of approach, whereas local laws, the Occupational Safety and Health Administration (OSHA), and other agencies have relevant regulations. Some laws are more wide ranging and have an influence throughout a practice. The laws governing employee safety, contract laws, and liability laws fall into this category. An awareness of these laws helps the veterinary assistant correctly fulfill responsibilities. *Ignorance of the law is not an excuse and does not constitute a defense in violation of any law*. Adherence to all laws, from local to national, is important.
Concept: While laws represent the required standards for practice, the veterinary profession itself makes additional recommendations.
Discussion: These industry recommendations serve as voluntary standards for the profession. The American Veterinary Medical Association (AVMA) and the for-profit American Animal Hospital Association (AAHA) are two of the organizations that offer recommendations. The AVMA is a nonprofit national organization representing the individual veterinarian. Representation is through its House of Delegates. Representatives to the House also include delegates from special interest groups such as the American Association of Feline Practitioners (AAFP) and the American Association of Equine Practitioners (AAEP). The AVMA provides representation of professional interests to various legislative bodies, provides policies and guidelines to the profession, provides continuing education for its members, and accredits colleges of veterinary medicine and programs of education for veterinary technicians.

The AAHA sets standards for veterinary hospitals themselves. A veterinary hospital displaying the AAHA logo meets and adheres to the organization's membership requirements. Member hospitals are subject to periodic inspections to ensure compliance. Standards are wide ranging and set criteria for examination facilities, pharmacy, anesthesia, surgery, housekeeping, and more. An AAHA member hospital exceeds minimum state practice act requirements. Not all veterinary facilities choose to meet AAHA membership standards.

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TASK 3.1
COMMON LAW

Concept: Legal precedents are the basis for common law.
Discussion: Decisions in earlier similar disputes are the basis of common law. Common law, or case law as it is sometimes called, is the result of judges' decisions over the years. Of particular interest in veterinary medicine are common laws related to business and to those that govern the relationships between people and between people and property.
Concept: *Liability* is a term for having a legal responsibility.
Discussion: An example of liability occurs when a pet owner falls while on veterinary premises. *Malpractice* is substandard practice, whether willful, negligent, or ignorant. Negligence is failure to do things properly. An owner may have a right to damages because of actions that cause a decrease in value of, injury to, or death of a pet or livestock.

In this *litigious* society, veterinarians protect themselves from lawsuits by purchasing liability insurance. Even if the veterinarian is not at fault, the cost for legal defense can be enormous and time consuming.
Concept: The veterinarian bears responsibility for the acts of all employees.
Discussion: All members of the veterinary team represent the veterinarian. Team member actions reflect on the veterinarian.
Concept: Misconduct by the veterinary assistant can lead to lawsuits against the veterinarian. This can lead to the loss of the veterinarian's license and the right to work as a veterinarian.
Discussion: Some reminders for the veterinary assistant regarding common law are listed as follows.

Never:

1. make any guarantee; this applies to recovery from major or minor illnesses
2. permit owners to restrain their own pets
3. allow an unsafe facility condition to persist; for example,
   a) clean all puddles and wet areas immediately and place a barrier or warning sign over them until dry
   b) check outside areas at least twice daily for potential hazards
   c) remove hazards immediately or mark until the situation is corrected
4. provide information to anyone on any subject on which you are not knowledgeable; never guess at an answer; in time, you will learn the correct answers.

Always:

1. Minimize the risks to the patient, even the healthy patient undergoing routine procedures:
   a) Keep all doors closed and windows secured.
   b) Provide leashes and carriers in the reception area for clients who do not have them.
   c) Provide adequate restraint of all patients within the hospital.
   d) Keep patients separate.
   e) Use identification collars on all patients.
2. Rather than risk giving an incorrect or incomplete answer, always refer a client to another member of the veterinary team who will know the correct answer.

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3. Document all conversations with the owner in the patient record. This includes telephone conversations.
4. Know all pertinent laws and conform to them.

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Prepare a task card entitled "Hazards and Precautions."
2. Make notes on the hazards in the workplace.
3. Consider the safety of team members, clients, and patients as well as of yourself.

PROCEDURE

1. Review the "never" and "always" lists on the preceding pages.
2. Correct or mark hazards immediately. They are everyone's responsibility.

FOLLOW-UP

1. Practice common sense throughout the day.
2. Reflect on your own behavior at the end of the day. Did you follow the rules listed? Did you correct hazards immediately? Did you practice safety throughout the day?
3. Where and when did you practice common law as it concerns veterinary medicine?

TASK 3.2
STATUTORY LAWS

Concept: Statutory law is the written law of government.
Discussion: Statutes are laws that modify the common law. These are the laws passed by federal, state, and local governments. Task 3.2–Task 3.5 will discuss these laws.

TASK 3.3
SUBSTANTIVE LAW

Concept: Substantive law is the body of law within a single area such as contract laws, property laws, and crimes.

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Concept: Contract law governs the relationship between the veterinarian and the client.
Discussion: A contract is a document that spells out the expectations of both parties involved. Contracts can be verbal or written and are considered an expressed contract. Assumptions are the basis of an implied contract. It is wise to conduct business using written contracts, to avoid assumptions. Breach of contract occurs when any party fails to fulfill its responsibilities. The use of consent forms including those for surgery, euthanasia, and boarding makes the responsibilities of each party clear. A client signature on an "estimate for services" becomes a form of written consent. If that client fails to pay for services, he or she is in breach of contract. The reverse is equally true. If a client agrees to services and the veterinarian fails to fulfill them, the veterinarian is in breach of contract. Euthanasia authorization forms are contracts where the client guarantees the animal has not bitten anyone in the last 10 days and is their property, once signed the veterinarian is obligated to carry out the euthanasia. *Contracts entered into by minors or the mentally incompetent are not enforceable*.

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Observe the use of contract law throughout the hospital.
2. Collect various forms of contracts in your hospital.

PROCEDURE

1. Review and understand the forms as contracts within your hospital.
2. Explain and be certain the owner has reviewed and signed all consent forms before rendering service.
3. Retain these forms in the patient record.
4. The veterinarian completes these and will use and explain estimate forms before rendering services. The receptionist may review the completed form with the client.

FOLLOW-UP

1. Were you able to identify the use of contract law within a veterinary practice?
2. Describe an example of implied contract within a practice.

Concept: Animals are considered as *chattel* or property.
Discussion: Animals are personal property just as much as an automobile or a house. Owners have rights when the property is stolen, damaged, or injured. This applies to animals while in a veterinarian's care or custody.
Discussion: Owners have the right to determine what to do to their animals. Owners and their employees can actually practice veterinary medicine on their own animals. This allows farmers to treat their own livestock. This also means owners are the final decision makers regarding what is done to their animals as long as it does not violate other laws.
Discussion: Changes in terminology from ownership to guardianship of animals has a legal repercussion. Ownership implies animals as property; guardianship grants a different level of recognition, similar to a parent–child relationship. Some municipalities have included the concept of guardianship in their animal laws.

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Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Research the discussions regarding ownership versus guardianship of animals.
2. Find out if your state or town considers pet owners as owners or guardians.

PROCEDURE

1. Be consistent in your use of the term owner or guardian as it applies to the laws within your community.

FOLLOW-UP

1. What happens to farmers if they become guardians of their livestock?
2. What happens to veterinary practice if clients are guardians of their pets?
3. What is the AVMA position on this issue? Why?

TASK 3.4
FEDERAL LAWS

Concept: Federal laws override state laws.
Discussion: Federal laws tend to be broader in scope and more general in statement than state laws. Some laws are not strictly federal laws. A federal law can influence state policy and penalty, but individual states implement and enforce the federal law, such as inclusion of animals in disaster relief efforts. Laws covering liability, slander, unfair competition, price fixing, and employment affect the conduct of the business of veterinary medicine and all other businesses.
Concept: Federal laws affect veterinary staff.
Discussion: The Fair Labor Standards Act covers child labor. The OSHA governs workplace safety. U.S. Equal Employment Opportunity Commission (EEOC) enforces laws regarding discrimination, such as the Civil Rights Act, The Equal Pay Act, and The Americans with Disabilities Act (ADA). Sexual harassment and antidiscrimination are forbidden activities. These are laws that affect all businesses.

Federal laws affecting animals and their care began with the anticruelty movement of the late 1800s. Anticruelty laws now exist in all states, although they are yet to be standardized.
Concept: The interstate shipment of animals is federally controlled.
Discussion: It is mandatory for animals moving across state borders to be accompanied by a health certificate.
Concept: Permissible drug residues in food animals are legislated.

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Discussion: *Withholding times* minimize drug residues. If the animal has been given a certain drug, wait times before shipping for slaughter or sending milk off the farm are required. The Food Animal Residue Avoidance Databank (FARAD) is the United States Department of Agriculture (USDA) risk management program to standardize these withholding times.

Concept: The Animal Welfare Act affects the care and handling of research animals.

Discussion: The USDA Animal and Plant Health Inspection Service (APHIS) regulate the care and handling of research animals. Organizations and businesses that use research animals must have an Institutional Animal Care and Use Committee (IACUC). They set policies and procedures for the animals' care and oversee their use in research and teaching. They ensure the rules set forth by the Animal Welfare Act are enforced.

Concept: Federal laws are wide ranging.

Discussion: Laws protect marine mammals' handling, transport, and care. Public and animal health is protected through meat and milk inspection laws and the mandatory reporting of foreign animal diseases. The federal government has successfully implemented animal disease eradication programs.

The Food and Drug Administration (FDA) "Provisions for Good Pharmaceutical Manufacturing Practices" and the issuing of veterinary biological licenses indirectly affect veterinary medicine. The U.S. FDA specifies the manufacturing standards and the distribution of food additives and drugs for animals.

Concept: The rules of the DEA discuss the handing of drugs with the potential for addiction, referred to as *controlled substances*. (Task 18.2.4 will discuss this in detail.)

This is only an overview. Knowledge of these laws is the responsibility of the veterinarian and practice manager. The policies and procedures of the veterinary worksite incorporate these laws. It is the responsibility of the assistant to adhere to these policies and procedures. The following table summarizes U.S. government agencies and their responsibilities (Table 3.1).

Table 3.1
U.S. Government Agency Responsibilities

Agency	Acronym	Responsibility
Food and Drug Administration	FDA	Food, pharmaceuticals
Center For Veterinary Medicine	FDA-CVM	Animal pharmaceuticals, new drug applications
United States Department of Agriculture	USDA	Protect food, agriculture and natural resources
USDA Animal and Plant Health Inspection Service	USDA-APHIS	Protecting agricultural health, Animal Welfare Act
Office of Laboratory Animal Welfare	OLAW	Part of National Institute of Health, Humane Care and Use of Animals in Research
Environmental Protection Agency	EPA	Pesticides, insecticides
Drug Enforcement Agency	DEA	Controlled substances
Occupational Safety and Health Administration	OSHA	Health and safety in the workplace

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TASK 3.4.1 OCCUPATIONAL SAFETY AND HEALTH

The general rules for workplace safety follow. Individual chapters will cover the specific policies relating to radiation safety, exposure to gaseous anesthetics and sterilizing substances, handling controlled substances, and handling hazardous wastes. The following tasks are part of the way veterinary staff complies with federal law.

Concept: A federal agency governs workplace safety, enforcing laws designed to minimize hazards in the workplace.

Discussion: OSHA is responsible for administering the rules governing workplace safety. These rules are extensive. Failure to comply with them results in hefty fines and even the closure of a business. Unannounced inspections do occur.

Concept: Each worksite must have a written plan complying with the law and a person designated as the plan's administrator (the hazard communication coordinator [HCC]), who oversees its local implementation.

Discussion: Review of the site plan with the designated administrator is part of the orientation of each new employee. The AVMA recommends that a new employee sign a notification verifying this review. Signs are posted throughout the hospital and in employee areas providing information on risks, how to minimize them, and what to do in an emergency. There are other posters informing employees of their rights under OSHA and how to make contact with OSHA.

Concept: A binder is kept in the clinic containing material safety data sheets (MSDSs) and is part of the safety plan.

Discussion: The binder includes an individual sheet for each chemical and drug purchased by the hospital. The MSDS is the source of information on the hazards of each material found within the hospital, including the proper way to handle the material and what to do in case of accidental exposure.

Concept: The employer provides personal protective equipment (PPEs).

Discussion: Goggles, face masks, and gloves are the basic safety equipment that are provided by the hospital. All of these must be worn when coming into contact with hazardous chemicals, infectious animals, and wastes. Follow your clinic's PPE policy; there can be no excuses for incorrect use.

Concept: It is the employee's responsibility to inform the employer if an illness or injury develops that might affect job safety.

Discussion: For women, it is especially important to inform your employer as soon as you become pregnant or suspect you are pregnant.

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. As soon as you are hired, identify the HCC or OSHA plan administrator in the clinic.

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2. Schedule a time to review the written plan for workplace safety within the first week of employment.

PROCEDURE

1. Review the safety plan.
2. Identify the hazards in the worksite: physical, chemical, and infectious.
3. Locate the binder containing the MSDS. Review the contents and type of information found on the MSDS with the plan administrator.
4. Learn the emergency procedures for accidents, hazardous spills, and gas releases.
5. Locate the emergency evacuation routes.
6. Review emergency procedures for personnel and patient evacuation.
7. Locate containers for disposal of hazardous waste.
8. Locate all PPEs and review their proper use (see Task 3.4.3).
9. Locate the eyewash station and learn to use them before you need them.

FOLLOW-UP

1. Sign and date the certification indicating you have reviewed the OSHA plan.
2. Practice workplace safety at all times.

TASK 3.4.2
PRODUCT SAFETY LABELS

Concept: Primary and secondary labels are required on all materials.
Discussion: A secondary label must be attached to all containers that have content from a primary bottle. The manufacturer's label or the MSDS is used to create this label. The label may be in the form of a diamond or a chart. They are color coded with the chemical name of the product just outside the diamond or at the top of the chart. All four areas need a score from zero to four. For example, alcohol poured into a spray bottle or dispenser must be labeled appropriately. Table 3.2 explains what the colors and scores represent.
Concept: When transferring a product from a primary container to a secondary container, affix a product safety label to the secondary container.
Discussion: Copy the information from the primary label or from the information provided in the product's MSDS.

Procedure

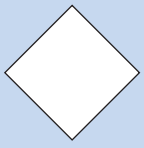
Location used: All areas of the veterinary with a possible exclusion of the reception area

PREPARATION

1. Prepare a card for your reference book entitled "Safety Labels." Use Table 3.2 as a reference for marking secondary containers.

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Table 3.2
Safety Color Code for Marking Physical Hazards

Color	Hazard	Score
Red 	Flammability	0—Will not burn 1—Ignites above 200°F 2—Ignites below 200°F 3—Ignites below 100°F 4—Ignites below 73°F
Yellow	Reactivity	0—Stable 1—Normally stable 2—Unstable 3—Explosive 4—May detonate
Blue 	Health hazards	0—No hazard 1—Slight hazard 2—Dangerous 3—Extreme danger 4—Deadly
White 	Special hazards	W—Water reactive Trefoil—Radioactive Cor—Corrosive ACD—Acid ALK—Alkali

Source: Adapted from "Compendium of Veterinary Standard Precautions: Zoonotic Disease Prevention in Veterinary Personnel." National Association of State Public Health Veterinarians, Veterinary Infection Control Committee. 2010. http://www.nasphv.org/Documents/VeterinaryPrecautions.pdf.

2. All containers, whether primary or secondary, must have safety labels.
3. Compare what the safety label means to Table 3.2 and how it must be handled.
4. If one is absent or needs to be prepared, find the correct MSDS in the MSDS binder.
5. Locate the colored self-sticking safety diamond or chart labels. They usually come in rolls.
6. Make sure you have a permanent marker.
7. Check the secondary containers for residue before attaching labels. Clean with alcohol and allow to dry so the label sticks.

PROCEDURE

1. Tear off a blank colored safety label from its roll.
2. Place the label flat on the counter.
3. Write the product name.
4. Find the necessary information in the MSDS:
   a) Flammability score: red
   b) Reactivity score: yellow
   c) Health score: blue
   d) Special hazards: white
5. Fill in the numerical score or symbol as appropriate. Remember the higher the number, the greater the hazard.

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6. Peel off the backing to expose the sticky surface of the label.
7. Securely place the prepared label on the container.

FOLLOW-UP

1. Check your work.
2. Have another team member check your first few safety labels to make certain they are correctly prepared.

TASK 3.4.3
PERSONAL PROTECTIVE EQUIPMENT

Concept: Always prevent personal injury by appropriately using PPE.
Discussion: Veterinary medicine is a hazardous occupation. There are dangers from a variety of sources. Patients bite, scratch, and kick. They transmit diseases directly through physical contact and in body fluids. Contact with surfaces touched by infected animals and their body fluids can transmit disease. Improper lifting or animal restraint results in muscle and joint injuries. Loud barking results in hearing impairment. The environment poses a wide range of hazards from slippery, wet floors to radiation exposure. Anesthetic gases and chemicals are another source of potential harm. Drugs, especially those used to treat cancer patients, pose a unique source for injury. Veterinary medicine can be physically and emotionally stressful, leading to failure to notice these dangers.
Concept: It is the responsibility of the employee to behave in ways that enhance personal safety and to conform to all OSHA regulations.
Discussion: Always assess the potential for injury in any task. Determine what to do to avoid inherent dangers. Do not compromise personal safety in the rush to complete tasks. Allow enough time to work safely. Although the employer is responsible for ensuring a safe work environment, it is also the employee's responsibility to behave in a prudent manner and to use the protective resources available to minimize occupational risks. To avoid occupational injury, it is best to "stop, look, and think" before beginning any task.

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Prepare a card for your reference book entitled "PPE Conditions for Use."
2. Determine the potential hazards present in the tasks to be undertaken.
3. Determine the potential hazards in the immediate environment.
4. Determine what PPE is appropriate for use based upon the hospital's safety policy.

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PROCEDURE

1. *Gloves:* Wear examination gloves in any circumstance where there is a potential for exposure of hands to infectious materials, chemicals, or toxic agents. This includes handling patients. Wear heavier gloves when handling caustic materials. Wash hands after glove removal. Use *universal precautions* (see Task 3.4.4) and dispose of contaminated gloves in a *biohazard container** if appropriate.
2. *Goggles:* Wear goggles any time there is a chance for splashing or spraying infectious or toxic materials into the eyes, as in mixing concentrated chemicals or working with body fluids.
3. *Outer Covering:* Wear protective outer wraps over clothing, such as aprons, gowns, or overalls whenever there is potential for body contact with highly contagious or exceptionally toxic materials.
4. *Masks and Face Shields:* Wear a face shield whenever there is a risk of splashing infectious or toxic materials onto your face (e.g., during dental procedures). Use a mask for protection against all inhaled hazards.
5. *Ear Protectors:* Prevent hearing impairment by wearing ear protectors whenever working in noisy environments such as animal wards.
6. *Footwear:* Wear footwear suitable to the task with thick soles and closed toes. Wear footwear that can be cleaned. Wear washable rubber boots over shoes in wet and dirty environments. Use shoe covers for protection and for cleanliness such as in the surgical suite or isolation ward.

FOLLOW-UP

1. Discard disposable equipment in appropriate containers.
2. Clean nondisposable equipment while wearing gloves.
3. Launder surgical items, such as dirty gowns and wraps, separate from regular hospital laundry.
4. Check nondisposable equipment for cracks and imperfections compromising their effectiveness. Notify the site supervisor when finding any defects.
5. If gloves are nondisposable, check for holes by filling each with water, holding the cuff tightly closed, and then squeezing. If a leak is present, water will shoot out of the hole.
6. Return cleaned, functional equipment to its proper storage place.

TASK 3.4.4
UNIVERSAL PRECAUTIONS

Concept: Universal precautions are the measures taken whenever there is the possibility of transmission of infection from a patient or the patient's body fluids to the handler.
Discussion: These precautions initially arose in the human medical field to prevent transmission of hepatitis and AIDS from patients to medical personnel. It is important to apply these same precautions in the veterinary setting. If a client or a team member is injured, do not help the individual until you have put on examination gloves.
Concept: It is safest to assume there is always potential for cross infection: person-to-person, animal-to-person, person-to-animal and animal-to-animal.

*The biohazard symbol is black on a red background.

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Discussion: Universal precautions have been adapted for use in veterinary medicine. In veterinary medicine, more than 200 diseases are transmissible from animals to humans. These diseases are *zoonotic*. Some of them are life-threatening illnesses. Since there is no way of knowing beforehand which of the many zoonotic diseases an animal may be harboring, assume that every encounter with a patient poses the threat of zoonotic infection. It is necessary to protect yourself from these diseases. All veterinary staff handling animals or their body fluids must always wear examination gloves free from holes or other defects. Hand washing is not a substitute for gloves.

Concept: An "infection control plan" is created for protection from zoonotic infection and to prevent transmission of diseases from one animal to another.

Discussion: These procedures cover such topics as "bites and other animal-related injury protection," "needlestick injury precautions," "rabies preexposure vaccination," "isolation/quarantine plan for infectious patients," and "environmental controls." As with many documents, the disease prevention plan has numerous attachments, including contact information for various state, federal, and local agencies. Check this document to learn which diseases are reportable.

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Review the infection control plan as part of new employee training.
2. Prepare a section for your task box entitled "Disease Control."

PROCEDURE

1. Mark your task card with the key points contained within the plan.
2. Practice the procedures in the plan every day.
3. Identify the hospital's infection control officer.

FOLLOW-UP

1. Refer back to the plan or your task card to make sure you are practicing the plan.

TASK 3.4.5
GLOVING AND UNGLOVING

Concept: Change gloves whenever handling a new patient. This prevents transmission of diseases between patients. Change gloves between dirty and clean tasks on the same patient.

Discussion: While doing a series of laboratory procedures involving body fluids, the same gloves may be worn throughout but must be changed as soon as the procedures are completed.

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Concept: Remove the gloves according to occupational standards.
Discussion: Wash hands immediately upon degloving. Gloves can develop microscopic holes while being worn, allowing microorganisms to make contact with the skin. There is also the potential for disease-causing organisms to contact the skin during the degloving process despite the most careful efforts to avoid it. Intact skin is the best barrier to the entry of disease into the body; therefore, hand care is important for disease prevention. After washing your hands, dry them thoroughly. Apply hand cream to prevent chapping.

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Locate where the supply of gloves is stored.
2. Restock gloves in all areas of the clinic.
3. Try various sizes on to learn which will fit your hand. They should fit well without a lot of excess length on fingers and should stay in place. They should not be so tight as to reduce circulation!

PROCEDURE

1. Put clean gloves on before handling each new patient or their body fluids.
2. Wear them throughout contact with the patient.
3. Change gloves whenever handling a different patient.
4. Change gloves when going between dirty and clean tasks on the same patient.
5. Remove contaminated gloves according to industry standards. See description following this task.
6. Wear the same gloves when handling materials such as laboratory samples.
7. Did you catch yourself not wearing gloves at any time throughout the day?
8. If you did not wear gloves when appropriate, catch yourself the next time!

FOLLOW-UP

1. Discard gloves in a biohazard container if contaminated with body fluids or infectious materials.
2. Wash hands with disinfectant soap immediately after degloving.
3. Dry hands thoroughly.
4. Apply hand cream.

How to Remove Gloves (Fig. 3.1)

Removing the First Glove

1. Pinch the *outer* surface of the first glove about 2 in. below the cuff.
2. Pull the pinched area outward and downward while simultaneously pulling the enclosed hand backward out of the glove.
3. The removed glove will be inside out.
4. While still holding the removed glove in the fingertips, gather it into the palm of the still-gloved hand.

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Figure 3.1. Removing exam gloves. Hold soiled gauze or cotton in one hand; grasp the cuff of that glove with the fingers of the other hand; and pull the glove off so it turns inside out. Palm the removed glove and remove the other glove by grasping the cuff with finger tips and pulling it over the first removed glove. Discard appropriately and wash your hand thoroughly.

Removing the Second Glove

1. Firmly pinch the *inner* surface of the remaining glove with the ungloved hand about 2 in. below the cuff edge. Pull the pinched area upward and toward the edge of the cuff.
2. Pull the gloved hand backward, removing the hand from the glove.
3. The second glove will be inside out, with the first glove inside the second glove.

Procedure

Hand Washing

Location used: Any place and time when handling patients and their bodily fluids

PREPARATION

1. Whenever hands are visibly dirty, wash them using soap and running water.
2. If hands are not visibly dirty, an alcohol-based gel is acceptable, but soap and water are still preferable.
3. Have a source of liquid or foam soap next to every sink.
4. Have paper towels next to each sink.
5. Have a source of hand cream available.

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PROCEDURE

1. Moisten hands with running water.
2. Place soap in the palm of one hand.
3. Rub both hands together vigorously for a minimum of 20 seconds, including wrists, between fingers, and under fingernails.
4. Rinse hands well.
5. Use paper towels to dry hands.
6. Turn faucets off using the same paper towels.
7. Exit room using the same paper towels.
8. Dispose of towels immediately upon exiting the room.
9. Apply hand cream.

FOLLOW-UP

1. Did you produce a rich generalized lather when washing?
2. Did you wash for at least 20 seconds?
3. Did you use the same towels to turn off the faucets and open the door to exit?
4. Apply hand cream to hands after washing.

Tip Box 3.1: **Sing a song such as "Happy Birthday" in your mind to be sure you are washing for at least 20 seconds.**

TASK 3.5
STATE LAWS

TASK 3.5.1
VETERINARY PRACTICE ACTS

Concept: Veterinary professionals are governed by the state practice act rules and regulations for veterinary professionals and, in some states, the veterinary technicians.
Discussion: State laws vary from state to state. They reflect the needs of the region they govern and change over time as circumstances change. The purpose of each veterinary practice act is based upon consumer protection, protecting the public from incompetent and fraudulent veterinary actions.
Concept: The State Board of Veterinary Medicine in each state enforces the practice act.
Discussion: Although there are individual differences between state practice acts, each state's act will have some common elements.

The veterinary practice act usually defines

1. what constitutes the practice of veterinary medicine
2. who can practice veterinary medicine

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3. when a person is practicing veterinary medicine
4. minimum standards for the practice of veterinary medicine
5. standards for veterinary facilities.

The State Board

1. determines the penalties for violations of the act
2. administers veterinary examinations and issues licenses
3. licenses veterinary premises
4. defines rules of conduct for the business of the veterinary board.

Concept: Generally, only a person currently licensed to practice in a specific state can do so.
Discussion: For instance, a person licensed in California cannot practice veterinary medicine in Texas unless licensed in Texas as well.
Concept: Some states do honor another state's licenses through a process called *reciprocity*.
Discussion: This means one state will honor a license from another state. Not all states grant reciprocity, and those that do often limit the states named in the reciprocity process. Reciprocity changes over time.
Concept: The exception to a state license is when serving in a consultative capacity across state borders.
Discussion: An example is *telemedicine* in which an electrocardiogram is sent to a cardiologist in another state for interpretation. The consulting veterinarian is considered licensed in the state solely for reading that electrocardiogram.

The AVMA publishes a "Model Veterinary Practice Act" and a "Model Practice Act for Veterinary Technicians" in its directory. These serve as guidelines for the development of the individual state practice acts. Individual state practice acts can be accessed through the AVMA website links (http://www.avma.org).
Concept: A veterinarian has the exclusive right to

1. diagnosis
2. prognosis
3. prescribe medication
4. perform surgery.

Discussion: This applies to the treatment of animal disease in all the branches or specialties of veterinary medicine. Violation of this represents the practice of veterinary medicine without a license, which is prosecutable.
Concept: The veterinary staff may, with supervision and in compliance with all other laws, provide supplementary veterinary care.
Discussion: A veterinary technician is someone that has graduated from the AVMA accredited program and is eligible to take the Veterinary Technology National Examination (VTNE). A credentialed veterinary technician has passed the VTNE and is required to practice under the practice act within the state. The veterinary assistant is part of the team and works under the supervision of the veterinarian to provide assistance to the veterinarian and/or veterinary technician. It is through this stipulation that a veterinary assistant has permission to perform veterinary tasks. It is up to the veterinarian to determine the competence of the staff member before delegating a task. The veterinarian is responsible for providing the level of supervision necessary for the staff member to complete the task correctly. The veterinarian must remain in compliance with all laws.

At the time of this writing, not all states license, certify, or register technicians or other members of the veterinary team.

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Concept: Where technicians are credentialed, the technician is usually permitted, under immediate or *direct* supervision of the veterinarian, to

1. induce anesthesia
2. perform dental extractions that do not entail a surgical procedure such as sectioning a tooth or incising tissue; clean, polish, and float teeth
3. provide surgical assistance to the veterinarian as permitted by state law.

Concept: It requires the *direct* supervision of the veterinarian for a technician to

1. perform euthanasia
2. apply splints or slings.

Concept: With *indirect* supervision, the technician can

1. place intravenous catheters and begin intravenous administration of fluids
2. administer medications, including the giving of injections except where prohibited by law
3. collect urine, fecal, and blood samples
4. perform skin scrapings
5. conduct routine laboratory procedures
6. provide first aid to an animal in an emergency.

Concept: The veterinary assistant is to assist the veterinarian and technician in the performance of their duties.
Concept: The level of supervision for the assistant is higher, in all instances, than that of the credentialed technician.
Discussion: Delegation of any duties not specifically limited to the licensed veterinarian and technician under a practice act may be performed by the assistant as long as the veterinarian and/or technician

1. provides direct supervision
2. determines competence of the assistant
3. complies with all laws.

There are other statutes affecting veterinary medicine, such as those involving radiation exposure and radiographic equipment; still others involve the possession of wildlife.

Procedure

Location used: Throughout a veterinary facility

PREPARATION

1. Prepare a section for the task box entitled "Practice Act."
2. Review a copy of the veterinary practice act that governs the practice of veterinary medicine in the state in which you expect to work.
3. Know your own limitations, both physical and intellectual.
4. Comply with the level of supervision you need to perform a task correctly.

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PROCEDURE

1. Seek clarification whenever you are in doubt about a duty.
2. Mark the task card with what you can and cannot do.
3. Read those sections that govern veterinary facility standards.
4. Read the sections that limit specific actions to the licensed veterinarian and technician.
5. Read any sections that mention the veterinary assistant or technician. Make the assumption that for any task specifically assigned to the veterinarian and technician, the assistant is forbidden to do.
6. Never
   a) diagnose
   b) prognose
   c) prescribe
   d) perform surgery.

FOLLOW-UP

1. Always double-check your work.
2. Clean up after yourself.
3. Comply with the regulations in the practice act.

TASK 3.5.2 PUBLIC HEALTH AND VACCINATION LAWS

Concept: States enact vaccination laws to protect the health of their citizens.
Discussion: Rabies is a nearly always-fatal zoonotic disease. Many states enact laws about appropriate vaccination intervals, required age at first vaccination, and procedures for dealing with exposure to potential rabies subjects. States may require rabies vaccination only for dogs; dogs and cats; or dogs, cats, and ferrets. Some state laws allow exemptions to rabies vaccination.

Procedure

Location used: Wherever a rabies vaccination is to be administered

PREPARATION

1. Prepare a card in your reference book entitled "Vaccinations."
2. Determine your state's rabies vaccination laws.

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PROCEDURE

1. Record at what age the first rabies vaccination is given to dogs and cats in your state.
2. Record the number of boosters and when they should be given.
3. What species must have rabies vaccines and what species cannot be vaccinated for rabies?
4. Does your state have any exemption provisions?
5. Does your state permit or require titers?

FOLLOW-UP

1. Add any other "annual" vaccines given to patients seen in your clinic.
2. Add when the first of these vaccines are given and when they are boosted.

TASK 3.5.3
STATE ANIMAL LAWS

Concept: States protect their citizens through laws. Animal laws cover many areas, from agricultural interests to leash laws, market laws, and the import and export of animals over state lines.
Discussion: Agricultural laws protect the public from disease through good herd health. Animal laws protect the public and the welfare of companion and agricultural animals. Each state's code is different depending on the needs of the area.

Procedure

Location used: Throughout the veterinary facility

PREPARATION

1. Find out the source of your state's animal laws.
2. Make a task card entitled "Animal Welfare Laws" for your state.

PROCEDURE

1. Mark the card with the state animal welfare laws as they pertain to the patients your practice sees.
2. Record the contact information of your state's veterinary board and state veterinarian.

FOLLOW-UP

1. File your card and keep it in mind when faced with possible infractions of the law.

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TASK 3.6
LOCAL ORDINANCES

Concept: Local ordinances affect every business.
Discussion: Veterinary medicine is a business. Local ordinances affect the community or county governed. They are relevant to a range of activities in a veterinary practice such as the size of signs a business can post. Business licenses are typically required. Zoning ordinances limit the location of a veterinary practice.
Concept: It is up to the veterinarian and the practice manager to establish practice policies and procedures that comply with local ordinances.
Discussion: Review the policy and procedure manual. Know its contents and comply with them.
Concept: Local ordinances affect pet ownership.
Discussion: Clients need to know local pet laws and depend on the veterinary staff to inform them correctly. Leash laws are one of the most common laws. They require all dogs outside a fenced enclosure to be on a leash. Any animal roaming freely can be subject to capture and detention by local animal control officers. From a practical standpoint, this offers protection to dogs as much as to the public.

Nuisance laws usually govern noise and soiling or destruction of private property by animals. Barking dogs, failure to clean feces during exercise of dogs, and dogs that chase or harm other animals can result in citation of an owner.
Concept: Licenses are usually required for all dogs and, in some areas, are required of cats as well.
Discussion: A license requires a current rabies vaccination. In some communities, veterinary practices are required to notify the local animal control office whenever administering a rabies vaccination. This allows animal control officers to know when an animal needs licensing. In some instances, veterinarians issue licenses and send the collected fees to the county or to the town. The fees are determined by the length of time an animal is to be licensed and the spay/neuter status.
Concept: Local ordinances often state how many and what kind of animals can be owned within specified areas of the community.
Discussion: Owners might need special permits to breed their pets, to own certain species of animals or breeds of dogs, or to have more than a specified number of animals on their property.

The client turns to the veterinary staff to answer such questions as follows:

1. How many pets can I have on my premises?
2. How and where do I license my pet?
3. What species need licensing?
4. How much does it cost to license my pet?
5. When are licenses due?
6. What special permits do I need for breeding or ownership of certain species of animals?

Keep up to date on local regulations. Begin by accessing the county and city websites in which you work. Locate information regarding licensing, shelter hours and location, ordinances regarding pet ownership, and information about local dog parks.

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Procedure

Location used: Primarily reception areas and examination rooms

PREPARATION

1. Prepare a card for your reference book entitled "Pet Laws and Agencies."
2. Find the local statutes on pet ownership.
3. Make a list of the shelters/rescues with their interests, animal control, and pounds.
4. Collect the telephone numbers of the appropriate agencies that can answer questions about pet ownership, licensing, hazardous animal restrictions, reporting of inhumane treatment.

PROCEDURE

1. Group each agency as to what they do: shelter, pound, rescue, law enforcement.
2. Make a telephone call to each to find out the name of the person to whom you speak if a pet is surrendered, a law is broken, or a license is needed.
3. Confirm what services each agency provides to your clients and patients.
4. Ask if they can provide a brochure or handout appropriate for you to give to your clients. Ask for multiple copies if available.
5. Thank the person who assisted you by name.

FOLLOW-UP

1. Share the information with other staff members.
2. If the agency sends only one brochure, post it in a conspicuous place in the reception area or make multiple copies if the agency approves.
3. If multiple copies are available, place them in a holder in the reception area where interested clients can read and take a copy.
4. If no brochures are available, prepare one for your clients containing the relevant information you have learned.
5. Remain informed. Schedule periodic reviews, usually annually, with all animal-related agencies in the practice area.
6. Make changes to your reference book as you learn of changes in policies.

RESOURCES

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Safety Vet—website dedicated to safety and OSHA standards for veterinary practice. Retrieved from: http://www.safetyvet.com.

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

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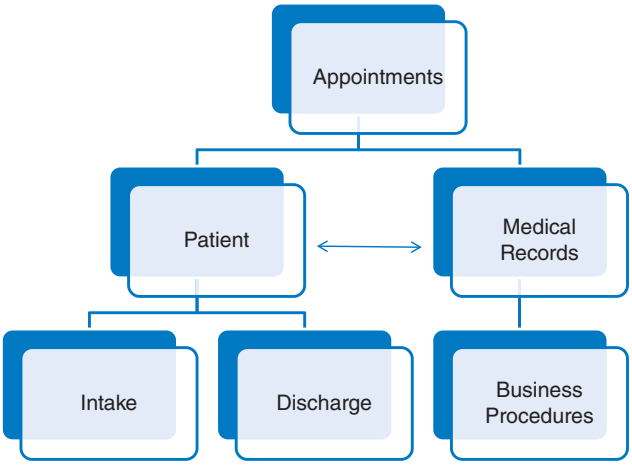
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CHAPTER

4

FRONT OFFICE PROCEDURES

PAULA PATTENGALE



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Assemble a medical record according to the standards of the site where employed whether utilizing a paper-based or computer-based record system.
2. Correctly enter data into a paper- or computer-based medical record.
3. Color code medical records according to an employer's procedures.
4. Correctly file medical records both numerically and alphabetically.
5. Schedule appointments to provide efficient utilization of time and smooth work flow.
6. Update client information on a routine basis.
7. Follow patient intake procedures as established by the employer.
8. Maintain the reception area in a pleasant, clean, and safe manner.
9. Correctly enter patient information into the medical record.
10. Follow legal requirements for transfer of patient information.
11. Correctly prepare a rabies vaccination certificate.
12. Prepare a health certificate for the interstate shipment of animals.
13. Review with and have clients sign consent forms for designated procedures.
14. Prepare appropriate written client communications.
15. Complete all patient discharge procedures.
16. Answer the telephone, helping a caller or redirecting the telephone call, in a professional and knowledgeable manner.
17. Handle difficult clients appropriately.

INTRODUCTION

While the veterinary assistant is seldom involved in front office procedures, an understanding of what takes place facilitates the work of the veterinary medical team. There may be days the receptionist is absent or the front desk is understaffed. On these occasions, the assistant may be asked to work in the reception area.

"Front office procedures" covers the wide range of activities that usually take place in the reception area of a veterinary hospital. These are the first and last steps in client and patient procedures and encounters.

Concept: The individual working in the reception area must be able to multitask.

Discussion: Often the receptionist will be answering telephones, doing patient intakes and discharges simultaneously. All the time, this individual needs to maintain a cheerful, calm, and helpful attitude.

Concept: A true goal of helpful and thoughtful customer service is essential for these activities.

Discussion: The receptionist is the first and last impression of a facility. Always make a positive impact when working in the reception area. Here are a few reminders.

1. Always:
   a) Wear a smile! You can "hear" a smile over the telephone.
   b) Maintain an attitude of helpfulness.
   c) Pay particular attention to personal grooming.
   d) Acknowledge every client and patient immediately. If someone must wait for service, even briefly, smile and tell them that you will be with them shortly.
   e) Be organized.

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f) Anticipate work to stay ahead.
g) Be accurate.
h) Know all policies and procedures of the worksite.
i) Remain calm.

Tip Box 4.1: **When under pressure, focus on the task *immediately* at hand then handle tasks sequentially.**

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TASK 4.1
MEDICAL RECORD ASSEMBLY

Concept: The advent of interactive databases has allowed the true functionality of computer-based patient records to be realized.
Discussion: There are a number of companies offering such programs each with slightly different features, look, and feel. Mastery of the computer-based medical record is essential in any veterinary hospital using such a program.
Concept: An interactive database allows information to be added and accessed anywhere in the hospital.
Discussion: Data are added at the beginning of a visit, during a visit, during hospitalization, and at discharge. It also does inventory control, prints rabies vaccination certificates and consent forms, determines client fees for service, and so on.
Concept: All team members have access to data. The data may be limited to what is relevant to a team member's responsibilities.
Discussion: Anyone using the computer-based medical record needs to be accurate in any data entered. Data retrieved can be read but not altered. If a mistake is made, a line is drawn through all of the lines, initialed, and dated. The new entry is made with the corrected information and a brief reason for the correction.
Concept: To present task information for a paperless practice here is not worth the time spent by the reader to learn as new features and modifications are constantly occurring.
Discussion: It behooves the reader to have excellent keyboarding skills with accuracy and speed. The practice manager will inform you which computers you are to use and which parts of the database to access.

The following information applies to paper-based medical records, not computer-based medical records. Computer-based records are similar but may store the client's and patient's information in a slightly different way. Just remember that *anything* that is done or said to a client about a patient *must* be recorded in the records!
Concept: Whereas paperless medical records are becoming more common, some practices still maintain some or all of their client and patient information in a paper format, hence the need for retention of this information in the third edition.
Concept: Minimally, the information found in a medical record must meet the requirements of the state practice act. This also applies to computer-based medical records.
Discussion: For American Animal Hospital Association (AAHA) member hospitals, standards are available through the AAHA "Medical Records Manual." Preprinted forms from AAHA provide recommended samples of various forms.
Concept: Where brief repetitious information is entered onto medical records, customized stamps or preprinted stickers increase efficiency.
Concept: In most private practices, a medical record contains information about the client and the patient.
Discussion: The medical record, in its entirety, is referred to as the client record. The client information section includes address, contact numbers, and information regarding the client and the pet's human household. The section within the client record containing patient information is referred to as the patient record. This results in dividing a medical record into two different sources of information. In multipet households, medical information will either

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have a separate file for each pet or all in the same file but separated within the patient record by dividers. The dividers are usually tabbed with the patient's name typed on it or color coded to indicate the divisions within the record. The type will depend on the amount of filing space available in a hospital.

Concept: There are many forms found in a medical record; sections are indicated by tabbed and typed dividers.

Discussion: Forms related to a client often list how to contact the owner by listing home and work addresses, phone numbers, driver's license numbers, and alternate contacts authorized to give consent for patient treatment in an emergency. There is a financial section for preferred method of payment and a listing of debits and credits incurred. A statement of ownership, consent for treatment, and acceptance of financial responsibility is included and must be signed by the owner before the first meeting with the veterinarian.

Information regarding all patients, which includes date of birth (DOB), species, breed, sex (altered), and description, is called signalment.

At the beginning of each patient's record is a patient summary sheet, referred to as the master problem list. This includes a summary of immunizations, laboratory procedures, medications dispensed, and a problem list with date diagnosed and date resolved. Important information such as adverse drug reactions and behavioral problems are also recorded.

Concept: Immediately after the summary sheet, a treatment sheet is used to record, in reverse chronological order, the treatments, medications prescribed, and diagnostic tests ordered for the patient.

Discussion: Be certain there is enough space on the treatment sheet for the incoming patient visit. If there is none, add another sheet onto the upper surface of the existing sheet.

Concept: It is prudent to have several blank records prepared in advance so a medical record is available for any new client.

Discussion: This prevents omissions in the assembly of records and prevents clients from waiting while a record is being assembled. Metal fasteners are added or come attached to the folders to secure the forms to the file. Forms are hole punched to fit the fasteners. In some cases, folders will come with preplaced fasteners and forms already hole punched. Pockets can be used on the inside covers of a medical record to secure forms that are not the standard 8½" × 11" size.

Concept: Each hospital has its own preferences for the forms included in a medical record and the sequence in which they are placed.

Discussion: Special circumstances can require additional forms. Learn what each form is used for and in what order they are required to be in the folder.

Procedure

Medical Record Assembly

Location: Usually the reception area

PREPARATION

1. Prepare a reference book card entitled "File Assembly."
2. Review several existing client records.

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3. Note the forms and dividers used.
4. Note the location and sequence of the forms and dividers within the record.
5. Determine the location of all the materials used to assemble a medical record.
6. Choose a clear, uncluttered area in which to work.

PROCEDURE

1. Choose one perfect medical record as your example. You may ask the receptionist to confirm your choice.
2. Lay out one of each required form for a basic medical record.
3. Place them within the medical record folder in the hospital's designated sequence.
4. Secure the forms within the folder.
5. Prepare at least five complete, blank, new client records.

FOLLOW-UP

1. If you have never done this before, have the receptionist check your work.
2. Place the blank records you have prepared in a readily accessible place near the patient intake area.
3. Use these records for new clients as they enter the clinic.
4. Replace the records as they are used. Check daily to see that there is an adequate supply of prepared blank records on hand.
5. Put all materials away after preparing the new records.

TASK 4.2
COLOR CODING MEDICAL RECORDS

Concept: Medical record folders are color coded to reduce erroneous filing and as an alert for special information.
Discussion: The addition of color acts as a secondary notification over and above printed information. Colored stickers are placed on the exterior of a medical folder to indicate numbers or letters. These are locator labels that enable faster and more accurate handling of records. They are placed on the tabs or margins of a folder and are two sided so they can be seen from either the front or back of the folder. The bottom or right front cover margins are used for sticker placement. Placement depends on how the folders are stored, upright or on the spine.
Concept: For an alphabetic filing system, the first three letters of the last name are color coded.
Discussion: Using the last name of Harris as an example, *H* might be represented by a solid purple sticker, *A* by a blue sticker, and *R* by a red and white sticker, or they may be color coded with the letter already on them. These stickers are usually placed on the bottom left outside margin of the folder flap. When the record is filed, the stickers will face outward, which results in all the folders beginning with the purple H being grouped together. All records beginning with the letters H and A, a purple and blue pattern, are together. Those

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files with the first three letters of HAR have a purple, blue, and red/white pattern. Misfiled records are more readily noticed. Similarly, a numeric filing system can be color coded with a different color for the numbers 0–9.

Concept: For added convenience, the client's name is typed adjacent to the color coding on the tab or in the middle of the outside margin of the folder.

Discussion: If desired, the first letter of the first name can be color coded, too. That sticker is placed to the right of the client's typewritten name. This speeds up the process of finding a file if there are multiple last names that are the same.

Concept: Additional colored-coded stickers are used on the right edge of the folder to indicate many different things.

Discussion: These can include the year of the most recent visit, facilitating the purging of inactive files. Allergy stickers warn of patient allergies. Insurance stickers indicate billing procedures. Behavior stickers for aggressive animals are usually red.

Concept: An array of information is found in a medical record. To locate specific information quickly, color coding within the folder is also used.

Discussion: This can be in the form of colored tabs or colored divider sheets separating different types of information. For example, the telephone log might begin with a gray tab or divider, and a yellow tab or divider might precede the financial records within the same client record.

Colored stickers and color-coded dividers are available from medical filing system companies and stationery stores. What is used in a filing system is based on cost, availability, and preference.

Color Coding Files

Procedure

Location: Usually the reception area

1. Prepare a reference card entitled "Color Coding Files" that includes the information on the color-coding system used.
2. Locate all coding materials needed.
3. Put records and materials in one place and adjacent to the computer and printer, labeling machine, or typewriter.
4. Before filing, gather all the new client records used throughout the day and check for completeness. Part of the inspection is application of color coding.

PROCEDURE

1. Working with one record at a time, locate the last name.
2. Type the name label first.
3. Place it in the center on the correct edge or tab of the file folder.
4. Determine the name or number coding using your reference card.
5. Place the appropriate color codes to the left of the name label.
6. Place appropriate coded stickers in order according to hospital preference to the right of the name label.

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FOLLOW-UP

1. Check the client record for completeness. Make any additions as appropriate.
2. Note the quantity of filing materials at hand. If any are deficient in quantity, inform the business manager or make a notation on the hospital want list.
3. Put materials away.
4. Correctly file the records.

TASK 4.3
FILING

Concept: Medical records are legal documents that must be retained for a prescribed amount of time.
Discussion: Check with the practice act for the exact length of time.
Concept: The importance of accurate filing cannot be overstated.
Discussion: A misplaced or unavailable file is frustrating to everyone. Clients think the facility is irresponsible and does not care enough about their pets to maintain records properly. Misfiles waste staff time. Misfiles result in split files. Misfiles result in poor patient care. Medical records provide information facilitating continuity of patient care.
Concept: The alphabetic method of filing is a one-step process.
Discussion: The record is filed alphabetically by the owner's last name, then the first name. Alphabetic filing has the disadvantage that new records are placed between existing records. Eventually, files need to be rearranged on additional shelving or cabinets. More misfiles occur with alphabetic filing.
Concept: Numeric filing is a two-step process.
Discussion: Each client is assigned a number according to the hospital's numbering system. A card system, for example, a Rolodex file or computer database must be set up alphabetically to locate the number assigned to the client. New records are added to the end of the existing records so rearranging files on shelves becomes unnecessary. Numeric filing is as simple as 1, 2, 3.
Concept: Client cards can be issued to the owners with the record number on it.
Discussion: The card is made of plastic or very stiff cardboard. The card number is assigned when the client arrives for the first appointment. The client presents the card when arriving for subsequent appointments. Unfortunately, these cards are often misplaced or clients fail to bring the card to the appointment necessitating a database of some sort for accessing the numerical file.
Concept: A variation to numeric filing is based on the last three digits assigned to a record.
Discussion: This is called terminal digit filing. All files ending in the same last three digits are filed together. The first three digits determine the order. Here is an example. There are five files numbered 99-001, 10-001, 47-002, 38-001, and 55-002. The three ending in 001 are grouped together. The two ending in 002 are grouped together. Within a grouping, simple numeric sequence is maintained. The resulting order is as follows: 10-001, 38-001, 99-001; 47-002, 55-002. An evenly expanding file system is retained with terminal digit filing, and there are fewer misfiles. Color coding is used for the last three digits.

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Concept: An "out-guide" is used to indicate where a file has been removed.
Discussion: This simple manila sheet is preprinted with a place for the dates a file is removed and returned, the name of the file, and where it went or who took it. When the file is returned to central filing, the out-guide is removed and the date returned recorded. A single out-guide is repeatedly used, entering similar information each time. This speeds filing, prevents misfiles, and aids in locating files that have been removed from central filing.

Procedure

Filing Medical Records

Location: Medical record storage area

PREPARATION

1. Determine the filing system used:
   a) Alphabetic—know the color-coding system and how to alphabetize.
   b) Numeric—know the color-coding system.
2. Locate out-guides.

PROCEDURE

1. Check the appointment book each morning before the clinic opens.
2. Pull the records of clients with appointments.
3. Enter information on out-guides.
4. Place an out-guide where each file is removed.
5. Place the records to be used each day, in order of client scheduling, near the appointment book. Use separate appointment files for multiclinician practices.
6. If a client is new to the clinic, place a prepared, blank file in the order they are scheduled. A sticky note can be attached to alert anyone that this file needs to be completed.

FOLLOW-UP

1. Check all files to be returned to central filing for completeness.
2. Complete as necessary.
3. Return files to central storage.
4. File accurately according to the site's filing system.
5. Remove the out-guide and enter the date.
6. Return completed out-guides to their appropriate storage location.

Reminders

1. Before leaving each day, make sure all files are returned to their proper locations.
2. Once weekly, check all out-guides to determine how long each file has been removed from central filing. If more than 1 week, locate the file and remind the user to return the file as soon as possible.

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TASK 4.4
APPOINTMENT SCHEDULING

Concept: Appointment scheduling is an art.
Discussion: If well done, it maintains a smooth flow of work. Clients are at ease. Staff is not overwhelmed. Efficiency is high.
Concept: Most clinics schedule an appointment every 15 minutes.
Discussion: This works if the staff functions as a team, the veterinarian is time conscious, and cases are routine.
Concept: It does not work when there are complicated cases or for new patients requiring more of the veterinarian's time.
Discussion: In instances in which more-than-average time might be needed, it is best to check with the veterinarian or an experienced receptionist regarding the amount of time to allocate.
Concept: Two short appointments can be scheduled for the same time slot (e.g., a routine suture removal and a second puppy vaccination) if the time needed for each is brief.
Discussion: This is called double booking. It requires a clear understanding of how long various procedures take.
Concept: Since the world is not perfect, the best scheduling is ruined by the unforeseen emergency.
Discussion: In this circumstance, it is best to call clients and to let them know there will be a wait to see the veterinarian. Give clients the opportunity to reschedule their appointments.
Concept: Appointment scheduling must take into account clients' needs, hospital staffing, and the flow of activities throughout the day. Each day time is allocated for different activities.
Discussion: This depends on the veterinarian's preference and the amount and kinds of work to be done. Typically, time is set aside before a clinic opens for the veterinarian to check and treat currently hospitalized patients. Once the clinic opens, several hours are designated for appointments. After morning office hours, surgeries and treatments of admitted patients, and a bit of luck, the staff will have time for lunch. Many veterinarians remain on-site to do charting and to make phone calls. By early to midafternoon, clinic hours resume. After clinic hours, the most recently hospitalized cases are treated, existing hospital patients checked and re-treated as appropriate, and the hospital staff prepares for clinic closure. To the client, appointment hours may seem few. To the staff, hours are long and demanding.
Concept: Elective appointments should be scheduled intermittently throughout the day.
Discussion: This allows time between them for the more time-consuming appointments. For example; a nail trim appointment and a vaccination appointment has a check vomiting or a check limping appointment between them. The two quicker appointments give the vet time before and after the check appointment.

Tip Box 4.2: **Intersperse shorter appointments between longer appointments.**

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Concept: Try to schedule the more complicated, serious cases earlier in the day.
Discussion: By doing so, the patient can be treated during the day rather than at the end of the day. If appropriate, this gives the patient a chance to go home by the end of the day, recover from anesthesia, laboratory work to be completed, and prevents staff having to stay later in the day.
Concept: "Walk-ins" are clients who come in without an appointment.
Discussion: If the situation is not an emergency, inform the walk-in clients they will have to wait while scheduled appointments are seen first. The walk-in client can be worked into the schedule if previously scheduled appointments are still seen at their allotted times. Give the client an approximate wait time and, if unacceptable, ask them to schedule a time to be seen. A few clinics work on an entirely "walk-in" basis.
Concept: Learn to differentiate between appointments that are true emergencies that must be seen immediately, urgent cases that need to be seen the same day but can wait a few hours, and routine appointments that can be scheduled at everyone's convenience.
Discussions: Emergencies are life threatening. A few examples of true emergencies are choking, collapse, ingestion of a known toxin, coma, seizure, toxic snakebite, sudden onset of paralysis, being hit by a car (HBC), bloat, falling out of a window from a high story building (high-rise syndrome [HRS]), straining to eliminate especially in a male cat, and *dystocia*.

Urgent cases include vomiting/diarrhea, frostbite, hives, worsening of preexisting disease, eye injuries, and unplanned breeding.

Routine appointments include annual physicals, reexamination appointments, health certificate physicals, vaccinations, suture removals, toenail trims, anal gland expression, and routine laboratory work.

These lists are not inclusive; they represent a limited number of examples.
Concept: Appointments are scheduled using computer-based appointment software or a bound appointment book.
Discussion: Appointments entered into an appointment book are done so in pencil. This facilitates changes.
Concept: When scheduling an appointment, basic information is recorded.
Discussion: The information required includes the client's name, the patient's name, why the appointment is requested, and the client's daytime, home, and cell phone numbers.
Concept: If a client is physically present at the time of appointment scheduling, complete an appointment reminder card.
Discussion: This card has the clinic's address and phone number on one side. The other side has blanks for completing appointment information: patient name, date, and time. There may be a blank section in which to write reminders such as "Do not feed for 12 hours before appointment" or "Please bring fecal sample." Give the completed card to the owner before he or she leaves the clinic.
Concept: The day before a scheduled appointment, each client should receive a confirmation call.
Discussion: The confirmation call serves as a reminder to the owner. Identify yourself to the client; explain you are confirming (patient's name) appointment at (place and time) for (purpose of appointment).

The client will respond with an affirmative or will state the appointment needs to be changed. If necessary, suggest rescheduling at the client's convenience. Ask the owner to recommend a new date and time. If there is a conflict with the clinic schedule, suggest an alternative date and time; otherwise, grant the client's request. Write the new appointment in the appointment book. Erase the preexisting appointment. If using a computer, move the appointment to the new date.

If the appointment is confirmed as scheduled, simply initial the appointment to indicate the confirmation.

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Procedure

Making Appointments
Location: Reception desk if using an appointment book; if using computer-based software, anywhere there is a telephone and a computer terminal

PREPARATION

1. Prepare a reference book card entitled, "Appointments"—create a chart with emergency/urgent/routine columns. Fill in the columns as you learn which is which in your clinic.
2. Keep a sharpened pencil by the appointment book at all times.
3. Have a good eraser next to or on the pencil.
4. Keep the appointment book open to the current date.
5. Block off unavailable times for appointments with a single vertical line through them. This may be surgery time, office safety meetings, or simply lunch time.

PROCEDURE

1. Determine if the request for an appointment is an emergency, urgent, or routine. In a multiveterinarian practice, also determine with whom the client wishes to make the appointment.
2. Determine the length of time needed for the appointment: short, routine, or long.
3. Ask the client the preferred date and time for the requested appointment.
4. Check the appointment book for availability and suitability.
5. Determine a time and date appropriate for both the client and the clinic.
6. Enter data into the appointment book:
   a) Client's name. Confirm the spelling.
   b) Patient's name. Confirm the spelling.
   c) Reason for appointment (chief complaint [CC])
   d) Client's cell and daytime telephone number. Confirm the number.
7. If the owner is present when the appointment is scheduled, complete an appointment reminder card. Give it to the owner.
8. Call the client the day before the appointment to confirm the appointment. A simple message left on a client's telephone answering machine is sufficient if the client does not answer the telephone.

FOLLOW-UP

1. At the end of each day, take time to reflect on the appropriateness of the day's scheduling and the work flow. Was time used efficiently? Was wait time for all team members and clients minimized?
2. Consider changes that could be made to improve client convenience and staff efficiency.
3. Ask for suggestions from your supervisor.
4. Implement changes.
5. Repeat the cycle of reflecting and changing, consciously working each day toward the most efficient scheduling possible.
6. In a multiveterinarian practice, realize each veterinarian has a different routine, works at a different pace, and has different preferences.

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Tip Box 4.3: **Rule: Know which medical and surgical procedures are performed at the worksite.**

TASK 4.5
UPDATING CLIENT INFORMATION

Concept: Client information must be current.
Discussion: It is essential to be able to contact an owner easily in an emergency. Incorrect and outdated phone numbers, addresses, and employment data are impediments to prompt contact. To keep client information up to date, ask clients at every visit to confirm their address, phone numbers, or other personal information changes. If information has not changed, simply initial and date the client information sheet. If there have been changes, politely request the completion of a new client information form. *Make updating client information a part of the routine intake procedure to keep client records current.*

Procedure

Check File for Accuracy
Location: Reception area

PREPARATION

1. Check each file when pulling in preparation for an appointment.
2. Locate the client information form.

PROCEDURE

1. When the client arrives for the scheduled appointment, as appropriate, inquire about possible changes.
2. Initial and date the client information sheet if no changes have occurred.
3. If there are any changes, have the client fill out a new client information sheet.
4. Once a new form is completed, remove the previous form and shred it.
5. Attach the most recent form.

FOLLOW-UP

1. In time, maintaining client information will become routine.
2. Add this information to your assembly of medical record card in your reference book.

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TASK 4.6
INTAKE PROCEDURES

Note: The hospital patient intake tasks performed by the assistant differ significantly from those performed by the receptionist or the assistant working at the reception desk.
Concept: The first 30 seconds of interaction between the client and the receptionist are the key to client service.
Discussion: The client folder is ready. The appointment is confirmed. The client is walking through the door. What is next?
Concept: Put the client and patient at ease.
Discussion: Make them feel genuinely welcome. Put on a big smile. If you know the client's name, greet the person by name. If the client is unfamiliar to you, simply welcome the person and ask, "How may I help you?" From the appointment book, you can guess the name of a client from the time of arrival. In this case, you might offer, "Mrs. _____, I presume."
Concept: From the appointment book, you can determine the patient's name.
Discussion: Greet the patient by name. Tell both client and patient you are happy to see them and welcome them to the clinic.
Concept: Indicate on the appointment record that the client did arrive.
Discussion: If the client is seriously late, make a brief notation of how late. Take the medical record from its location near the appointment book.

Before you even open the folder, here are some things to remember:

1. Medical records are legal documents. If it is not written on the record, it did not happen according to a court of law.
2. All entries are in dark permanent ink.
3. Errors are indicated with a single line drawn through the error with the date and initials of the person making the correction immediately following the correction.
4. Do not use Wite-Out.
5. Do not try to erase or obliterate the erroneous entry.
   Example:
   8/08/12 Chief Complaint: Patient has been vomiting intermittently for 10 days 5 days. (JAJ, 8/31/13)

Concept: The next step is to make certain all anticipated paper work required to complete the visit is included in the folder.
Discussion: Having all required paper work together beforehand increases examination room efficiency and enables the veterinarian to more rapidly and completely record patient information. Determine if there is enough space remaining on the top progress note for the day's visit. If not, add another progress form on top of the existing sheets.
Concept: At the end of the previous visit's entry, begin the current entry.
Discussion: Enter the date. To the right of the date, write "Chief Complaint" or the abbreviation CC. This is why the appointment was made. Locate this information in the appointment book.
Concept: It depends on the procedures of the individual clinic as to whether additional information is requested at this time.
Discussion: In some locations, the receptionist adds the history of the CC to the record before handing the file over to the team member accompanying the client and patient to the examination room. Some clinics use a separate history form. In that circumstance, simply place a

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loose, unfilled history form in the record for the technician or veterinarian to complete. In some clinics, clients self-complete the history form before entering the examination room.
Concept: What is used and where it goes on the progress notes depend on the preferences of the veterinarian and the procedures to be done.
Discussion: Stamps and stickers increase efficiency by eliminating repetitious writing and serving as a means for more quickly recording information. A physical examination stamp or sticker is placed on the progress notes in the objective section. If an examination includes injections/vaccinations or skin lesions, a body stamp or sticker can be placed on the progress notes to speed up making entries in the patient's file. If there is to be a dental examination or procedure, a dental sticker is used. Stamps and stickers are available from commercial veterinary stationery and medical record companies.
Concepts: A charge slip and/or fee estimate slip is placed in the folder. A blank discharge instruction form is inserted for the veterinarian to complete. All anticipated consent forms are placed in the folder.
Concept: Only when all the expected forms are placed in the folder and appropriate entries recorded are the client and patient taken into the examination room.
Discussion: Their medical record accompanies them. It is usually placed in a file holder outside the door of the examination room where it can be briefly reviewed before the veterinarian enters the room.

By anticipating what is needed and having it at hand, efficiency increases, errors decrease, and everyone is happier.

Procedure

Welcome the Client and the Patient to Clinic

Location: Receptionist's desk

PREPARATION

1. Have medical records for each day's appointments beside the appointment book.
2. Check for the most recent client update.
3. Be at the reception desk.
4. Have a smile on your face and in your voice.
5. Have a helpful and considerate attitude.

PROCEDURE

1. Welcome the client by name. Make eye contact.
2. Welcome the patient by name.
3. Ask how you may help them.
4. Initial the appointment book to indicate the client's arrival.
5. Open the medical record.
6. Make certain there is enough space on the progress notes to record the patient's examination. If not, add an additional sheet.
7. Enter the date and CC on the progress note.
8. Affix required stamps and stickers to the progress notes in appropriate spaces below the CC. Allow enough space for data entry.
9. Slip all appropriate forms and certificates into the folder.

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10. Charge slip and/or fee estimate sheet, consent forms and/or certificates, and discharge instructions.
11. Notify the designated team member that the client and patient are ready to be taken to the next available examination room.
12. Direct the client to appropriate seating in the reception area.
13. Inform them of potential wait time.
14. Have current pet-oriented magazines and animal care brochure materials available.
15. If the patient is not leashed or caged, offer a restraint device to the client.
16. 16. If children are present, have a coloring book and crayons as well as appropriate reading materials available. (The American Veterinary Medical Association [AVMA] publishes child-appropriate materials, as does AAHA.)
17. As soon as an examination room becomes available, the client and patient are escorted to the room.

FOLLOW-UP

1. Keep a roll of paper towels, a spray bottle containing disinfectant, a mop, and a mop bucket containing a disinfectant solution near the reception area.
2. Keep a box of tissues in the reception area.
3. Keep a few leashes and a carrier in the reception area for client use.
4. At least twice daily, dust mop the floor and straighten reading materials in the reception area.
5. Keep reading materials current and relevant.
6. Bulletin boards should be attractive and materials current.
7. Any pet product displays must be orderly and clean. Dust and replenish daily.
8. Wash finger and nose prints from windows and doors at least twice daily.

TASK 4.7
THE SIGNALMENT

Concept: Patient forms have information that staff, other than the veterinarian, are expected to complete.
Discussion: This is a description of the patient that includes the following:

1. *Patient's Name:* Confirm the spelling. There can be variations on the same sounding name. For example, Sunny or Sonny. Do not make assumptions.
2. *Species:* This is the kind of animal. See Appendix E, "Common Name, Genus Name, Scientific Name, and Gender Term for Common Species."
3. *Breed:* Learn the most common breeds of dogs and cats. If in doubt, ask owners as they take great offense when their pet is misidentified. Since many dogs are of mixed breeding, trying to identify the mixture is often misleading. In this case, just list the breed as "mixed." If an owner states the genetic combination, that information can be entered under breed.
4. Most pet cats are considered domestic cats and are designated by the length of their hair coat. Breed descriptions and identification are discussed in Chapter 6.

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5. *Description:* This covers the coat color, length, and texture. Again, refer to Chapter 6.
6. *DOB:* Most owners do not know the exact date of their pets' birth. The approximate date is satisfactory, for example, spring 2013. Often an owner will reply to an inquiry of the pet's DOB in years. It is then necessary to subtract the age given from the current year. Never enter a pet's age in years. The following year the pet will be older and the entry becomes incorrect.
7. Young dogs and cats can be aged according to the eruption of their *deciduous* (baby) and *permanent* (adult) teeth. Refer to Chapter 17 and Table 17.2, eruption patterns of teeth in dogs and cats, for the eruption patterns of teeth in dogs and cats. Just because an animal is small does not mean it is young nor does a gray or grizzled nose mean it is old.
8. *Sex:* Male (M) or female (F). In very young pets, especially cats, owners often misidentify the sex of their pets. Refer to Chapter 13, "Patient Care III," on how to sex the more difficult species. The sex of a bird is usually determined through blood testing.
9. *Neutered or Spayed:* Means sexually altered. If the pet has been altered, the sex is written as M/N or F/S. For the male, this is a castration, technically called *orchidectomy*. For the female, this is referred to as spayed or ovariohysterectomy. The last term is abbreviated OHE or OVH. More recently, a simplified version of the OHE is being performed. It is the ovariectomy (OE). This procedure only removes the ovaries leaving the uterus intact. When this occurs at your clinic, make sure the date the procedure was performed is recorded.

Procedure

Patient Data
Location: Receptionist's desk

PREPARATION

1. Identify which forms require patient information to be entered.
2. Know the types of data and abbreviations used for each entry.

PROCEDURE

1. Ask the client for the following:
   a) the patient's name; confirm the spelling
   b) patient's DOB
   c) sex
   d) date of the procedure, if the pet has been sexually altered.
2. Using your own observations, unless the pet is in an enclosed carrier and you cannot see it, record the following:
   a) species
   b) breed
   c) description.
3. Complete each form requiring patient data.

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FOLLOW-UP

1. Make certain all forms requiring patient information are complete.
2. Make certain all required sections on each form are complete.
3. Confirm data accuracy—spelling and correct use of abbreviations.

TASK 4.8
RELEASE OF PATIENT INFORMATION

Before beginning the release or transfer of patient information from one veterinary facility to another, it is necessary to understand the legalities of the medical record. A simplified explanation follows.

Concepts: The clinic that generates the record owns the physical record. The client owns the information on the record.

Discussion: Whenever medical records need to be transferred from one veterinarian to another, a copy of the record, or a summary of the information contained therein, is sent. Remembering that medical information is confidential, a waiver of confidentiality form must be signed by the client before any transfer of information occurs.

When a patient is referred to a specialist or veterinary teaching hospital for treatment unavailable at the patient's customary veterinary hospital, these are the steps to be completed:

1. The owner must first sign a "waiver of confidentiality" or "consent for disclosure" of the medical record.
2. A referral form is prepared. This may be a letter stating the client's pet is being referred from veterinarian A to veterinarian B for the purpose of _____. Alternatively, a preprinted form can be used.
   The form may be provided by the specialist or teaching hospital and meets that group's needs. The originating hospital might have its own referral form.
3. The third step is to have the referring veterinarian prepare a summary of relevant information, or a copy is made of the patient's record covering the dates relevant to the referral.
4. The signed waiver of confidentiality is retained in the patient's record. A dated notation is entered into the patient's progress notes as to whom, where, and what was sent.
5. The final step is to transfer the referral form and the patient information directly to the specialist or teaching hospital. This can be done by registered mail, a commercial carrier that can track the package such as FedEx, or a courier. With computerized records, the information including a scanned release form is e-mailed to the facility.

A similar process happens when a client moves from one location to another. For the sake of continuity of care, an owner wants the medical record. It seems like a reasonable request to the owner. The staff must make a tactful explanation of the legal constraints prohibiting such an action. This is the procedure to follow:

1. The client signs a waiver of confidentiality.
2. The owner provides the name and address of the veterinarian at the new location.
3. A patient record summary or a record copy is made.

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4. The summary or copy is sent directly to the new veterinary site by registered mail, commercial carrier, courier, or e-mail.
5. The waiver is placed in the patient record with a dated notation of where, how, and when the summary or copy was sent.
6. The medical record is retained by the originating veterinary facility for the time required by the state practice act.

Try to complete the entire transfer of medical information process within a day or two of receipt of the signed waiver.

Concept: Although an owner cannot have the actual medical record, a mechanism is available for the owner to have up-to-date information about their pet at all times.

Discussion: A patient medical record folder can be provided to the owner during a pet's first visit to a facility. These folders are customized with the veterinary hospital's name, address, and phone number.

These folders often have a pocket for retaining receipts for veterinary services. The folders have lined sections for dated entries to record routine vaccinations, laboratory examinations, and treatments.

There are sections to add dates for the next recommended physical examinations, vaccinations, or appointments. Information is added to the folder by the staff at the end of each visit. Some owners are conscientious about maintaining these records; others do not bother. If patient folders are issued, make certain to request them to be brought along before concluding telephone calls requesting a wellness appointment.

Procedure

Preparing Records for Transfer
Location: Reception desk

PREPARATION

1. Prepare a reference book card entitled "Release of Patient Information."
2. Locate the waiver of confidentiality form.
3. Determine the reason for information release.
4. Write the release procedure used at the worksite on the reference book card.

PROCEDURE

1. Have the owner sign the waiver of confidentiality.
2. Determine the charges for this service. Often, when a veterinarian refers a patient to another site for continued care, a fee is not charged to transfer the medical record. When the owner terminates veterinary care and a request for information to be transferred to another veterinarian, there is usually a fee.
3. Secure the confidentiality waiver to the patient record.
4. Make a dated entry on the progress notes as to how whom, where, what, and why the information was released.
5. If the patient is being referred to a specialist or teaching hospital:
   a) Complete a referral form.
   b) Make a copy of the patient record for the dates relevant to the referral.
   c) Have the referring veterinarian write a brief summary.

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6. If the owner is moving:
   a) Request the name and mailing address of the new veterinary facility.
   b) Before making a copy of the record, check with the veterinarian as to the preferred procedure:
      i. a copy of the summary sheet preceding the progress notes
      ii. a copy of the entire record (or)
      iii. a summary prepared by the veterinarian.
7. Mail the information, with the referral information if appropriate, using a method that provides tracking of shipping.

FOLLOW-UP

1. Return the file to central filing.

TASK 4.9
RABIES CERTIFICATES

Concept: The near elimination of rabies in the human population of the United States is due to the control of rabies in the pet population.
Discussion: Improved vaccines and mandatory vaccination for licensing of pets has made this possible. A current rabies vaccination is one of the stipulations for licensing with penalties for unlicensed pets, which include impounding and fees.
Concept: The veterinarian is the only person that can give a rabies vaccination.
Discussion: Because rabies is a zoonotic disease and of concern to public health, most practice acts require a licensed veterinarian to administer the rabies vaccine. A rabies certificate and tag are then issued to the owner as proof of vaccination. The veterinary staff completes the certificate. The veterinarian's signature verifies the accuracy of the information on the certificate.
Concept: Vaccine manufacturers produce removable labels on their vials.
Discussion: The vial label is removed then affixed to the patient record after the vaccine is administered. The data requested on a rabies certificate are available, in part, from the label on the vaccine. This includes the manufacturer, the type of vaccine (killed or modified live [MLV]), the product lot or serial number, and the expiration date of the product. Owner information and patient description are also required on the certificate, which is available from the medical record.

Computerized clinics usually generate a computer-based rabies certificate. Data are generated from information on the patient's progress notes. This is done at the end of the client visit when the itemized statement and client receipt are generated. A signed copy of the rabies certificate and tag is given to the owner.
Concept: Information regarding the duration of a vaccination is found in the manufacturer's recommendations for use; however, state law may require more frequent revaccination.
Discussion: The manufacturer's recommendations include the following:

- species in which it is safe to use the product
- minimum age of the patient to which the vaccine is safely administered
- revaccination recommendations

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- how the vaccine is administered (subcutaneously or intramuscularly)
- proper storage of the product.

Typically, if this is the first rabies vaccination a pet is receiving, another one is due in 12 months. If this is the second or subsequent rabies vaccination, then the vaccination is good for 36 months. However, it all depends on the vaccine being used, the manufacturer's directions for use, and the legal requirements for the area in which it is administered. Read labels. Know the law.

Concept: In some municipalities, whenever a rabies vaccination is administered, a duplicate copy of the rabies certificate is sent to the animal control authorities. The clinic copy is filed for access if the animal bites someone and the owners cannot find their copy.

Discussion: This results in the periodic mailing of rabies certificates and/or maintaining a filing system.

Concept: Rabies tags are issued with the certificate.

Discussion: Tags will have the clinic address, phone number, tag number, and year. This is how authorities determine who owns the animal and if the rabies vaccination is current. When issuing a tag, make sure to keep the numbers in consecutive order. This reduces confusion when searching for a particular tag number. Most computer programs will automatically put the next tag number on the rabies certificate.

In some localities, pet licensure is done at the veterinary clinic. Whereas this is convenient for the client, the veterinary staff is responsible for completing licensing materials, issuing tags, and collecting fees. The staff must then forward the paperwork and fees to the animal control authorities.

Procedure

Preparing a Rabies Certificate

Location: Reception desk

PREPARATION

1. Locate the patient progress notes.
2. Locate the date when the most recent rabies vaccination was administered.
3. Determine the data required for the completion of the rabies certificate.

PROCEDURE

1. Complete the rabies certificate filling in
   a) client's name and address
   b) patient description including
      i. name
      ii. species
      iii. breed
      iv. description—coat color, coat length, size, and/or weight of the patient
      v. sex, including if surgically altered
      vi. DOB
   c) vaccine information including
      i. manufacturer
      ii. vaccine type, killed or MLV
      iii. lot number of vaccine

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   d) duration of vaccine administered or when the next vaccination is due
   e) administering veterinarian's name, address, and state license number
   f) rabies tag number is confirmed as the next in line and is then entered onto the certificate.
2. Have the veterinarian sign the completed form.

FOLLOW-UP

1. Check the accuracy of the required data is entered.
2. Give a copy of the certificate to the owner.
3. If mandatory, mail batched duplicate rabies certificates to the local animal control department as per schedule.
4. If appropriate, license the patient, issue tags, and collect the license fee. Forward the fee and paperwork to the animal control authorities as per schedule.
5. Duplicate certificates can be issued if an owner has misplaced the original. The certificate is clearly labeled "Duplicate." A fee is customarily charged for this service.

TASK 4.10
HEALTH CERTIFICATES AND INTERSTATE SHIPMENT OF ANIMALS

Concept: Both federal and state agencies are responsible for the prevention of the spread of animal diseases.
Discussion: Every country and each state have their own requirements for animal shipment and entry to prevent importation of infectious and contagious diseases from one locale to another.

This control is accomplished through the issuance of health certificates before the movement of an animal across state or international borders.
Concept: Currently, only United States Department of Agriculture (USDA) accredited veterinarians can sign a health certificate.
Discussion: The accreditation certificate is usually displayed in a prominent place within the facility along with the veterinarian's license to practice and the facility's business license.
Concept: The certificates for small animals differ from those of large animals.
Discussion: Certificates are available through a state's Department of Agriculture. Airlines routinely require an accompanying health certificate when animals are shipped.

A health certificate contains information about the following:

1. *The Owner or Consignor:* name, address, and phone number; this is the animal's current location
2. *Purchaser or Consignee:* name, address, and phone number; this is the animal's destination.
3. *The Animal or Animals:* name/identification, species, breed, description, age, sex, and license number or tattoo
4. *For Small Animals:* rabies vaccination data including manufacturer, serial number or lot, vaccine type, and vaccination date

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5. *For Large Animals and Poultry:* disease status of state and herd or flock, individual animal identification, and testing dates with results
6. *The Signing Veterinarian:* state license number and address.

There are preprinted statements certifying the following:

1. An accredited veterinarian has examined the animal(s) described within the past 10 days. This is additional licensure issued by the USDA to veterinarians who have completed their training.
2. A statement that the animal is free from contagious or infectious disease.
3. For small animals, there may be a statement that the animal has not bitten anyone in the past 10 days.
4. The animal meets the requirements for entry into the state or country of destination.
5. The signing veterinarian is licensed by the state of issuance and is certified by the state and USDA to sign the certificate.

Concept: The examining veterinarian signs and dates the certificate after examining the animal(s) described.
Discussion: A staff member enters client and patient data.

Forms are prepared in multiple copies with one copy accompanying the animal during shipment. Additional copies, as required, are sent to the State Department of Agriculture and the USDA for approval. A fee is charged for the preparation of these certificates, with an additional fee for those sent to the USDA.
Concept: These requirements change over time and vary by species.
Discussion: The staff is responsible for determining the destination state or country requirements for animal entry. This is accomplished by calling the USDA's free, 24-hour, automated voice response service. The phone number is 1-800-545-8732. When asked for the category, select "2" for state requirements. This is followed by the state code then the species code. This information is also available at http://www.usda.gov/wps/portal/usda/usdahome?navid=PETS&navtype=RT&parentnav=TRAVEL_RECREATION or through a link at https://www.avma.org/public/PetCare/Pages/Traveling-with-Your-Pet-FAQs.aspx.

For international shipment of animals, contact the destination country's nearest embassy or consular office for specific requirements and forms. International regulations are accessed at www.aphis.usda.gov/regulations/vs/iregs/animals/.

Tip Box 4.4: **Health certificates are legal documents. Accuracy is essential.**

Procedure

Preparing a Health Certificate

Location: Reception desk

PREPARATION

1. Access USDA either by phone or through their website.
2. Have paper and pen at hand.
3. Know the destination of the animal shipment.

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4. Press on the link to the site of destination.
5. Correctly record the requirements for entry.
6. Choose the appropriate certificate for the species to be shipped.
7. Determine how many copies of the form are needed.

PROCEDURE

1. Type or write legibly on the appropriate form. Multiple copies can be printed if the forms are computer generated.
2. Complete each section as required.
   a) From the medical record:
      i. *The Owner Who Is the Consignor:* name, address, and phone number
      ii. *The Animal:* name/identification, species, breed, description, age, sex, license, microchip, or tattoo
      iii. *Small Animals:* rabies vaccination data and other vaccinations if requested
      iv. *Large Animals:* disease status of the state, disease status of the herd or flock, individual animal identifications, and testing dates with results
   b) From the owner: purchaser or consignee name, address, and phone number
   c) From the veterinary site: name of the signing veterinarian, state license number, and address
3. Check the accuracy of all entries.
4. Make certain all sections are completed as appropriate.
5. Place or scan the form in the medical record. It accompanies the medical record into the examination room. It is signed after the veterinarian examines the animal. At the discharge of the patient:
   a) Give a signed copy to the client
   b) Charge the client the fee listed for health certificate preparation plus the physical examination and any additional fees required.

FOLLOW-UP

1. Mail any required forms to the State Department of Agriculture or State Veterinarian and the USDA.
2. One copy of the certificate is retained and secured within the client's record or scanned into the record.

TASK 4.11
CONSENT FORMS

Concept: Consent forms are contracts.
Discussion: They provide written evidence of the services requested or agreed to by the owner. They do not protect the veterinarian from malpractice or negligence, but do provide proof that the services performed were requested.

A consent form includes

1. the veterinarian's name
2. the hospital name, address, and phone number

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3. the owner's name, address, and phone number
4. the patient's name/identification, species, breed, description, age, and sex
5. a statement that the signer of the form is the owner and is authorized to execute the consent form
6. authorization statement for the specified procedure
7. a statement that the owner has been informed of risks and/or potential complications of the procedure; in the case of euthanasia, castration, OVH, tail docking, and so on, the irrevocability of the procedure
8. any other statements as deemed appropriate (e.g., use of support staff, veterinarian not on the premises 24/7, other staff veterinarians may participate in patient care)
9. a signature and dateline for the owner to complete.

The completed form is retained in the medical record. As with any medical record datum, it must be complete and accurate.

Concept: Consent forms can be customized, resulting in several forms used within a facility.

Discussion: Examples include those for surgery/anesthesia, boarding, euthanasia, and estimate forms. Some hospitals use a single generic form and customize the information according to purpose and procedure. The AVMA publishes a generic consent form in its annual directory with recommendations for its use.

Tip Box 4.5: **As with any policy or procedure, check the consent form types and the procedures for the use of each at the worksite.**

Procedure

Preparing Consent Forms

Location: Reception desk

PREPARATION

1. Prepare a card for your reference book entitled "Consent Forms."
2. Determine the specific services an owner is requesting.
3. Know when a consent form is required.
4. Know which form is used.
5. Have the appropriate consent forms loosely placed in the medical record before the patient's appointment.

PROCEDURE

1. The technician or veterinarian will review the consent form with the owner before the procedure. After review, the owner signs the form.
2. If the patient is being left at the facility without seeing the veterinarian or technician beforehand, the consent form is signed at the reception desk. An example of such a situation is when an animal is left for boarding and/or grooming.

FOLLOW-UP

1. Copy the consent form and give it to the owner.
2. Attach the original, signed consent form to the medical record.

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TASK 4.12
CLIENT COMMUNICATIONS

Concept: Client communication takes forms other than the face-to-face communications that occur daily within a veterinary facility.
Discussion: Veterinary hospitals produce periodic newsletters targeted to potential and existing clients within a defined geographic area. Websites and social media reach clients worldwide, explaining special features and services of the facility. Client postcards are a more traditional means of communication. All of these enhance public awareness of a veterinary practice. They become a form of strengthening the veterinarian–client bond.

The "welcome" card is addressed and sent to first-time clients as the initial reinforcement. This card welcomes the client to the practice and thanks the client for using the site's services. This is followed by a statement that the clinic is always concerned about the pet's health and happiness, followed by the phone number to be used when there are questions regarding the pet's well-being.

The "Thank you for the referral" card is sent to a client who refers another client to the practice. To do this, new clients need to inform the staff as to why they chose the services of a particular practice. To facilitate this, there can be a referral section on the client information sheet. The card lets a client know the recommendation is appreciated.

A "sympathy" card is sent whenever a pet dies. It is customary for each staff member to sign the card. The veterinarian or technician may include a personal note to the owner.

In situations in which the loss is particularly traumatic for the owner, it is common for a staff member to call the owner within the first 24 hours and check on how the individual is doing. Owners are reassured they provided their pet with a happy life, the pet will always be remembered by the staff, and referral is made to a grief counseling service if available and/or desired. In some cases, a donation is sent in the pet's and owner's names to an animal-related charity. Whenever a patient dies, remove the reminder cards from the file box. *There is nothing more insensitive than sending reminder cards to an owner whose pet has died.*

The "reminder" card is sent to owners to remind them when a pet is due for routine services such as the annual/semiannual physical heartworm test, dental prophylaxis, or vaccinations. The client typically addresses the card for the following routine service at the time a periodic service is rendered. The card is then placed in a file box under the month and year the next service should be rendered. Once a month at the beginning of the month, the cards for services due during the month are mailed to the owners. In some practices, reminder cards are computer generated. Other practices use a preprinted postcard or e-mail. By using varied forms of contact, the owner is more likely to respond.
Concept: Veterinarians and technicians routinely use the telephone to contact owners of pets that are ill but are not hospitalized.
Discussion: This provides a means of monitoring patients, allowing owners to ask questions, and gives the veterinarian or technician an opportunity to decide if a patient should be seen sooner than its next scheduled appointment. Each hospital has a routine for doing this. It may be as simple as placing the records of patients to be called by the veterinarian's telephone.

Another mechanism is the daily "Follow-Up Phone Call Reminder" form. This form has headings for

1. the owner's name and phone number
2. the patient's name
3. a problem statement

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4. the dates of patient discharge and possible reexamination
5. space for entry of telephone notes.

This form is preferable to letting the medical record linger on someone's desk. When using this procedure, the medical record remains in central filing available to others. A number of individually dated forms are maintained at the receptionist's desk. The entries are made on the form dated for the appropriate day of contact. Entries on the form are made as patients needing such contact are discharged. The completed form is placed by the telephone of the person delegated to do the follow-up telephone calls. A single form is used for each day and then stored at the end of the day in a three-ring binder as a permanent record of telephone conversations. The date, the reason for the call, and a synopsis of the conversation is marked in the patient's record. If there is information of which the veterinarian should be made aware, the contacting staff member promptly does so with the file in hand.

These processes seem time consuming. They are not. They become a part of the hospital routine. These actions pay priceless dividends in practice goodwill while improving the quality of patient care.

Procedure

Client Communications
Location: Reception desk

PREPARATION

1. Prepare a task card entitled "Client Communications."
2. Determine the types of client communications used at the practice site.
3. Determine which cards or forms are appropriate for an individual client's visit.
4. Write the telephone (client call back) procedures on your card.

PROCEDURE

1. For a reminder card:
   a) Have the owner address the card as part of the patient discharge procedure.
   b) File the card under the month and year in which it is to be sent.
2. For all other cards:
   a) As soon as the client leaves, pull the appropriate blank cards.
   b) Place them inside the front cover of the medical record.
      i. Before the medical record is filed, fill in the appropriate cards with the client's and pet's information.
   c) File the cards under the month the client is to be notified then mail the cards as appropriate.
3. For daily follow-up telephone call reminders:
   a) Complete owner and patient information on an appropriately dated form and in the patient's file as patients are discharged.
   b) Place each day's form in a predetermined location.
   c) A designated staff member makes follow-up telephone calls each day.
   d) Notes are taken during the conversations.
   e) File the completed form in a binder at the end of each day.
   f) File the patient's record or alert the veterinarian if necessary.

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4. Pull cards of pets that are euthanized to prevent hurting the client with what is perceived as a thoughtless gesture.

FOLLOW-UP

1. Check on supplies of cards and forms.
2. If a particular type is low, place on want list or notify the practice manager. Allow enough time for them to arrive once ordered.
3. Check on postage; if the stamp supply is low, place on want list or notify the practice manager.

TASK 4.13
PATIENT DISCHARGE

Concept: These are the events occurring immediately before a patient leaves a facility.
Discussion: The owner will be present for some of them. Other actions occur after client departure. Whether a patent is leaving after a brief outpatient visit or a prolonged hospitalization, there are standard procedures that take place.

In either case, the owner and patient have just left the examination room after having received final instructions from the veterinarian or technician. The following events occur at the reception desk. As soon as the client reaches the reception area, inquire regarding the following:

1. Ask if the client received all the services and medications anticipated. If they have not, see that the situation is corrected immediately. A veterinary visit is complex. There are things that even the owner may overlook.
2. Ask if the discharge instructions are clear.
3. Inquire if the administration of the medication was demonstrated in the examination room. If not, alert staff to do it.
4. If a clinic sells pet-related products such as nail trimmers and special diets, this can be the time to remind the owner of their availability.
5. Determine if a follow-up appointment is needed. This information is usually placed at the end of the plan section of the SOAP notes. Make the appointment accordingly. Give the owner an appointment card with the date and time of the appointment recorded on it.

Assuming a charge slip was completed in the examination room, it is now totaled and presented to the owner. Never simply present the total fee for services. For example, a receptionist presenting a fee uses this technique: "Mrs. Jones, Missy received a distemper vaccination for $ ___; the examination was $___; the laboratory work came to $____; and the three medications cost $ __, $__ and $__ for a total of $___ for medications. The total for services today is $_____. How do you wish to pay for this: cash, check, or credit card?"

Tip Box 4.6: **Always review the individual items with the client on the charge slip first before announcing the total.**

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The usual procedure is to ask how the owner wishes to pay immediately after the total is presented. Seldom does a veterinary facility permit a client to be billed for services. A receipt is prepared and given to the client immediately upon payment. Receipts are usually computer generated. If not, use the facility's receipt form.

The veterinary assistant should know which credit cards the facility accepts, how to swipe a card, and the access number for the clinic. Ask an experienced staff member to demonstrate charge card procedures. Be certain to return the credit card to the owner with their receipt and a charge slip for their signature which the clinic retains.

If a veterinary site uses reminder cards for annual physicals and other routine patient care, have the owner address the card at the desk during the discharge process.

Remember your manners; thank clients for coming. Tell owners you and the other staff members appreciate their use of the veterinary services. Indicate that you hope they will use your services again. Let them know they are free to call whenever they have questions or need help. Thank the pet for being a good patient.

After the owner leaves and before closing for the day:

1. Check the medical record for completeness and file only after all stickers, color coding, information and reminders, and so on, are complete.
2. File the reminder card.
3. If this was a new owner, address and prepare for mailing a welcome card.
4. If a patient has died, address and prepare for mailing a sympathy card. Remove any reminder cards from files.
5. If a discharged patient is ill, enter information on the telephone follow-up sheet for the technician or veterinarian. Place it and the patient's file by the telephone on his or her desk.

Procedure

Client Checkout

Location: Reception desk

PREPARATION

1. Prepare a task card entitled "Client Checkout."
2. Maintain a cheerful and calm attitude.
3. List what you are expected to do on your task card.
4. Work efficiently and accurately.

PROCEDURE

1. Acknowledge the client and patient.
2. Inquire and respond accordingly:
   a) Were all services received?
   b) Were all medications received?
   c) Was there a demonstration of administration of medications?
   d) Are there any additional questions?
   e) Are there any other products or services needed?
3. If indicated on the medical record, make a follow-up appointment and complete an appointment card.

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4. Have the owner address a reminder card if appropriate.
5. Total the fee for services.
6. Present the fee in an itemized manner. Always service first then price.
7. Inquire regarding the method of payment.
8. Collect the fee.
   a) Give change as appropriate.
   b) Handle credit card procedures. Remember to return the credit card to the owner.
   c) Handle the credit card slips in such a way that no one else has access to the information on them.
   d) Checks are immediately endorsed with the facility account stamp before being placed in the locked cash drawer.
9. Prepare the receipt and give it to the client.
10. Show your appreciation.
    a) Thank the owner for coming.
    b) Compliment the patient for being a good patient.
    c) Let clients know the staff is concerned about the health and happiness of their pets.
    d) Phone calls are always welcome.
11. Let the owner and patient know you are looking forward to seeing them again.

FOLLOW-UP

1. File reminder cards.
2. Prepare welcome cards for new clients.
3. Prepare sympathy cards and pull reminder cards for deceased patients.
4. Make entries on telephone follow-up form for veterinarian and/or technician.
5. Place the day's telephone follow-up form in a three-ring binder.

TASK 4.14
TELEPHONE TECHNIQUES

Concept: How telephone calls are handled influences practice success.
Discussion: With the varied demands of the front desk, the phone is too often misused. Things to remember:

- Answer within the first three rings.
- Put a smile on your face and in your voice before answering the telephone.
- Welcome the caller.
- Give your name and that of the clinic.
- Ask how you may help the caller.
- Do this calmly and at a moderate pace.

Concept: If it is necessary to put the caller on hold, ask them if you may do so first, then wait for the response and then push the hold button.
Discussion: A client with an emergency risks being put on hold by an abrupt receptionist who fails to wait for the caller's response. Do not leave a caller on hold for more than 1

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minute without checking on the caller. If necessary, it is better to take the caller's name and number and tell them you will call back within the next 5 minutes rather than have them hold for an extended period. If you say you will call back within a given period, do so without fail.

Concept: Prerecorded patient care information can be played while an owner is on hold.

Discussion: These infomercials are commercially available and are customized to meet a site's requirements.

Concept: There should be an adequate number of telephone lines.

Discussion: This prevents clients from receiving a busy signal or having staff unable to make outgoing calls. Alert the office manager if you are told by a client that the lines are busy and they had to try multiple times to get through. *Never make personal phone calls on the clinic phones.*

Concept: Always have a functional pen and a message book by every telephone in the hospital.

Discussion: Standard spiral-bound telephone message books with no carbon required (NCR) duplicates are preferred. They provide spaces for important information and a record of each call after the original has been removed. The spiral is used for tying a long string to the pen or pencil.

Concept: Most phone calls are divided into one of four categories.

Discussion: The following are the primary categories:

1. *The Client Who Needs an Appointment:* This is discussed in Task 21.4. Remember that in emergency situations, a client is directed to come in immediately. Emergencies do not require an appointment. The rest of the staff is notified of the client's impending arrival and the type of emergency; the patient's medical record is pulled from central filing. Waiting clients are informed of the imminent arrival of an emergency and that it will be admitted immediately, with a possible delay in their own appointments depending on the circumstances. Permit those who cannot wait to reschedule.
2. *The Potential Client Who Is Shopping for Services:* This is the person calling to inquire about the fees for services. Rather than treating these persons as a nuisance, the trick is to turn them into enthusiastic clients. This is done by describing the steps involved in completing a particular service, what is offered that is special about this service, and only then inform the caller of the cost. This procedure is similar to the manner in which the total fee for service is presented to a client at time of discharge.

   A copy of the suggested fees for services is kept by the front telephone and any other locations where it might be useful. Immediately ask if you may make an appointment for the caller after presenting the details of the service. If there is any hesitancy, offer to have them drop by to tour the quality facilities and to meet the caring professionals available for their pet's care.

   Rather than thinking of this caller as a time-consuming nuisance, make this a game of "Challenge." The "challenge" is to make this person come in to see the facilities and/or to make an appointment. Turn the hesitant shopper into an enthusiastic client.
3. *A Client Who Is Inquiring about a Hospitalized Pet:* Know who is hospitalized and the status of each patient. Know if the patient is to be discharged that day, if the veterinarian wishes to speak with the owner, or if the procedure for which a patient has been hospitalized is complete. This information is available on the hospital treatment board in the treatment room or the hospital patient status sheet, another of the many forms used within a veterinary facility for in-house communication. This

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form is completed by the nursing staff and given to the receptionist after morning treatments and updated in the afternoon. It has lines for each patient's name, why each patient is hospitalized, and a message about the patient. If using vet management software, this will either be in the patient's record or on the "whiteboard" section of the software.

4. *The Caller Who Needs to be Redirected to Another Staff Member:*
   a) calls for a veterinarian from another veterinarian
   b) technical calls that should be answered by the technician or business manager
   c) calls for which you do not know the answer. It is better to state you do not know the answer and you will direct the caller to someone who does rather than to give an incorrect answer.

Concept: Try to screen calls for veterinarians.
Discussion: Ask what the call is about and redirect if other staff members can answer a caller's questions. Do not interrupt a veterinarian in the examination room or surgery unless it is a real emergency. This applies to the surgery room too. Take a message and tell the client when their call will be returned. Veterinarians often limit their telephone time to specific hours of the day. Get the phone number where the individual can be reached during that time. *Personal calls for staff members should not be made or received by staff members during work hours except for true emergencies*. If this happens, inform the staff member and others so duties are covered for that staff member.

Procedure

Telephone Etiquette

Location: Usually the reception desk but can be anywhere a telephone is located

PREPARATION

1. Check for message taking supplies next to each telephone in the clinic (e.g., pen attached to spiral binding of message book).
2. Have an updated patient status sheet by the appointment book at the front telephone.
3. Know basic hospital procedures and have a clinic price list by the front phone.
4. Keep a smile in your voice. This is best accomplished by keeping a smile on your face.
5. Answer by the third ring.
6. Use the hold button sparingly.
7. Review the differences between emergency, urgent, and routine situations.

PROCEDURE

1. Greet the caller. A simple "Good morning" or "Good afternoon" is sufficient.
2. Give your name and that of the clinic.
3. Follow this with "How may I help you?"
4. Determine the appropriate procedure meeting the caller's needs. Follow it.
5. If you must put a caller on hold, ask if you may do so first, then wait for their answer. If the wait time will be more than 1 minute, take the caller's name and phone number and return the call promptly.

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6. Record telephone message, completing all sections on the message form. Give the original to the recipient of the message.
7. Direct phone calls as needed. When redirecting callers, find out their names and why they are calling. A simple inquiry asking "And may I inform ____ of the reason for your call (name of caller)?" will do. When notifying recipients of calls, they will then know why they are accepting the call and from whom. Reminder: It is always best to have someone knowledgeable answer a question than risk giving an incorrect answer.

FOLLOW-UP

1. Review hospital procedures with an experienced staff member. Have the staff member check your accuracy and telephone technique. Continually strive for improvement.

TASK 4.15
HANDLING DIFFICULT CLIENTS

Concept: Coming to a veterinary clinic is not for pleasure.
Discussion: It is the accepted obligation of the conscientious animal owner. It is time consuming in a world where there are many demands on an owner's time. It costs money; veterinary services are paid with discretionary income. The owner has determined to spend resources on a pet rather than elsewhere. To make matters worse, the stresses are increased if the seriously ill or injured pet is a beloved family member. Likewise travel with some pets is difficult. Consider the carsick puppy and the cat who neither likes carriers nor cars. The staff is then left to deal with clients who are already upset. Some clients are outright demanding. Let us look at how these situations arise.

1. Clients are mad at the situation in which they find themselves.
2. The situation seen from their perspective is stressful and we do not know the additional stressors in their lives.
3. Most issues arise from miscommunications.

How do you deal with these people?

1. Remain calm.
2. Listen. Let them finish what they have to say. There may be a clue in what they say as to what the underlying problem might be.
3. Try to see the situation from their perspective, not yours.
4. Do not be defensive. Clients are not mad at you despite what they say.
5. Begin to calm the client by
   a) reflecting back what the client has said. For example, "I understand Mrs. ___. Snoopy is very ill, and I know he is happier at home. If he stays here and receives intravenous fluids, he will be able to return home much sooner and does not risk becoming worse."
   b) asking the client what you can do to remedy the situation. For example, "Mrs. ___, what would you suggest to make the situation more comfortable for both you and Snoopy?" Suddenly, the client needs to think, and the whole situation

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usually starts to de-escalate. Continuing with this scenario the super staff member allows Mrs. ___ to catch her breath and think about what she wants. If her suggestion is totally unreasonable, suggest an alternative. Mrs. ___ now demands, "I want a cot in the ward, so I can be near my Snoopy." Staff member: "That is a good idea but there are other patients in the room and it will not be a comfortable place for you or them to get proper rest. Snoopy needs you to be well rested to continue his nursing when he returns home. "How about bringing the pillow case or blanket you used last night, and we will give it to Snoopy to snuggle."

6. Some people can never be satisfied. It is not your fault. That is the way some people function. These are clients best handled by the veterinarian or practice manager. Take the client and the medical record into an examination room. Notify the appropriate team member, and let that person deal with the situation. There is a bit of psychology here. When the voice of authority speaks, clients are more willing to listen.
7. If a client is belligerent, noisy, shouting, and out of control, get the person out of public areas immediately. Put this person in an examination room. If one is not available, an office will do. It creates a negative impression on other clients to see such a situation. Assure the clients in the reception area that their appointment will be seen on schedule.

Unfortunately, there are ample opportunities to practice these client skills. The staff member who successfully deals with difficult people is important to a practice. Never shout or raise your voice. This just escalates feelings and it is always harder to yell at a person who is not yelling back. Remain calm, cool, and collected.

Procedure

Dealing with Distressed Clients

Location: All public areas of the veterinary facility

PREPARATION

1. Try to avoid creating situations in which problems arise:
   a) Treat everyone with courtesy and respect.
   b) Minimize interruptions during client transactions.
   c) Minimize client wait time.
   d) Use fee estimate sheets and explain services and procedures in detail before disclosing the total.
   e) Get client permission for all procedures by using consent forms.
   f) Communicate as clearly as possible. Ask the client to reflect back instructions. This is an excellent way of making sure the client understands.
2. Project a warm, caring, and positive attitude at all times.
3. Be genuinely helpful.

PROCEDURE

1. Determine who can best resolve the situation.
2. Determine if the situation should be dealt with in private.

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3. Remain calm.
4. Listen to clients' needs, problems, and perspectives.
5. Do not be defensive.
6. Ask clients what they want you to do to resolve the situation. Offer alternatives if necessary.

FOLLOW-UP

1. Afterward, take a deep breath and put the situation aside. You can talk about it more during break time. Meanwhile, other clients need your focused attention now. Do not allow anyone to determine how your day is going.
2. Take time at the end of the day to reflect on why the situation arose and how it might have been prevented.
3. Consider ways in which such situations can be better handled.
4. Remember to think about it from the client's perspective! Learn to control your own emotions.

TASK 4.16
HOSPITAL CLOSING PROCEDURES

Concept: At day's end, two team members complete the tally of the receipts and prepare the bank deposit.
Discussion: This increases accuracy and efficiency as well as ensures honesty. Usually, staff members are randomly rotated for this procedure.
Concept: A bank deposit is then prepared, which is signed by the two individuals preparing the slip.
Discussion: The signatures verify the accuracy of the deposit slip and the fees collected. Cash, checks, and credit card slips along with the completed and signed deposit slip are placed into the bank transfer bag. It is either placed in a safe that is immediately locked or the bag is given directly to the practice manager.
Concept: There are a series of small tasks to be completed immediately prior to staff closing the premise doors and departing.
Discussion: Complete any closing procedures expected of the veterinary assistant. This might include

1. backing up computer data
2. closing and locking the safe
3. turning off most lights
4. setting the alarm
5. turning on the answering machine
6. turning down the thermostat
7. a final walk through of patient wards. Walk through the animal wards and check on patients. If there is anything amiss, immediately contact the veterinarian or technician on duty. Otherwise, turn off lights and close ward doors.
8. doing any maintenance or procedures that require 12 hours like the gas sterilization or radiograph cassette care.

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Procedure

Closing Procedures
Location: Throughout the veterinary facility

PREPARATION

1. Prepare a task card entitled "Closing Procedures."
2. List the procedures for which you are responsible for completing in the order in which they are accomplished.

PROCEDURE

1. Do closing procedures as appropriate.
   a) Business/reception
      1) Balance the till; count collected money.
      2) Prepare deposit slip; place the deposit slip and the money into a deposit bag.
      3) Give the deposit bag to the office manager or place it in a locked safe.
      4) Pull client records for the next day.
      5) Back up computer data.
      6) Turn on the answering machine.
   b) Patients
      1) Check each ward. Are the patients doing well?
      2) Are the medications completed and recorded in patient records?
      3) Are food and water appropriate?
      4) Are the kennels clean and comfortable?
   c) Building and parking lot
      1) Pick up any clutter inside and outside of the building.
      2) Doors and windows are securely closed and locked as appropriate.
      3) All equipment is turned off: computers, dryer, dishwasher, medical equipment, and so on.
      4) A few lights are left on for security reasons. Know which ones are left on, turning off all the others.
      5) The thermostat, if not programmable, is turned down in the winter and up in the summer; know to what temperature the thermostat is kept at night.
      6) Alarm is set immediately prior to exiting and after all staff members have checked out and left.

FOLLOW-UP

1. Review the task card if you do not close the practice often so that nothing is forgotten.

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

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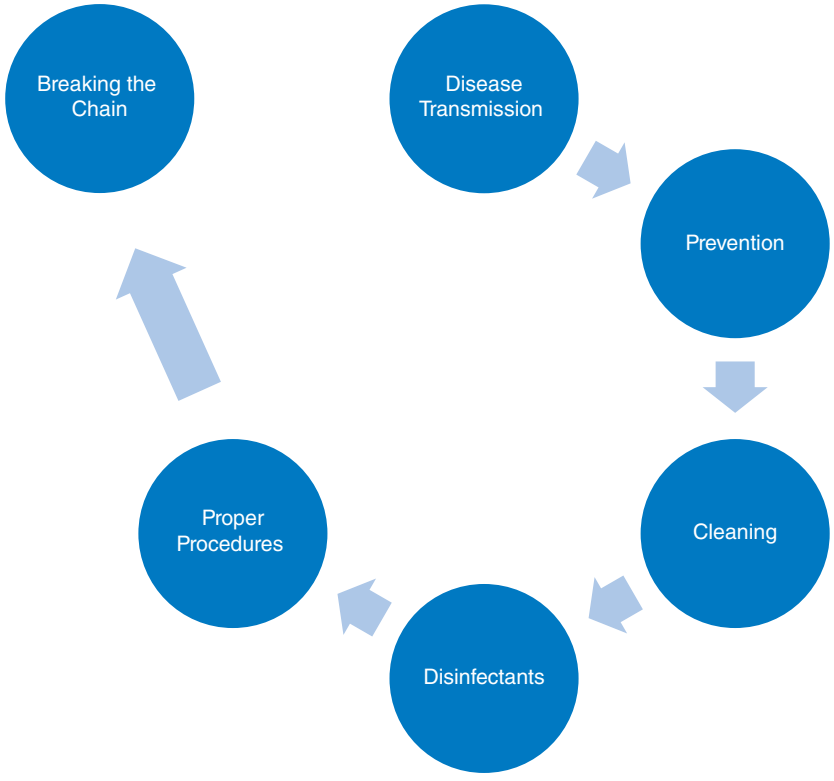
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CHAPTER

5

DISEASE TRANSMISSION, CONTROL, AND PREVENTION

JENNIFER SERLING



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Identify potential sources of infection in a veterinary facility.
2. Understand the types of pathogens present in the veterinary setting and how they are transmitted.
3. Differentiate between the three levels of sanitation: cleaning, disinfecting, and sterilizing.
4. Differentiate the types of disinfectants available and how to apply the appropriate level of sanitation based on the surface to be sanitized.
5. Use proper cleaning procedures for hospital and isolation wards.
6. Identify which antiseptics are used for particular procedures.
7. Calculate the dilution of a concentrate.
8. Differentiate the types of hospital waste.
9. Safely hand and properly dispose of hospital wastes.
10. Identify hazardous hospital waste and know how to properly dispose of it.
11. Correctly sort, pretreat, wash, and store hospital laundry.

INTRODUCTION

Imagine taking your pet into the veterinarian for a routine surgery and vaccines. Several days later, he develops a horrible cough. The veterinarian explains that your dog has contracted "kennel cough." Your pet has become ill with a *nosocomial* infection, one that is acquired at a hospital.

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TASK 5.1
DISEASE TRANSMISSION

Concept: Infectious or communicable diseases are transmitted in many ways.
Discussion: Infectious organisms enter the body through the skin, mucous membranes, and from mother to fetus. Likewise, they exit the body through discharges such as blood, vomitus, urine, feces, respiratory discharges, wounds, and milk. Transmission is either direct, as in animal-to-animal contact, or indirect, as in animal to a vector (tick, mosquito, flea, etc.) to another animal, or animal to inanimate object (air, water, soil, mechanical objects, etc.) to another animal.

1. Airborne diseases are transmitted via coughing, sneezing, or even possibly, the ventilation system. For example, kennel cough in dogs is caused by the *Bordetella* bacteria and is highly contagious.
2. Diseases can also be transmitted by contact either directly or indirectly.
   a) Direct transmission involves the patient coming into contact with bodily secretions that are infected with a harmful organism. Infectious agents can be found in the saliva, blood, urine, and feces. Direct transmission also includes any surface of the body such as the coat, skin, ears, eyes, and mouth. Feline leukemia is caused by a virus that is spread by body fluids and is highly contagious.
   b) Indirect transmission is from surfaces that are contaminated by an infectious agent. This can include hands, clothes, and shoes as well as hard surfaces such as tables, grooming tools, equipment, and doorknobs. Inanimate objects that transmit disease are called *fomites*. Ringworm is caused by a fungus that is easily transmitted by fomites.
3. Vector-borne diseases are ones that are transmitted via an intermediate host such as a tick, flea, or mosquito. One example of this seen frequently in the veterinary field is heartworm disease. Transmission occurs when a mosquito bites a dog infected with the heartworm parasite. This same mosquito bites another dog and it becomes ill with the heartworm.
4. When patients are hospitalized or shipped, they are stressed. With the possibility of malnourishment, their immune system is further weakened, making them susceptible to *secondary infections*. Neonatal, geriatric, and immune-compromised patients are more likely to develop secondary infections. Staph, strep, and other bacteria are commonly found in veterinary clinics and are often the culprits infecting surgical wounds.

Concept: To reduce the risk of a nosocomial infection, know which infectious agents are most prevalent in the veterinary environment and take the necessary precautions.
Discussion: Organisms that cause disease are called *pathogens*. These *microbes* can be viral, bacterial, protozoan, fungal, and parasitic. Viral and bacterial agents are the most prevalent cause of nosocomial infections in a veterinary hospital setting. But others are carried in every day by patients and clients. Learn what infectious agents are around you. Ask your supervisor which ones are endemic to your area.

There are many diseases that are species specific, meaning a specific organism will only affect a specific species. Many parasites and viruses are species specific like the parvovirus in dogs. There are over 200 infectious agents that are considered to be *zoonotic*, which is a disease transmitted from animals to humans. This is just another reason to learn how to prevent diseases from spreading.

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Concept: The hospital team is the most common source of nosocomial infection.
Discussion: Rules to reduce nosocomial infections:

1. When in doubt, assume every animal and every surface is contaminated with infectious organisms. Even patients that appear healthy can be harboring an infectious illness. Clinical signs may not appear for several days, but an animal can be shedding pathogenic microbes. Following quality control procedures and aseptic technique can help reduce the risk of spreading disease.
2. Clean gloves should be put on before touching any potentially contaminated surface, whether animate or inanimate (see Task 3.4.5).
3. Wear clean, washable clothing. Keep a second set of clothes and change as needed. If available, wear a disposable or washable lab coat to keep main articles of clothing as free from contamination as possible. Change as needed. Wear a waterproof apron when bathing or working with water.
4. Use a footbath or disposable shoe covers whenever entering clean areas such as surgery or contaminated areas such as the isolation ward.
5. Be aware that *all* items that come in contact with a patient need to be sanitized as well, not only the cage and bedding but also restraint and handling equipment, clippers, otoscopes, stethoscopes, and so on. These all need to be disinfected before being used on another patient.
6. A huge percentage of daily work at a veterinary facility is cleaning. *Everyone* needs to do his or her part. Chaos compromises everyone's well-being particularly the patients. To ensure a safe veterinary practice for employees, patients, and clients, the staff needs to function in a clean, orderly, and well-organized environment. A valuable and competent veterinary assistant is one who not only can maintain the immediate environment of the patient but also looks at the surrounding areas and identifies and corrects potential issues. Do not neglect the not so obvious areas such as the parking lot, sidewalk, hallways, and staff room in the facility.

Concept: In order to control an infectious organism, you need to understand how it survives in the environment and responds to various disinfectants.
Discussion:

1. Pathogens respond in various ways to sunlight, heat, cold, oxygen, and chemicals. Some are quickly inactivated by heat or sunlight. Others are adapt at surviving at extreme temperatures and weather. Organisms also can thrive in oxygen-depleted environments such as the ear canal and puncture wounds. These are called *anaerobic organisms*. Some organisms can form *spores*, which are shed and live in the environment for months to years. When conditions are optimal, the spore opens up and starts to reproduce. Spores are highly resistant to cleaning and disinfection.
2. Organisms are variably susceptible to chemical disinfectants. Chemical cleaning agents can be classified in many different ways. Some agents are *bactericidal* and *virucidal* (-cidal means to kill). Others are classified as *bacteriostatic* or *virustatic* (-static means to prevent further replication). Ideally, an agent should be a -cidal product.
3. Organisms are also destroyed based on the amount of time they are in contact with a chemical agent at the correct dilution. *Contact time* is the amount of time an organism needs to be in contact with a disinfectant in order to be destroyed. It is important to know the contact time of an agent or sufficient disinfection may not be accomplished.

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4. Correct dilution is also very important. A disinfectant diluted too weakly will not destroy pathogenic microbes. A disinfectant that is too strong can be toxic to the administrator or patients and corrosive to equipment.

Concept: There are three levels of sanitation: cleaning, disinfection, and sterilization.
Discussion: Use the appropriate level of sanitation with each of the following in mind:

1. *Cleaning:* the use of detergents mixed with water to mechanically lift and remove soil from a surface. The water lifts and carries the visible debris to the bucket or washtub via a mop or cloth. This is appropriate for walls and floors. Cleaning reduces microbes but not sufficiently to prevent nosocomial infections.
2. *Disinfection:* the use of specific chemicals to reduce the number of pathogenic microbes to an even greater extent than cleaning but does not kill every organism. In a veterinary facility, cleaning is followed with a disinfectant that is sprayed on and left to air-dry for maximum contact time. If necessary, wipe the surface with a paper towel after the appropriate contact time.
3. *Antiseptics:* are disinfectants that are formulated to reduce the number of pathogenic microbes on living tissues. Some will have a detergent mixed in with them to create suds so you can tell where the detergent has been spread. Surgical scrubs are an example of the application of an antiseptic.
4. *Sterilization:* destroys all organisms, pathogenic and nonpathogenic alike. It is achieved with mechanical devices or specialized chemicals. Autoclaving and gas sterilization are the most common sterilization techniques in veterinary practice.

Procedure

Transmission of Disease

Location: Throughout the hospital environment

PREPARATION

1. Determine the common infectious pathogens endemic in your area.
2. Prepare a section in your reference book entitled "Infectious Pathogens."
3. Prepare a section in your reference book entitled "Reducing Nosocomial Infections."

PROCEDURE

1. In the "Infectious Pathogens" section:
   a) Start with the name of the pathogen, for example, *Bordetella*.
   b) Place the common name next, for example, kennel cough.
   c) Identify the species it affects, for example, dogs.
   d) List the mode of transmission: direct transmission dog to dog, aerosol saliva, and fomites.
   e) List the signs or symptoms of the disease, for example, deep, throaty, or honking cough.
   f) Is it zoonotic?
   g) What disinfectant can be used to destroy this pathogen?
2. List the clinic's rules for preventing nosocomial infections in the other section. With whom and what has this patient had contact?

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FOLLOW-UP

1. Discuss your finding about infectious pathogens and check to make sure you have listed all of the procedures associated with preventing nosocomial infections with your supervisor.

Tip Box 5.1: **It is more effective to prevent a disease or accident then to treat one after it happens.**

TASK 5.2
LEVELS OF SANITATION AND SANITATION AGENTS

Concept: Pathogens are controlled by both chemical and mechanical means.
Discussion: While there are many chemical agents that can be used to disinfect an object or an item, its compatibility with that object must be taken into account. The main areas in a clinic are surfaces, equipment, and animal tissues. The product information will tell you if a disinfectant can be used on one or the other, or in some cases all three.
Concept: The interaction between an organism and a disinfectant determines the efficacy of the disinfectant.
Discussion: Information to use to determine what disinfectant to use in various situations.

1. What organism is the disinfectant effective against? There is *no* universal disinfectant. The product label, package insert, or the material safety data sheet (MSDS) will tell you what you need to know about what organisms a particular disinfectant is able to destroy.
2. The important information you need to know is
   a) Indications for use: where, when, and how
   b) Contact time needed to kill the infectious agents
   c) The dilution factor to set the strength of the disinfectant
   d) *Contraindications* to be aware of when using this product. Are there any other chemicals that cannot come in contact with this disinfectant? *Do not ever* mix chemicals without reading their labels and knowing the compatibility. This could have catastrophic effects.
   e) Are there issues that can cause the disinfectant to lose its potency or effectiveness? For example, chlorhexidine cannot be used with soaps. Quaternary ammonium compounds and bleach are deactivated by organic material, and formaldehyde is toxic to animals and humans.
   f) Know how long a *diluted* product is effective. Diluted sodium hypochlorite is only effective for 24 hours.

Concept: The standard for describing "kill strength" is the phenol (carbolic acid) coefficient. Phenol is a disinfectant that is used as a standard to test the efficacy of other disinfectants.
Discussion: A product that has a 50% phenol coefficient is capable of destroying half of the microorganisms compared with the number of the same organisms destroyed by phenol.

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Contact time, temperature, pH, and the concentration of the solution all affect the ability of a chemical agent to destroy microorganisms.

Concept: There are many classes of chemicals that are used to disinfect areas in the veterinary facility.

Discussion: The commonly found disinfectants in the veterinary field are the following:

1. *Chlorine* (sodium hypochlorite or bleach) is an excellent bactericide (regular and spore forming), virucide (parvovirus and panleukopenia virus), fungicide (ringworm), and yeast in the veterinary environment. It is deactivated by organic matter. Clean any vomitus, feces, or other debris with detergent and water first, then spray with diluted bleach and allow to air-dry. Use only on inanimate surfaces as chlorine will damage living tissues. Chlorine is inactivated by sunlight, so it must be stored in a light impervious container. The dilution factor is 1:32 for general disinfection and 1:10 for ringworm. Diluted bleach must be made up fresh every day because it becomes ineffective after 24 hours.
2. *Quaternary ammonium compounds ("quats")* are particularly effective against certain types of bacteria and viruses and are good against fungi, amoeba, and enveloped viruses. Quats are not very effective against endospores and nonenveloped viruses. Quats are deactivated by soap, detergents, organic material, and cotton fibers. They tend to be nonirritating and do not have offensive odors. Parvosol II™, Roccal-d™, Lysol IC™.
3. *Alkalies* (lye) and *formaldehydes* are highly toxic and their use in the veterinary field is limited for that reason. Lye is used to decontaminate soil. Formaldehyde is a tissue preservative and it is a carcinogen. The Occupational Safety and Health Administration (OSHA) severely restricts the use of formaldehyde and special precautions must be followed. Glutaraldehyde is used for chemical sterilization of endoscopic equipment; it too is toxic to tissues and equipment must be double rinsed before use on or inside animals.

Discussion: Antiseptics are the disinfectants used on patients in the veterinary facility:

1. *Alcohol (isopropyl or ethyl)*: Isopropyl is used at a 70% concentration. They are commonly used to disinfect injection and surgical sites and thermometers. Isopropyl and ethyl alcohol are good at cleaning and degreasing skin so that other antiseptics can work better. Hand sanitizers are usually 60–62% ethyl alcohol and moisturizers.
2. *Povidone-iodine* is used in the veterinary practice at a 2% dilution. Full-strength iodine can cause staining, skin irritation, and burning. Betadine® (povidone-iodine) is the most common product found. It comes in two surgical forms—a solution and a thicker soapy scrub. Although dark in color and appearing to stain the skin, it washes off quite easily with water. Povidone-iodine in a 1:10 dilution is used on intact skin, whereas a 1:100 dilution can be used for tissue *lavage*. It is inactivated by alcohol and organic matter and its *residual activity* is only effective for 4–6 hours.
3. *Chlorhexidine* comes in a variety of scrubs and as a solution. It is not inhibited by alcohol or organic material but is inhibited by soaps and pH changes. It is used full strength as a scrub for surgery and has a 2-day residual activity. The solution is diluted at 1:40 for wound lavage and at 3 oz/gal of water for disinfecting surfaces. It can be corrosive to surgical instruments and so a detergent designed for them should be used (e.g., Nolvasan™, Hibiclens™).
4. *Chloroxylenol* at a 3% dilution is capable of being both an antiseptic surgical scrub and a preoperative/postoperative solution. It is safe for use on mucous membranes and debrided wounds. It is nontoxic to mammals and birds.

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5. *Hydrogen peroxide* is used at a 3–20% concentration to clean around (but not on!) skin wounds. It is shown to damage healthy tissues, so it is a one-time use product. It is very useful for removal of blood stains from clothing, fur, and fabrics.

Concept: Most disinfectants come in concentrates that require dilution. This information will always be on the product label.
Discussion: Calculating the required dilution calls for a bit of math and possibly conversion from one measurement system to another. If a ratio is given on the label such as 1:250, for example, it means that you use 1 part concentrate to 250 parts of water. If you have four bottles to fill and each has 250 mL volume, how much water and concentrate do you need? Use the math problem analysis from Chapter 1 to determine the answer.

Another situation might require conversion. If 1 oz of a concentrate added to 1 gal of water but you only have a 50-mL syringe available to measure the concentrate, you need to know that 1 oz is equal to 30 mL. How much concentrate in milliliters do you need for a 5-gal bucket? Refer to Appendix D for common equivalents.
Discussion: A few handy time-saving tips:

1. Use your reference book and move the equivalents from Appendix D for a quick reminder.
2. Mark the bottle of concentrates with the dilution factors. For example, using an indelible marker, write "3 oz (90 mL) to 5 gal of water" on a 30- or 60-mL syringe casing and then tape that to the bottle. Use the syringe provided to measure the amount of concentrate needed. When the bottle is empty, simply move the syringe and casing to a new bottle.
3. With large containers such as a mop bucket, measure out 5 gal, then using an indelible marker on the inside of the bucket, mark the water level. Then add the predetermined amount of concentrated disinfectant using the syringe. The next time you need to fill the bucket, you have the fill line as a guide.
4. When dispensing a concentrate into another or "secondary" bottle, it is important that the secondary container is labeled with the contents, dilution, and date. OSHA standards require all secondary bottles to be labeled; if a bottle does not have a label, do not use it as you cannot be sure of the contents.
5. When diluting concentrates, always measure the concentrate and the water. Do not "eyeball" the color of the final dilution. If not diluted properly, the disinfectant will not work against the microbes that cause disease.

Concept: Always add water to a container first and then add concentrate.
Discussion: This rule applies whenever mixing water and any other chemical.

Tip Box 5.2: **Read all labels carefully on disinfectant and antiseptic concentrates as most require being diluted for safe use.**

Concept: Sterilization is the only method of sanitation that destroys all organisms.

Freezing, drying, ultraviolet light, radiation, heat, and filtering are all methods of sterilization. *Autoclaving* is a mechanical form that uses moist heat and pressure to kill microorganisms. *Ethylene oxide* is a chemical form used to sterilize equipment, particularly those that cannot be exposed to high temperatures like plastics. Ethylene oxide, as with many other chemicals, is toxic and extreme care must be taken when handling. More information about sterilization techniques will be discussed in Chapter 20.

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Procedure

Location: Storage areas of clinic and other areas with secondary containers

PREPARATION

1. Locate the primary and secondary disinfectant containers.
2. Check for proper labeling on the secondary containers.
3. Gather measuring equipment such as appropriately sized syringes or clear plastic or glass measuring cups, funnel, paper towels, permanent markers, and labels if needed.
4. Reference book on the "Equivalents" section.
5. Put on personal protective equipment (PPE).

PROCEDURE

1. Always maintain a clean and uncluttered workspace when preparing dilutions or transferring from a primary to secondary container.
2. If dilution is required, calculate the proper amount needed.
3. Measure out the amount of concentrate required.
4. Add water to the container first then add the concentrate.
5. Pour diluted disinfectant into a secondary container using a funnel.
6. Label the container with secondary label that meets OSHA requirements.
7. Return all bottles to their appropriate locations:
   a) reception area
   b) all examination rooms
   c) laboratory
   d) radiology
   e) treatment room
   f) surgery and surgical prep areas
   g) all hospital wards including isolation.
8. In addition, the following items will also be needed to maintain a clean environment:
   a) box of disposable examination gloves—sizes needed by the staff
   b) paper towels.

FOLLOW-UP

1. Clean the equipment and area used to make solution and store.
2. If the quantity of the original chemical is low, check supply and, if necessary, follow facility procedure for inventory control.
3. Make a notation in task box—daily duties to replenish disinfectant bottles around the clinic and to remix dilute bleach bottles.

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TASK 5.3
CAGE AND KENNEL CLEANING

Concept: Patient health and safety are the underlying principles of any veterinary practice.
Discussion: Think patient comfort and safety at all times. Keep your patients in a clean and safe environment. Your patients are unable to express their needs. It is *your* job to anticipate those needs and to provide for them. By maintaining a clean and healthy environment, you are not only reducing the risk of nosocomial infections but also the end result is a healthier patient, a happier client, and a successful practice.
Concept: Hospital housing is determined by the care that a patient needs.
Discussion: The types of care/housing include the following:

1. healthy boarding animals
   a) outpatients receiving: dentistry or minor surgical procedures
   b) grooming (if applicable)
2. medical patients
3. major surgical patients
4. contagious patients (housed in the isolation area).

Depending on the type of facility, patients may be grouped together or housed in separate areas according to level of care needed and the species.
Concept: Always work from the least contaminated area first to areas of highest contagion last.
Discussion: By moving from the least to the most infectious area, you reduce the risk of transferring a contagious organism to a patient. Usually, surgery patients are those considered the least infectious and those kennels should be the first cleaned. Isolation wards or kennels are cleaned last.
Concept: The goals to cleaning kennels and runs are to minimize chances of cross infection and to provide comfort to your patient.
Discussion: There are several ways to clean cages, but the principle is the same for all. Clean from the top down with kennels; start with the ceiling, then the sides, the back, the door, and last, the bottom. Clean the top kennel first and work down to the lower kennels. The lower kennels should hold the patients that could potentially be the most infective.
Concept: Set up a supply cart before starting to clean the wards.
Discussion: Ideally, each ward or kennel room should have its own cleaning supplies, mops, and buckets. Preferably, a cart with three shelves is available to hold cleaning supplies. The top shelf would have cleaning supplies, food, and water. The second shelf can have newspapers, clean bedding, and water dishes. The bottom shelf can collect dirty bedding and litter pans. Extra garbage bags can be draped over the cart's handle.

An additional option would be to have a disinfectant bucket to soak litter scoopers in between kennels.

The order of cleaning kennels and runs is covered in the "Procedure" section later in this chapter.
Concept: After cleaning kennels and runs, the ward itself needs to be cleaned.
Discussion: This involves disinfecting any potentially contaminated surface such as light switch plates, doorknobs, walls, and floors. Again note this is from the top down! Use spray disinfectant and paper towels to wipe down the walls and doors. Then sweep and mop the floors to finish.
Concept: The two-mop bucket technique is the most effective way to mop.

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Discussion: The first bucket contains fresh disinfecting solution. The second one contains fresh clean water. Each bucket should have a squeeze mechanism to remove excess liquid from the mop head.

To begin, a clean mop is placed in the disinfectant, squeezed, and used to mop a section in the farthest corner of the ward. The mop is then placed in the rinse water, agitated up and down, then squeezed as dry as possible. The mop is then placed back into the disinfectant, squeezed until damp, and then used to clean another section. It is once again placed in the rinse water. Repeat the steps until the entire floor is cleaned.

This procedure keeps organic matter from contaminating the disinfectant solution. The rinse water keeps the particulates gathered from the mop head confined to the rinse bucket.

Mop heads should be laundered after each use. This may occur daily to weekly depending on the ward in which it is used. A separate mop and bucket should be kept exclusively for the surgical room as well as a separate one for the isolation ward. If this is not possible, start the cleaning process with the surgery room then move through the wards, saving the isolation ward for last. Changing disinfectant in the bucket between these areas is also a best practice protocol. The area where the dirty water and disinfectants are dumped and the mop head rinsed should be disinfected as well. The drain should be flushed with copious amounts of water.

Concept: What is placed in the kennels and runs depends on several factors: patient comfort, hospital protocol, and ease of cleaning.

Discussion: Some hospitals line kennels with newspapers. Newspaper can add warmth to a stainless steel cage as well as allow for ease of cleaning. Rather than handling items separately, the entire newspaper can be pulled out with everything on it. Other facilities decline to use newspaper as the print can rub off on fur. Bedding can be rubberized elevation mats or cotton towels are used to provide a resting area. Regardless of the type of bedding used, it should be checked for cleanliness and replaced if soiled. The usual rule is to change towel bedding every other day unless wet or soiled. Your practice may want the bedding changed every day; consult the ward clean protocol in your practice.

Concept: Kennels and runs come in many styles.

Discussion: Stainless steel kennels are easy to clean and are durable but can be cold. Fiberglass kennels are usually warmer and quieter but are sometimes harder to clean if the surface has any imperfections.

Some have built-in perches for cats. Others have removable but nondisposable perches, and still others have disposable perches that can be used as a carrier for a small animal when it goes home or as a transfer kennel while cleaning the individual unit.

Kennels and runs should have a raised bed for the patient or rubber mats that allow for liquids and waste to be wicked away to keep the patient dry. Some mats have interlocking pieces to allow for individual sizing depending on the kennel.

Procedure

Kennel and Run Maintenance

Location: Hospital wards

PREPARATION

1. Put supplies on a cleaning cart.
   a) Use the top shelf for clean supplies, food, and water:
      i. spray bottles of diluted disinfectant and one with diluted detergent and one with rinse water
      ii. paper towels

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iii. examination gloves in appropriate size
iv. food dishes—disposable is best
v. food as appropriate for the animals being cared for
vi. water dishes to replace soiled ones if necessary
vii. fresh water in a pitcher.

b) The second shelf contains bedding and litter supplies:
   i. if cleaning a cat ward: stock litter pans—disposable is best—make up one for each cat in the ward with the correct amount of litter as per your clinic's protocol
   ii. newspaper if used—if not, elevation mats or towels
   iii. bin with disinfectant to soak food and water dishes.
c) The third shelf is for dirty items:
   i. soaking bin for litter pans if using nondisposable
   ii. soaking bin for litter scoop
   iii. soaking bin for scrub brushes.
d) Large plastic garbage can with fresh liner in place
e) Extra garbage bags draped over cart handle for nondisposable bedding.

2. Put on PPE—exam gloves, waterproof apron or gown, goggles or face shield if splashing of chemicals is likely, and ear protection.

PROCEDURES

Kennel Cleaning Technique 1

This technique is to be used in a facility where cages are never fully occupied.

Location: Kennels/hospital ward

1. Dispense food to patients in the ward if they are not on a withhold food for surgery.
2. Use a clean empty kennel as a holding kennel; move a patient to the holding kennel. Make sure to move any toys and identifying cage card.
3. Remove everything from the patient's kennel.
   a) If present, remove feces from kennel/litter pan with sanitary scoop placing it in a trash can.
   b) Dirty food dish is placed in a soaking bin on the second shelf of the cart.
   c) If the water dish is not soiled, empty it and set it aside for reuse.
   d) Dirty bedding is shook out into the trash can then placed in a garbage bag.
   e) If bowls are disposable, place in the trash can along with newspaper if used.
4. Spray detergent mixed with water on the inside of the cage, then wipe with paper towels. Remember to work from the top down. Do not forget the door of the kennel! Use a scrub brush if necessary to get into the joins on the bars.
5. Spray with water to rinse and wipe dry with paper towels.
6. Spray with disinfectant and allow to set for the required contact time. If still wet, wipe with a paper towel to dry.
7. To clean a run, spray down the area with a hose, spray with detergent, then use a large stiff brush to scrub the entire height of the walls and door; a push brush works well for the floor.
8. Return the brush to the bucket of disinfectant.
9. Rinse with the hose, then spray down with disinfectant spray.
10. Squeegee the walls and floor as dry as possible after the required contact time has passed. Any excess water should be pushed to drain. If available, a floor fan can decrease the drying time of the kennel.
11. After drying, line the kennel with newspaper, replace the comfort beading if not soiled, litter box if appropriate and fresh water in a bowl.

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12. Return the animal to the original kennel or run. Again move any toys and identifying cage card.
13. Spray the holding kennel with dilute disinfectant before placing the next animal.
14. Repeat until all kennels are clean.
15. Clean the drain with a paper towel.
16. Sweep and mop the floor.
17. Wipe down light switch plates, walls, door handles, window sills, and any other surfaces with diluted disinfectant.
18. Place dirty laundry from the trash bag into the washing machine or soaking bin.
19. Take the disposable garbage to the dumpster outside.
20. Place dishes in the dishwasher and start it.
21. Clean litter pans and pooper scoopers with detergent and water, then spray dilute disinfectant and air-dry.
22. Empty and rinse soaking bins and mop buckets; avoid splashing dirty water as it contains potential pathogens. Spray with dilute disinfectant and air-dry.
23. Wipe down the cart with diluted disinfectant.
24. Replenish supplies for the next time.

Weekly duties

1. Disinfect ceilings and tops of cages, if open to the room once a week.
2. Disinfect and change out cages that have not been used in a week.

Reminders

1. Never place a white animal on printed newspaper. Use unprinted white paper, butcher paper, or clean towels.
2. *Always* keep the correct cage card with patients. Compare names with hospital identification collars.
3. Never use nondisposable transfer cages for housing. These should only be used for transporting patients from the exam room to the treatment or hospital ward. The cage should then be thoroughly disinfected after each use.
4. Change gloves between individual animals.

Kennel Cleaning Technique 2: Tidying Up a Nonsoiled Kennel or Run

PREPARATION

Same as Kennel Cleaning Technique 1.

PROCEDURE

1. Take the animal outside to relieve itself and get in a little walk, then return it to its kennel or run.
2. Tidy the kennel or run by removing dirty and disposable items.
3. As appropriate, place food, fresh water, bedding, and litter back into housing.

FOLLOW-UP

1. The patient is kept in its kennel the entire duration of its hospitalization.
2. When discharged, the kennel undergoes a five-step cleaning process:
   a) Everything is removed from the housing unit.
   b) Everything nondisposable is disinfected. Cloth toys can be laundered or autoclaved if there are no plastic or rubber parts/fillers.

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c) The cage door is removed and soaked, then scrubbed down with disinfectant.
d) All surfaces are scrubbed with soapy water and then rinsed and dried.
e) Surfaces are disinfected according to the manufacturer's required contact time.

3. Prepare a housing unit for another patient, fresh newspaper on the floor, and/or clean bedding.
4. Place the empty cage card on the door to signal that the cage is ready for the next patient.

TASK 5.4
ISOLATION WARD RULES AND SANITATION

Concept: Environmental disinfection and isolation of contagious patients are the best preventative for nosocomial infections. Patients with highly contagious diseases are isolated to further reduce the risk of spreading a disease.
Discussion: If a patient is suspected of having a contagious disease such as kennel cough or parvovirus, the owner should be instructed to wait before bringing the animal into the facility until an examination room is available. Ideally, the patient can be carried directly from the car to the room without contact with the floor. If this is not possible, the area should be mopped with a disinfectant immediately after they move through to the exam room. Many facilities have specific rooms set aside for contagious patients. From the exam room, the patient is then transported directly to the isolation ward if hospitalization is necessary. Otherwise, treatment can be conducted in the examination room itself. After the patient has left, the examination room must be disinfected immediately as per the clinic protocol.
Concept: The isolation ward is reserved for highly contagious patients.
Discussion: Use the following "universal precautions" when dealing with a contagious patient:

1. Separate clothing is used when entering the ward and left behind when exiting. At no time should any clothing, equipment, or bedding be brought from isolation to the main wards. Soiled clothing is placed into trash bags and carried straight to the laundry for hot water washing.
2. A disinfectant footbath is recommended when exiting from the isolation area. Shoe covers or booties can be placed over shoes prior to entering the isolation ward and disposed of immediately before exiting.
3. It is even more important that exam gloves be changed out between patients inside the isolation ward.
4. Anything disposable used in the isolation area and patient waste are sealed in a biohazard waste bag. These bags are never to be carried through the hospital when discarding.
5. The isolation ward is cleaned and the patients fed *after all the other wards* are cleaned and patients fed.

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6. Place known contagious animals in the lowest cages possible so that feces, urine, saliva, or blood does not run down into another patient's cage.
7. If the isolation ward is full, mixing species is the next appropriate choice. For example, felines with possible feline leukemia can be placed in the canine ward without concern for the disease spreading to the canines.

Concept: Treatment of patients in isolation is done after all other hospitalized patients are treated.

Discussion: Patients are treated in the isolation area. They are not to be brought into the regular ward. Ideally, one individual is responsible for handling the isolation patients and is not responsible for any other patients. However, this is not always feasible. In that case, regular staff that treat isolation patients or enter the isolation area need to be particularly vigilant to avoid contamination and spreading contaminates. Careful cleaning of hands and forearms is essential as well as changing clothing and disinfecting shoes or removing shoe covers.

Every staff member must have a high level of awareness for the potential transmission of diseases from patient to patient and from patient to person.

Before entering the isolation ward, review the three sections in your reference book so far:

1. Infectious Pathogens—what pathogen are you dealing with?
2. Preventing Nosocomial Infections—what supplies do you need?
3. Disinfectant Section—what will kill the pathogen and at what dilution?

Procedure

Isolation or Quarantine Care

Location: Everywhere within the hospital environment

PREPARATION

1. Treat every patient as if it were contagious.
2. Consider everything the patient has touched as a potential source of contamination

PROCEDURE

1. Disinfect *everything* the patient touches or uses.
2. Highly contagious patients are placed in isolation immediately. Minimize contagious patient contact with anything in the noncontagious hospital environment by remembering the following rules:
   a) Everything in isolation stays in isolation.
   b) If it is disposable, bag it before it leaves the isolation ward. Always take it directly to the outside dumpster, never through the hospital facility.
   c) If it is not disposable, clean and sanitize within the confines of the isolation ward if possible.
   d) If it is nondisposable and must be removed from the isolation ward, move it directly to the area in which it can be disinfected, for example, dirty isolation bedding. Only remove when it can go directly into the washing machine or in a

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soaking tub. It must be laundered separately from other hospital wash. Wash with hot water, detergent, and bleach. Return to the isolation area once dry; do not use it in other areas of the clinic.

e) Use disinfecting bath for shoes when exiting the isolation area or wear shoe covers while in the area. Remove covers when exiting the room.

3. Wear examination gloves while handling all patients.
4. Wash hands after removal of gloves. Follow correct industry procedure for hand washing. Wear a lab coat, disposable gown, or apron to protect clothing and to prevent contamination from infectious patients.
5. Wear goggles or a face shield if there is a risk of infectious material being splashed.
6. Change clothing if it becomes contaminated.
7. Disinfect all doorknobs that were touched going in and out of isolation, laundry, and to the dumpster.

FOLLOW-UP

1. Check the disinfection bins at the beginning and end of each shift and replenish contents.

TASK 5.5
CLEANING THE OTHER AREAS IN THE VETERINARY CLINIC

Concept: All areas of the facility have the potential to harbor infectious microorganisms. No area should be overlooked or assumed "clean" because it is not used as frequently or specifically used for patient care.

Discussion: Because pathogens can be airborne, all areas need to be cleaned and disinfected regularly. A cleaning schedule of facility rooms is useful. Areas that should be included are the following:

Daily:

1. reception area
2. restrooms
3. treatment or exam rooms

Weekly:

1. laundry room
2. employee lounge and lockers, if applicable
3. pharmacy area

Monthly:

1. library or conference rooms
2. offices
3. storage areas.

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As with all patient-occupied areas, work from the top down—ceilings and air vents, walls, surfaces, light switch plates, doorknobs and floors should be wiped down with detergent and water, then disinfected if the surface will tolerate the chemical.

Concept: How to clean a specific surface and with what depends on the material surface. Is it smooth like a stainless steel? Or rough? Does it have small holes or pits like concrete? Also consider the washability of the surface. Can it get wet? Not all disinfectants can be used on all surfaces. Just as in the fight against pathogenic microbes, there is no one cleaner that is safe for every type of surface and every type of circumstance in a veterinary facility.

Discussion: Ideally, every surface in the veterinary facility would be smooth, impervious, and washable. However, in reality, ceilings, walls, cabinets, and floors are typically not all three. Sound-absorbing material on ceilings is often used and the only way to clean them is by vacuum. Disinfection is limited to the ultraviolet lights that some facilities will place around the perimeter of the ceiling. Air filters in ceiling ducts need to be replaced more frequently than in other facilities. Minimally, they should be replaced four times a year for all areas other than surgery, where it should be replaced as recommended by the manufacturer.

If a surface is rough or pitted but washable, such as concrete, it is cleaned with a disinfectant applied with a power sprayer and scrubbed thoroughly with a stiff brush. The spray should not be so forceful as to cause water droplets to aerosolize; however, the spray must penetrate into the small pits.

Fabrics are another issue. Ideally, upholstery should be vinyl to allow for cleaning with a disinfectant. Hair can be removed from fabric via vacuuming. A damp sponge or cloth wiped over fabric can pick up any remaining loose hair.

Loose hair also tends to float around a clinic forming little dust balls in corners and on floorboards. Rather than using a broom, which only kicks up dust and hair scattering small particles, a dust mop with an attractant lightly sprayed on it is preferable. The dust mop attracts the hair and dust and holds them to its surface. It should then be taken outside and shaken before returning to storage. It should also be laundered at minimum once weekly. A vacuum can also be used to pick up hair.

Windows and glass doors attract nose and finger prints. Surfaces that come into contact with people and animals need to be cleaned at least twice daily. Disinfectants tend to streak on glass, so it is best to use a specific glass cleaner.

Wood surfaces are damaged by disinfectants unless they have a protective plastic coating. They can be washed with detergents and water, then sprayed and wiped with polish. Use a product formulated for wood furniture that is not protected by a plastic finish.

When cleaning an object, do not apply disinfectant spray haphazardly to everything. Think about the item, the characteristic and what it is used for, and how it is best cleaned to maintain its appearance. What works for one surface may very well be inappropriate for another if you are unsure what to clean a surface with. Ask!

Concept: Areas in the facility that are often neglected and rarely cleaned are the drawers, shelves, and cabinets.

Discussion: Routine cleaning and replenishing on a daily or weekly plan schedule makes it a fairly simple task rather than a mountainous hurdle to tackle every few months. Too often, items are placed in storage and are forgotten or lost.

Drawers usually hold in smaller manageable boxes or bins in a system of organization that makes sense for your facility. The bins themselves need to be cleaned out periodically. Empty the drawer, vacuum and spray with disinfectant, and wipe dry. Remove the contents of the bin on a counter; wipe down the bin itself with disinfectant. If necessary, wipe down items before they are returned to the bin. Check items for expiration dates before returning to the drawer or bin. Replace the bin to its proper place. The same situation applies to cupboards. Shelves often have items that are lost on higher areas or shoved toward the back of the shelf. Shelves should be organized to keep things in place and to avoid the probability

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of lost items. Bins again are helpful for keeping things grouped together. The bins can also be brought down and cleaned as described previously. This will also help with inventory. "A place for everything and everything in its place" holds true and saves time and money. Time is not wasted looking for a misplaced item, and items that you already have are not reordered wasting money.

Concept: The contents of the bins can have one of two methods for grouping: Items can be grouped together based on a single type of procedure or like items can be placed together.

Discussion: Bins are available in various shapes, sizes, and colors. Plastic bins are relatively lightweight and inexpensive. They can also be moved easily from place to place when contents need to be used throughout the facility. The outside of the bin can be marked with indelible marker as to its grouping such as IV catheter supplies or bandage material.

A list of contents can be placed either inside the bin or taped to the side or lid. This is helpful for restocking and inventory.

Concept: Store and laundry rooms need routine cleaning.

Discussion: Depending on the size of the facility, storerooms may have pallets on the floors. These prevent moisture and dampness from harming the contents of bags and cases such as those used for pet food and other items for backup inventory. In the storeroom, shelves should be dusted, and floors swept and mopped on a regular schedule. Keep storeroom doors closed at all times except when entering and exiting to move inventory. Check regularly for rodent droppings; if there is evidence of rodents, talk to maintenance about placing traps or rodent bait. The laundry room is often used to house cleaning supplies and pesticides, which should not be kept in the same area that houses food supplies. The tops of the washer and dryer should be kept free of clutter, and floors should be swept and mopped on a regular schedule.

Concept: Refrigerators and freezers should be defrosted and cleaned regularly.

Discussion: Have a schedule for dealing with this task. Some items have special storage requirements, so a cooler with ice should be available before you start this task. *Never* use the same refrigerator for foodstuffs, pharmaceuticals, vaccines, laboratory samples, and biological samples. These items need to be refrigerated, but they should not be in the same place where you store your lunch!

Tip Box 5.3: **If you use something up, refill or replace. When you take something out, put it back. Never walk across a room empty handed. There is *always* something needing to be put away.**

Procedure

Facility Maintenance

Location: All areas of the clinic

PREPARATION

1. Based on your clinic's cleaning schedule, mark your task cards for all areas of the facility that need daily, weekly, and monthly cleaning. Do not overlook storage areas and other less trafficked areas. Another idea is to hang a whiteboard with check-off list and have employees date and initial when rooms are cleaned.

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2. If your clinic agrees to bins, organize and label them according to one of the three following ideas:
   a) All items used in a single procedure are boxed together.
   b) Like items are placed together.
3. Evaluate a surface for smoothness, imperviousness, and washability.

PROCEDURE

1. Prepare the cleaners appropriate for use as per what you need to clean. Read the product label and dilute or mix the chemicals appropriately.
2. Disinfect everything possible, but still maintain the appearance of the object. Use alternative methods of cleaning when appropriate to do so.
3. When straightening up drawers, put items back into bins or replenish items to bins if necessary. Make sure items are not stored directly on the floor. Heavy bulk items are placed on raised pallets. Do not overlook changing air filters when cleaning light fixtures.

FOLLOW-UP

1. Evaluate how the clinic areas look and adjust the cleaning schedule as needed to maintain the clinic.
2. Keep a variety of cleaners on hand to meet the cleaning needs of the variety of surfaces within the facility.
3. New products are constantly being introduced to the market. Evaluate those products to determine if they meet a need within the clinic that is not being currently well met or could be better. Periodically check a janitorial supply company to see what is new on the market.

TASK 5.6
HANDLING HOSPITAL LAUNDRY

Concept: Sorting laundry is even more important with hospital laundry than it is with home laundry. In many cases, pretreating and soaking are also necessary.
Discussion: Hospital laundry is sorted into three categories: surgical, regular, and contagious. Surgical laundry is the material used as gowns and drapes and to wrap surgical instruments. They must not be washed with regular laundry because of the lint and hair that may accumulate on their surfaces and fall into a patient during surgery. Regular laundry involves towels and bedding. Contagious items are any items that come into contact with an infectious patient.

Do not mix these three categories together. They should never be stored, transported, pretreated, washed, or dried together. By maintaining separation of these groups, you reduce the possible spread of disease and contamination.
Concept: Pretreatment may be necessary for some items in each category.
Discussion: Fabric that is stained with blood should be pretreated with hydrogen peroxide and soaked in cold water for 30 minutes. Fabric covered in organic matter such as feces or have been in contact with contagious animals should be soaked in warm water and bleach for 30 minutes before washing.
Concept: Washing is more effective at higher temperatures, optimally 140°F.

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Discussion: Ideally, an on-demand water heater is used to maintain proper temperature. Use a good detergent and rinse well. A fabric softener is used in the rinse cycle or use a dryer sheet for towels and bedding. While wrinkles are not an issue with towels and bedding, surgical drapes and gowns should be removed from the dryer upon completion to avoid unnecessary creases.

Do not overload either washer or dryer. The washer should be cleaned on a regular basis to remove detergent residues. Run an empty wash cycle with hot water and bleach to periodically disinfect the washer. Lint should be removed from lint filters after drying each load.

Surgery laundry is folded and stored in the surgical preparation room pending placement in packs. Contagious laundry is returned immediately to the isolation area. The rest of the hospital laundry is folded and stored in the clean laundry area.

Procedure

Laundry

Location: Laundry area of the clinic

PREPARATION

1. Have three laundry baskets or bags and label them as follows:
   a) surgery
   b) contagious
   c) noncontagious.
2. Have the required laundry supplies on hand:
   a) detergent
   b) bleach
   c) hydrogen peroxide
   d) labeled presoaking bins
   e) fabric softener.
3. Keep an inexpensive kitchen timer in the laundry area to note presoaking times.
4. Wear gloves whenever handling dirty laundry.

PROCEDURE

1. Sort the laundry.
2. Pretreat in the appropriate bin. If there is too much laundry to pretreat in a bin, you can do so in the washing machine itself. However, note this will tie up the washer when it could be utilized for other loads.
3. Set the washing machine cycle for hot water. Washing is more effective at higher temperatures, optimally 140°F.
4. If adding fabric softener; do so in the rinse cycle or wait for the dryer.
5. Dry—clean lint filter after each load.
6. Fold and put away in the appropriate area.

FOLLOW-UP

1. Wipe laundry baskets with disinfectants.
2. Pretreatment bins are dumped, rinsed, sprayed with disinfectants, and allowed to air-dry.
3. Put away laundry supplies; make a note if supplies are low to notify the inventory manager.

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TASK 5.7
HOSPITAL WASTE: HAZARDOUS AND NONHAZARDOUS

Concept: Hospital waste is handled according to environmental concerns and safety issues.
Discussion: In general, waste is divided into two groups: hazardous and nonhazardous. Nonhazardous waste can then be further divided into recyclable and nonrecyclable depending on the community and the recycling services provided to the veterinary facility. If there are questions or concerns about any item to be recycled, check with a hospital staff member or the recycling service.
Concept: Line garbage or recycling containers with a plastic liner.
Discussion: Keep a few extra liners at the bottom of the container. This makes immediate replacement easy and convenient. Lined containers stay cleaner and are easier to clean when necessary to do so. Nonhazardous and nonrecyclable materials are placed in lined cans until they are full or are emptied at the end of a shift or day. They are tightly sealed and transferred to the outside of the building and are placed into the waste container used by the facility for waste disposal.

Recyclable materials are divided into those for reuse in the facility and those for post-consumer use outside the veterinary site. Items recycled in the facility are sanitized and stored in an appropriate manner depending on the item. Check to confirm which items are recycled in-house and how.

Items recycled outside the veterinary facility may require presorting into separate containers or just one large container labeled "Recyclables." Items that may require sorting can be plastics, paper goods, metals, and glass.
Concept: Hazardous waste is considered anything with the potential to cause harm or injury whether it be mechanical, chemical, or biological.
Discussion: In the veterinary facility, hazardous waste is divided into hazardous materials and biohazardous waste.

Biohazardous waste are medical or infectious waste. They include anything with blood on it or in it, cultures, laboratory samples, empty vaccine vials, isolation waste, and patient tissues. Biohazardous waste is placed in a special heavy-duty red plastic bag that lines containers with both labeled "biohazard waste." The bags are labeled with the facility name and address and the date the bag was sealed by the clinic personnel. Multiple containers are placed throughout the facility to eliminate moving biohazards around the site.

Special containers called *Sharps* containers are placed throughout the hospital for disposal of used needles and syringes and other sharp objects such as surgical blade, suture needles, and disposable instruments. The containers are red with a biohazard symbol and a "fill-to" line. When contents have reached the fill line, they are sealed and stored until a company that handles these items comes to collect them. Chemotherapeutic agents and anything that comes in contact with them are placed in a yellow biohazard container.

Hazardous waste includes items such as developer solution, outdated drugs, disinfectants, pesticides, chemotherapeutics, and anesthetic gases. There are regulations in place governing the disposal of these hazardous wastes. Read the MSDS for disposal instruction.

Unless an animal or its byproducts is known to carry a zoonotic disease, it is not considered hazardous. This explains why fecal and urine contaminated newspapers can be put in a nonhazardous waste container but laboratory samples such as fecal samples go into a biohazard container.

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All nonhazardous and nonrecyclable material can be placed in the general waste management bins for disposal or, if liquid, can be poured down the drain.

Tip Box 5.4: **Remember the three R's for waste reduction: reduce, reuse, and recycle.**

Procedure

Hazard Waste Management
Location: All areas of the clinic

PREPARATION

1. Review practice procedures for hazardous waste disposal of all infectious material and empty waste containers with the *hazard communications coordinator (HCC)* in your practice.
2. Set up a section in your task box to reflect "Handling Recyclable Materials."
   Determine if an item is recyclable. If yes:
   In-house?
   1) Which items
   2) How to recycle
   3) Clean as appropriate
   4) Put away correctly
   Postconsumer?
   1) What items
   2) Sort if needed
   3) Store
   4) Transfer
3. Set up a section in your task box to reflect "Procedure for Handling Hazardous Waste."
   a) Consult the MSDS for the products in question. Look at the following sections:
      i. Health hazard information
      ii. Reactivity data
      iii. Spill, leak, and disposal procedures
      iv. Special handling information
   b) Determine who the licensed hazardous waste hauler is for the facility; mark the phone number and information on when to call for a pickup.
      i. List the information required by the pickup company on the outside of the Biohazardous waste containers or bags.
   c) Mark the location of biohazardous containers placed throughout the facility to reduce transportation of biohazards through the hospital.

PROCEDURE

1. Wear appropriate protective equipment.
2. Follow recommendations on the MSDS and the Hazardous Waste Material Removal Company.

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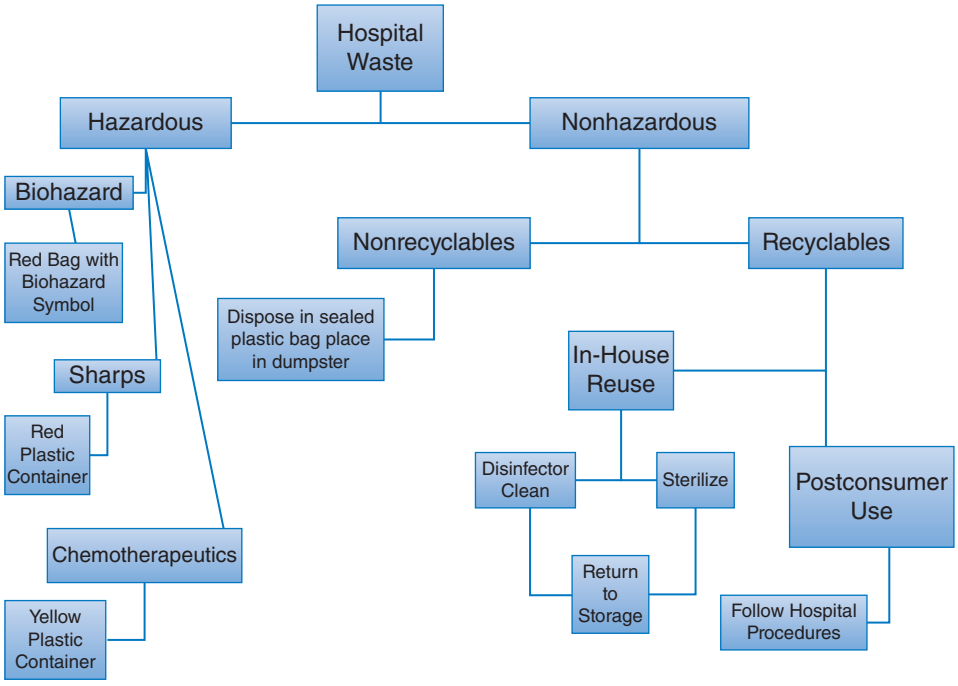


Figure 5.1. Algorithm for hospital waste.

3. Follow procedures established by the veterinary facility.
4. Close the top of any container and bag securely before disposal.

FOLLOW-UP

1. Clean PPE after use.
2. If any spills or accidental exposures have occurred, report to the HCC or supervisor immediately.
3. Clean spills according to directions on the MSDS (Fig. 5.1).

RESOURCES

Disinfection—Best Management Practices Fact Sheet. Retrieved from: http://www.p2pays.org/ref/09/08703.htm.
Sustainable Hospitals. Retrieved from: http://www.sustainablehospitals.org.

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklists
- Downloadable flash cards
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- The figures from the chapter in PowerPoint
- Instructor lesson plans

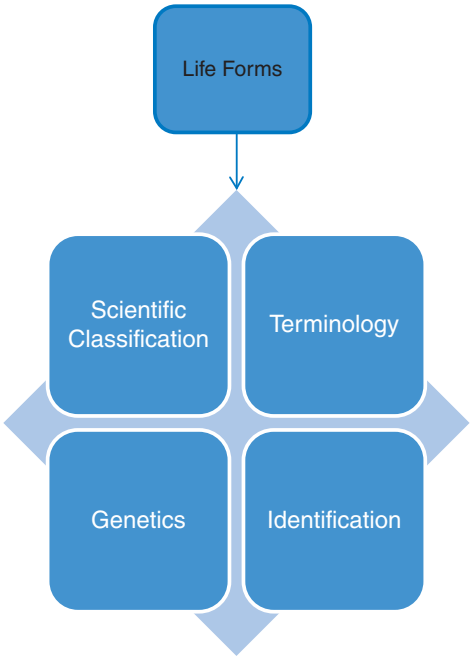
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CHAPTER

6

INTRODUCTION TO ANIMALS

TAMMIE PEARCE



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Describe scientific classification of animals.
2. Apply the classification terminology related to animal species seen in veterinary medicine.
3. Use signalment to describe a patient in the veterinary practice.
4. Recognize 10 breeds of the breeds of dogs recognized by the American Kennel Club (AKC) and apply terminology related to color and coat characteristics.
5. List the seven AKC classifications of dogs.
6. Recognize at least five breeds of cats and use correct terms to describe coloration and coat characteristics.
7. Recognize at least three breeds each of cattle, horses, sheep and goats, swine, and poultry.
8. Correctly use terminology related to genetics.
9. Explain genetic inheritance.
10. Use a Punnett square to determine the genotype and phenotype of offspring of two individuals.

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TASK 6.1
SCIENTIFIC CLASSIFICATION

Concept: Scientific classification groups life forms into increasingly smaller groups based on increasingly similar characteristics.
Discussion: Classification and scientific names of animals were developed to make it easy to describe yet provide specific information about an animal. The scientific classification begins with large groups of animals and then is refined to smaller and smaller groups of animals. The Linnaean System of Classification is a cladistics system (a classification of animals that consists of the ancestor and all of the individuals' descendants) based on evolutionary difference in the genomes. Originally, the Linnaean System of Classification classified animals by the way they moved. More refinements have been made with discoveries of more species and recognition of evolutionary classifications. Developments in sequencing *deoxyribonucleic acid (DNA)* has led to further refinement of this system of classification.
Concept: All living things are divided into six kingdoms. (Although viruses and prions cause disease, they do not meet the criteria to be considered living.)
Discussion: According to the Linnaean System of Classification, all living things are divided into six kingdoms (animals, plants, fungi, protozoa, archea, and bacteria). Then each kingdom is divided further until animals are classified by species then breed and varieties that we commonly refer to in veterinary medicine. Most domestic animals have been bred to consistently to have specific attributes both in appearance and in function.

Classification groupings follow:

- Kingdom
  - Phylum
    - Class
      - Order
        - Family
          - Genus
            - Species
              - Breed/variety

A mnemonic for remembering this system of classification is the following phrase, "*K*ings *P*laying *C*ards *O*n *F*ine *G*old *S*eats." Use the first letter of each of the words in the phrase to remember the first word relating to the classification system.
Concept: The scientific name of an animal is based on the genus and species names.
Discussion: For example, the domestic dog is known as *Canis familiaris* and the common dairy cow as *Bos primigenius*. By convention, the genus name is always capitalized, while the species name is in lowercase letters, and the whole name is written in italics. Commonly used terms for commonly seen species seen in a veterinary clinic are listed in Appendix E.
Concept: Species is important to the *signalment*.
Discussion: When working in a veterinary clinic, a patient will be described by its signalment. The signalment is the part of the medical history or medical chart that designates the species, the breed, the sex, and the animal's age. Because of inbreeding (breeding closely related animals together to establish desired attributes), many animals have genetic diseases that make knowing the breed important in disease diagnostics and care.

Abbreviations are used to designate the information about the patient, M(N) or M(n) for male neuters. These abbreviations may differ between veterinary clinics, so it is best to

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find out what abbreviations are acceptable at the clinic in which you work. Appendix E contains the species name, common gender, and offspring designations for commonly seen animals in the veterinary practice. Appendix F lists the commonly used abbreviations by veterinary hospitals.

Concept: Breeds of animals are described by form and function.

Discussion: Within each species of animal, there exist a number of breeds of animals. Breeds were developed by breeding for certain genetic traits including conformation for function (draft horse breeds for pulling or carrying heavy loads), for specific coat patterns (Angora rabbits for their long fibers for spinning into yarn), or for coat colors (Appaloosa horses and Dalmatian dogs have spotted coats). Breeds of animals were developed for conformational differences by breeding *phenotypically* the external characteristics. In some instances, the conformation of the animal makes them better at their intended job. For example, the long, lean sight hounds, the greyhound, borzoi, and saluki were bred to run faster than their prey, the deer they hunt. Dachshunds, on the other hand, were bred with *chondrodysplasic* legs and cannot chase their prey across open fields. With their compact legs and body they are better suited to fit down the hole or den of their prey. In addition, some breeds such as the Dachshund are further divided into coat types: smooth, rough, and wire haired. The development of different coat patterns is many times the result of the preferences of the breeder and do not serve a functional purpose.

Some animals were developed on looks or phenotype alone with no regard for function. For example, many of the "show" poultry, pigeons, and budgerigars (parakeets) have been bred to "look" a certain way, which has nothing to do with their egg laying, flying, or breeding ability. By developing specific breed characteristics, genetic-based diseases have also been passed on to every domestic animal.

Concept: All domestic animals have multiple breeds that have been developed. Development of breeds has led to the introduction of genetic diseases.

Discussion: It is beyond the scope of this text to list, describe, and specify every genetic disease for each breed and variety of domestic animals seen in veterinary medicine. Knowing where to locate resources will help identify breeds prone to various genetic diseases (see "Resources" section in Chapter 4). Use these resources to look at the breeds listed.

When trying to learn the different breeds, it is helpful to look at the registries of purebred of animals. For example, the American Kennel Club (AKC) has divided dogs into seven groups: working, terrier, sporting, nonsporting, herding, toy, and hound. Since there are over 173 breeds AKC recognizes, it is helpful to divide them up by function. Once familiar with the different breeds, the individual breed societies provide information on genetic problems. Many breed societies are well aware of the genetic problems that their individual breeds harbor and are working to eliminate the problems. (See also http://www.scwtca.org/health/index.htm.)

Concept: Knowledge of genetics aids understanding of how breeds and breed characteristics are developed.

Discussion: Genetic traits are inherited from both parents. Each genetic trait and specific hair coat color, conformation, and coat length are determined by a specific site on a gene called an *allele*. An allele is made up of a pair of genes, one from each parent. Genes are the genetic code made up of DNA that is contained within every cell in the body. These determine how that cell functions or what that cell is—a hair cell versus a liver cell. The way each allele or pair of genes interact or express themselves determines an animal's characteristics. *Dominant* genes within an allele are those that are always expressed visually and can mask *recessive* genes within the alleles. *Phenotype* refers to how the animal looks visually; a green colored budgerigar and a blue colored budgerigar have green and blue phenotypes, respectively. *Genotype* refers to what alleles the animal carries and what alleles (genetic traits) they can contribute to offspring. An animal may have a specific dominant phenotype, but its

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genotype may carry alleles (expressed as a "carrier" or "split to") that are recessive. The split or carried recessive characteristic may be notated after a slash, such as dominant trait/recessive trait or green/blue. Green is a dominant gene in budgerigars and blue is a recessive gene. Since the gene characteristics are carried in pairs (allele), an animal can appear (phenotypically) to be one color (dominant) but can carry another color (recessive) that is not expressed or seen. So, a budgerigar that appears green colored has a green allele but can be "split to" or be a "carrier of" a blue allele without any visual change. The parents of any individual contribute one gene to their offspring, one-half of their allele. The two parents then contribute one-half of their genetic makeup to their offspring, thereby not multiplying the genetic code every time an animal breeds. Which allele the parent contributes is statistically a 50–50 chance. So, a budgie that is green split to blue could contribute a dominant green allele or a recessive blue allele to its offspring. But there is an equal (50–50) chance that the offspring will receive either one.

Concept: Punnett squares help predict the phenotypic and genotypic outcome of breeding two individuals together.

Discussion: Alleles are designated with capital letters for dominant traits and small letters for recessive traits. The letters chosen are usually based on the first letter of the dominant trait. An animal is said to be *homozygous* when the same genes make up an allele. An animal designated as split to or a carrier of recessive traits is termed heterozygous. For example, a homozygous green bird would be designated GG, a heterozygous green bird split to blue would be Gg, and a homozygous blue bird would be gg. Punnett squares are a tool to determine the probable phenotypic and genotypic outcomes of a breeding of two animals. A Punnett square gives an easy way to statistically determine what the outcome from a breeding might be. Remember this is statistical. The outcome of the breeding of the same pair results in the same or any of the different genetic outcomes. Simple dominant and recessive allele inheritance will be demonstrated here, but realize multiple inherited factors are determined as well (see "Resources" section for rabbit genetics). Table 6.1, Table 6.2, Table 6.3, Table 6.4, and Table 6.5 show Punnett squares and different combinations breeding green and blue budgerigars together. Each of the traits illustrated in the tables is a single dominant or recessive allele. For each of the phenotype and genotype, the percentage of offspring is also described below each table.

Finally, one last Punnett square that shows how more than one dominant trait/recessive trait can be inherited by the offspring. Again, using a green budgerigar split or carrying a recessive blue allele and now adding in another pair of dominant and recessive traits, we will use a Punnett square. The example is the dominant, normally expressed, black-wing stripping and the recessive gray-wing stripping. The designation for the black wing homozygous bird

Table 6.1
Green Homozygous Cock Bred to a Green Homozygous Hen

Hen / Cock	G	G
G	GG	GG
G	GG	GG

Result: The offspring of this breeding will be 100% phenotypically green and genotypically homozygous for the dominant trait of green.

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Table 6.2
Blue Homozygous Cock Bred to a Blue Homozygous Hen

Hen / Cock	g	g
g	gg	gg
g	gg	gg

Result: Because both parents are homozygous for the recessive trait, all the offspring will be homozygous for the recessive blue trait and phenotypically blue.

Table 6.3
Breeding a Homozygous Blue Cock (Recessive) to a Homozygous Green Hen (Dominant)

Hen / Cock	G	G
g	Gg	Gg
g	Gg	Gg

Result: All of the young from this breeding will appear phenotypically green but will be heterozygous or split for blue (100% green/blue) genotypic.

Table 6.4
Breeding a Homozygous Blue Cock to a Heterozygous Green/Blue Hen

Hen / Cock	G	g
g	Gg	Gg
g	Gg	gg

Result: Because the heterozygous green budgerigar appears like a homozygous green budgerigar, matting a green bird to a blue bird will determine if the parent is homozygous (as in breeding one) or heterozygous as in this breeding. Because green is dominant, a blue offspring can only be obtained from this breeding if the green parent is split to blue or heterozygous to the blue color.

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Table 6.5
Breeding a Heterozygous Green/Blue Cock to a Heterozygous Green/Blue Hen

Hen / Cock	G	g
G	GG	Gg
g	Gg	gg

Result: The cock is green phenotypically but split to blue. The hen is green phenotypically and is split to blue. The outcome of this breeding would be 25% green homozygous (phenotypically green), 50% green heterozygous (phenotypically green), and 25% blue homozygous (phenotypically blue). The green homozygous and green heterozygous birds are not distinguishable unless test breeding is performed. Remember there is only a 25% chance of a blue chick appearing with each breeding.

is BB and the designation for the homozygous gray-wing bird is bb. Since there are now four possible combinations of alleles from each parent, every combination is used across the top and the side of the Punnett square. So, for a breeding of a heterozygous green/blue black wing (normal)/gray-wing cock (GgBb) to a hen with the same genotypic makeup, each of the possible combinations are as follows: GB, Gb, gB, and gb. There are 16 possible outcomes of the above-mentioned breeding with the likelihood of the majority of the offspring phenotypically appearing to be green black wing (normal). As can be seen in this chart, the more genetic factors that an individual has, the more difficult it becomes to predict the outcome of the breeding. Using Punnett squares can help point the breeder toward a phenotypic and genotypic goal (Table 6.6).

Procedure

Location used: Everywhere

PREPARATION

1. Prepare a section in your reference book entitled "Breeds of Companion Animals."
2. Set up each card to include breed, coat color, and type, standard weights optional.
3. Access each of the following websites:
   1. AKC: www.akc.org
   2. Cat Fanciers of America: http://www.cfainc.org
   3. Breeds of livestock including poultry: http://www.ansi.okstate.edu/breeds/
   4. Rabbit and Cavi breeds: http://www.arba.net/
   5. Avian—species—avian species: http://www.birdchannel.com/bird-species/; pigeon breeds: http://www.pigeonweb.net/pigeon-breeds.

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Table 6.6
Breeding Heterozygous Green/Blue Normal/ Gray-Wing Cock Bred to a Heterozygous Green/ Blue Normal/Gray-Wing Hen

Cock	Hen	GB	Gb	gB	gb
GB	GGBB		GGBb	GgBB	GgBb
Gb	GGBb		GGbb	GgBb	Ggbb
gB	GgBB		GgBb	ggBB	ggBb
gb	GgBb		Ggbb	ggBb	ggbb

Results:
6.25% Homozygous Blue gray-wing (1 out of 16 offspring)
6.25% Homozygous Green black wing (1 out of 16 offspring)
12.5 % Green Black wing/gray-wing (2 out of 16 offspring)
6.25% Green gray-wing (1 out of 16 offspring)
12.5% Green/blue gray-wing (2 out of 16 offspring)
25% Green/blue Black wing/gray-wing (4 out 16 offspring)
6.25% Blue Black wing (1 out of 16 offspring)
12.5% Blue Black wing/gray-wing (2 out of 16 offspring)
12.5% Green/blue Black wing (2 out of 16 offspring)

PROCEDURE

1. Access the standards and select a picture to place in your reference book then add a description for the following:
   a) top 10 breeds of dogs or those commonly seen in your practice; include pictures or descriptions of piebald, parti, grizzled, belton, and brindle coat patterns and the different types of ears and tails.
   b) top five breeds of cats
   c) three breeds each cattle, pigs, and goats
   d) five breeds of horses, examples of coat colors: bay, buckskin, dun, sorrel, chestnut, paint, and palomino; also include examples of face and leg markings
   e) five breeds of rabbits
   f) three types of guinea pigs, two types of hamsters, gerbils, mice, and two types of rats
   g) chickens, geese, ducks, and turkeys.
2. Practice identifying the different breeds of animals using your Reference book.
3. Practice with different pictures from internet searches or breed books.

FOLLOW-UP

1. Once you can identify 10 breeds of the various species, start to expand the list each week until you can identify all the breeds of dogs, cats, and rabbits.
2. If your practice sees other species, start adding them to your knowledge bank. Prepare a card for each animal as you are introduced.

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RESOURCES

American Kennel Club. Retrieved from: www.akc.org.
Breeds of Livestock including Poultry. Retrieved from: http://www.ansi.okstate.edu/breeds/.
Cat Fanciers of America. Retrieved from: http://www.cfainc.org.
Pigeon Breeds. Retrieved from: http://www.pigeoncenter.org/pigeonbreeds.html.
Rabbit and Cavi Breeds. Retrieved from: http://www.arba.net/.
Rabbit Genetics. Retrieved from: http://www.welshrabbitry.com/matrix.php.



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

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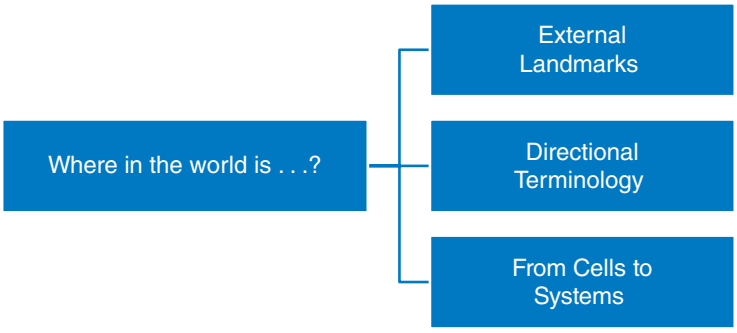
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CHAPTER

7

ANATOMY AND PHYSIOLOGY

BARB BURRI



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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Companion website: www.wiley.com/go/pattengale/tasks

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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Correctly identify external landmarks on companion animals and livestock.
2. Use correct directional terminology in describing locations on the animal body.
3. List the four categories of tissue found in the body and the function of each.
4. Identify the major bones of the skeletal system.
5. Identify the major external muscles.
6. List the types of tissue found in the body and the function of each.
7. For these nine body systems (cardiovascular, immune, respiratory, digestive, urinary, reproductive, nervous, endocrine, and integumentary systems):
   a) List the major structures of the system.
   b) Describe each organ's role in the system's function.
   c) List diseases affecting the organs in this system.

INTRODUCTION

Anatomical terms are used to correctly identify external and internal body structures. These terms are used when orders are given for diagnostic tests and when writing in patient records. Physiology is the workings of a body. By learning some basic physiology, the assistant will understand some of the reasons for doing different tests and procedures to determine an illness or condition.

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TASK 7.1
EXTERNAL LANDMARKS

Concept: There are species-specific terms for the external landmarks on an animal.
Discussion: While we might want to apply human terms, it is more correct and clearer to communicate using animal terminology. Figure 7.1 and Table 7.1 highlight many of the more common landmarks with common terms, anatomical terms, and species differences.

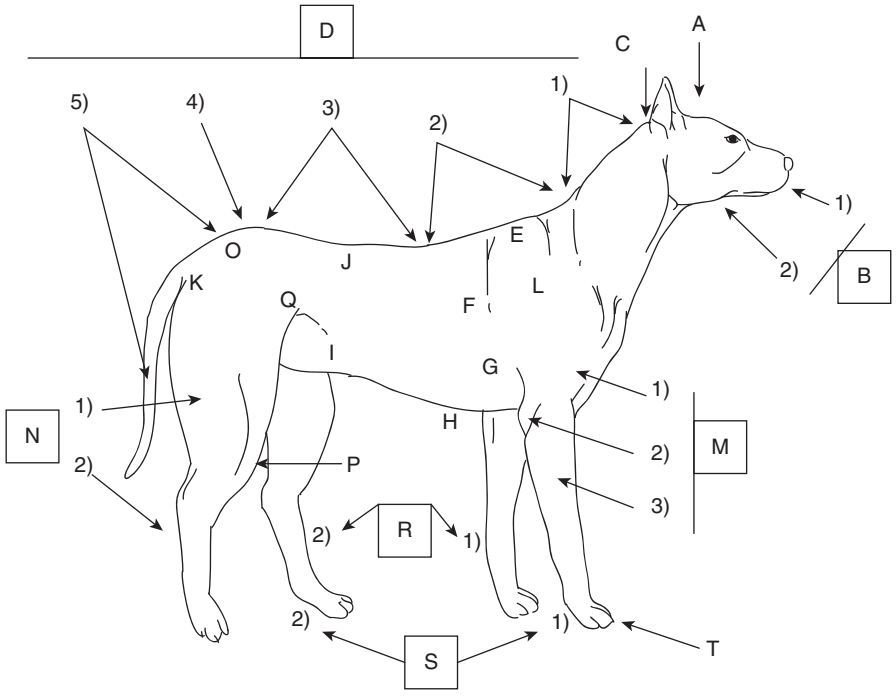


Figure 7.1. Anatomical landmarks and terminology. A. Skull. B. (1) Maxilla, (2) mandible. C. Poll. D. Vertebrae: (1) cervical, (2) thoracic, (3) lumbar, (4) sacrum, (5) coccygeal. E. Shoulder. F. Ribs. G. Thorax. H. Sternum. I. Abdomen. J. Loin. K. Hind limb. L. Forelimb, M. (1) Humerus, (2) radius/ulna, (3) carpus. N. (1) Femur, (2) tibia/fibula. O. Pelvis. P. Stifle. Q. Flank. R. (1) Metacarpus, (2) metatarsus. S. (1) and (2) phalanges/digits. T. Toenails.

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Table 7.1
Comparison Chart: Landmark Terms to Anatomical Terms

	Location	Dog/Cat	Horse/Cow	Anatomical Term/Bone
A	Head	Skull	Skull	Cranium
B	Jaws	Muzzle	Jaw	1. Upper—maxillary 2. Lower—mandible
C	Behind the ears	Poll	Poll	
D	Backbone	Vertebrae	Vertebrae	1. Neck—cervical 2. Thorax—thoracic 3. Abdomen—lumbar 4. Pelvis—sacrum 5. Tail—coccygeal
E	Point of shoulder	Withers	Withers	Point of scapula
F	Chest	Chest	Chest	Thorax
G	Ribs	Ribs	Ribs	Ribs
H	Chest bone	Chest bone	Chest bone	Sternum
I	Stomach	Stomach	Barrel	Abdomen
J	Back area before	Loin	Loin	Lumbar
K	Rear	Rump	Croup	Rear or rear quarters
L	Shoulder	Shoulder	Shoulder	Scapula—front quarters
M	Front legs	Forelimb Elbow	Forelimb Elbow	1. Humerus—proximal 2. Olecranon process 3. Radius/ulna—distal
N	Back legs	Hind limb	Hind limb	1. Femur—proximal 2. Tibia/fibula—distal
O	Hip	Hip	Hip	Pelvis
P	Knee	Stifle	Stifle	Patella
Q	In front of the stifle	Flank	Flank	Flank
R	Ankle	Wrist Hock	Wrist Hock	1. Carpus—front 2. Tarsus—back
S	Foot	Paw	Hoof	1. Metacarpus—front 2. Metatarsus—ear
T	Toes/hoof	Toes	Hoof	Phalanges or digits

Procedure

Learning Anatomical Landmarks and Terminology

PREPARATION

1. Prepare a card in your reference book entitled "Anatomical Landmarks and Terminology."
2. Find images of a dog and a horse standing broadside.

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3. Attach the images to the cards in your reference book, leaving enough room to write the terms in at the appropriate locations.

PROCEDURE

1. Using Table 7.1 and Figure 7.1, label your images with the terms.
2. As you work through the day, use one term properly until you have all the terms memorized.

FOLLOW-UP

1. Ask clinic staff for help in identifying landmarks or correcting your terminology if this is used incorrectly.

TASK 7.2
DIRECTIONAL TERMS

Concept: Directional terms are very important in veterinary medicine.
Discussion: Quadrupeds, mammals that stand on four legs, add an interesting challenge. Where is the front of a dog? Does that mean the chest, the nose, or the belly? Where is the back of the dog? Does that mean the spine or the rump?

To eliminate this problem, veterinary medicine uses the terms *dorsal* for the surface by the spine, and *ventral* for the surface of the belly. *Cranial* refers to toward the head. *Caudal* refers to toward the tail from the point of reference. *Rostral* is used for locations on the head that are toward the nose. *Proximal* is a term used for limbs to indicate a point close to the point of attachment. *Distal* is a point on a limb that is far from the point of attachment. *Medial* and *lateral* mean toward the middle and away from the middle, respectively. Terminology used to describe the depth into the body includes superficial for on the surface and deep for areas extending into the structure of the body. Refer to Appendix C, "Directional Terms."

Tip Box 7.1: **Using correct terms for the landmarks in on an animal increases your credibility.**

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Directional Terms."
2. Attach a similar image to the card, leaving room for you to write the terms on the card.
3. Review Web resources of directional terms such as http://vanat.cvm.umn.edu/anatDirections/Directions.html.

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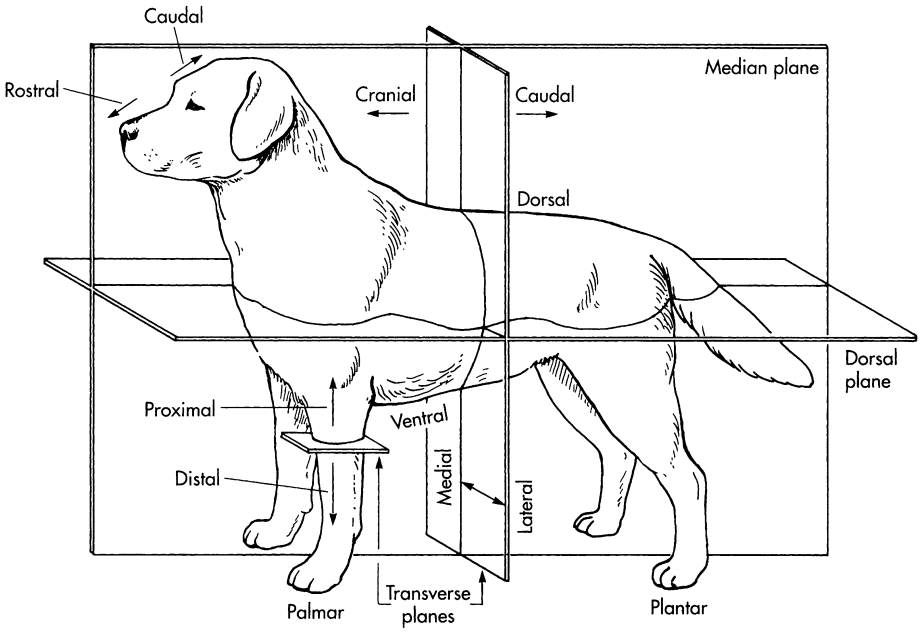


Figure 7.2. Directional terms. *Source*: McBride, D. F. (2002). *Learning Veterinary Terminology*, 2nd ed. St. Louis, MO: Mosby. Reproduced with permission from Elsevier.

PROCEDURE

1. Label images on the task cards with the directional terms.
2. Review directional terms by labeling an image of an animal, then compare it with Figure 7.2.

FOLLOW-UP

1. Use correct terminology in practice.
2. Use proper terminology when writing in medical records; ask clinic staff for assistance.

TASK 7.3
CELLS AND TISSUES

Concept: The body is composed of smaller structures that in combination make larger structures.
Discussion: The smallest contained unit in the body is the cell. Cells have a *nucleus* to control the activity of the cell, and other *organelles*. Organelles function as "mini" organs to take care of energy production and waste elimination for the cell. The study of cells is

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cytology. Cells are combined together to create tissues. There are four primary kinds of tissue in the body:

- *epithelial* tissues that make up the linings and coverings of the body and its organs
- *muscle* tissues that contract to provide movement
- *nervous* tissues that conduct messages
- *connective* tissues that include bones, ligaments, tendons, fat, and blood.

The study of tissues is *histology*. Tissues combine to create *organs*, units of specific function within the body. When performing diagnostics, the veterinarian will often take samples of cells and tissues to be examined under the microscope. Chapter 14, "Laboratory Skills," will cover these tasks in detail.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Tissues."

PROCEDURE

1. List each of the four types of tissues and their functions in the body.

FOLLOW-UP

1. As you go through your workday, identify which tissues are being discussed.
2. Confirm with a coworker that you are using the correction designation for the tissues.

TASK 7.4
SKELETAL SYSTEM

Concept: The skeletal system provides a framework for the body as well as protection for the internal organs. The bones of the skeleton allow muscles to attach, providing movement.

Discussion: All the bones in the body are part of the skeleton. The total number of bones varies by species. Each bone has some similar characteristics. Bones have an outer covering, the *periosteum*. Bones have an inner cavity called the medullary. A vascular lining inside the cavity is called the endosteum. The medullary cavity contains bone marrow where blood cell production takes place.

The *axial* skeleton is made up of the cranium, vertebral column, ribs, and sternum. The cranium and vertebrae protect the central nervous system (CNS). The vertebral column is divided into five sections. The ribs and sternum protect the heart and lungs. The *appendicular* skeleton is made up of the limb bones and their means of attachment, ligaments and tendons.

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Refer back to Table 7.1 to review/learn the major bones of the body starting at the head and moving caudally.

Concept: Trauma or disease can adversely affect the skeletal system.

Discussion: The veterinarian may request *radiographs* to examine skeletal structures in detail. Bones can be broken in trauma. Bones may have *congenital* abnormalities, those occurring at birth. These abnormalities include elbow and hip *dysplasia*, which are poorly formed hips and elbows. Other skeletal conditions can develop over time, such as disk disease, or *arthritis*, the inflammation of a joint. A young animal might experience *panosteitis*, inflammation of the bones similar to growing pains. Bones can be affected by cancer, *osteosarcoma*. The cancer breaks down the bone tissue causing weakness and breakage.

Procedure

Learning the Skeleton

PREPARATION

1. Prepare a card for your reference book entitled "Skeletal System."
2. Collect an image of a full body skeleton of a cat or a dog and a horse. Attach the images to your card, saving room to label the bones.
3. Collect some radiographs either from your workplace or from online sites such as:http://www.veterinaryradiology.net/cases/ or http://dvminsight.com/imagelibrary/SearchPage.aspx.

PROCEDURE

1. Identify and label these bones on each image: skull, the five pairs of the spine, ribs, sternum, front limb (humerus, radius, and ulna; carpus, metacarpus, and phalanges), and the hind limb (femur, tibia and fibula, tarsus and metatarsus, and phalanges).
2. Use radiographs to also practice identifying bones.

FOLLOW-UP

1. Use the correct terms for bones when working with medical records and speaking to clients.
2. Pay attention to skeletal conditions when staff is discussing a case.
3. Use your skeletal knowledge when you assist in positioning for radiographs.

TASK 7.5
MUSCULAR SYSTEM

Concept: The roles of the muscular system include allowing movement, creating heat, and helping circulation.

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Discussion: Muscles are made of bundles of fibers that contract and relax. The three types of muscles do very different jobs inside the body. Skeletal muscles move the body and only work when the brain tells them to, and so they are called voluntary muscles. Involuntary muscles are called smooth and cardiac muscles. Smooth muscles make up all of the organs except for the heart, which is made up of cardiac muscle. Each type of muscle is specialized for a specific function.

The outer covering of muscle bundles is called *fascia*. *Tendons* are the connective tissues that connect muscles to bones. *Ligaments* are strong bands of connective tissue that connect bones to other bones. Table 7.2 shows the name, location, and purpose of some of the major external skeletal muscles.

Concept: The muscles can be adversely affected by trauma or disease. *Myopathy* is a general term for muscle disease. *Polymyositis* is an inflammation of many muscles. *Degenerative myopathy* causes weakness in the affected muscles. Overstretching of muscles results in *strains*, whereas *sprains* are the overstretching of a ligament. The veterinarian will often do blood work as well as a physical exam to determine muscular issues.

Table 7.2
Muscle Groups and Lymph Nodes: Location and Purpose

	Muscle Name	Location	Purpose
A	Masseter	Cheek	To grind or chew food
B	Brachiocephalus	From head to clavicle	Forelimb advancement, side-to-side neck movement
C	Trapezius	Spine to scapula	Forelimb lifting
D	Triceps brachialis	Caudal humerus	To extend the elbow and flex the shoulder
E	Biceps brachialis	Cranial humerus	To flex the elbow and extend the shoulder
F	Pectoral	Chest	Stabilization of the limbs—in avians, this is the flight muscle
G	Latissimus dorsi	Dorsal lateral Thoracic area	To move the forelimb caudally; flexes the shoulder
H	Quadriceps	Cranial thigh	Extends the hip, rotates the pelvis
I	Biceps femorus	Lateral thigh	Extends the hip, stifle, and hock
J	Semimembranosus Semitendinosus	Caudal thigh	Extends hip
K	Sartorius	Medial thigh	Extends the hip
L	Epaxial	Over the sacrum	Extends the spine, turning the trunk.
	Lymph Node		**Location**
1	Submandibular		Under the mandible
2	Popliteal		On the caudal knee
3	Subscapulary		Under the scapula
4	Axillary		In the armpit
5	Inguinal		In the groin

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Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Muscles."
2. Collect a broadside image of a cat or a dog and a horse.
3. Attach the images to your cards.

PROCEDURE

1. Identify the location of the superficial muscles listed in Table 7.2 on the images of both species.

FOLLOW-UP

1. Have clinic staff help you find these muscles on real animals.
2. Use the correct names for muscles when working with medical records and clients.
3. Pay attention to the use of muscle terms when the staff is discussing cases and patients.

TASK 7.6
CARDIOVASCULAR SYSTEM

Concept: The role of the cardiovascular system is pumping blood to bring nourishment and oxygen to, and remove wastes from, the cells and tissues.
Discussion: The primary organ is the heart. It is a hollow, four-chambered muscular organ. The upper two chambers are the *atria* (singular: atrium), and the *ventricles* are the lower two chambers. Blood comes into the heart and is pumped to the lungs to drop off carbon dioxide and to pick up oxygen. The blood returns to the heart through the *pulmonary arteries* and is then pumped around the body to oxygenate the tissues. The arteries are thick-walled vessels leading away from the heart, which branch into smaller *arterioles*, and eventually into *capillaries*, which are one cell in thickness. Capillaries drain into *venues*, which are small veins. Venues drain into larger veins and eventually go into the inferior vena cava and the superior vena cava. These are the largest veins returning to the heart. Veins often have valves to keep blood from pooling. Arteries have thicker, more muscular walls as they receive blood from the pumping heart and so have the highest blood pressure.
Concept: The circulatory system can be adversely affected by disease.
Discussion: Conditions of the muscles or of the electrical system are the two primary ways in which the heart can be diseased. *Dilated cardiomyopathy* is a condition where the muscles surrounding the chambers of the heart stretch out. This causes the chambers to enlarge and the heart to pump poorly. *Hypertrophic cardiomyopathy* is a condition where the heart walls enlarge, causing the chambers to be smaller. The smaller chambers store less blood to flow out of the heart. The thicker walls make the heart walls stiff and not able to pump blood well. *Arrhythmia* is any abnormal heartbeat. *Atrial fibrillation* is a rapid fluttering beat of the atria of the heart caused by dysfunction of the heart's electrical system. *Chronic heart failure (CHF)* occurs when the heart does not pump well enough to distribute the blood around the body. It can be the result of cardiomyopathy, high blood pressure, or a blockage of the heart's

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own blood supply. A clot that blocks off circulation to the rear part of the animal is known as a *saddle thrombus*. It has this name because it occurs in the area that a saddle might be if the animal were a horse.

The veterinarian will *auscultate* or listen to the heart with a stethoscope to hear its rhythm. This is also done to detect any valve malfunctions or *heart murmurs*. Radiographs may be taken to see if the animal's heart is enlarged. An *electrocardiogram (ECG)* will be used to study the electrical activity of the heart. Cardiac ultrasound may be used to indirectly view the internal structure and function of the heart.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Cardiovascular System."
2. Find a diagram of the heart in a textbook or online.
3. Attach the image to the card.

PROCEDURE

1. Review a diagram of the heart to be familiar with its chambers and vessels and the flow of blood to and from the heart.
2. Add some of the more common heart conditions to the card with definitions.
3. On the back of the card, make a chart and mark the normal heart rates for dogs, cats, horses, and any other species your hospital sees.

FOLLOW-UP

1. When animals with cardiovascular issues visit the clinic, use correct terms when discussing their care and when working with medical records.
2. Check with clinic staff for the correct name of the animal's diagnosis.
3. Check with the clinic staff for any precautions to be taken with cardiac patients. Make a note of this on your card so that you remember the next time.

TASK 7.7
IMMUNE SYSTEM

Concept: The immune system is responsible for protecting the body from infection and disease.

Discussion: The immune system is made up of all the lymph vessels, skin, spleen, and lymph nodes. Lymph nodes are also called lymph glands, but they are really filters, not glands. Lymph nodes are found throughout the body. Typical areas to check for lymph nodes are *submandibular*, beneath the jaw; subscapulary; *popliteal*, on the caudal knee; axillary, in the armpit; and *inguinal*, in the groin. The spleen stores red blood cells and serves the role of filtering toxins and creates *lymphocytes*. These are the white blood cells needed for an immune response. An immune response is triggered by a toxin or foreign substance that produces antigens such as viruses or bacteria. Lymphocytes are released when the body detects an antigen. Lymphocytes create *antibodies* against these invaders.

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Concept: Although the role of the immune system is to fight disease, the immune system can be adversely affected by disease.
Discussion: *Lymphoma*, or cancer of the lymph system, is a systemic cancer that affects both cats and dogs. The veterinarian will examine and biopsy any swollen lymph nodes to rule out lymphoma or infection causing the *lymphadenopathy*, or swelling of the lymph node. The immune system, if not functioning well, allows disease to affect the animal. Some immune conditions are called *autoimmune*, meaning the immune system is attacking normal body tissue and organs as though they were invaders.

Antibodies fight off antigens. *Vaccination* is one way to encourage antibodies in the body. The animal is given a small amount of an antigen for a specific disease so its body will create antibodies to fight off that disease in the future. Vaccination protocols will be discussed in Chapter 12, "Patient Care II."

Procedure

PREPARATION

1. Add lymph nodes to the card entitled "Muscles and Lymph Nodes" in your reference book.

PROCEDURE

1. Identify the locations where lymph nodes are found and mark your muscle images. See Table 7.2 for reference.

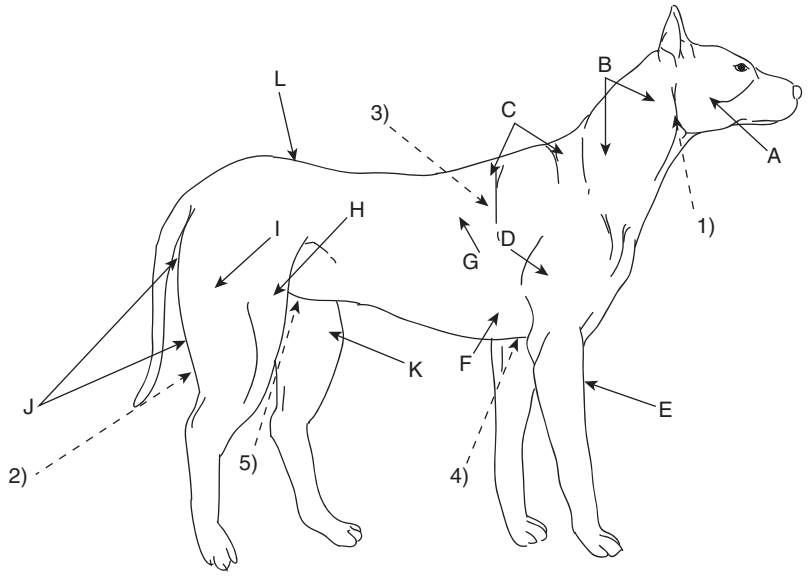


Figure 7.3. Indicate major muscles and lymph nodes on this figure. Check your work using Table 7.2.

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FOLLOW-UP

1. Use correct terminology when discussing immune conditions or when working with the patient's medical records

TASK 7.8
RESPIRATORY SYSTEM

Concept: The role of the respiratory system is to bring oxygen into the lungs, where the capillaries in the lungs can collect oxygenated blood before it goes to the heart to be pumped throughout the body.
Discussion: The respiratory system starts in the nose and in the mouth. These join in the *nasopharynx*, the part of the throat behind the nose, and the *oropharynx*, the part of the throat behind the mouth. The system continues to the *larynx*, or the voice box, the *trachea*, or windpipe, and into the bronchi, which divide to supply air to each lung. The bronchi branch down to narrower tubing called *bronchioles*. The bronchioles eventually end at the *alveoli* or air sacs. The alveoli have many capillaries where the exchange of carbon dioxide and oxygen takes place.
Concept: Diseases and allergies can affect the respiratory system.
Discussion: *Asthma* is a respiratory condition where the airways are swollen and irritated. This is demonstrated by a wheezing sound when the animal breathes. This is more common in cats than in dogs and can be caused by allergies. In horses, there are barn *heaves* and summer heaves; both are brought on by allergies to molds and pollens. *Plural effusion* is a condition of fluid in the tissues of the lungs.

Pneumonia is a condition of fluid in the lungs themselves. This can be the result of infection. Pneumonia can also be secondary to another diseases such as kennel cough, or from aspirating vomitus when unconscious or under anesthesia. *Laryngeal paralysis (LP)* is a condition where the folds in the larynx in the throat do not move properly. These folds block the airway and make breathing difficult. This is sometimes seen in older dogs. CHF, mentioned previously, can lead to respiratory difficulties. In CHF, fluid can build up in the lungs from poor circulation. A collapsing trachea is seen in small dogs, where slight pressure from a collar causes the trachea to collapse, blocking airflow to the lungs. This may cause the mucous membranes to turn blue and is called *cyanosis*. Any animal that is cyanotic must have immediate intervention or it can die. Kennel cough is a viral respiratory infection. It is generally self-limiting but can lead to pneumonia.

Veterinarians will auscultate or listen to the lungs. They are listening for abnormal breath sounds. Radiographs may be taken to look for fluid in the lungs, or for *neoplasms*, cancers in the lungs. The veterinarian may use an endoscope to examine the larynx to rule out LP.

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Procedure

PREPARATION

1. Find a website where you can listen to breath sounds, such as: http://www.cvmbs.colostate.edu/clinsci/callan/breath_sounds.htm.
2. Prepare a card for your reference book entitled "Respiration Rates."

PROCEDURE

1. Become familiar with normal and abnormal breathing patterns; mark the terminology on one side of your card.
2. Look up the normal rates of respiration for the species seen at your clinic.

FOLLOW-UP

1. Alert clinic staff to any unusual breath sounds or patterns in patients.

TASK 7.9
DIGESTIVE SYSTEM

Concept: The digestive system performs the role of taking food and turning it into nutrients to nourish the body and then eliminating the undigested remainder.
Discussion: Animals may have a *monogastric* (one stomach) digestive system, or may be *ruminants*, which are mammals with a four-compartment stomach. The term ruminate means to chew again. Cats, dogs, pigs, and horses are all monogastric as are most pocket pets. Cows, sheep, goats, and llamas are ruminants.

The first step in digestion is *prehension*, the taking in of food. The animal chews the food where it mixes with saliva. The food then proceeds down the esophagus to the stomach. The food is broken down further in the stomach by enzymes, acids, or bacteria then moves through the pyloric sphincter to the small intestine. There are three sections of small intestine: the *duodenum*, the *jejunum*, and the *ileum*. This is the part of the digestive tract where absorption of nutrients takes place. The movement of the digestive matter through the intestines is called peristalsis. Finally, the digestive matter moves to the *colon* (large intestine). The colon has three sections: the ascending, transverse, and descending colons. The colon is where water is removed and *feces* are formed. The most final portion of the digestive tract includes the rectum and the anus, which is bordered by anal glands. These structures contain *sphincters*, rings of muscle that control the flow of feces to the outside world. The process of expelling feces is called *defecation*.

In ruminants, the chewed food goes to the *rumen* and then to the *reticulum*. The solid portion of the chewed food is the *cud*. The cud is regurgitated and chewed again to break down the fibers. The cud is swallowed and the liquid portion goes into the *omasum*, where water and minerals are absorbed into the bloodstream; what is left moves to the *abomasum*, then to the small intestine and colon. The solid portion of the cud remains in the rumen, where microbes continue to break the feedstuff down into energy. The solid portion eventually follows the same path as the liquid.

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There are three accessory organs in the digestive system: the *liver*, the *pancreas*, and the *gall bladder*. They are accessories because they play a role in the digestive system but are not part of the *alimentary canal* (digestive tract). The liver is a large filter that removes toxins from the blood. The liver helps metabolize drugs and produces bile, which is used in the digestion of fats. The pancreas produces digestive enzymes and hormones (insulin), which are excreted into the duodenum. The gall bladder's role is the storage and release of bile.

Concept: Some diseases can affect the functioning of the digestive system.

Discussion: Some gastrointestinal (GI) diseases will cause the symptoms of vomiting or *diarrhea*, an abnormally watery stool. There are many reasons for vomiting and diarrhea including stress, dietary indiscretion, bacterial toxins, or foreign bodies blocking part of the digestive tract. *Ileus* is the paralysis or cessation of normal intestinal movement. *Gastric dilatation and volvulus (GDV)* is the dilation, expansion, and twisting of the stomach, also known as bloat. The stomach fills with gas, or too much food, expands, and flips over. This twisting blocks the passage of food. This twisting also cuts off the blood supply to the stomach and causes *necrosis*, or death of the stomach tissue. *Intussusception* is when a part of intestine folds like a telescope around another section of intestine. *Gastritis* is the term for inflammation of the stomach. *Irritable bowel disease (IBD)* occurs when the intestines are overly sensitive to food or stress. *Pancreatitis* is the inflammation of the pancreas. This can be caused by eating rich foods or highly salty or spiced foods like ham.

The veterinarian will take fecal samples to rule out parasites as a cause of diarrhea. X-rays may be performed. A contrast agent such as barium can be used to view the status of the digestive tract and its interior lining. Endoscopy can be used to directly visualize the interior of the GI tract. Ultrasound can be used to indirectly visualize structures in the abdominal cavity such as the liver and gall bladder.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Digestive System(s)."
2. Review the digestive system organs in an anatomy text, or websites such as http://vetmed.illinois.edu/courses/imaging_anatomy/ or http://www.vetmed.wsu.edu/ClientED/anatomy/

PROCEDURE

1. On one side of the card, list in order the parts of the monogastric digestive tract.
2. Indicate what each section's role is in digestion and the disease condition that can affect it.

FOLLOW-UP

1. Did you use correct terminology for the digestive system in your daily work?
2. Use correct terminology for elimination and digestive system organs when speaking with clients and working with medical records.
3. Alert clinic staff to any vomiting or diarrhea in patients.

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TASK 7.10
URINARY SYSTEM

Concept: The urinary system is responsible for filtering the blood and for removing wastes and balancing the amount of water in the blood.
Discussion: The filtering organs are the kidneys. Each kidney has millions of tiny filtering units, called *nephrons*. Nephrons filter the blood removing excess fluid and waste products. This filtration creates urine. Urine leaves the kidneys via the ureters and makes its way to a hollow organ called the bladder. The bladder is connected to the outside world by the urethra. The action of releasing urine is *urination* or *micturition*, which is controlled by the urinary sphincter. *Chronic renal failure* is the ongoing progressive failure of the kidneys to properly filter out wastes. *Acute* renal failure is a sudden onset of kidney failure from toxic overload or poisoning. *Incontinence* is the inability to hold urine, causing accidental urination. There are many causes of incontinence, from hormonal, structure, or muscle weakness. FLUTD is the acronym for feline lower urinary tract disease. Symptoms include bloody urine, straining to urinate, and inability to urinate. FLUTD can lead to a blocked cat. This is a medical emergency as the body keeps producing urine, but there is no way for it to leave the body. Bladder stones or *uroliths* can cause some urinary blockages. Other urinary issues include urinary tract infection (*UTI*). The veterinarian will often order a *urinalysis* to diagnose a UTI, FLUTD, or crystals in the urine. Radiographs or ultrasounds can be used to find bladder stones. Ultrasound may be used to visualize the kidneys. Blood work can also give an indication of kidney health; this is a chemistry test called blood urea nitrogen (BUN).

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Urogenital System."
2. Use the Web to find an image of male and female urogenital systems.
3. Attach the image to the card.

PROCEDURE

1. On one side of the card, mark the urinary system.
2. List the disease terms with a short description.
3. Leave the room to describe the methods for urine collection and analysis described in Chapter 14.

FOLLOW-UP

1. Use correct urinary system terms in client discussions and medical records.
2. If a client indicates that he or she has a cat who is straining to urinate, unable to urinate, or producing bloody urine, remember this is an emergency. Alert clinic staff.

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TASK 7.11
REPRODUCTIVE SYSTEM

Concept: The role of the reproductive system is to create new life and to sustain the species.
Discussion: The male and female reproductive systems work together to produce new life. The male *gonads* or sex organs are the *testes*. The testes produce sperm and male hormones. The female gonads are the *ovaries*, and their role is to produce eggs and female hormones. Sperm are created in the testes and travel through the *vas deferens*, the spermatic vessel, then to the penis for inseminating the female. Eggs, or *ova*, are released by the ovaries based on the release of hormones from the pituitary gland. This is *ovulation*. Some species ovulate based on cycles of hormones. Other species, cats, rabbits, and ferrets, are *induced ovulators*, where breeding has to take place for ovulation to occur. The sperm fertilizes the egg and the fertilized ovum implants in the uterus. This egg will grow into a fetus and is sustained by the *placenta*, which supplies nutrient, oxygen, and blood to the fetus. *Gestation* is the time of development of the fetus. Gestation periods vary widely between species from as short as 3 weeks in hamsters to about 2 months in cats and dogs, to 9 months in cattle, and 11 months in horses. When the gestation period is over, the animal gives birth, which is called *parturition*. Difficult birth is called *dystocia* and may need veterinary intervention due to an abnormal presentation of the fetus. A *cesarean section* is the surgical procedure for delivering the young directly from the uterus.

Procedure

PREPARATION

1. Review Table 5.1 in Chapter 5, paying attention to the names of offspring for the different species.
2. Prepare a card for your reference book entitled "Gestation Periods."
3. Research a site online or use a reference book to find the different gestation periods.

PROCEDURE

1. Determine the gestation period of the species seen at your clinic and mark these on your card.
2. On the other side of the card, put your clinic's procedure for assisting in cesarean sections.

FOLLOW-UP

Practice using the correct terminology for reproductive issues seen in your clinic.

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TASK 7.12
NERVOUS SYSTEM

Concept: The nervous system controls all the body functions.
Discussion: The cells of the nervous system are called *neurons*. The space between neurons is the *synapse*. *Neurotransmitters* are the chemical messengers that carry information across that space. The brain and spinal cord make up the *CNS*. The nerves of the body are the *peripheral* nervous system. The body also has an *autonomous* nervous system (*ANS*) that responds in times of stress. The *sympathetic* nervous system is the part of the ANS that responds to stress, creating the fight-or-flight response. Heart rate increases, breathing becomes more rapid, and the body gears up for a fight. The other part of the ANS is the *parasympathetic* nervous system. This system aids the body in relaxing after a stressful event. The parasympathetic nervous system lowers the heart rate and the breathing rate and enhances digestion.
Concept: Disease, trauma, and drugs can affect the nervous system.
Discussion: Enervation is the term for a nerve bringing signals to and from an area of the body. If a nerve has experienced trauma, the animal will lose feeling in the area that nerve *enervates*. If nerves are not functioning properly, the animal may have difficulty moving. The animal may be unsure of where its feet are, or *conscious proprioception*. The animal might exhibit *ataxia*, or difficulty in coordinating movement. Sometimes, an unusual gait or way of walking can indicate a neurological problem. Issues from a vertebral disk pushing on the spinal cord can lead to pain, ataxia, and paralysis. Disease such as *distemper* can cause a patient to have seizures, tremors, and limb weakness from its effect on the nerves. *Seizures* or convulsions are a nervous system disorder. A quiet place in a kennel, with the door firmly latched, or on the floor with padding only, is a safe place for the patient while having a seizure. *Vestibular* disease can be caused by the inner ear or the brain. Vestibular symptoms include head tilt, circling, and *nystagmus*, or rapid flicking motion of the eyes.

The veterinarian will do proprioception tests to see if the animal knows where its feet are. The The veterinarian may also examine the eyes, and sometimes it may be necessary to do an MRI. This is magnetic resonance imaging to visualize what is going on with the patient's nervous system.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "CNS" or "Central Nervous System."

PROCEDURE

1. Mark the card with the nervous system parts, definition of terms, and disease conditions.
2. Make note of what a normal gait looks like and watch for any unusual gait or head tilt.
3. Make a note of what to do if a patient has a seizure.

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FOLLOW-UP

1. Alert clinic staff to any seizures, ataxia, nystagmus, or other nervous system symptoms in your patients.

TASK 7.13
ENDOCRINE SYSTEM

Concept: The endocrine system is made up of the glands that control the body's function by the production of hormones.
Discussion: The *pituitary*, which is in the brain, is the master gland, controlling the other glands. The *thyroid* is found in the neck and it controls the metabolism. The *parathyroids* are located on the thyroid. Parathyroids are responsible for calcium regulation. The *adrenal glands* are on top of the kidneys and have two roles. One adrenal role is helping to control inflammation and body function. The other role of the adrenals is to provide hormones to help the animal respond in times of stress, producing adrenaline. The pancreas is wrapped around the small intestine and is responsible for insulin production to maintain proper levels of blood glucose. The other glands are the reproductive glands, the ovaries in the female and the testes in the male.
Concept: The entire body can be affected by disease of the endocrine system.
Discussion: Disorders of the thyroid include too little or too much production of hormone, leading to *hypothyroidism* or *hyperthyroidism*. Too little production of insulin by the pancreas leads to diabetes mellitus. If there is too much adrenal hormone, the animal has Cushing's disease or *hyperadrenocorticism*. If there is too little adrenal hormone, the disease is called Addison's disease or *hypoadrenocorticism*. Many endocrine diseases have vague symptoms such as increased thirst and increased urination. Testing blood for the levels of hormones helps the veterinarian determine if the animal has too much or too little of the various hormones.

Procedure

PREPARATION
Prepare a card for your reference book entitled "Endocrine System."

PROCEDURE

1. List each gland in the endocrine system, its role in the body, and the hormone it creates.
2. Be prepared to help with a blood sampling technique to test for endocrine disorders.

FOLLOW-UP

1. Alert clinic staff to all symptoms of patients, even simple ones like increased water consumption or increased urination.

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TASK 7.14
INTEGUMENTARY SYSTEM

Concept: The *integument* is the skin. Its primary role is protection.
Discussion: The skin has three layers. The first is the *epidermis*, the outermost layer, which is dead and is made up of protein. The second layer is the *dermis*; this is the living layer of the skin with blood vessels and nerves. The third layer as we move deeper is the *subcutaneous* or *hypodermis*. This layer has fat to cushion the skin and body structures. The accessory structures in the integumentary system are the hair and nails or hooves.
Concept: The skin is adversely affected by parasites, allergens, and infections.
Discussion: *Ectoparasites* are pests such as fleas, ticks, mites, and lice. An infestation of parasites can cause *pruritus* (itching), *alopecia* (hair loss), and skin irritation. Pets with allergies often show signs of itching and scratching, as well as hair loss and poor coats. Infections in the skin may show as *pustules* (pimples with pus). Infections may appear as flakes, which remain when a pustule breaks. The veterinarian may do a skin scraping or tape prep to look for parasites. Skin scraping is using a scalpel blade to scrape the skin until it oozes blood. The tissue is scraped onto a microscope slide and viewed under the microscope. Tape prep is taking a piece of cellophane tape, placing it on areas of the skin, lifting it up, staining, and placing it on a microscope slide. A flea check is done by placing a white paper towel or cloth towel down, setting the patient on top of it, fluffing up the hair coat to dislodge any debris, and then squirting the debris with water. If the debris breaks down into red or rusty stains, this indicates fleas are present as this is flea feces. The ears are examined and samples taken to look for ear mites, yeast, and bacteria. Allergies are often difficult to diagnose, but blood testing, skin testing, and food trials are some of the tools the veterinarian will use.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Ectoparasites/Skin Disorders."
2. Go online and search for pictures of the disorders described earlier.
3. Use a website such as http://www.capcvet.org/parasite-prevalence-maps/ to find parasites common in your area.

PROCEDURE

1. On one side of the card, write the procedures and supplies needed for each of the disorders seen commonly in your clinic.
2. On the other side of the card, list your clinic's protocol for parasite prevention and treatment.
3. Write your clinic's protocols for cleaning an exam room where parasites have been detected.

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FOLLOW-UP

1. Follow your clinic's cleaning procedures.

Basic knowledge of anatomy, the parts of the body, and physiology, and how those body parts work is important in veterinary medicine. Understanding the roles of the body's systems will help you be more alert to signs that might indicate a change in the patient's health.

RESOURCES

Colville, Thomas, & Bassert, Joanna M. (2002). *Clinical Anatomy and Physiology for the Veterinary Technician*. St. Louis, MO: Mosby.

Evans, Howard (2000). *Guide to the Dissection of the Dog*, 5th ed. Philadelphia, PA: W.B. Saunders Co.

Romich, Janet Amundson (2006). *An Illustrated Guide to Veterinary Medical Terminology*, 2nd ed. Clifton Park, NY: Thompson Delmar Learning.



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

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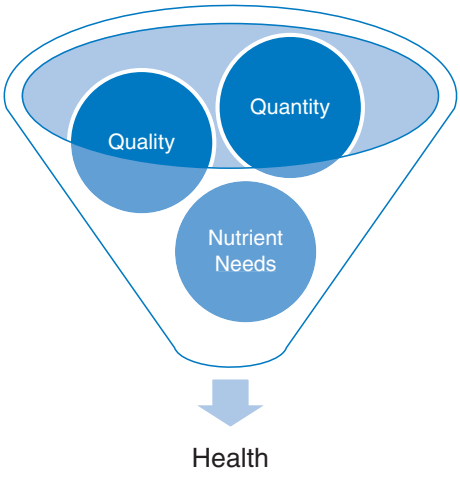
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CHAPTER

8

NUTRITION

PAULA PATTENGALE



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Explain an animal's diet as related to its ecological niche.
2. Rank the basic nutrients in a diet in the order of the quantity needed.
3. Calculate an animal's basic energy requirements (BER).
4. Specify the maintenance energy requirements (MER) or caloric needs of the hospitalized patient based on its illness.
5. Compare pet food labels for content.
6. Recall the differences in caloric content per gram of fats, proteins, and carbohydrates.
7. Calculate how much to feed a patient based on the instructions on the label.
8. Justify the use of prescription diets for some small animal patients.
9. Calculate the cost per feeding of several types of small animal pet foods.
10. Explain the meaning of AAFCO.
11. Differentiate between various baled products.
12. Apply the concepts of a balanced diet to feeding large animals.
13. Use the Internet to locate the nutritional requirements of novel species.

INTRODUCTION

This is the "what to feed" chapter. The "how to feed" is found in Chapter 11, "Patient Care I." In learning this chapter, the student needs a modicum of chemistry and algebra.

Appropriate nutrition for any individual depends on two factors: the *ecological niche* of the organism and the availability of essential components for a healthy diet. The ecological niche is determined by the forage and feed available and the anatomical and physiological adaptations of the organisms to utilize the food as well as the resources and competitors in the environment. Hence, we see *ruminants* with a multichambered stomach and *monogastric* creatures having a large *cecum* able to utilize cellulose in plant cells. Most can consume a variety of plants, while others, such as the panda being limited to bamboo and the koala to eucalyptus, have highly specialized diets. The anatomical and physiological adaptations of an organism and the environment in which an organism normally lives are related. This interrelationship determines an appropriate diet.

The second factor has to do with the *metabolism* of an organism. A smaller animal has a higher rate of metabolism. A cat has a higher heart rate and body temperature than a cow. Refer to Appendix G. Therefore, species, breed, and age play a role in nutritional needs. The younger animal has different nutritional needs than an adult and the adult differs in needs than the geriatric patient.

The third determinate of nutritional needs has to do with the stressors to which the animal is exposed. This includes the work performed and the environment in which it is performed, lactation, growth, changes in the environment, and state of health. All of these are considered stressors.

Tip Box 8.1: **A proper diet depends on (1) the interrelationship of the species and the totality of its environment, (2) the metabolic rate of the individual, and (3) the stressors to which the individual is subjected. (See the Hill's Science Diet website for the latest information on selecting a quality pet food: http://www.hillspet.com/products/science-diet.html.)**

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TASK 8.1
THE BASICS: ESSENTIAL NUTRIENTS

How nutrients are classified has been changed over time. Some authors have categorized them into six components. I have chosen to discuss these components in five groups.
Concept: The large molecules found in the diet are broken down into simple molecules before being absorbed through the intestinal wall where they are carried into the capillaries that lie adjacent to the intestinal wall.
Discussion: Until these large molecules are broken into simple elements by *enzymes* and bacteria, their components are not carried across the cells lining the intestine.
Concept: While all nutrients are required in a healthy diet, they are not required in the same *quantity*.
Discussion: Water is required in the greatest quantity. In decreasing volume come the carbohydrates, proteins, fats, minerals, and, least of all, the vitamins.
Concept: Water is the most important component of a diet.

Tip Box 8.2: **An animal will die sooner from dehydration than from lack of food.**

Discussion: Water is essential for transporting molecules and serves as a component of most chemical reactions in the body and as a solvent for other molecules.
Concept: Calories are needed for energy production.
Discussion: Energy can be derived from three sources: carbohydrates, proteins, and fats/oils. Carbohydrates and proteins produce 4 kcal (usually referred to as calories) of energy per gram, while fats and oils produce 9 cal/g.

This information is applied to animal diets. Animals needing a low-calorie diet should have a low-carbohydrate diet that is high in indigestible fiber. Animals in need of a diet high in calories but of lower volume will require a higher fat content in their diet.
Concept: Excess carbohydrates are stored as fat in fat cells as well as in the form of glycogen in liver and muscle.
Discussion: The amount of body fat can be determined by the body condition score (BCS). See Chapter 13, "Patient Care III," Task 13.1.1, for more information on BCS.
Concept: There are multiple sources of carbohydrates. Which are utilized depends on the species.
Discussion: Carbohydrates can be found in grasses, rice, oats, wheat, millet, and corn. There is no minimum essential amount of carbohydrates in a diet. If carbohydrates are unavailable, proteins and fats will become the source for energy.
Concept: Protein is essential in every diet.
Discussion: Protein requirements vary by species. Cats have a higher protein requirement, about 32% dry matter, than dogs, which need 22% protein based on the dry matter basis of diet.
Concept: Proteins are broken down into amino acids.
Discussion: There are a total of 20 amino acids, not all of which are essential to every species. Rats require 10 of the amino acids, while adult humans require only 8.
Concept: There major sources of proteins are plants, eggs, dairy, and meat.
Discussion: Plants having proteins include *legumes*, seeds, grains, and grasses. Animal proteins include meat, blood, meat by-products, and bone.

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Concept: Fats and oils can be found in both animal and plant tissues.
Discussion: Fats and oils can be found in animal fats such as the subcutaneous tissues of animals. Eggs and milk are other dietary sources. Plants having fats or oils include peanuts and soybeans (legumes), sunflower seeds, sesame seeds, corn, and canola.
Concept: Fats and oils are broken down by the bile and pancreatic lipase, an enzyme.
Discussion: Bile is formed in the liver, stored in the gall bladder, and released directly into the small intestine in the presence of fat. The pancreas also releases pancreatic lipase directly into the small intestine in the presence of fat.
Concept: Fats and oils are broken down to form the essential fatty acids.
Discussion: Fatty acids, when metabolized at the cellular level, form a large quantity of energy in the form of ATP. Fats are a necessary component of the cell wall, which is composed of phospholipids. Cats require linoleic and arachidonic acids, while dogs require linoleic and gamma linolenic acids. There is now some discussion that alpha linolenic acid may also be essential for both species.
Concept: Minerals do not produce energy, but they are an essential component of the diet.
Discussion: Skeletal deformities are the result of insufficient macrominerals during the growth period. Likewise, an excess of minerals, both macro- and micro-, can lead to toxicities.
Concept: Minerals are needed in variable amounts.
Discussion: The macrominerals are needed in larger quantities than the microminerals. The macrominerals are Ca, Cl, Mg, P, K, Na, and S (Table 8.1).

Table 8.1
Essential Nutrition Minerals

Chemical Name	Chemical Symbol	Need in Body	Source
Calcium	Ca	Provides structural strength to teeth and bones	Milk, ground egg shell, bone meal
Chloride	Cl	Together with Na, regulates blood pressure and volume, osmotic pressure, and pH	Salt (chemical symbol: NaCl)
Magnesium	Mg	Component of enzymes	Plants as a component of the chlorophyll molecule
Phosphorous	P	Usually in the form of PO_4, major role in DNA, RNA, and ATP	Often fed as a feed additive
Potassium	K	Major role in nerve and muscle (smooth, striated, and cardiac)	Plants
Sodium	Na	See Cl	See Cl
Sulfur	S	Essential component of enzymes and antioxidants, strengthens skin, hair, fur, and feathers	Plants

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The microminerals, also known as the trace minerals, are boron (B), cobalt (Co), copper (Cu), chromium (Cr), fluorine (F, usually in the form of fluorides), iodine (I is primarily as a feed additive), iron (Fe), manganese (Mn), molybdenum (Mo), selenium (Se), and zinc (Zn). Microminerals function as transporting molecules and serve as *catalysts* in the body. While only small amounts of microminerals are needed in the diet, they need to be supplemented. Plants growing on soils deficient in any of the microminerals result in such a situation.

Concept: Vitamins are essential but do not produce energy.

Concept: Vitamins are classified into water-soluble and fat-soluble vitamins.

Discussion: The fat-soluble vitamins, A, D, E, and K, can be stored in fatty tissues. Water-soluble vitamins, B complex, choline, and vitamin C, are not stored in the body. When an animal is not eating and drinking, the B vitamins need to be supplemented in the IV feedings.

Concept: Not all species need all vitamins.

Discussion: Animals can synthesize some vitamins and others cannot. Vitamin C is synthesized by most species except humans and other primates, guinea pigs, bats, birds, and some fish.

Concept: Vitamins act as *coenzymes* and catalysts.

Discussion: Enzymes and coenzymes become bound to proteins. This facilitates the biological activity of specific proteins in the body. By definition, a catalyst changes the rate of a chemical reaction. Within the body, catalysis increases the rate of the chemical reactions.

Concept: New information is being learned all the time.

Discussion: This is the joy of science, but it means we must continue to learn and adapt. Taurine is essential for cats. Its classification is controversial as it does not fit nicely into any category, although some authors have classified it as a vitamin, while others consider it an acid. Carnitine plays a role in fatty acid metabolism and also in bone mass.

TASK 8.2
HOW MUCH TO FEED

Some foods have an indication of what volume to feed based on an animal's weight. This makes it simple to calculate how much to feed as long as you know a patient's weight. Simply note the required factor and multiply or divide as needed.

This formula should be used to figure amounts of food for pets that are boarding and healthy.

All of the following calculations should be included on a card in your reference book entitled "Nutritional Requirements."

Applications

PREPARATION

1. Note the patient weight in both kilogram and pound.
2. Read the label carefully to locate how much to feed. Is it per 24 hours or per meal?

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PROCEDURE

1. This is set up as a simple algebraic equation. *X* (what you want to know) divided by patient weight in units (pound or kilogram) as stated on the label equals the quantity stated on the label per units to feed: *X*/weight = per units to feed.
   Example: patient weight: 36.37 kg; food label: Feed 1 cup/20 lb daily.
2. First convert kilogram into pounds. Formula is 1 kg = 2.2 lb, so 36.37 kg × 2.2 lb/kg = 80 lb.
3. Divide the patient weight by cups per pound to determine the number of cups to feed: 80 lb ÷ 1 cup/20 lb = 4 cups.
4. This dog is fed twice daily. Now divide your answer by two: 4 cups ÷ 2 = 2 cups per meal.

FOLLOW-UP

1. Reread the label carefully.
2. Is your equation set up properly?
3. Have someone check your work the first few times you do this.

TASK 8.3
DETERMINATION OF BASIC ENERGY REQUIREMENTS (BER)

Concept: There are formulas for determining the caloric requirements of an individual. This number is used in the next step of determining the amounts to be fed.
Rules: A) Animals over 5 kg BER = (30 × BW* in kg) + 70
B) Animals 5 kg or less BER = (60 × BW in kg) + 70

Procedure

PREPARATION

1. Weigh the patient.
2. Calculate the body weight in kilograms. (Remember: 1 lb/2.2 lb/kg = __kg.)

PROCEDURE

1. Decide which rule to apply, A or B.
2. Make the appropriate calculation.
3. In the patient's medical record the appropriate BER based on the results from the calculation.

*BW, body weight.

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FOLLOW-UP

1. Return the patient to correct enclosure.
2. Clean the scale.
3. Recheck your calculations.
4. In the beginning, have someone check your work.

TASK 8.4 DETERMINATION OF THE MAINTENANCE ENERGY REQUIREMENT (MER) OR CALORIC NEEDS OF A PATIENT

Rules: The caloric needs of the hospitalized patient change depending on the illness, injury, or procedure performed. The following are guidelines used to determine the MER or caloric needs. Note that the caloric needs for an obese patient is used if on a weight loss program:

1. Boarding/cage rest: 1.2 × BER = _____ MER
2. Surgery/trauma: 1.3 × 1.5 × BER = _____ MER
3. Cancer/*sepsis*: 1.7 × BER = _____ MER
4. Burns: 2 × BER = _____ MER
5. Obesity: BER − 10–15% BER = _____ MER

Procedure

PREPARATION

1. Calculate the BER.
2. Read the medical record to determine why the patient is hospitalized.

PROCEDURE

1. Multiply BER by the appropriate factor.
2. Record your result as MER.
   Example: The patient is a dog that weighs 36 lb and had urolith surgery: 36 lb/2.2 lb/kg = 16.3 kg; 16.3 × 30 + 70 = 560.9 BER; 560.9 BER × 1.4 (surgery patient) = 785 MER.

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FOLLOW-UP

1. Check your work.
2. The first few times you do this, have a technician evaluate your results.
3. Challenge: Tubby the cat weighs 18 lb. How many calories does he need to maintain his weight? To lose weight? How many calories does he need once he has regained a normal weight of 10 lb? (See the end of the chapter to check you work.)

TASK 8.5
FEEDING THE ANOREXIC PATIENT

Other diets, especially diets for anorexic patients, may indicate the total number of calories per container. It is especially important that cats are monitored for eating. If they go for more than 1 day without eating, it affects their liver quite dramatically.

Procedure

PREPARATION

1. Weigh the patient.
2. Note the number of calories for the total volume of the container.
3. Note the total volume in the container.
4. Calculate MER based on the formulas previously provided.

PROCEDURE

1. Calculate the caloric content in 1 oz of the product. This is a division problem.
   Example: A 12-oz container has a total of 750 cal. Determine the calories per ounce.
   Divide 750 cal/12 oz = 62.5 cal/oz.
2. Now divide the calories needed by the calories per ounce. Example: x = calories needed/calories per ounce.
   Example: A patient requires 397 MER/day. Your product has 62.5 cal/oz. Formula is $x = 397$ MER/62.5 cal/oz; $x = 6.35$ oz/day.
3. Divide according to the prescribed meals per day.

FOLLOW-UP

1. Recalculate the patient's MER. This is multistep, so it is often a source of error.
2. Recheck the equation. Is it correct?
3. Recheck the answer. Is it reasonable?

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TASK 8.6
FEEDING PRESCRIPTION DIETS

There are many specialty diets, referred to as prescription diets, produced by various manufacturers. As the name implies, these are only available through veterinary prescription.

Prescription diets meet the special needs of individuals with unique needs. A chronic or recurrent disease often imposes atypical dietary needs. This includes low-sodium diets to reduce fluid retention in cardiac failure patients. Others have low protein, which reduces the work for failing kidneys. There are hypoallergenic diets, low-calorie diets for obese patients, and the list goes on. Specialty foods can be in the form of dry, canned, and liquid formulations. As prescribed diets, the Food and Drug Administration (FDA) oversees the manufacturers for what these products claim to do. Food is not normally overseen by the FDA.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Prescription Diets."
2. Locate the storage area for all pet foods used and sold within the facility.

PROCEDURE

1. Record the name of each specialty diet and specified use in the card.
2. Whenever a prescription diet is fed to any hospitalized patient, note the diagnosis in the patient's medical record as to why the food is being fed.
3. If this is a change in the previous diet fed to the patient, discuss with the technician how you are to introduce the new food to the patient.
4. Follow the directions for feeding.

FOLLOW-UP

1. How does the diagnosis correlate with the use directions on the label?
2. If you cannot determine the diagnosis and/or indication for use of the food, ask the technician.

TASK 8.7
READING A PET FOOD LABEL

The Association of American Feed Control Officials (AAFCO) sets standards for labeling of pet foods sold in the United States. The label must include the following:

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1. minimum statement of weight of contents
2. list of ingredients in descending order based on weight
3. use
4. feeding guidelines
5. nutritional adequacy statement (minimum, may be more)
6. name and address of the manufacturer or distributor.

Pet foods come in a variety of formulations, so contents will vary. Labels help to determine some information but not all. The guaranteed analysis may list only the maximum or minimum of an ingredient, not the exact quantity. *The quality of the ingredients is not mentioned.*

Procedure

PREPARATION

1. Collect the labels of a dry, semimoist, and canned pet food from either feline or canine products.
2. If available, also collect similar labels of prescription diets.

PROCEDURE

1. Locate on each label the AAFCO standards.
2. Compare each label. What are the differences?
3. What are the similarities?
4. Identify any information not required by the AAFCO. What is it?
5. How does this information help the consumer and you?

FOLLOW-UP

1. Review your answers to the previous question.
2. Compare your answers with those of other learners.
3. If there are differences or uncertainties, check with your instructor or a technician at your worksite.

TASK 8.8
CALCULATING THE TRUE COST OF FEEDING A PET

Since quality is not listed on a label, one has to turn to three sources for evaluation. The first is the manufacturer/source. Specialty and veterinary sources usually carry higher-quality ingredients unavailable at grocery stores and outlet chains.

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Another factor has to do with observation. Note the BCS of every patient. Is it normal? Another observation has to do with fecal output. Is the food being digested? If the feces are formed but voluminous or frequent, the food may contain a high percentage of indigestible feedstuffs and is being wasted. This means the true cost of any product is hard to identify.

Procedure

PREPARATION

1. Collect the receipts for the purchase of the products whose labels you compared.
2. Select one each of a dry, semimoist, canned, and prescription diet for one species.
3. For the following procedure, assume the patient's weight is 7 lb.

PROCEDURE

1. Locate the feeding guidelines.
2. How much is to be served each day?
3. Locate the cost of the product on the receipt.
4. How many servings for a 7-lb dog or cat are in each container of food types?
   a) Divide the number of servings by the total cost of each product.
   b) Prepare a table with total servings and cost/serving in columns and brand/type of food in rows. Repeat for each product.
   c) Which product is most expensive per serving?
   d) Which product is least expensive per serving?
   e) Why? What is the single largest difference in these products?

FOLLOW-UP

1. Compare your answers with those of the other students.
2. Any differences should be compared to the answers given.

TASK 8.9
FEEDING LIVESTOCK AND POULTRY

Livestock consists of horses, cattle raised for meat and milk, goats, and hogs. Poultry includes all birds raised for food. The same rules apply to feeding livestock and poultry as to all other animals. The big difference lies in the source. Forages, also known as roughages, are found in pastures, grasses, and grain plants. Pastures or direct feeding of *silages* and hay is always necessary for livestock. Some soils are deficient in minerals, which can be provided by supplying a salt block or loose salt supplement. If the pastures are of poor quality or the animals need a higher energy level in their diet, concentrates such as grains (wheat, rice, sorghum, and millet) may be added to the diet. Supplements such as vitamins can be added to the concentrates to balance the diet. Poultry are usually feed grains as they are only rarely allowed to range feed.

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As always, a source of clean fresh water must be provided. In cold weather, remember water freezes. Ice must be broken to allow the animals to drink. Do not overlook this responsibility. When it is hot, animals increase their water intake. Provide more water frequently. Water sources must be available at a level accessible to the smallest individual being watered.

TASK 8.10
EXAMINATION OF FORAGES FOR QUALITY

Concept: Not all forages are the same.
Discussion: When feeding, look for the development of mold and the presence of excessive weeds and dust. Mold appears as a dark, powdery substance usually deep within a bale where there is some moisture remaining. Do not feed moldy hay. Likewise, excessively dusty and weedy hay should be avoided.

Quality is also noted by the characteristics of the hay itself. Does it contain leafy material, grains, or just stems? Ideally, the whole plant is found in good quality hay. Know the location of its source. Some areas are known to product plants with deficiencies.

Procedure

PREPARATION

1. Schedule an appointment to visit a feed store.
2. Explain that you are coming to determine what feeds, supplements and concentrates are available to local livestock owners.
3. Take a notebook or clipboard and pen with you.

PROCEDURE

1. Arrive at the scheduled time.
2. Introduce yourself.
3. Take time to note the varied products carried by the store, but primarily focus on baled and bagged large animal feeds.
4. Note the type, quality, contents, labeling, and prices.
5. Which are forages, supplements, or concentrates? List them.
6. What are the types of forages available and what is their quality and source?
7. Look at the label of a bagged supplement for livestock or poultry feed. What is on the label? What are the contents? What is its purpose?
8. Why do you need to feed forage even though you are feeding a concentrate to livestock?

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9. Compare straw and alfalfa. What differences are noted? Which would you purchase for your horse, lamb, or calf?
10. Are different types of sacked products available for variously aged animals? Why?

FOLLOW-UP

1. Write a thank you note directly addressed by name to those who helped you during your visit.
2. Mail the note within 24 hours of your visit. (E-mail and a phone call are not permissible. This must be a brief handwritten note sent through the U.S. Postal Service.)

TASK 8.11
FEEDING OF OTHER SPECIES

Concept: Every species has its unique nutritional needs as does each individual.
Discussion: The basics remain the same. Modifications in diet are subject to age, work, lactation, and stressors such as weather, illness, and transportation.

Procedure

PREPARATION

1. Identify each hospitalized species at your worksite.
2. Look in patient records to identify species, age, and illness.
3. Locate hospital resources for appropriate housing and feed for each species treated within your facility.
4. Search the Internet for appropriate housing and feeding of each species treated.

PROCEDURE

1. Examine labels for contents and use-by date. Is there an appropriate food for each hospitalized patient type?
2. If there are none, based on your research results, explain to the practice manager which species needs appropriate food and why. Ask where to purchase it. The other alternative is to request the owner to bring several days' worth of food with the patient. Doing so also gives the veterinarian a chance to note any inappropriate items in the diet or insufficient components of the diet.

Tip Box 8.3: **The most frequently encountered cause for disease and death in exotic species is malnutrition.**

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FOLLOW-UP

1. Identify which species are commonly found in the veterinary facility where you work.
2. Is appropriate food on hand, again based on your research?
3. If the answer is "no" to either question, discuss the situation with the practice manager.
4. Remedy the situation based on the results of your discussion.
5. Join the Veterinary Support Personnel Network (VSPN) located at www.vspn.com. It is free. VSPN provides information specific to veterinary personnel. If you need to know what to feed a ball python or how much vitamin C a guinea pig needs, this is where you can find reliable information.

Answer to Challenge Question from Task 8.4
BER to maintain existing weight of 18 lb: (30 × 8.2 kg) + 70 = approximately 316 BER.
To lose weight = BER − 10–15% = MER/day.
(316 BER × .10) = 284 MER *or* (316 BER × .15) = 268 MER per day.

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
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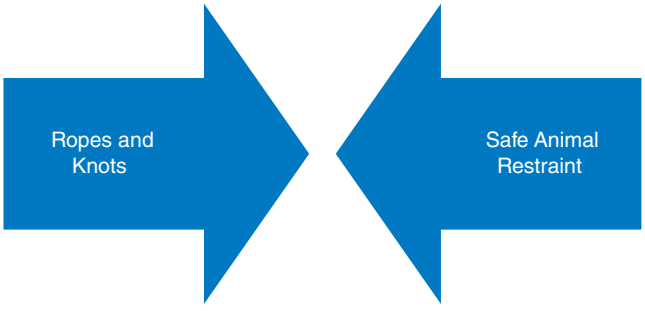
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CHAPTER

9

ROPES AND KNOTS

TERESA SONSTHAGEN



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Apply rope and knot tying terminology.
2. Prevent the ends of ropes from fraying.
3. Hank a rope.
4. Properly tie a halter tie, square knot, reefer's knot, sheet bend, bowline, and bowline on a bight knot.
5. Use half hitches and clove hitches to secure patients' limbs to surgery tables.
6. Produce a leash from a length of rope.

INTRODUCTION

Texts on animal restraint rightfully begin with the use of ropes and knots. Although this may seem unusual, without this knowledge, an assistant will be unable to provide effective animal restraint. A length of rope can quickly become a leash, halter, hobbles, or security with the quick application of the following knots. This can mean the difference between a patient injuring it, clients, coworkers, or you!

Tip Box 9.1: **All staff members must have a leash in their pocket; it can mean the difference between life and limb!**

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TASK 9.1
KNOT TYING TERMINOLOGY

Concept: Knot tying uses a specific terminology.
Discussion: Understanding the different terms used in knot tying will help you understand how to tie a knot.

Knots: The intertwining of parts of a rope or two ropes together.
Hitch: The intertwining of loops arranged so the *standing part* pushes against the *end*, securing the rope to an animal or object.
End: This is the end of the rope that can be freely moved and manipulated.
Standing Part: This is the "other" end of the rope that is either secured to the animal or inanimate object or held still while the *end* is passed around or through it.
Throw: This is when the *end* is wrapped around another part of the rope being used. Think of it as the first tie when tying your shoes. As you wrap one shoestring (*end*) around the other *(standing part)*, you have made a throw!
Bight: A *bight* is a sharp bend in the rope. This is can be made with either the *end* or the *standing part*. Again, using shoe tying as an example, when you make a "bow," this is a bight!
Loop: The *loop* is a complete circle made to start a knot or hitch. It is often made in the *standing part.* It is important to note that a *loop* can be made so it opens toward you or toward the ground. Knowing the difference will ensure a successful knot every time.
Overhand Knot: This is a quick and easy way to secure the *end* of a rope from fraying and to produce a loop to make a fixed bight (Fig. 9.1).

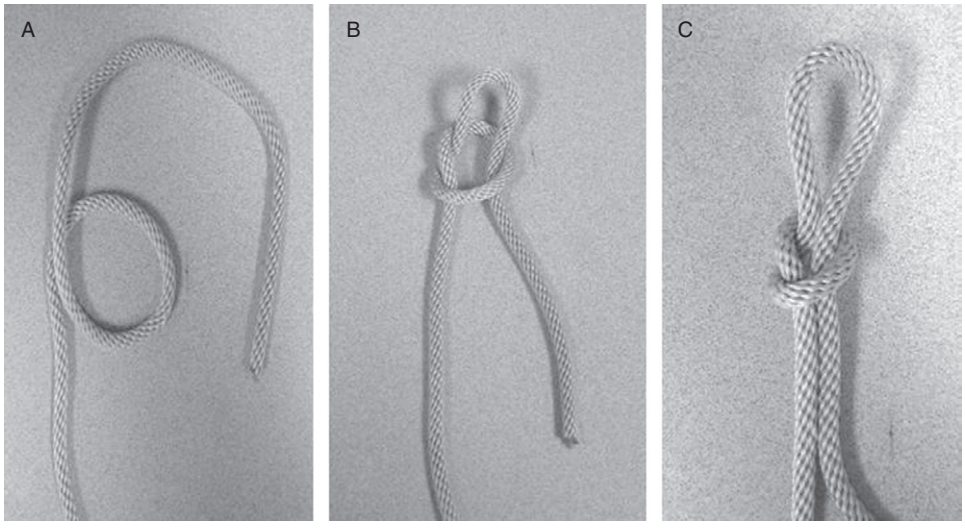


Figure 9.1. Overhand knot with a bight. Photo courtesy of Teresa Sonsthagen.

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TASK 9.2
TYPES OF ROPES

Concept: The choice of material and flexibility depends on the rope's purpose.
Discussion: Ropes are made of many types of materials and are of varying thicknesses. The diameter is expressed in fractions of an inch, such as ⅝, ½, and ¼ in. Strength varies by material and diameter. Ropes are flaccid to stiff depending on the material used to construct the rope.

A cotton rope with a small diameter and good flexibility is suitable for positioning a small, anesthetized animal during surgery or radiography. A stronger nylon rope with some stiffness is more suitable for maintaining a loop while slipping it over a kenneled dog's head. Flexibility should be such that knot retention is secure. The surface must be smooth enough to be comfortable for both the patient and the handler. A thick, stiff rope is characteristic of the lariat used for large animals. A soft cotton or nylon rope of medium diameter is used for horse halters.

Rope is purchased from hardware and feed stores in requested lengths. When purchasing rope in this manner, it becomes necessary to treat the ends with some technique to prevent fraying or unraveling.
Concept: Nylon or synthetic ropes will fray quickly if the ends are not secured.
Discussion: Apply tape around each end, leaving a ¼–½ in. of rope sticking out; a quick pass through a candle or disposable lighter flame will melt the end together and prevent fraying. A temporary fix is wrapping the ends tightly with tape; however, the tape becomes brittle over time and often slips off. A simple overhand knot tied at the end of the rope will also prevent unraveling. Unfortunately, the thickness of the overhand knot may prevent the insertion of it through small loops while tying a knot.

TASK 9.3
WHIPPING

Concept: Cotton rope ends are secured by whipping.
Discussion: Whipping is wrapping a small diameter cord around the ends of cotton rope to prevent fraying.

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Procedure

Location: Any time and place where there is need

PREPARATION

1. Scissors
2. Thick kitchen string or lightweight cord about 24 in. long
3. Cotton rope with unfinished ends

PROCEDURE

1. Make a bight in the center of the cord.
2. Place it on the surface of the rope with the *bight* adjacent to the cut end of the rope.
3. Use one *end* of the cord to begin tightly encircling the rope and the other half of the cord. Start about 2 in. from the end of the rope. Leave about 1 in. of cord free from the wraps. This will be used later to bury the other end of the cord under the wraps.
4. Continue to tightly wrap the rope with the cord working toward the end of the rope.
5. Place each wrap adjacent to each other, without a space between the wraps or wrinkles or twists in the cord.
6. Make at least 12 complete wraps or cover a minimum of 1½-in. of the rope. Do not cover the bight with the wraps.
7. As you get to the bight, stop wrapping and put the end of the cord through the first bight at the end of the rope.
8. Pull the other end of the cord left free at the beginning of the wraps until the bight and the end are pulled under the wraps.
9. Trim the end of the cord to within ¼ in. of the edge of the wraps.

FOLLOW-UP

1. Put away all materials (Fig. 9.2).

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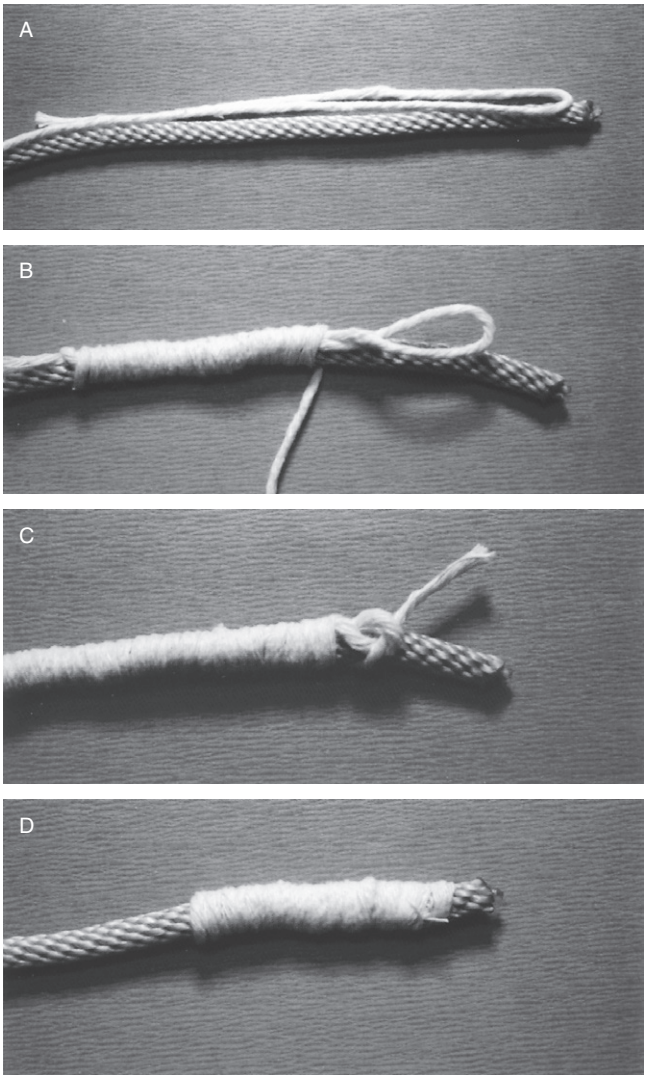


Figure 9.2. Whipping. ***Source*****: Sheldon, C. C., Sonsthagen, T., & Topel, J. A. (2006).** ***Animal Restraint for Veterinary Professionals*****. St. Louis, MO: Mosby Elsevier, with permission.**

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TASK 9.4
HANKING A ROPE

Concept: *Hanking* is a method for shortening long ropes or extension cords for storage.
Discussion: Hanking provides a quick release of a rope's length without tangling or knotting.

Procedure

Location: Any place and time there is need

PREPARATION

1. A long length of rope or extension cord.

PROCEDURE

1. Form a *loop* that opens toward you at one end of the rope and hold it together with your nondominant hand. The loop becomes the *standing part*.
2. Reach through the loop, grasp the rope and form a *bight*, then bring it up through the loop. This makes a second loop in which the next loop is brought through.
3. Repeat the process of forming the loops to form a continuous chain.
4. When no more loops can be made, bring the *end* through the last loop and tighten.

FOLLOW-UP

1. To untie the rope, pull the *end* out of the last loop.
2. Pull on the *end* and the rope should unloop itself easily. If it does not, you may have selected the wrong end! Try again at the opposite end (Fig. 9.3).

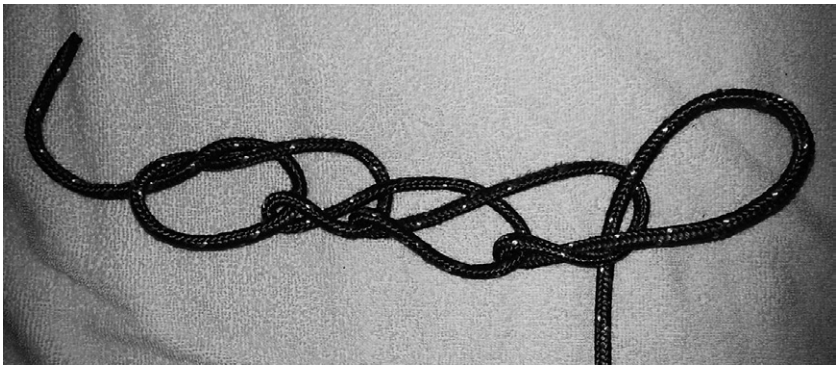


Figure 9.3. Hanking. Photo courtesy of Teresa Sonsthagen.

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TASK 9.5
TYPES OF KNOTS AND HITCHES

Concept: In veterinary practice, there are seven frequently used knots. They are the halter tie, square knot with its variants as the reefer's knot, sheet bend, bowline, and the bowline on a bight. The half hitch and clove hitch are also used to secure animals in the veterinary practice.
Concept: To secure a conscious animal to an object, a knot must meet two requirements: quick release by the handler and it does not tighten up the animal if the ends are pulled.
Discussion: This may seem contradictory in a single knot, yet several knots meet these requirements.

Three important rules to remember when tying any animal to an immovable object are the following:

1. Always tie an animal with a quick-release knot. The halter tie meets this requirement. If the animal gets into trouble, it can be quickly released.
2. An animal must be tied in such a way that it does not become tangled. This will often frighten an animal and it can be injured.
3. A rope is never tied around an animal using a knot that continues to tighten if tension is placed on the end or standing part. Circulation or airways can be compromised if such a knot is used, causing injury or death.

TASK 9.5.1
HALTER TIE

Concept: Animals are often secured to inanimate objects like fences or rings attached to walls.
Discussion: The halter tie is used to tie an animal to a fixed object. If the animal gets tangled up or is in some other predicament, it is released quickly and easily by pulling on the end. The halter tie will always release even if the animal pulls on the standing part and tightens it around the object. This is the only knot that should be used to tie an animal to a fixed object.

Procedure

Location: Any time and place an animal needs to be secure; very often happens in the treatment area

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PREPARATION

1. Six-foot leash or halter rope with the clip end attached to a collar or halter, respectively.

PROCEDURE

1. Pass the *end* of the rope around or over the object to which the animal is to be secured.
2. The *standing part* and the end of the rope are now held parallel to each other.
3. Form a loop that opens toward you in the end as close to the object as possible; lay this on top of the standing part. Pinch the loop and standing part together with your nondominant hand.
4. Reach through the *loop* from the top and grasp the end just far enough down to make a *bight* by folding the rope between your index finger and thumb.
5. Pull the bight up through the loop.
6. Tighten the knot by pulling on the bight and pushing the loop close to the fixed object.
7. Some animals have figured out that if they pull on the end, the halter tie comes untied. To prevent this, place the end loosely through the bight.
8. To untie the rope, remember to remove the end from the bight.
9. Give the end of the rope a firm tug; the knot unties.

Tip Box 9.2: **A vertical post is stronger than a horizontal post; if available, always use the vertical post.**

FOLLOW-UP

1. Practice makes perfect. If the knot does not untie easily, you have not tied it correctly. If the animal can back up and untie the knot by applying pressure to the standing part, then the knot was not tied correctly. Often it is because the loop was made to open away from you.
2. Develop speed. This knot is used repeatedly every day. Accuracy and proficiency are essential (Fig. 9.4).

TASK 9.5.2
SQUARE KNOT

Concept: The square knot is used whenever a knot must remain secure, without slipping even if tension is applied to one or both ends.
Discussion: The square knot is the foundation for the reefer's knot and the tomfool knot as well as all suture knots. This knot is unique because as tension increases, the knot becomes

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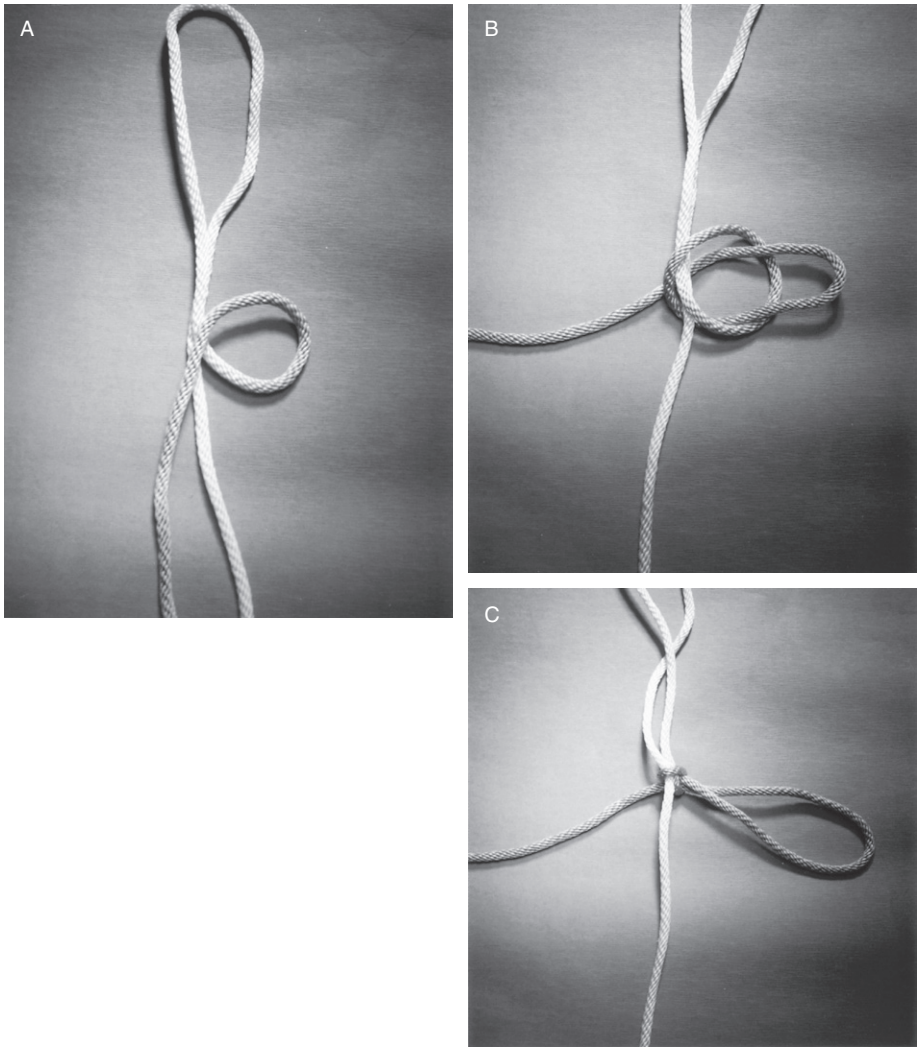


Figure 9.4. Halter tie. *Souce*: Sheldon, C. C., Sonsthagen, T., & Topel, J. A. (2006). *Animal Restraint for Veterinary Professionals*. St. Louis, MO: Mosby Elsevier, with permission.

tighter, which prevents it from loosening. However, no matter how tight the knot becomes, it can be untied easily by pushing the ends toward the knot. When this knot is tied correctly, it never slips either tighter or looser. This is imperative for suture knots and when going around an animal's body part.

The key to tying a perfect square knot every time is to remember the end that you start your throw with is the end that is used to make all the throws. The square knot uses both ends and the resulting loop is the standing part.

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Procedure

Location: Any time and place you need a secure knot

PREPARATION

1. Length of rope.

PROCEDURE

1. With one hand on each end to be tied together, place the right end over the left end.
2. Make a *throw*. The right end now becomes the left end.
3. Place the left end over the right end, then make another throw. This restores it as the right end again.
4. Pull each end tight; a loop should be formed that does not tighten or loosen if tension is applied to the ends or loop.

Tip Box 9.3: **Remember: "right over left, left over right" or "left over right and right over left" when tying a square knot. The key is to remember which end was used to make the first throw and to continue to use that end to make the second throw!**

FOLLOW-UP

1. To check that you have tied it correctly, grasp both ends and part of the loop closest to the knot and push them toward the knot. You should see two interconnected loops.
2. If you are tying this around an animal's body, make one end shorter than the other so that when you finish, you have a length of rope that can be used to tie the body part to another to secure it out of the way.
3. Suture knots stack square knots on top of each other; usually, three to four throws or one and a half to two full square knots are used per suture knot (Fig. 9.5).

TASK 9.5.3
REEFER'S KNOT

Concept: The reefer's knot is based on the square knot.
Discussion: This knot is tied like a square knot but uses a bight made in one of the strands to provide a quick release. It would be similar to tying a shoelace with only one bow.

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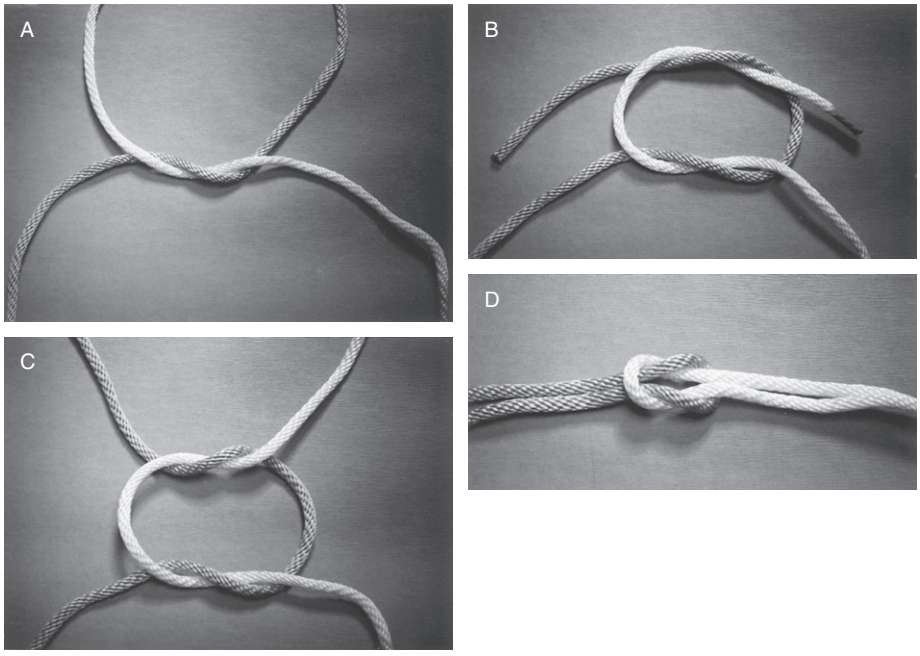


Figure 9.5. Square knot. *Source*: Sheldon, C. C., Sonsthagen, T., & Topel, J. A. (2006). *Animal Restraint for Veterinary Professionals*. St. Louis, MO: Mosby Elsevier, with permission.

Procedure

Location: Whenever you need a quick-release knot that is also secure

PREPARATION

1. Length of rope.

PROCEDURE

1. Make the first throw as described for the square knot.
2. Before making the second throw, make a bight in the left end and wrap that around the right end.
3. Tighten the knot by pulling the bight one way and the end the other. This makes a one-loop bow.
4. To untie the knot, pull on the end of the bow.

FOLLOW-UP

1. To make sure this knot will not tighten down, pull on the sides of the loop. If it moves, you have not made the throws correctly (Fig. 9.6).

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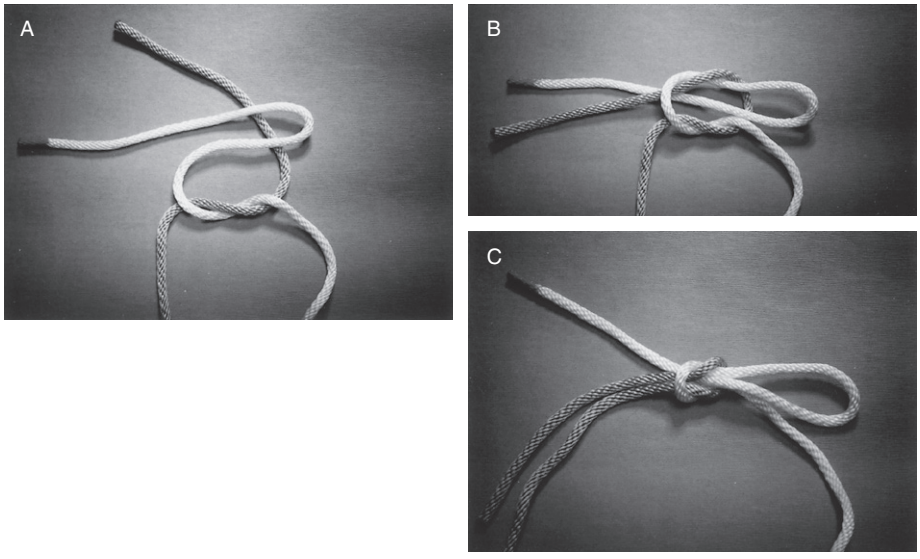


Figure 9.6. Reefer's knot. ***Source*****: Sheldon, C. C., Sonsthagen, T., & Topel, J. A. (2006).** ***Animal Restraint for Veterinary Professionals*****. St. Louis, MO: Mosby Elsevier, with permission.**

TASK 9.5.4
SHEET BEND KNOT

Concept: If a long length of rope is needed but only short pieces are available, this knot will connect the ropes securely.
Discussion: Ropes of different diameters and conformation can be connected securely using this knot.

Procedure

Location: Anywhere there is a need for long ropes when only short pieces are available

PREPARATION

1. One or more ropes.

PROCEDURE

1. Make a bight on one end of the thickest rope so that you have an elongated U on one end. Both ends of this rope will be pointed in the same direction; one should be substantially shorter than the other.

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2. Grasp the other rope at one end and use it to do all of the following. Bring the end up from underneath the bight in the thick rope right where it bends.
3. Pass the end underneath both of the ropes of the bight, bringing it over the top and to itself in the middle of the bight.
4. Lift the portion of the end in the middle and pass it under itself.
5. Tighten the knot by pulling all four ends in opposite directions. As you pull it tight, you should see the bite in the first rope and an X forming in the second rope. The second rope should have one end under the bight and one end over the bight.

Tip Box 9.4: **If the tail needs to be tied out of the way, always tie it to the owner of the tail. That way, if the animal should happen to get away, the tail goes with the owner!**

FOLLOW-UP

1. The knot should not fall apart and it should *not* look like a square knot. If it does, you did not go under the second rope as described.
2. Because this is a variation of the square knot, it will be easy to untie by pushing the ends toward the knot.
3. The sheet bend is also used as a tail tie in horses and cattle. The U is made with the hair on the tail bent at the tip of the vertebrae as one rope and then a ½ or ¼ inch rope is used to as the second. This allows you to tie the tail to a front leg or neck using a halter tie or a bowline, respectively (Fig. 9.7).

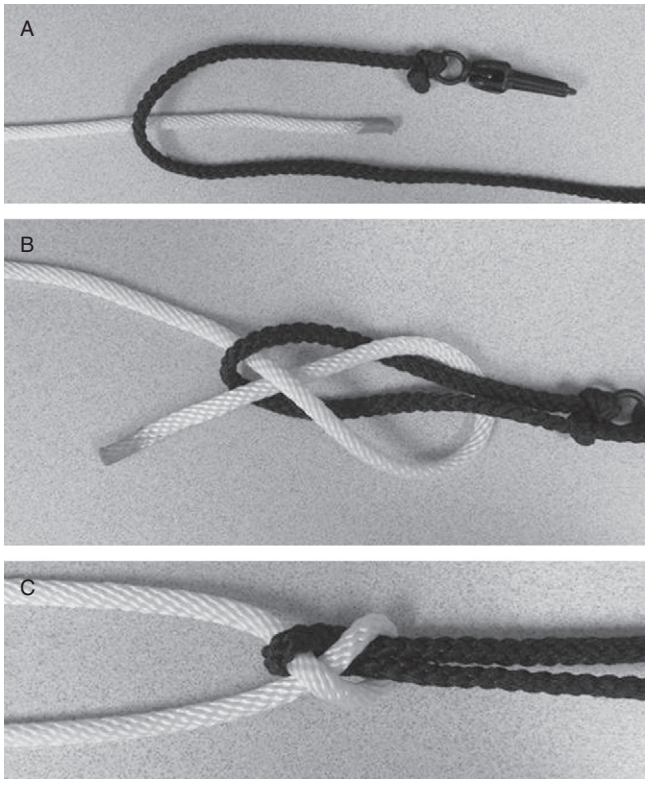


Figure 9.7. Sheet bend. Photo courtesy of Teresa Sonsthagen.

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TASK 9.5.5
BOWLINE

Concept: To create a nonslipping knot that can be used to secure ropes around an animal's body part or a load to a trailer.
Discussion: This knot is sometimes difficult to master, but once you can tie it correctly, it is a great all-purpose knot. It can create a loop that is nonslipping and so safe to tie around an animal's body. It is very easy to untie because of the way it is tied, no matter how tight the knot is pulled.

Procedure

Location: Anywhere a nonslipping loop or a tight knot that is easy to untie is needed

PREPARATION

1. Length of rope.
2. Post or bar to tie the rope around.

PROCEDURE

1. Pass the rope around a body part or object; leave the left end longer than the right. This now becomes the standing part.
2. Make a loop that opens toward the ground in the standing part.
3. Use the right end to make the knot. Pass the end up through the loop, around the standing part, and back down through the loop.
4. Tighten the knot by pulling the end up and the standing part down. You should see two loops: the one made in the standing part and the one made by the end around the standing part.

Tip Box 9.5: **To remember how to tie the bowline, use this saying: "The rabbit comes out of the hole, goes around the tree, and back into the hole."**

FOLLOW-UP

1. If the knot slides, you have not tied it correctly and need to retie it so it does not cut off circulation or respiration if used on an animal. Usually, the loop is made opening the wrong way.
2. To untie the knot, pull the loops in different directions and it will loosen it right up, no matter how tight it is (Fig. 9.8).

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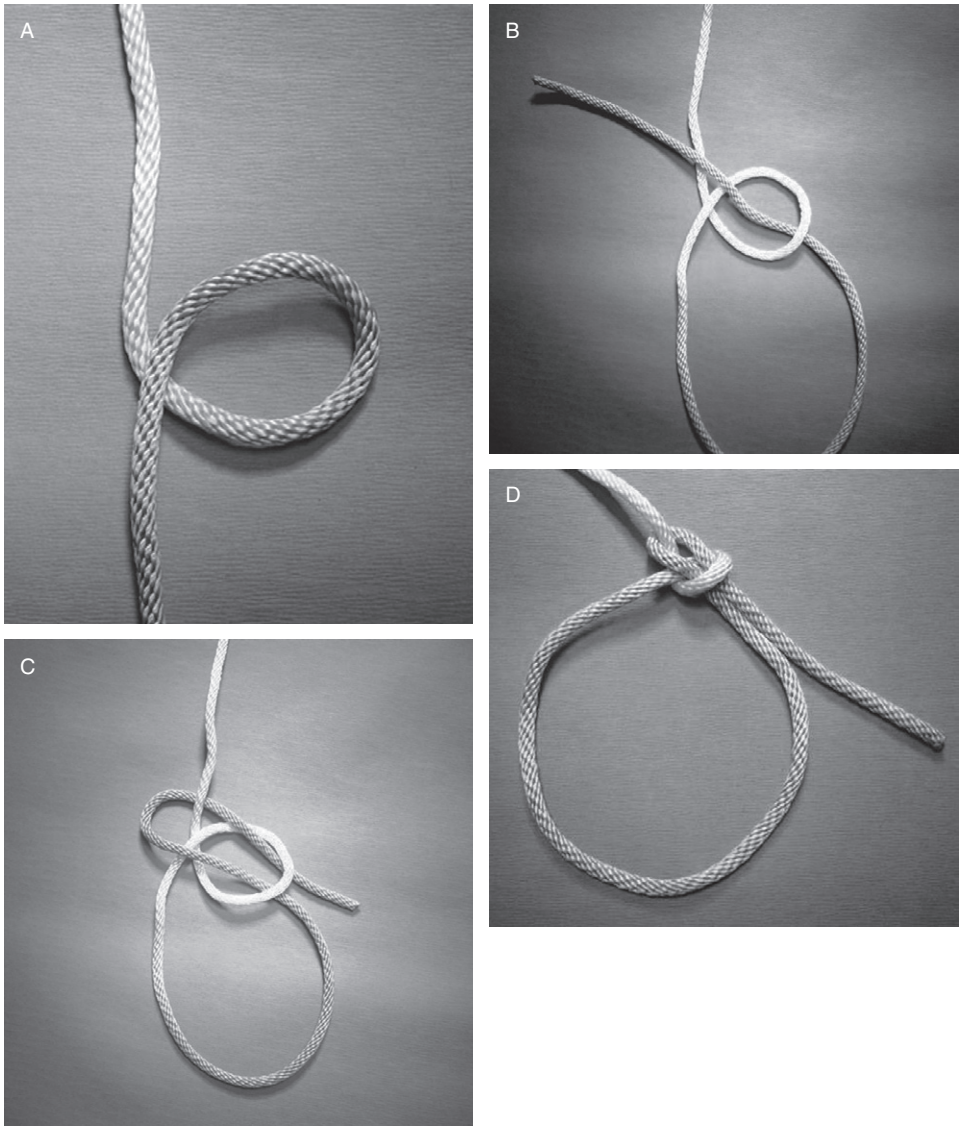


Figure 9.8. Bowline. ***Source*****: Sheldon, C. C., Sonsthagen, T., & Topel, J. A. (2006).** ***Animal Restraint for Veterinary Professionals*****. St. Louis, MO: Mosby Elsevier, with permission.**

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TASK 9.5.6
BOWLINE ON A BIGHT

Concept: The bowline on a bight creates a nonslip noose with equal length ends that can be tied to a fixed object or another part of the animal.
Discussion: This knot is particularly useful in equine and large animal practices when securing patients to prevent kicking or when tying limbs out of the way. The two long ends can be used to secure legs to the animal's own body.

Procedure

Location: Anywhere there is a need to secure the legs on an animal

PREPARATION

1. A long length of rope.

PROCEDURE

1. Fold the rope in half, which makes a bight in the middle of the rope and gives you two long ends.
2. Use the bight as an end, form a large circle by making a throw around the two strands of the rope. Make sure the resulting circle can pass over the head and around the neck of the animal.
3. Hold the large circle at the top with your left hand; pass your right hand fingers through the bight toward the ends of the two strands.
4. Using your index finger and thumb, grasp the two strands of the ends, just before it starts to rise to make the arch.
5. Drop the top of the circle being held by your left hand and grasp the bight with your left hand.
6. Pull the bight toward the two ends and at the same time pull the two strands in your right fingers in the opposite direction.
7. Switch your hold to the two strands coming from each side of the knot and pull in opposite directions to tighten the knot.

FOLLOW-UP

1. Place the nonslipping noose over the patient's head. You can use the two long ends to tie the rope to back legs to prevent kicking or to pull the legs in a certain direction to get them out of the way.
2. When tying the legs, use half hitches around the leg followed by a halter tie to secure the rope.
3. To untie the bowline on a bight, grasp the single loop and pull it away from the two strand ends, then pull it over the double-stranded circle; this will open the knot right up (Fig. 9.9).

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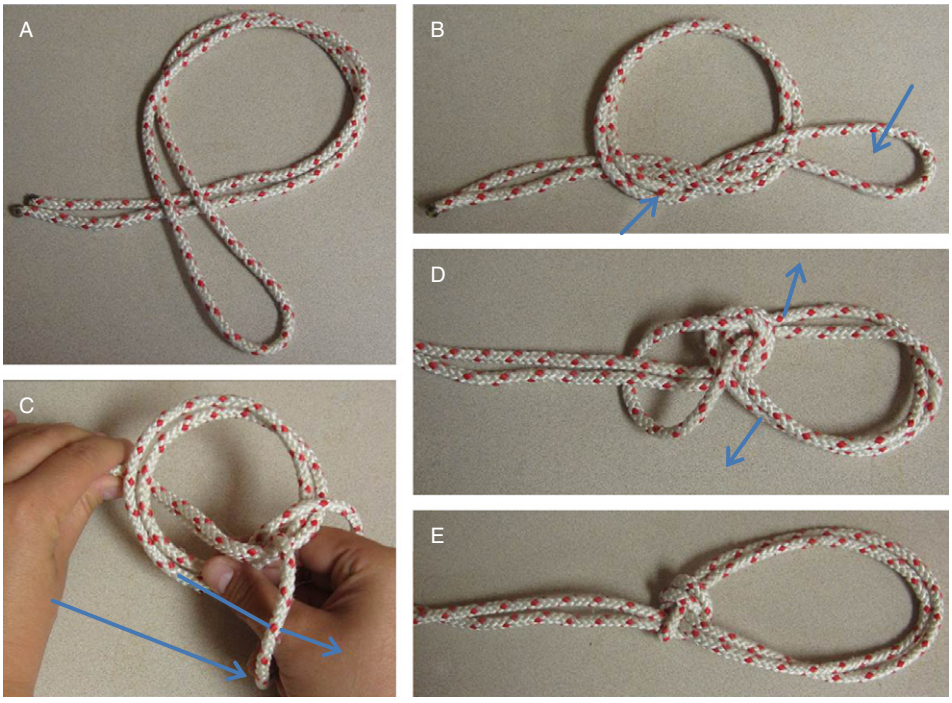


Figure 9.9. Bowline on a bight. Photo courtesy of Teresa Sonsthagen.

TASK 9.5.7
HITCHES

Concept: Hitches are used in the veterinary practice for a number of reasons.
Discussion: The half hitch is used to secure a rope to a leg, post, or cleat. Cleats are typically found on the sides of surgery and X-ray tables. Remember that hitches stay secure because the end presses the standing part against the leg, post, or cleat. Also note the hitches are actually loops that are made either toward you or away from you! It will matter a great deal which way the loop is made; if the rope stays in place you made it the right way!

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Figure 9.10. Half hitch used to secure a limb to a surgical table. Photo courtesy of Teresa Sonsthagen.

Procedure

Location: Often used in the surgery suite to secure anesthetized animals to the table.

PREPARATION

1. Length of soft nylon rope.
2. Anesthetized animal or a stuffed animal.

PROCEDURE—TYING A LIMB TO A SURGICAL TABLE

1. Start with a rope leash; bring the handle end through the loop or ring, creating a circle that opens and closes with tension when released or applied to the end.
2. Slip the circle around the limb above the elbow or hock; pull the end to make it snug but not extremely tight.
3. Make a hitch by forming a loop that opens away from you in the end and slip the loop around the leg, below the circle usually at midleg. Make the loop snug but not tight around the limb.
4. Use the end to secure the limb to the table by winding the end around the cleat once in a figure eight, then make another half hitch by making a loop that opens away from you and place it around one side of the cleat; pull to tighten. Apply another half hitch to the opposite side of the cleat for added security (Fig. 9.10).

FOLLOW-UP

1. To loosen, push up on the end; this will release the pressure applied to the standing part.
2. If you do not have a leash with a ring or loop in which to form the circle, you can make one. On one end of the rope, make a bight then tie an overhand knot.

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Make a loop and pull the bight through it to tighten the knot. This creates a nonmoving loop that the end of the rope can be passed through to create a circle that will loosen up when tension is released. One more step will produce a leash. Create a handle on the other end by repeating the instructions to make a nonmoving loop; only this time, make the bight longer to accommodate your hand after tying the overhand knot.

TASK 9.5.8
CLOVE HITCH

Concept: The clove hitch can be used to secure a rope to an object and leave two long ends available to tie something up to it or to secure a load on a trailer.
Discussion: The clove hitch is made with two half hitches, each made in opposite directions then stacked one on top of the other. This is great to secure loads to trailers as you can tighten the first hitch down and it will hold as you make the second hitch.

Procedure

Location: Wherever there is a need to attach a rope to a post, especially if two long ends need to be available to secure something else to the post

PREPARATION

1. Length of rope.
2. Post.

PROCEDURE

1. Pass one end of the rope around the object. You can make one end longer than the other or keep the rope ends even.
2. Continue to pass the rope all the way around the object with the left strand passing under the right strand. At this point, you can drop the right strand as the left will hold it close to the object. The left strand now becomes the end and the right is the standing part.
3. Continue around the object with the end and when you get around it, pass it under itself, in effect making the left-hand strand become the standing part and the end.
4. The result should be two loops around the object with an X forming the standing part.

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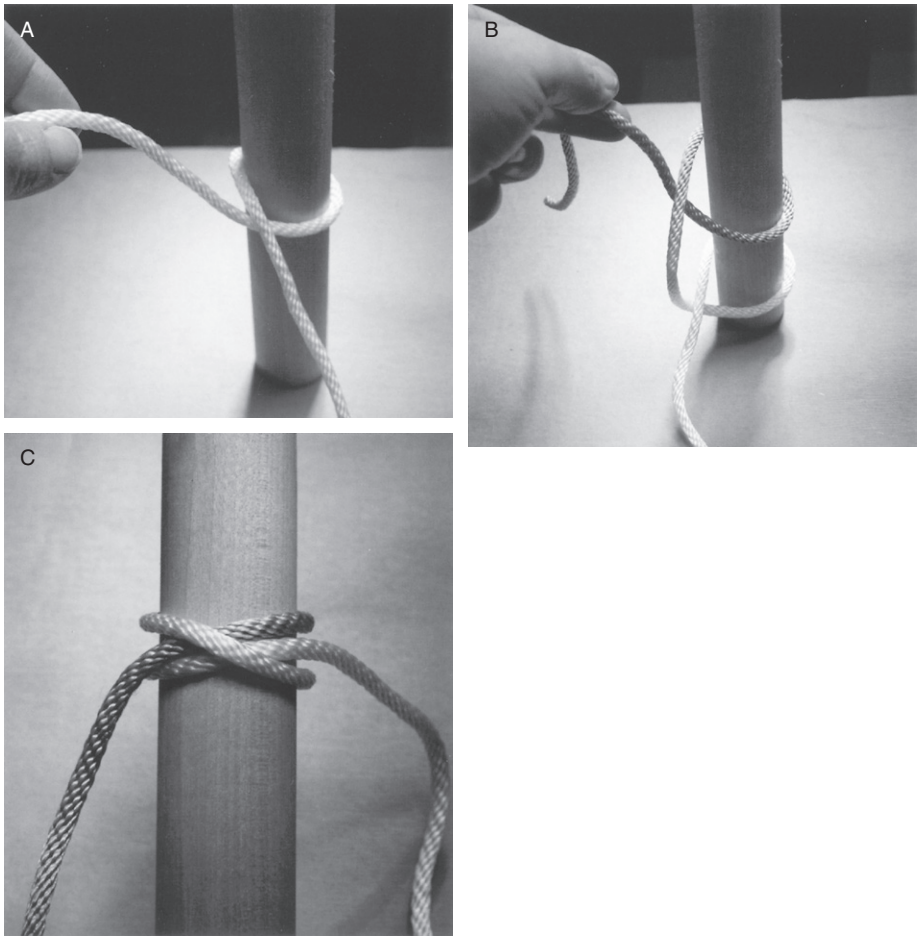


Figure 9.11. Clove hitch (from Sheldon, C. C., Sonsthagen, T., & Topel, J. A. (2006). *Animal Restraint for Veterinary Professionals*. St. Louis, MO: Mosby Elsevier, 2006, with permission).

FOLLOW-UP

1. If using this to tie a load down, secure the rope to the trailer with a bowline knot then pass the rope over the load to the opposite side of the trailer. Apply a half hitch, pull the rope tight, cross over the load again, and use another half hitch. Continue this pattern until you get the load sufficiently secured, then finish off with a clove hitch to secure the rope to the trailer. The clove hitch will not come undone even if tension is applied to one strand or the other (Fig. 9.11).

RESOURCES

Animated Knots by Grog. Retrieved from: http://www.animatedknots.com/indexbasics.php?LogoImage=LogoGrog.jpg&Website=www.animatedknots.com.

Sheldon, C. C., Sonsthagen, T., & Topel, J. A. (2006). *Animal Restraint for Veterinary Professionals*. St. Louis, MO: Mosby Elsevier.

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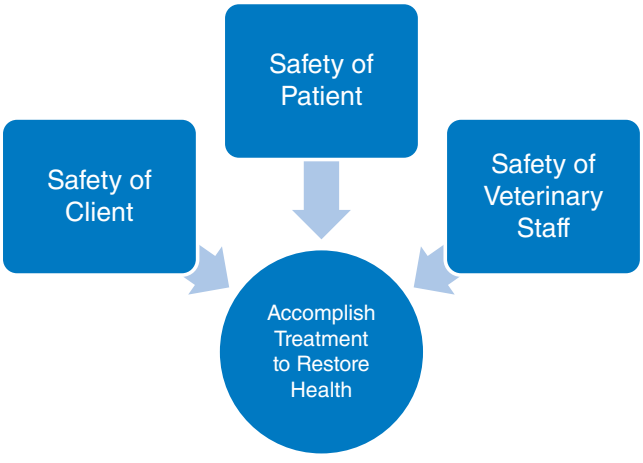
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CHAPTER

10

ANIMAL RESTRAINT

TERESA SONSTHAGEN



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Safely approach a variety of species.
2. Apply the principles of restraint to a variety of animals in various circumstances.
3. Adapt animal restraint to a patient and the procedure being performed.
4. Use psychological restraint to supplement physical restraint.
5. Demonstrate the proper use of a commercial leash.
6. Walk a dog at the heel position.
7. Place and remove patients from hospital enclosures safely.
8. Apply various techniques, enabling safe handling of the fractious patient.
9. Use a quick-release pole on a patient.
10. Use commercial muzzles for dogs and cats.
11. Apply a gauze muzzle to a dog.
12. Use a leash to muzzle a large dog.
13. Use supplementary devices when moving heavier unconscious animals.
14. Effectively restrain a patient during the physical examination.
15. Restrain a patient in sternal, lateral, and dorsal recumbency.
16. Restrain a patient during injections at various sites.
17. Restrain a patient for venipuncture: jugular, cephalic, saphenous, and femoral.
18. Apply an Elizabethan collar, neck brace, and hobbles to a patient.
19. Correctly halter and lead a horse.
20. Lift and restrain a rabbit.
21. Remove from their caging and restrain birds for examinations.

INTRODUCTION

Mastery of physical restraint is the mark of a skilled assistant. This chapter focuses on the techniques needed for mastery. Very simply, care cannot be completed without proper patient restraint.

To work with animals, one must recognize their basic behaviors and needs. The choice of restraint is based on the physical characteristics of the patient and general patterns of response.

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TASK 10.1
SPECIES DIFFERENCES AND SAFETY

Concept: Awareness of the differences and similarities in all animals allows the veterinary professional to treat and handle a wide variety of patients.
Discussion: Some animals are predators (dogs and cats), while others are prey (horses, cattle sheep, etc.). Each has different fields of vision. Prey animals have eyes placed at each side of the skull providing a wide peripheral field of vision. This means their visual field extends far to the side of the body with only a small blind spot directly in front of their face and directly behind their rear end. This gives them a wide range of vision so they can see something approaching them from the side without turning their heads. Predators have forward-facing eyes, providing greater depth perception, which increases their ability to capture prey. They can see directly to the front, but their peripheral field of vision is similar to that of humans.
Concept: Knowing the visual field of an animal allows a handler to approach safely.
Discussion: Horses are always approached on the left side of the body due to custom and training, as both sides have equal visual fields. Horses should always be spoken to in order to alert them to your presence. If they are asleep, they sleep standing up; they may not hear you and may bolt or kick out if startled.

Livestock (cattle, sheep, and goats) are approached at or behind the point of the shoulder depending on which way you want them to go. By using the "point of balance" at the shoulder as you walk toward the tail, the animal will move forward; keeping pressure just behind the shoulder will keep it moving forward, while pressure in front of the shoulder will make it stop or back up. This reduces the amount of prodding or whipping needed to get animals to move.

Pigs are contrary and will turn and look at you as you approach; the use of a solid hurdle is used to turn them, make them move forward, and direct them left or right.

Dogs should be approached from the side; a straight-on approach is often a challenge, and if you are dealing with an aggressive dog, it may accept the challenge and bite. Turn your body to the side, speak kindly, and avoid direct eye contact. If they are not signaling aggression, continue to approach them and place a leash around their neck.

Cats are usually allowed to approach you; let them sniff a closed hand, find their itchy spot, and make friends before attempting to place them into a restraint hold.
Concept: Allow an animal to become aware of your presence.
Discussion: Use your knowledge of the varied senses in animals in learning to handle them. Other senses, such as hearing and smell, differ. Some birds have sensors that enable them to follow magnetic fields as they migrate. Snakes "smell" through their tongues. Some animals are nocturnal and will be asleep during the day; always wake them up before you touch them.

Approach an animal within its field of vision to avoid causing them to startle. Livestock and horses will startle if a person suddenly appears from their rear blind spots. Speak up to let them know you are there before coming into range so you do not get kicked. Touch gently but firmly and with confidence after you have "announced" your presence.
Concept: All animals have a "fight-or-flight distance."
Discussion: This is the distance from a person or another animal that the animal will tolerate without moving. Closer than that, the animal may flee or attack if it cannot get away. Be aware of the body language that indicates they are ready to flee and back off slightly. If the pressure is continued and there is no place to go, the animal has no other choice but to fight for freedom. This distance varies depending on the prior experiences the animal has had and the degree of human exposure.

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Concept: Aggressive behavior can be aroused by pain, fear, territorial instincts, dominance, sex drive, and maternal protection of young. Stress lowers tolerance limits and so restraint procedures should be selected based on these behaviors so as not to raise stress levels.
Discussion: All mothers are protective of their young but some more than others, again based on their exposure to humans. Livestock usually bear young that can stand and run within a few hours of birth as a survival mechanism. Sows and cows are very protective and will attack humans if they feel their young are being threatened. Piglets should be removed from the room before being worked on as the squeals will agitate a sow. Calves, lambs, and kids can be worked on in front of their dams, but it is important to keep an eye on the mother in case she decides to charge. Mares will fret and try to get to their young so vigorously that they can injure themselves. For that reason, foals should always be worked on within line of sight to the dam.

Predators bear young that spend the first few weeks of life blind, deaf, and helpless, totally dependent on their mother for survival. Dogs and cats can be defensive of their young and do get quite agitated when their young cry out. If procedures such as tail docking or dewclaw removal are to be done, it is best to take puppies to a backroom away from the mother.

Tip Box 10.1: **Use your knowledge of animal behavior to modify yours when handling patients.**

Concept: Note the defensive anatomy (claws, teeth, hooves, etc.) of every animal and how they use them for protection.
Discussion: Cats have sharp canine teeth that can create deep punctures that often become infected. They also have claws that can cause deep and painful scratches. Dogs' canine teeth can cause deep punctures and blunt molars cause bruising. Dogs tend to hang on and rip by shaking their heads, while cats bite and release a number of times. Cows tend to kick out and to the side usually with one hind foot. They are extremely accurate and can kill a person if caught at full kick! Cattle can ram you with their heads and, if they get you down, will often use their heads to smash you into the ground. Horses kick backward with one or both hind feet; they can also strike out with their front feet, both of which can kill a person. Horses also bite and if they do, it is difficult to make them let go! Sheep and goats will ram you with their heads. Birds will use their beaks, some of which are very strong and can severely cut and bruise tissue. Depending on the type and size of bird, their talons can inflict damage. Rodents will often bite, which can be painful but usually not life threatening.
Concept: Body language can tell you how an animal is reacting to a situation or how it is feeling.
Discussion: Dogs and horses communicate an amazing array of emotions. Careful observation is needed to see sometimes subtle body language cues. Table 10.1 describes some of the body language used by animals while being restrained.
Concept: Restraint equipment is used to handle animals safely.
Discussion: Halters and lead ropes for livestock and horses are used to control the head. Collars, leashes, muzzles, capture poles, and towels are used to control dogs, cats, and other small animals.

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Table 10.1
Body Language

Animal	Body Language	Emotion
Dogs—These descriptions are general. Some dogs can change from a message of friendliness to trying to tear your face off without any warning! Always approach with caution, and if you feel uncomfortable, heed that feeling and see if there is someone to help you with the dog.	Ears pinned down, whites showing in the eyes, tail tucked, shoulders humped, will look everywhere but directly at you	Scared or submissive
	Ears held out to the sides, head held low between shoulders, tail straight out behind it, trying to make eye contact with you	Aggressive or challenging
	Ears forward, tail wagging, bright expression on face	Social or friendly
Cats are the most forthright with their feelings. They will let you know when they have had enough handling. Their body starts to tense, and they may start a low growl that seems to come from their toes. Alert the vet when you feel the first bit of tension and the growl!	Ears flattened, either crouched or arching its back, raised hairs on the back of the neck and along the back, hissing or a deep rumble growling, bat at you with their front claws	Mad and/or scared
	Ears down; if possible, hiding under or behind something, peeking to watch you; eyes dilated	Scared or nervous
	Ears forward, sniffs offered hand, rubs against hand, tail up and waving, purrs.	Friendly
Horses are similar to dogs in that they often will react with very little warning. With practice, you can often tell when a horse is getting close to enough of whatever is going on. Their heads will try to go higher than their shoulders and their body starts to tense up. Let the veterinarian know what you are feeling; try some distraction techniques.	Head up, ears moving in all directions, fidgety feet, whites showing around the eyes, tail swishing rapidly, possibly vocalizing	Nervous
	Head down even with shoulders, standing on three legs, tail in a relaxed position	Sleeping, in pain or sick (evidenced by having no reaction when called to or touched)
	Head at or just above shoulders, ears moving to where the people are talking, tail still or swatting at flies, standing on all four feet evenly	Social or friendly

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Procedure

Location: Wherever a patient needs to be restrained for examinations or treatment

PREPARATION

Before going into a room or enclosure, it is important to go with a plan. The following are things you should think about to help you make that plan:

1. What do you know about the behavior of this species?
2. What do you know about the behavior of this individual?
   a) Is this a mother with the young at her side?
   b) Is this an aggressive or territorial animal?
   c) Is the animal afraid?
3. What do you know about this patient's state of health?
   a) Presence of pain?
   b) Where and how much?
4. What is the animal's body language telling you?
5. Have an appropriate restraint device with you such as a halter, a leash, or a capture pole.
6. Whenever dealing with a large or potentially dangerous animal, have a planned escape route.

PROCEDURE

1. Enter an area making certain it is secure. (Ward or stall doors are closed, corral gates are closed.)
2. Approach the patient within its visual field.
3. Speak softly in a low tone.
4. Move slowly, but be prepared to move quickly if the patient's behavior changes.
5. Touch gently but firmly.
6. Correctly slip and secure the restraint device on the patient.

FOLLOW-UP

1. Gently remove the patient from its enclosure, moving it to the treatment area.
2. Return the patient to its enclosure; clean and return any equipment you used.

TASK 10.2
DECIDING ON A RESTRAINT TECHNIQUE

Concept: The choice of restraint is governed by three overarching principles.
Discussion: The first keeps the people involved safe from harm. The second makes sure not to harm the animal either physically or psychologically. The third keeps the animal still enough to accomplish the procedure.

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Tip Box 10.2: **Animals remember unpleasant experiences.**

To achieve this, the assistant must apply restraint techniques properly. Start with the least possible restraint needed to accomplish the procedure. Be ready to increase the restraint if the animal should strike out with teeth, claws, or hooves. If injury occurs because of inattentiveness or the inability to properly hold on to a patient, the assistant would be held accountable.

Attentiveness to a patient's responses, body language, and general condition serves as the foundation for restraint. Be knowledgeable about animal behavior. Be aware of the nuances of patient response. Use these to select the optimum restraint technique and plan for a more restrictive restraint if needed.

Concept: The choice of restraint begins with an analysis of five fundamentals.

Discussion:

1. Behavior influenced by
   a) species (dog vs. cat, horse vs. cow)
   b) breed (Chihuahua vs. St. Bernard, Holstein vs. Charolais)
   c) sex (stallion vs. gelding)
   d) age (playful puppy vs. fragile senior citizen)
   e) territory (theirs vs. yours)
   f) hierarchal position (alpha vs. beta or lower)
   g) prior experiences (positive vs. negative)
   h) trained versus untrained (obedience vs. wild)
   i) current health (systemic illness vs. localized injury).
2. Medical procedure:
   a) Pain levels (none vs. severe, chronic vs. acute)
   b) Duration (short vs. long)
   c) Body location (proximity to easily damaged structures such as the eye or tympanic membrane, proximity to defensive weapons)
   d) Degree of immobility required (total vs. acceptability of minor movement)
3. Handler(s):
   a) Level of expertise (novice vs. expert)
   b) Physical strength (able to lift 25–50 lb vs. able to lift more than 50 lb)
   c) Availability of assistance (one vs. more; the fewer staff members needed, the more cost efficient the restraint)
4. Equipment and its availability:
   a) Ropes and leashes, halters, and lead ropes
   b) Towels, blankets and cat bags
   c) Muzzles, commercial and gauze
   d) Gauntlets
   e) Kennels and carriers
   f) Quick-release (capture or rabies) pole
   g) Panels, barriers, squeeze cages, stanchions, and chutes
5. Defensive anatomy of animal:
   a) Teeth, beaks, heads
   b) Claws, hooves, talons
   c) Body size (hamster vs. horse)

Concept: The diversity of patients seen in a veterinary practice requires continual adaptation for effective patient care.

Discussion: Ask the owners how they handle their pets, but never fully trust their responses. Their pet may have never bitten them, but then they probably have never tried to draw a blood sample from it! Ask other staff members to share their skills in handling species you

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are unfamiliar with. Remember to take all of the above-mentioned items into consideration and adjust the following techniques to suit the individual.

Tip Box 10.3: **Never trust an owner's evaluation of an animal's potential behavior.**

Concept: Restraint is divided into three categories: chemical, psychological, and physical. Psychological and physical restraints will be discussed further along in this chapter.
Concept: Chemical restraint is the most restrictive form of restraint with the use of drugs ranging from tranquilizers to general anesthesia.
Discussion: Chemical restraint is often the restraint of choice when levels of immobility are needed because the animal is in pain or when handling an unpredictable or intractable animal. The decision to use chemical restraint, dose, and administration is always entirely the veterinarian's.

TASK 10.3
PSYCHOLOGICAL RESTRAINT

Concept: Psychological restraint is the least restrictive and is never used alone due to the unpredictability of animal response.
Discussion: It is used to supplement all other restraints by engaging training and by using distraction techniques. The tone of voice, mental state, body language, eye contact, and physical movements of the veterinary staff affect patient behaviors, either positively or negatively. Be aware of your own behavior and attitude as well as patient responses to them.
Concept: The foundation for psychological restraint begins with the relationship between the animal and the handler.
Discussion: The trained animal responds to commands, auditory or visual, given by the handler. This is the least restrictive form of restraint. It is also the most unreliable. Some patients have extensive training, while others have little to none. Some well-trained patients respond to only one handler; others respond to any handler. A sudden distraction can take a well-trained animal off command, especially in a potentially threatening environment such as a veterinary facility. The appearance of another animal, an unfamiliar odor, or a sudden noise is enough to make any animal forget its commands. Do not take an owner's word for the obedience level a patient has achieved. Expect the least and at times be pleasantly surprised.
Concept: Psychological restraint is used as a supplement to physical restraint.
Discussion: Movement, sound, and touch play a role in this form of restraint. A soft, crooning voice reassures many patients. A gentle stroking behind the ears or along the jaw comforts a cat. This mild distraction may be all that is necessary to restrain a cat waiting on an examination table. Similarly, most dogs will respond well to being stroked under the jaw and along the ventral part of the throat after first familiarizing itself to a proffered hand. Some dogs require a more dominant voice and firmer touch. Take care that your firm tone does not evolve into yelling. The only thing yelling accomplishes is to the raise the discomfort level for everyone and everything. Birds taught to "hop up," moving from perch to proffered finger, are easier to capture and are less stressed. In moving slowly, confidently, and quietly, most animals tend to remain calm and more relaxed. Less physical restraint is needed for the less apprehensive patient.

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Tip Box 10.4: **Warning: Owners should handle, or at least remain in the presence of, dogs trained to be police, guard, or attack dogs. A minor gesture is often enough to make these trained individuals respond in a particularly vicious manner.**

Concept: Training is based on conditioning, also known as reinforcement. Positive reinforcement is the rewarding of an animal when it performs a desired behavior.
Discussion: This is the most effective and humane training method. By rewarding an animal during the development of desired behaviors, there is a progression from imperfect toward perfect performance of the terminal action.

A positive reinforcement technique used often in restraining animals is the "letup." When an animal is in a restraint hold, you always start with the gentlest grip possible. If the animal begins to move or struggle, tighten your grip to prevent it from getting loose. The nanosecond they relax, you "let up" on your grip as well. A couple of rounds like this and the animal quickly learns that if it holds still, the grip reminds gentle; if it moves, the grip gets tighter. Novice restrainers have a hard time in remembering to let up, so the animal will struggle more and more fiercely until the only option is to let the animal up, which is also a positive reinforcement. The animal realizes, "The faster I struggle the quicker they let me go."
Concept: Negative reinforcement is reprimanding an animal for negative behaviors.
Discussion: Rather than punitive measures, it is more humane to determine the reason for the negative behaviors. Providing diversions or preventive measures may be all that is needed to extinguish undesirable behaviors.

There are a plethora of "how to" texts and audiovisual materials on the subject of animal training. Develop a "recommended" list for owners. Be aware of local animal training programs and reputable pet trainers. Keep the information current. Look for resources that emphasize positive reinforcement.

TASK 10.4
PHYSICAL RESTRAINT

Concept: Physical restraint increases the competency of the veterinarian and technician. If used effectively, it reduces patient stress and prevents harm to all.
Discussion: A calm, confident attitude by a patient's handlers reassures an animal and elicits cooperation. Loss of temper, yelling, and/or hitting can result in injury to staff and/or patient. Skilled animal handlers always control their emotions and treat animals kindly but firmly and always patiently.

Although this chapter covers some of the major methods of physical restraint for dogs and cats, and in some instances other species, the reader is directed to texts and videotapes devoted in their entirety to animal restraint. Supplementary resources are listed in the "Resources" for this chapter.
Concept: Patient identification is extremely important in the veterinary hospital.
Discussion: Procedures done on the wrong animal at best will not cause any harm; at worse, these could result in death and legal battles. The assistant's job is to make sure all identification procedures are carried out for all animals being kept at the hospital or seen in the clinic.

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TASK 10.4.1 PATIENT IDENTIFICATION PROCEDURE

Concept: If an animal is to be hospitalized, it will need to be put in a cage or a kennel. Before this takes place, two important steps must always be taken.
Discussion: An identification collar is immediately placed around every patient's neck. No exceptions. These are usually paper with a strong plastic backing. They have a sticky closure at one end permitting adjustment of the collar to the circumference of the patient's neck. The collar is placed around the animal's neck with the sticky side up. This allows you to cut the excess off on top of the tape and not under it, which could lead to accidently cutting the patient. Make sure the collar allows for two fingers to be slipped underneath it to confirm it is not too tight.
Concept: Information is written on the outer surface of the collar with indelible black ink before it is placed on the patient.
Discussion: The required information includes the following:

1. owner's name
2. patient's name
3. date of admission
4. reason for hospitalization
5. attending veterinarian
6. allergies/warnings. (These are usually written in red, indelible ink.) The collar remains on the patient throughout hospitalization. Only after the patient is released to the owner and discharge is completed is the collar removed.

Concept: A cage card is filled out and placed in a holder on the cage or clipped to the cage door.
Discussion: The format of the card is variable. At the minimum, it contains the same information as the collar described earlier. Many cage cards also include a chart on which daily physical observations are written. This includes

1. food fed
2. quantity eaten
3. quantity of water consumed
4. urination
5. defecation
6. body temperature and time taken
7. medications received and time administered
8. observations.

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TASK 10.5
PATIENT KENNELING TECHNIQUES

Concept: Cage or kennel preparation.
Discussion: Before placing the patient in the cage, check for clean newspaper placed on the cage bottom with a clean towel on top, a full water dish, and a litter box if appropriate. The cage card is completed and is in the cardholder. If not, clean with a spray disinfectant and paper towels. Wipe it dry before placing the newspapers and towel inside.
Concept: Patients are often hospitalized and require someone to take them outside to relieve themselves. The assistant is just that person.
Discussion: It is very important to know how to safely place and/or remove a dog or cat into a cage or kennel.

TASK 10.5.1
PLACING A DOG OR CAT INTO A KENNEL

Procedure

PREPARATION

1. Make sure the ward door is closed then open the cage door completely.
2. Place the animal, on its feet and facing you, to the rear of the cage.
3. Grasp the part of the leash around the neck and start to close the door with the other hand.
4. Gently slip the loop of the leash over the patient's head and pull it out of the cage as you close the door.
5. Check the door to make certain it is firmly latched.

FOLLOW-UP

1. Check on the animals in the wards periodically throughout the day.
2. Never allow an animal to sit in a wet cage; accidents of the bodily kind or tipping the water dish makes for an uncomfortable situation.
3. Remove the animal from the cage and temporarily place them in a free cage.
4. Remove the soiled bedding, spray the cage with disinfectant, wipe dry, and place fresh bedding in the cage.
5. Replace the water dish, perhaps putting it to the back of the cage if it is an exuberant puppy. Put the litter pan back if appropriate.

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6. Return the patient to its original cage and then clean out the holding cage. You don't want to place another animal in that cage without cleaning it as the first patient may be infective!

TASK 10.5.2 REMOVE A DOG OR CAT FROM A KENNEL

Procedure

Location: Hospital wards

PREPARATION

1. Make certain the ward doors are closed.
2. Remove the cage card and slip it in your pocket if the dog is going home. If just out for exercise or treatment, leave it attached to the kennel.

PROCEDURE

1. Open the kennel door just enough to slip a leash securely around the patient's neck. Make the leash loop large and hold it open at the ring, then flip the loop around the patient's head and tighten the loop around neck (Fig. 10.1).



Figure 10.1. Removing dog from kennel. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. Reproduced with permission from Elsevier.

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2. Open the door wider and allow the animal to walk out if at floor level. If the patient is in a kennel that is higher up, slip the leash on as previously described and allow the animal to come to the front of the cage or gently pull it to the front with the leash.
3. Hold the leash tight to control the head, then quickly slip your other arm around the animal's abdomen and continue so your arm is under the chest to the front legs. Grasp the front legs in a three-finger hold.
4. Slide the hand holding the leash under the neck to control the head. You can place your fingers and thumb on either side of the mandible or gently scruff the loose skin over the neck and shoulders.
5. Lift the patient out of the cage and carry it to the treatment area or set it on the ground to walk.

FOLLOW-UP

1. If the patient is not coming back, return and take care of the kennel.
2. Remove everything from the kennel.
3. Spray the kennel with dilute disinfectant and wipe dry with paper towels.
4. Place fresh newspapers in the kennel and latch the door.
5. Mark the cage card with the time and date that the animal left, then place it in the patient's file to alert personnel.

TASK 10.5.3

PLACING A LARGER DOG INTO A RUN

Procedure

PREPARATION

1. Close the ward doors.
2. Make sure the run is clean and has a bed for the dog to lie on and a full water dish.
3. Clip the cage card to the run door.

PROCEDURE

1. Open the run door completely and send the dog in with a verbal "kennel" command and a prompt with the leash to go forward.

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2. As the dog steps into the run, gently pull its head toward you and start to shut the door.
3. Grasp the leash section around the neck and pull it off the dog's head as you remove your arm and shut the door in one motion.

FOLLOW-UP

1. Make sure the door is latched.

TASK 10.5.4 REMOVING A LARGE DOG FROM A KENNEL

Procedure

PREPARATION

1. Remove the cage card and slip it in your pocket if the dog is going home. If just out for exercise or treatment, leave it attached to the run door.
2. Have the leash, with the neck loop open, in your hand.
3. Speak quietly and reassuringly to the patient. Try to coax the patient toward you. (The ideal run door is a double or Dutch door that allows you to coax an animal toward you without actually entering the run. Simply bend over the bottom half of the door to slip the leash on the patient.)

PROCEDURE

1. Slip the leash over the patient's head.
2. Move to the patient's right side.
3. All at once, gently but firmly tug the leash with an upward motion; give the command "heel"; step out with your left foot first.

FOLLOW-UP

1. Never wrap the leash around your hand, fingers, or wrist; if the animal bolts, it may injure your hand.
2. Keep the leash short enough so the animal is forced to walk adjacent to your left leg. This is called the heal position. If the dog lurches ahead, a quick pop of the leash with the command "heel" should bring the dog back to your side.
3. The excess length of leash is folded and carried in the right hand.
4. If the patient is not coming back, return to the kennel and clean according to the practice protocol.

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TASK 10.6
LIFTING ANIMALS

Concept: Most examinations of small animals are done on an examination table that is about waist height.
Discussion: The task is getting these animals up onto the table. Anything less than 50 lb can be lifted by one individual. There are two techniques that work well. The first is squatting down and placing both arms around the animals legs just below the body; gather and lift, remembering to lift with your legs and not your back. The second technique is similar to that described for lifting an animal out of a cage: one arm around the body and under the chest, the other hand under the neck, placing a finger on each side of the mandible bones to control the head.

Most cats will come in a carrier, which can be a challenge getting them out. Some will

- walk out after the door is opened
- need a little coaxing
- need coaxing and a slight tilt up with the back of the carrier
- need coaxing and a reach in to grasp the scruff
- need the carrier turned upright with the door pointed at the table and a little shake
- need the carrier dismantled
- need the carrier dismantled and a towel thrown over their heads.

Once the cat is out of the carrier, if possible, make friends by finding its itchy spots: over the tail, under the chin, or around the ears. By the time the veterinarian is ready to examine it, you and the cat will be great friends and some gentle maneuvering will be all that is necessary for a physical exam. If the cat is very upset, refer to the section on handling fractious cats later on in this chapter.
Concept: As a general rule, any patient over 50 lb should be lifted by two handlers.
Discussion: While many members of the veterinary team can easily lift more than that, the repetitive stresses of heavy lifting to the back eventually cause harm.

Tip Box 10.5: **Remember to use your leg muscles when lifting any heavy object.**

Be aware of what is going on around you. If you notice that another staff member needs help in lifting a large patient, step right in and help. Likewise, notice which staff members are not critically involved in other activities. These are just the people to ask for help when you are lifting heavy patients. Lifting a heavy patient by yourself only risks harming yourself and the patient while doing something others think unsafe and unnecessary. It is not heroic to lift the heavy patient by yourself.

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Procedure

Location: Treatment area or examination room

PREPARATION

1. Have two staff members ready.
2. Have the surface onto which the patient is to be lifted clean and sanitized.

PROCEDURE

1. The patient should be standing and parallel to the table on which it is to be placed.
2. Both staff members are squatted down on the same side of the patient with the patient between them and the table.
3. The person nearest the head:
   a) Places one arm underneath and around the patient's neck.
   b) The other arm is placed just behind the elbow, under, and around the chest as far as possible.
   c) Pull the patient firmly toward your chest.
4. The person nearest the tail:
   a) Places one arm under and as far as under and around the abdomen, between the chest and pelvis.
   b) The other arm is placed behind the tail and hind limbs at the level of the stifles.
   c) Push the hind limbs slightly forward.
   d) Pull the patient firmly to your chest.
5. To lift:
   a) With each team member in position, give the verbal countdown, 1, 2, 3, with a simultaneous lift on 3 to the desired location.
   b) The person on the back end can leave or help position the patient for the procedure. The person on the head stays to carry out the restraint procedure. *Never take your hands or eyes off an animal when on an elevated surface.*

TASK 10.7
RESTRAINT PROCEDURES FOR DOGS AND CATS

Concept: Restraint is much like ballroom dancing—it is a coordinated effort. The veterinarian or technician takes the lead, the assistant follows. In following, the assistant must anticipate the actions of the other staff member and respond so smoothly that the movements of the two are seamless.

For example: As the patient is lifted to the table, the restraint ("dance") begins and must be maintained until the examination is complete and the animal is returned to the floor ("the music ends"). Here are a few basic rules to remember:

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1. Always stand on the side of the table opposite to the person treating the animal.
2. Never take your hands off a patient no matter how cooperative it may seem.
3. Use your whole body when restraining an animal, not just your hands.
4. Be aware of what the technician and veterinarian are doing, watch, listen, and anticipate their next moves. At the same time, you want to be watching and listening to the patient for cues to it getting upset.
5. Restrain the patient in such a way that the part of the body being treated is exposed. This means that you will need to continuously modify your restraint positions as a patient is being examined.
6. The degree of restraint varies depending on the animal, its situation, and the procedure being done. Learn to differentiate.
   a) Firm restraint is more critical whenever examination and treatment of delicate structures occur. For example, when a foreign object is being removed from the ear, the patient should be especially still to prevent *iatrogenic* injury. Examination of an eye is another situation in which the patient must be held very still. The examiner's face is close to the mouth, so there is an increased risk of the examiner being bitten.
   b) Some situations require less restraint. Simple distraction such as puffing air on the nose or scratching behind the ears is often enough during the administration of a routine vaccination in which a short, fine-gauged needle is used and the medication is not painful.
7. Know directional vocabulary (Appendix C). If you are asked to place the patient in "left lateral recumbency," you should know what is being requested.
8. Pay attention to your patient's body language. Make modifications in restraint in response to changes in the patient's attitude.
9. If you are losing control because of struggling or just slipping, mention this to the other person so that he or she can stop and allow you to readjust or to let you know to try and hang on for a second longer. Never just let go; if you do, the animal may injure the other person.

The basics of restraint remain the same when the patient is on the examination table; minimum restraint is needed to effectively accomplish the task without injury to people or the patient. Start gentle and move to more restrictive holds as needed.

Alertness and responsiveness to the elements of the situation are essential. They are the key to your success.

TASK 10.7.1
GENERAL RESTRAINT

Concept: Many procedures such as physical examination, oral and ophthalmic medications, vaccinations, anal gland evacuation, toenail trims, and ear cleaning can be accomplished with minimal restraint and virtually the same technique. A few modifications to present the specific body parts may be necessary, but overall, one technique can work with a wide variety of patients.

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Discussion: It is the assistant's job to provide this restraint while the veterinarian or veterinary technician is performing the task. About 90% of our patients won't mind this, even the thermometer or the toenail trim; a gentle hand and some reassuring words is all it takes to hold the animal still enough to complete the task. It is the other 10% that requires the assistant to be on his or her toes and be ready to switch holds or tighten your grip at an instant.

Most of these patients and some of the good ones also object strongly to having these procedures done on them. When it comes to time to do these procedures, the assistant must be ready for the blowup. Controlling the head and movement of the body is vital, as well as implementing these *three golden rules* to restrain a patient:

1. Always control the head. These are some options for holding onto the head:
   a) Grasp the mandible, placing your thumb on one side of the mandible and wrapping your fingers around the maxilla. Scruff the skin on the back of the neck; this works well on cats.
   b) Wrap your fingers around the nose and lift up the jaw a bit (Fig. 10.2).
   c) Wrap your arm around the neck and squeeze the patient's head against your shoulder.
2. Place the hand that you are going to hold the front legs with over the shoulders; use your forearm and elbow to snug the patient up against your body. Then grasp the legs.
3. Always grasp the feet with a three-finger hold. This is placing the middle finger and thumb around a leg each with the index finger in between. This gives you an amazingly secure hold (Fig. 10.3).



Figure 10.2. Holding the dog's head. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. Reproduced with permission from Elsevier.

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Figure 10.3. The three-finger hold. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. Reproduced with permission from Elsevier.

TASK 10.7.2 HEAD RESTRAINT FOR EXAMINATION OR MEDICATIONS

Procedure

Location: Treatment area or examination room

PREPARATION

1. Before the patient enters the examination room:
   a) Make certain the room is clean.
   b) Lay out all anticipated instruments and materials that will be used during the examination.
   c) Put on clean examination gloves.
2. Greet the client and patient at the reception desk.
3. Place your leash on the patient, take the patient's leash, and hold that with your leash.
4. Weigh the patient and record the weight in the patient's medical record. Record the body condition score (BCS) at the same time (see Chapter 13, Task 13.1.1).
5. Escort the client and the patient into the examination room.
6. Place the patient on the examination table with the left side of the patient facing the veterinarian. This facilitates auscultation of the heart during the physical exam.

PROCEDURE

1. Basic physical examination position; the patient is kept standing with its body snugged against yours (Fig. 10.4).

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Figure 10.4. Holding a dog's body for examination. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. Reproduced with permission from Elsevier.

a) During auscultation, allow the patient to move slightly away from your body to allow the stethoscope to be passed along the right side of the chest.
b) To allow examination of the abdomen, perineum, and limbs, shift the arm under and around the abdomen to reach through the back legs and lift slightly on the pelvis or grasp the back leg closest to you at the femur and hold. Another technique is to grasp the base of the tail and lift. This is especially useful if the patient tries to sit down for the thermometer, anal examination, or intramuscular (IM) injection. If the patient is being really naughty, grasp the scrotum or vulva and give a gentle squeeze. You will get their attention and it usually stops them in mid move!
c) Turn the patient so it is facing the other way for the other side to be examined.

Tip Box 10.6: **Remember: Talk quietly to patients, encouraging them to sit still, be good, or some such thing. The tone of your voice reassures them and is a bit of a distraction.**

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2. Examination of the eyes and ears: Ask the patient to sit or rest in sternal recumbency, keeping its body close against yours.
   a) Grasp the muzzle as described in the golden rules.
   b) Sometimes, the veterinarian will take the head when examining the mouth, eyes, or ears. If this is the case, wrap your hand or arm around the neck and press it against your shoulder to continue to steady the head.
   c) Be ready to shift the animal to present the other side for the examination of the other eye or ear.
   d) If requested, lift and hold the pinna, then move the arm encircling the chest to grasp the pinna. Position your forearm to elbow along the patient's side to keep it snugged against your body. You may need to increase the firmness of your grip during the otoscopic examination as this is sometimes painful. Be ready and do not allow the patient to turn or move its head in any way. If the animal does react badly to the otoscope, a quick application of a gauze muzzle will keep everyone safe.

Tip Box 10.7: **Remember less is more. Start out as gentle as possible and move to a firmer hold as needed; remember to let up if the patient relaxes under the firmer hold; reward the behavior by returning to the gentle hold.**

FOLLOW-UP

1. Only after examination and treatment and after the veterinarian has terminated the conversation with the client is the patient removed from the table.
2. Never allow an animal to jump off the table. Even the largest of patients is to be lifted from the examination table and placed on the floor.
3. After the client and the patient have left the examination room, return to the room to clean the table and equipment, replace the supplies, and put away all materials.

TASK 10.7.3
RECUMBENCY RESTRAINT

Concept: There are various times that patients need to be in specific positions: surgery, radiographs, ultrasonography, cystocentesis, and urinary catheterizations, to name a few.
Discussion: These positions are usually easy to get the animal into and, if handled right, to keep them in; however, if the animal struggles and gets away, it is extremely more difficult to return them to these positions.

Restraint: Sternal Recumbency

Concept: The chest is touching the table and the legs are tucked under the body.
Discussion: This is a position frequently assumed by patients during examination of the head, for cephalic intravenous (IV) injections, venipunctures or catheterizations, jugular venipunctures. and when a large dog needs to be on the table. If a large patient stands on

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the examination table, the veterinarian is unable to see or reach over the patient's body, and it is unlikely the assistant will be able to hang on to it with any security. For a large dog, as it is lifted to the table, lay it in lateral recumbency, then allow it to roll up on its sternum. Quickly reach around its neck and grasp the front leg away from you and snug its entire body up against yours.

Procedure

PREPARATION

1. For medium-sized dogs and cats, begin with the patient in a standing position on the examination.
2. Ask the patient to sit; if it doesn't, place one hand over the hips and the other under the chin; tilt the neck back, saying "sit" and applying pressure to the hips at the same time. Care must be taken not to force the patient to sit as this could be painful and the patient would retaliate with a bite.
3. Once in the sitting position, secure the head and front legs as per the golden rule, then apply downward pressure across the shoulders to slide them to their sternum.
4. Maintain them in this position or continue on to lateral recumbency.

Restraint: Lateral Recumbency
Concept: In lateral recumbency, the patient's left or right side is in contact with the examination table.
Discussion: Left lateral recumbency means the patient is lying with its side in contact with the examination table. Always ask the person for whom you are restraining the animal which side they want down. This restraint hold is great for toenail trims, subcutaneous or IM injections, urinary catheterizations, and femoral or lateral saphenous venipuncture or IV injections or catheterization.

Procedure

Location: Examination room or treatment area

PREPARATION

1. Place the patient on the table.
2. Ask or put the patient into the sitting position.
3. Determine which side is to be the downside and stand on that side of the patient.

PROCEDURE

1. Reach both arms over the back and then under the chest/abdomen of the patient to grasp the legs that are closest to your body.
2. Pull the legs out from under the patient and allow its body to slide down your body to lie on the table.

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Figure 10.5. Lateral recumbency with a three-finger hold. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals.* Reproduced with permission from Elsevier.

3. The arm holding the hind limbs should be across the flank on the upside of the patient.
4. The arm holding the forelegs lies across and on top of the neck.
5. The limbs are held slightly up from the table to prevent them from getting back to their feet. If they struggle, apply a bit of pressure on the neck and flank with forearms (Fig. 10.5).
6. The top hind limb can be released, freeing up a hand; as long as the front limb is held off the table and the forearm is on the neck, the animal cannot regain its feet.

Restraint: Dorsal Recumbency

Concept: Dorsal recumbency places the patient on its back, the dorsal surface.
Discussion: Patients are placed in this position during abdominal surgery, for radiographs and cystocentesis. The patient is placed on its back with the forelimbs extended cranially and the rear limbs extended caudally.
Concept: In the conscious patient, this position requires two people and is started with the patient in lateral recumbency. Rather than holding just the down limbs, one person grasps both front limbs and another person grasps both hind limbs, and the patient is rolled unto its back. The legs are extended. Try to keep the head between the front legs. If the patient is a tail wagger, include the tail with the hind limbs.
Concept: In the anesthetized patient, a thoracic positioner, sandbags, or if on a surgery table that can be V-d into a trough is used to keep the chest from flopping from side to side.

TASK 10.7.4
RESTRAINT FOR INJECTIONS

Concept: Patient restraint during an injection is based on where the injection is administered and on the behavior of the patient.

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Discussion: The injection site is determined by the manufacturer's directions, the organization's recommendations, and the veterinarian's personal preferences.

Injections can be given subcutaneously (SQ) or under the skin, IM or into the muscle, IV or into a vein. SQ injections seem to be tolerated fairly more so than IM or IV injections. The assistant must know where and how the drug is to be administered. Ask if this is the first time you have assisted, then mark the location down in your reference book so that the next time a particular injection needs to be given, you know how to restrain the patient.

Concept: Most IM and SQ injections are given to dogs and cats using either the general restraint position described for physical exams or in lateral recumbency.

Concept: Vaccines are usually given in the same location every time for every animal.

Discussion: If the vaccine should cause a reaction or a tumor to form, giving it in the exact location is helpful in confirming that it is indeed vaccine related. This is especially true of cats. Most clinics follow this recommendation: Feline distemper vaccines are given SQ on the right shoulder low enough that if a tumor should develop, the leg can be amputated. Feline leukemia vaccine is administered IM into the left hind limb. Rabies vaccinations are given SQ or IM in the right rear leg. *Bordetella* or kennel cough is given to dogs intranasally (IN). Animals do not like nose drops and usually sneeze vigorously!

Larger patients can be handled on the floor in the standing position. Squat or kneel down on the opposite side the vaccines need to be injected on; encircle the neck with one arm pulling the head against your shoulder and wrap the other arm under the abdomen and over the back again, pulling the animal's body into yours.

TASK 10.7.5
RESTRAINT FOR IV INJECTIONS, VENIPUNCTURE, AND CATHETERIZATION

Concept: Injections and venipuncture is the placement of a needle into the patient's veins for the purpose of administering drugs or taking a blood sample. IV catheterization is placing and securing a synthetic tube into the vessel in order to administer fluids or medications rapidly.

Discussion: This can be a painful procedure for the animal and so special care is taken to hold the patient well not only to keep it from biting but if they move at the wrong time, it can cause them injury as well.

Concept: The number of vessels used for IV injections, venipuncture, or catheterization is limited by the amount of drug to be given, the amount of blood needed, or the size of the catheter. As a general rule, blood for tests should be taken from the jugular vein and the peripheral veins are saved for IV injections and catheters. If the patient is a medium to large dog and it is not expected to need IV fluids, then the cephalic vein located in the forelegs can be used. Alternatives include the medial femoral vein in the cat or the lateral saphenous vein in the dog. Birds can yield a blood sample from the right jugular vein, and rodents from the tail veins or periorbital vessels. With horses and cattle and other livestock the jugular vein is typically used for all three. Cattle also have a tail vein that is very accessible for blood collection.

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Concept: Keeping the patient motionless is an absolute must.
Discussion: Movement from the patient can cause the needle to slip out of the vessel. If a solution that is caustic, like chemotherapy drugs, is being injected and it goes *perivascular*, because the patient moved and the needle slipped out of the vein, it can make the area *slough*. This is quite painful and takes a very long time to heal. If performing a venipuncture and the needle slips, the vessel bleeds into the surrounding tissues, causing a *hematoma*. This is unsightly as a large bump rises under the skin, is uncomfortable for the patient, and renders the vessel unusable. The technician or veterinarian is forced to try to use another vessel.
Concept: Veins are the return blood flow to the heart.
Discussion: To increase visibility of the veins, they must be distended for visualization and to enable the needle or catheter to be inserted into the *lumen*. To make them distend, pressure is applied between the needle insertion point and the heart. This is called occluding the vessel. Fingers are either pushed against the vessel or laid across the vessel and squeezed.
Concept: Veterinarians and technicians have individual preferences for venipuncture sites and many times are dictated by the type of solutions being given.
Discussion: Learn the vocabulary associated with anatomical locations of vessels (see Appendices C and H). The following are some common procedures for restraint during IV injections, venipunctures, and catheterization of various species of animals.

Restraint for Cephalic Venipuncture

Concept: The cephalic vein lies along the cranial surface of the forelimb between the carpal joint and the elbow.
Discussion: In larger dogs, it is big enough to use for blood collection. In both canine and feline patients of all sizes, it is the site of preference for placement of an IV catheter and IV injections. The cephalic vein is also used for blood collection in goats, sheep, and rabbits.
Concept: During restraint of a patient for cephalic venipuncture, two things must be kept in mind.
Discussion: The patient's elbow must be extended throughout the procedure. The handler must keep a continuous forward pressure on the elbow from behind the joint to prevent the patient from jerking the limb backward and thus making the needle slip out of the vein.
Discussion: The vein is occluded to force it to distend, allowing the venipuncturist to see the vessel. Pressure on the vein is let off while medications or fluids are being injected. Extension of the limb continues in either situation. Pressure over the insertion point must be applied before the needle or catheter is pulled out so that blood does not seep out or into the SQ causing a hematoma. The assistant is often asked to apply this pressure. The cue to do this is when the venipuncturist places a cotton ball over the needle or catheter. Slide your hand down the leg or move your fingers over the cotton ball and apply pressure. Learn to pay attention to what is being done and anticipate the needs of the venipuncturist.
Concept: The venipuncturist may use either forelimb.
Discussion: Most have a particular preference, although they tend to develop expertise in the use of both limbs. Ask the preferences of the person for whom you are restraining a patient. Learn to restrain the patient from either side of the body. Stand on the side of the patient opposite the limb being restrained. Place your arm over the back of the patient and grasp the limb being used.

Restraint consists of the animal sitting or in sternal recumbency; restraint of the head depends on the size of the patient. In the very large patient, the other arm reaches under and around the patient's neck. The neck is held close to the handler's chest. If the patient is small enough, the head can be restrained by slipping the hand from under the jaw and placing the fingers around the nose. The patient's head is turned slightly away from the restrained limb to allow room for the venipuncturist to work.

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The cooperative cat's head is restrained with the thumb at the back of the skull and the fingers below the jaw. Use the scruff of the neck to restrain a fractious cat. Remember to grasp the skin close to the ears to give greater control over possible head movements. Tuck the body close to yours using the forearm and elbow on the same side as the hand restraining the limb.

Concept: Occlude and extend the leg toward the venipuncturist.

Discussion: The patient's elbow is placed in the restrainer palm and the thumb is placed over the foreleg immediately distal to the elbow joint, and rotated laterally. The fingers are wrapped around the leg just behind the elbow, forcing the leg to straighten. The pressure of the thumb over the vein causes the vein to distend, making it visible to the venipuncturist.

Concept: Some veterinarians and technicians prefer to use a tourniquet.

Discussion: This can be as simple as a wide rubber band and a small hemostat or commercially available tourniquets. If a tourniquet is used, the person restraining the patient only needs to extend the forelimb at the elbow and keep the patient still.

Concept: Discontinue occlusion of the cephalic vein only at the venipuncturist's direction.

Discussion: As the venipuncturist finishes, she places a cotton ball over the insertion point, the restrainer places a finger or thumb over the cotton ball and continues light pressure for a minute or until the bleeding stops. A pressure bandage of tape and a cotton ball may be applied to the area to maintain pressure. After removing your finger, check to see that the site is clean by dabbing; do not rub as this will knock the clot loose and bleeding will resume. Remove blood from fur and fabric with hydrogen peroxide. After cleaning with peroxide, rinse the fur with water. Dry and brush the area.

Procedure

Location: Treatment area or examination room

PREPARATION

1. Have all materials needed laid out for the venipuncturist use. This might include
   a) alcohol bottle or dispenser
   b) cotton balls
   c) adhesive tape with cotton ball in the middle (optional—use of a prepared bandage is desired)
   d) clippers with no. 40 blade
   e) catheter, syringe (check on the volume required); label blood collection tubes (patient's name, species, and date) or IV drugs (see Appendix I for blood collection tubes and their uses)
   f) if the venipuncturist prefers to use a tourniquet, have the one of choice on the counter with the other items
   g) patient record.
2. Confirm patient identity.
3. Place the patient on the examination table.
4. Put on examination gloves.

PROCEDURE

1. Determine which limb is being used.
2. Stand on the opposite side of limb to be restrained.

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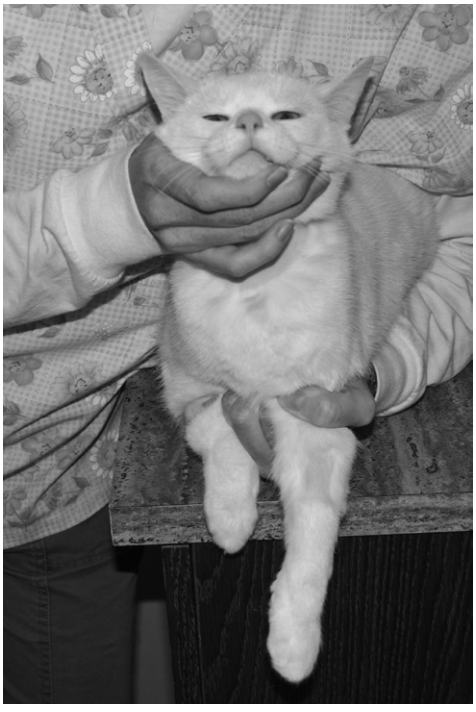


Figure 10.6. Cat head and cephalic vein restraint. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. Reproduced with permission from Elsevier.

3. Place the animal in a sitting position and restrain the head.
4. Keep the leg extended throughout the procedure.
5. Use either the index finger or the thumb technique to occlude the vein. Maintain pressure on the vein until the venipuncturist directs you to release the pressure (Fig. 10.6).
6. Slide a gloved finger over the cotton ball placed on the puncture site as the needle or catheter is removed. Maintain pressure until bleeding stops or a bandage is applied.
7. If blood is on the fur, clean the area with peroxide and then rinse the fur with water and dry.

FOLLOW-UP

1. Return the patient to its owner or cage.
2. Clean and put away all materials.
3. If blood was collected for laboratory procedures, complete the labeling and packaging and place in the refrigerator.

Restraint for Jugular Vein

The jugular veins are located along the length of the neck from the jaw to the thoracic inlet lateral to the trachea with the most accessible area being approximately mid-neck. The vessel is occluded by the person doing the procedure.

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Procedure

Jugular Venipuncture in the Dog and Cat
Location: Treatment area or examination room

PREPARATION

1. Put on examination gloves.
2. Confirm the identification of the patient.
3. Have all materials needed ready and laid out for the venipuncturist. This will depend on the procedure: IV injection would include a needle, syringe, and drug to be given. Venipuncture would include a blood collection system or a needle, syringe, and collection tube. IV catheterization would require a clipper, surgical scrub, adhesive tape, and the catheter.
4. Label all blood collection vials before venipuncture: patient's name, species, and date.
5. Place the patient on the table and remove the collar and your leash.

PROCEDURE

1. Restraint positions:
   a) *Cats and Medium-Sized Dogs:* Slide the patient to one end of the examination table until the chest rests on the edge of the table. Grasp both front legs with the three-finger hold and extend them over the end of the table. The forearm and most of your body is over the patient's body, snugging its body close to your chest. Point the nose upward with fingers wrapped around the jaw and the thumb behind the head on cats and behind the head for dogs. Do not overextend the head as this can cause the vessel to collapse (Fig. 10.7).
   b) *Large Dogs:* Back them into a corner, straddle them, and use both hands to lift the jaws up to extend the head.
   c) *Cat Alternate Position:* A cat can be placed on its back. The handler grasps all four feet, tucking them between all four fingers, grasps the scruff of the neck, and quickly turns the cat on its back. Lean over the body so it is tucked under your forearm and held firmly against your body. Or wrap the cat in a towel (see Task 10.8.1, "Fractious Cats," #4, "Kitty Burrito." The venipuncturist holds the head with fingers wrapped around the head and the thumb lying across the mandible. The restrainer's other hand occludes the vein at the thoracic inlet.
   d) *Alternate Position for a Small to Large Dog:* Place it on its side with forelegs held in a three-finger hold with one hand. The forearm tucks the patient's body firmly to the handler's chest. The nose is grasped and extended, exposing the length of the neck.
   e) *Alternate Position for Small to Medium Dogs:* Place them in a sitting position on the exam table. One arm goes over the shoulders and grasps the forelegs with the three-finger hold and the other hand lifts and extends the neck. This usually works on a very calm dog that has never had a jugular venipuncture done before. Use your shoulder to brace the head against.
2. As the injection or venipuncture comes to a conclusion, the venipuncturist places a cotton ball over the insertion point, and the restrainer quickly places her fingertips over the cotton ball as the needle or catheter is being removed to prevent any hemorrhage. This is done with the hand that was holding the feet. The pressure

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Figure 10.7. Jugular venipuncture. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals.* Reproduced with permission from Elsevier.

should remain in place for a minute or two until bleeding ceases. If the pressure is removed too soon, a hematoma can develop from blood leaking out of the vessel and under the skin.

3. Reminder: The purposes of restraint are as follows:
   a) The venipuncturist must have adequate room in which to work. There should be enough room to draw the plunger in the syringe downward or outward while filling the syringe.
   b) The vessel must be adequately visualized; sometimes, this means holding on to the animal's head with just one or two fingers and a thumb.
   c) There must be adequate patient restraint throughout the procedure so the needle does not slip out of the vein.

FOLLOW-UP

1. Clean the patient before it is returned to its cage or to the client with hydrogen peroxide.
2. Clean the table and store equipment.
3. Prepare any blood samples for storage until picked up by an outside lab or processed in-house. Refrigerate samples if it will be awhile for either option. Never store body fluid samples or biologics in the same refrigerator in which food for human or animal consumption is stored.

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Restraint for Other Vessels

The use of other vessels is only limited by the size of the vessel and the needs of the venipuncturist. A bit of anatomical knowledge helps.

Procedure

Saphenous Venipuncture in the Dog

Location: Treatment area or examination room

PREPARATION

1. Place all anticipated equipment to be used on the counter.
2. Confirm patient identity.
3. Place the patient record on the counter.
4. Place the patient on the examination table.

PROCEDURE

1. Ask the venipuncturist which vein is to be used, left or right.
2. Place the patient in lateral recumbency with the hind limb being used on top.
3. Modify the usual restraint technique for lateral recumbency by lifting up on the front leg to keep it in lateral recumbency; move the hand restraining the hind limbs to grasp the leg just above the stifle. Maintain pressure on until advised otherwise.
4. Slip the thumb downward to cover the puncture site as needle is withdrawn.
5. Maintain pressure until bleeding stops or pressure bandage is placed.

FOLLOW-UP

1. If needed, clean the patient with peroxide.
2. Return the patient to its owner or cage.
3. Clean the area, table, and counters.
4. Clean the instruments and put them away.
5. If blood samples were taken, label, package, and refrigerate as appropriate.

Procedure

Femoral Venipuncture in the Cat

Location: Treatment area or examination room

PREPARATION

1. Lay out all materials as previously discussed.
2. Confirm patient identity.
3. Place the patient record with the materials.

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PROCEDURE

1. Place the patient in lateral recumbency with the leg being used on the bottom. Often this will require the cat to be wrapped in a towel or placed in a cat bag.
2. Grasp the scruff over the neck and shoulders; use the other hand to tuck the top leg up, holding it out of the way and occluding the vessel at the same time. Press deep in the groin of the leg.
3. The venipuncturist grasps the lower part of the leg and extends it.
4. Hold this animal as still as possible; this vessel is extremely fragile and a hematoma forms very easily.

FOLLOW-UP

1. Release pressure on the vessel when told to do so.
2. Slip thumb over the cotton ball over the puncture site for at least 2 minutes because this vessel will bleed profusely and form a huge hematoma.
3. Clean the patient with peroxide as needed.
4. Return the patient to its cage or owner.
5. Clean the area and put away all equipment used.
6. Label, package, and refrigerate blood samples as appropriate.

TASK 10.8
HANDLING FRACTIOUS PATIENTS

Concept: Unfortunately, some veterinary patients are uncooperative through either fear or aggression. Learning a few tricks in handling these patients will prevent injury to the veterinary staff and reduce stress to the patient. Just as it is important to learn how to handle these situations, it is also important to know when to stand back and not force restraint on such individuals. There are simply times when it is wiser to let someone else restrain an animal, use chemical restraint, or refer the patient to another facility. Injury to either staff or patient is too costly a risk.

TASK 10.8.1
FRACTIOUS CATS

Concept: Cats are very honest in their feelings. If a cat is going to be difficult to handle, you will know immediately.
Discussion: The cat may back into a corner of its cage or carrier and face the handler. They can and will defend themselves with claws and fangs. Most will strike out with front feet before trying to bite.
Concept: The goal is to handle the fractious cat only as long enough as it takes to administer chemical restraint.

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Discussion: The following are a few coping techniques for the difficult cat. Remember to close the door to the ward before opening the cage door!

1. *Hide and Seek:* Put on gauntlets to protect your hands and arms. Open the cage door and toss a towel over the cat's body to prevent it from seeing. As the towel settles over the cat's head, quickly reach in with one hand grasping the neck firmly and push down. Wrap the towel around the cat's body with the other hand. Slide the cat to the front of the cage and carry it quickly to the treatment table. Maintain your hold around the neck as another person lifts an edge of the towel to administer an injection to the hind limb. Often, once a cat is removed from the cage (its territory), it calms down enough to do what is needed without chemical restraint. Always take a moment to see if this is the case before giving the injection.
2. *Kitty Taco:* Put on gauntlets and open a large towel out so it is draped over both hands. Open the door to the cage and quickly flip the towel over the cat, scooping it up between the towel ends like a taco. Scoop its feet out from underneath of it and transport to the exam table. A leg can be found and injected with sedatives.
3. *Cat Bag:* Commercially available cat bags (sacks, restraint bags) are useful when a fractious cat needs to be restrained. The sack has zippers in strategic locations so either front or hind limbs can be withdrawn for injections or venipunctures. A zipper over the back facilitates SQ injections between the scapulae. The head is exposed so the ears, teeth, and head can be treated. Be careful as the fangs are still operative and a muzzle may be needed as well.
4. *Kitty Burrito:* Lay a towel out lengthwise on the exam table. Put on the gauntlets and then make a big loop in a rope leash and toss it over the cat's head, then gently tighten and pull to slide the cat toward the front of the cage. Pick the cat up by slipping the free hand under the cat's body while maintaining tension on the loop of the leash. Transfer the cat to the towel setting it down about one-third from one end. Quickly flip the cloth around the cat's body, snugging it under by tucking it beneath its body. Tightly wrap the rest of the towel around the cat. A front or hind limb can be withdrawn and an injection administered. The still wrapped cat can be returned to the cage until the drug has taken effect.
5. *The Net:* A fishnet is slipped through a slightly opened cage door and over a cat's entire body, then the frame of the net is slipped beneath the cat. A towel is then thrown over the cat's head and an injection is administered through the netting. The cat does not need to leave the cage. A modification of the net in has a frame that is opened like a giant trap and the cat is secured by enclosing it within the netting attached to the frame. This is commercially available and works quite well as the cat can be moved to the exam table inside the net.
6. *The Shield:* This commercially available or homemade device is used to wedge an animal into the back of a cage. Injections are given through the openings in the shield.
7. *Muzzle:* Commercial cat muzzles are preferred over gauze muzzles because they are easier to apply. A cat muzzle is cone shaped to cover the entire head and is secured behind the ears with a Velcro strap or tied closure. They come in several sizes and are washable. Quickly apply the muzzle after a cat has been removed from its cage or carrier to catch it off guard or it is placed after they are wrapped in a towel or cat bag. If a procedure is going to take more than a few moments, it is judicious to clip the cat's claws before proceeding any further. The patient's weapons are thus disabled (see Chapter 12, Task 12.4, Nail Trimming).
8. *The Stretch:* As mentioned previously, once the cat is out of the cage, it may calm down but still should not be trusted. To hold this cat, the "stretch" is the most secure.

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Figure 10.8. The stretch. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals.* Reproduced with permission from Elsevier.

Scruff the cat and start to move it into in lateral recumbency; quickly grasp the hind limbs with the three-finger hold and stretch its body along the length of arm holding the scruff. Care must be taken to avoid the front feet as these are still free. If an even more secure hold is needed, the person giving the injection can take over the back legs and the person holding the scruff captures both front legs in a three-finger hold (Fig. 10.8).

TASK 10.8.2
FRACTIOUS DOGS

Concept: Dogs can be more unpredictable than cats.
Discussion: Some are aggressive from the beginning, head level with shoulders, tail straight out, growling, or vicious barking. Others are capable of being cooperative and then suddenly and unexpectedly turning on the handler. The handler must continuously observe the patient for a subtle curl of the upper lip, raising of the hairs over the nape of the neck, or a slight stiffening of muscle tone preceding the deep throaty growl as warning signs of impending aggression. Sometimes, the bite comes without any warning. The teeth are the weapons of the dog; therefore, it is the mouth that must be immobilized. The same techniques used for aggressive cats can be used with small aggressive dogs. The following are a few of the many techniques used on the less-than-cooperative medium-sized to large dogs.

1. *Leash:* This is an assistant's main restraint tool and can be used in several ways:
   a) *With a Barrier:* Make a large loop in the leash, then open the cage door just enough to get your arm inside and flip the loop around the patient's neck. Pass the end of the leash through the bars or mesh of the door from the animal's side out to you. Pull the animal tight to the door until the head is held firmly against the door's surface, thus preventing it from turning around and biting. A second handler can grab the tail or hind limb, stretching the body backward and give an injection.
   b) *Cross Tying:* Two leashes are placed around the dog's neck. With one handler on each leash, tension is applied in opposite directions, preventing the patient from

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turning its head. A third handler grasps a hind limb and administers an injection. This is a quick and easy technique but requires three staff members to accomplish, while the use of a barrier requires only two.

2. Muzzles:
   a) Commercial fabric muzzles come in many sizes, accommodating patients of all sizes and shapes, even for brachycephalic dogs, such as the pug. In fitting the commercial muzzle, the narrower portion of the muzzle is placed over the patient's nose. (This is opposite that of the cat.) The wider portion of the muzzle is placed under the lower jaw. The closures are usually a snap, quick-release snap and a strap that can be adjusted in length to provide a snug closure around the head and behind the ears. The fit must be tight enough to prevent the dog from pawing the muzzle free from its head (Fig. 10.9A–C).

If an animal is resistant to having a muzzle placed, one handler can stand over the shoulders with one leg on each side of the thorax and squeeze press the animal's body with their knees. The other handler stands in front of the dog holding the leash. The dog is unable to



Figure 10.9. A. Form a large loop to be placed around the dog's muzzle. B. Slide the loop over the dog's entire muzzle with the ends on top of the nose and snug it tight over the nose by pulling on the ends. C. Bring the ends down under the lower jaw and secure with a third throw below the jaw. Then, the ends are brought up behind the ears and tied in a bow. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. Reproduced with permission from Elsevier.

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back up. The handler standing over the animal's body places the muzzle from behind the patient's head.

For the even more recalcitrant patient, a handler can stand behind the dog as mentioned earlier but also grasps the loose skin on each side of the neck just behind the ears. This keeps the head from moving from side to side. The handler in front of the dog places the muzzle.

Gauze Muzzle

Concept: Hard roll gauze is used to craft a quick muzzle in case of an emergency.

Tip Box 10.8: **Measure from the tip of your nose to the tip of your fingers when your arm is extended from your shoulder to determine the length of the gauze.**

Discussion: Unlike commercial muzzles, this one does not allow the animal to breathe through its mouth and so should not be used for a great length of time if possible. It does not require choosing a size, is inexpensive, and easily replaced.

Every staff member should carry approximately 30–36 in. of 1- or 2-in. gauze in a pocket at all times. No exceptions. No excuses.

Procedure

The Gauze Muzzle

Location: Wherever there is a need to prevent a dog from biting.

PREPARATION

1. One- to two-inch-wide gauze, approximately 36 in. long
2. Bring the two ends together and make a throw, then tighten it into a knot in the middle of the strand of gauze to stabilize the first loop.

PROCEDURE

1. Form a large loop in the gauze by making a second throw, but do not tighten it down yet.
2. Slip the loop over the dog's entire muzzle with the ends on top of the nose.
3. Quickly snug it tight over the nose by pulling on the ends.
4. Bring the ends down under the lower jaw and secure with a third throw below the jaw.
5. Bring the ends up alongside each side of the face and behind the ears.
6. Make a fourth throw and continue to tie a bow at the base of the skull.

FOLLOW-UP

1. To remove the muzzle, untie the bow.
2. Hold onto both ends and pull the gauze back and forth to walk it off the dog's muzzle.
3. The dog usually backs up and the muzzle slips off the nose.

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The Leash Muzzle

Concept: This is a faster alternative to the gauze muzzle but can sometimes slip and so is not as secure.
Discussion: The loop of the leash is placed around the patient's neck. The other end of the leash is quickly wound around the dog's mouth several times. The handler holds the end of the leash loops placed around the muzzle securely to the portion around the neck while an injection is administered. Care must be taken if the dog struggles violently as the wraps can come off the muzzle, thus freeing the mouth.

The Metal or Basket Muzzle

Concept: This is a wire basketlike device that slips over an animal's nose.
Discussion: It is secured behind the ears with a metal buckle. It comes in various sizes, and it is only used for dogs.
Concept: The advantage to this is the dog's ability to pant once it is in place, allowing the muzzle to remain on the patient for an extended period of time.
Discussion: This type of muzzle must be fitted to the dog, and so the owner of a consistently difficult-to-handle dog should be advised to purchase a basket muzzle. The muzzle is placed on the dog before each veterinary visit. This reduces time and effort expended on restraint. It also reduces stress to the patient and risk to the staff.

Capture Pole (Also Known as the Quick-Release, Dog Snare, or Rabies Pole)

This device is used to capture any animal (dog, cat, raccoon, fox, etc.) by the neck and keep it at a distance from the handler. It should be used on only the most vicious or wild animal. It consists of a plastic coated cable, inside of an aluminum pole, and it has a latch to hold the loop closed once it is applied. The handler makes a large loop that is placed over the animal's head and tightened around the neck. The pole has a stop on it so the animal does not choke. When using it on the dog, its head is held away from the handler or pinned to the floor by pressing the end of the pole against the floor. A second person can quickly grab a hind limb or tail and stretch the animal's body caudally or a leash can be slipped around the head and pulled in the opposite direction of the pole. An injection can be administered and the animal guided to its cage or kennel. Once inside, with the door closed against the pole, release the locking knob to expand the loop at the opposite end and slip it off the dog's head, quickly bring it out of the run, and close the door.

A few well-mastered techniques are the basis of good restraint. Confidence develops over time and experience. Modifications develop as various restraints are adapted to individual patients and special circumstances. Use what works best for you.

Tip Box 10.9: **Less is more with restraint; start out as gentle as possible, but be ready to move into more restrictive holds as needed.**

TASK 10.9
ELIZABETHAN COLLAR, NECK BRACE, AND HOBBLES

Concept: To prevent chewing of body parts, sutures, or bandages, an Elizabethan collar, neck brace, or hobbles is used.

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Discussion: Veterinary patients outsmart their caretakers at every turn. Never underestimate any patient. Patients can be persistent at chewing bandages and body parts. Basically, the Elizabethan collar is a circular device with a hole in the center through which the patient's head protrudes. The commercially available Elizabethan collar is made of foam-covered cardboard or plastic. The cardboard ones are disposable and are often sold to the client. The plastic ones are more durable and are lent to the client. Homemade collars can be constructed using old X-ray films, plastic buckets, or cardboards.

Manufactured or homemade, the principle remains the same: A device encircles the neck, surrounding the head, and extends just beyond the tip of the nose. If making one, remember to place tape over any sharp or rough edges.

Fitting the Commercial Collar

1. The collar is fitted around the patient's neck with its perimeter extending beyond the nose. This is critical inasmuch as the collar is meant to inhibit access to body parts.
2. The collar is fitted so that it is slightly cone shaped. There will be snaps or holes for lacing the collar with a length of gauze into the cone shape. The neck portion can have straps that attach to the patient's own collar. If these straps are present, be certain that the patient's collar is fitted tight enough before attaching the straps around it or it will slip off.

Concept: The collar is cumbersome and unwieldy for the patient.
Discussion: It can be dangerous as the patient can become wedged between objects through which it previously passed easily when the collar was not in place. The patient will require supervision. Access to food and water is difficult. Placing food and water dishes on a raised surface reduces this impediment. Clients must be informed of the hazards inherent to this device.
Concept: The neck brace is less cumbersome.
Discussion: The brace allows access to the front legs, so it is less frequently used. It only inhibits access to areas posterior to the abdomen. The brace is a series of stiff rods placed parallel to the neck and extending past it to the thorax. The neck cannot bend. The patient is freer to move without the risk of becoming entangled in other objects. As with the Elizabethan collar, the neck brace can be made by the veterinary staff, although several forms are commercially available.

Hobbles

Concept: Hobbles are used to limit movement of the limbs on which it is placed.
Discussion: Hobbles have traditionally been used to limit walking in large animals, especially horses. Hobbles are adapted for use in small animals to prevent the patient from scratching at its face or body with its feet. The animal can still walk, albeit slowly.
Concept: Small animal hobbles are made of adhesive tape.
Discussion: The first leg is wrapped above the carpal or tarsal joint. The tape is then pulled around the opposite leg, allowing enough space between the legs for the patient to take short steps. The second leg is secured. The tape is brought back between the legs covering the exposed sticky surface of the tape between the legs. Wrap around the first limb once more. When cutting the tape, leave a small tab at the end to facilitate removal. Firmly press together the two sticky edges of the tape between the legs.

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TASK 10.10 RESTRAINT PROCEDURES FOR OTHER SPECIES

Concept: A person never knows what a day in veterinary medicine will bring, and so we have included a number of procedures for a variety of animals that may cross your path.
Discussion: With a few exceptions, many procedures that are done on dogs and cats can easily be transferred to other animals.

TASK 10.10.1 HALTERING AND LEADING A HORSE

Procedure

Location: Wherever there is a horse needing an examination or treatment

PREPARATION

1. Check the halter and lead rope for any damage. Make sure it is turned the right side out and is ready to be placed on the horse. Attach the lead rope to the center ring on the chin strap.
2. If possible, place the horse in a small pen if outside. If inside a box stall, make sure to speak to the horse before going in so as not to startle it.
3. Look at the body language and determine if it is safe to enter the enclosure.

PROCEDURE

1. Approach the horse from the left side; angle in from in front of the shoulder toward the head.
2. Place the lead rope around the neck and make a throw in the rope to hold it in place.
3. Place your right arm over the neck; with the left hand, pass the neck strap to your right hand.
4. Open the halter up under the horse's muzzle then slide the halter over the end of the nose, holding the neck strap in the right hand and the buckle to the neck strap in the left.
5. Bring the halter up so the neck strap lays directly behind the ears and over the poll.
6. Buckle the strap so the halter is held in place and none of the rings are rubbing on any bony protrusions (Fig. 10.10).

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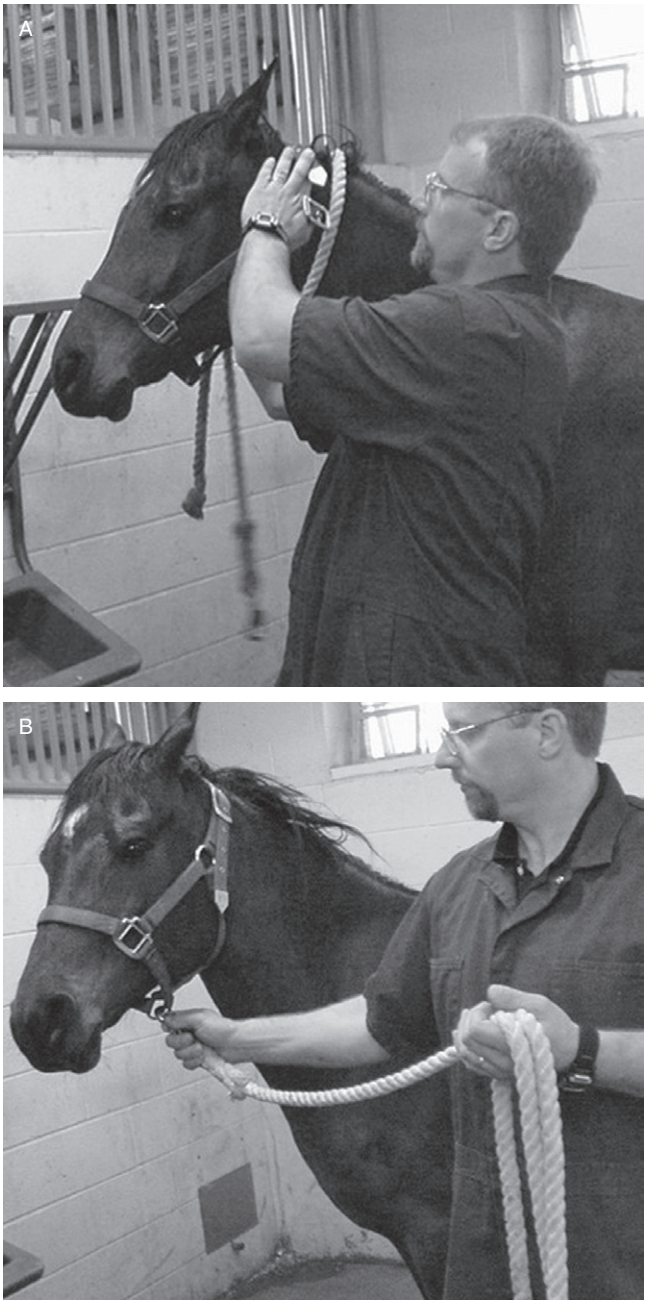


Figure 10.10. Haltering a horse. A. Approach the left side then tie the lead rope around the neck. Place your right arm over the neck; with the left hand, pass the neck strap to your right hand. B. Slide the halter over the end of the nose, holding the neck strap in the right hand and the buckle to the neck strap in the left. Settle the halter so the neck strap lays behind the ears and buckle the strap in place. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. Reproduced with permission from Elsevier.

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7. Untie the lead rope and gather it into the left hand; place the right hand below the clip attached to the halter and turn your body to face the same direction as the horse.
8. Step forward, give a tug, and cluck your tongue to indicate to the horse that you want it to move forward.
9. Walk alongside of the horse, staying even to slightly in front of the front legs.
10. Continuously watch the horse and the people around it. You will never know when a horse gets spooked by something and will try to take off.
11. Continuously talk to the horse and reassure it as the treatment proceeds.
12. You may need to deliver some distraction while the horse is being treated. This can be a hand over the eye you are closest to, a gentle rocking of the ear by cradling it at the base, or a rhythmic bounce of the lead rope on the halter. A number of things work to make the horse pay attention to you instead of the treatment.
13. Always stand on the same side as the person doing the treatment. If the horse should decide to bolt, it will move away from you, not over you or the veterinarian.

FOLLOW-UP

1. Lead the horse back to its pen or stall.
2. Release the buckle holding the neck strap and lower the halter off the horse's head.
3. Rebuckle the halter, coil the lead rope neatly with the halter, and return it to the veterinarian's truck or owner.

TASK 10.10.2
RABBITS

Concept: Rabbits and ferrets are increasingly popular as house pets. There are many breeds varying in sizes from the dwarf to the giant breeds. Both rabbits and ferrets can be house trained to use litter boxes.
Concept: Because they are so popular, it is important to be able to handle them in the veterinary setting.
Discussion: Contrary to old wives' tales, rabbits must never be carried by their ears. In addition, they are inveterate chewers of cords. Electrical cords of all types must be unplugged or otherwise made inaccessible if the animal is allowed to roam free in the house.
Concept: When handling pet rabbits, it is their sharp nails that pose a hazard.
Discussion: They very rarely bite, but their sharp nails can create very deep scratches.
Concept: The danger during rabbit restraint comes from potential injury to the rabbit rather than to the handler.
Discussion: The risks include injury to bones, muscles, and nerves as the rabbit tries to free itself from the handler.

The pet rabbit brought to the veterinary clinic is usually amenable to handling. To remove it from its carrier, then grasp the scruff of the neck with one hand. Slip the other hand under the rabbit's body and lift the rabbit out of the carrier.

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If the rabbit is carried any distance, tuck its head into the crook of your arm and rest the rabbit's body on your forearm. Continue to hold the rabbit by the scruff of the neck with your other hand.

A second technique involves lifting the rabbit by the scruff of the neck, with the other hand supporting the rear quarters.

Concept: A cloth should be placed on the examination table before placing the rabbit on it.

Discussion: Again, maintain control with one hand on the scruff of the neck. The other hand should be over the hips, applying downward pressure. This prevents the rabbit from kicking. Rabbits have been known to fracture a vertebra, resulting in posterior *paresis*, when improperly restrained. Wrapping a cloth tightly around the rabbit's body, covering the head and eyes, is also an effective means of restraint. This is a variant of the "kitty burrito" technique.

Procedure

PREPARATION

1. Ascertain any preexisting injuries to the rabbit.
2. Determine if the rabbit is accustomed to handling.
3. Close room doors before opening the cage or carrier door.
4. Place a folded cloth on table.

PROCEDURE

1. Open the cage or the carrier slowly.
2. Speak to the patient.
3. Grasp the scruff of the neck with one hand.
4. Slip the other hand under the hindquarters if the opening is at the top of the carrier. Slide the rabbit to the front of carrier if the opening is at the front of the cage.
5. Lift the rabbit from the cage.
6. To carry the rabbit any distance:
   a) Procedure 1:
      i. Hold rabbit by the scruff of the neck with one hand.
      ii. Place the rabbit's body on the forearm of the opposite arm with the hand under the hind limbs.
      iii. Tuck the rabbit's head into the crook of the arm bearing the rabbit's weight (Fig. 10.11).
   b) Procedure 2:
      i. Hold the rabbit by the scruff of the neck with one hand.
      ii. Let the body hang downward (only momentarily!).
      iii. Place the other hand under the hind limbs and rump, supporting the rabbit's weight in the hand.
7. Place the rabbit on the cloth on the table.
8. Keep one hand on the scruff of the neck.
9. Place the other hand firmly over the hips and rump, preventing the rabbit from kicking backward with its hind limbs.

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Figure 10.11. Rabbit transport. Place the rabbit's body on the forearm of the opposite arm with the hand under the hind limbs. Tuck the rabbit's head into the crook of the arm bearing the rabbit's weight. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. Reproduced with permission from Elsevier.

FOLLOW-UP

1. Reverse the process when returning the rabbit to the owner's carrier or cage.
2. When placing a rabbit in a hospital cage, always place it in a far corner, facing toward the door.

TASK 10.10.3
AVIAN RESTRAINT

Birds are easily stressed in the veterinary environment. Their size influences how they are handled.

Concept: The smaller the size of a bird, the greater is its vulnerability to injury during capture and restraint.

Discussion: As pets, many birds have been handled and may even have some training. Begin by asking the owner about the individual bird's behavior and training. Use the information in determining how to approach the patient.

Concept: The greatest danger in handling birds, especially small ones, is the risk of applying too much pressure to the chest.

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Figure 10.12. Small bird restraint. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals.* Reproduced with permission from Elsevier.

Discussion: Excess pressure inhibits respiratory movements, leading to asphyxiation and death.

Concept: Birds are caught from behind using a small- to medium-sized towel. Large parrots and raptors will require gauntlets as well.

Discussion: To begin, close all windows and doors to the room. Empty the cage, opening the cage door only enough to slip your hand into the cage. If the bird is small, use a bare hand or a washcloth. The head is grasped and held between the thumb and forefinger on either side of the head or directly under the lower beak. The bird's back is in the handler's palm with the fingers cupped around the wings and the little finger pinning the toes and tail against the palm (Fig. 10.12).

A bird trained to "hop up" when a finger is offered is the easiest to capture. Simply stroke the underside of the chest and give the command "hop up" or "step up." As the bird perches on your finger, move it toward the cage door. Use your other hand to come up behind the bird and grasp it as previously described.

If the bird is nervous and moves too quickly to capture, dimming or turning off the room lights may help. Old surgical towels are a helpful capture aid as the birds will not catch their claws and hurt themselves. Drop a small cloth over the bird's body to limit wing movements and to prevent the bird from seeing the handler. Hold the bird through the towel as previously described, allowing the edges of the cloth to drop backward, exposing the bird's chest.

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Figure 10.13. Large bird restraint. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. Reproduced with permission from Elsevier.

Concept: Large birds are handled with leather gloves.

They are handled similarly to small birds, but both hands are used. Approach from behind with one hand restraining the head and the other hand gathering the tips of the wings, both feet and tail feathers. The bird is laid on several layers of towel as padding for its back. This technique is used with gloves alone or with gloves and a heavy cloth (Fig. 10.13).

Tip Box 10.10: **Never use the lead-lined gloves from radiology for animal restraint. If the bird bites through the glove, they are rendered useless for protection from radiation.**

When returning a bird to its cage, place it on the floor of the cage. Allow it to stand. Remove your hand. Return perches, toys, and feeders to the cage, opening the cage door only enough to slip in the items. Make certain the cage door is securely locked before opening the room door.

Procedure

Location: Examination room

PREPARATION

1. Close all windows and doors.
2. Ask the owner how the bird is normally handled at home. Adapt your approach if the bird has been trained to perch on a finger.
3. Remove all objects from the cage.
4. Dim the room light.
5. Have an appropriately sized cloth at hand and gauntlets if necessary.

PROCEDURE

1. Use the appropriate sized towel, gloves, or just your bare hand come from behind the bird.

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2. Quick grasp the head or encircle the neck with the thumb and index finger and stretch the neck up.
3. For small birds, cup the wings around the body with your fingers. *Do not asphyxiate the bird by applying so much pressure that thoracic movements are inhibited*. Secure the feet and tail against the palm with your little finger.
4. For large birds, grasp wing tips, feet, and tail with the other hand.
5. Remove the bird from the cage.
6. Hold the bird on its back during examination and treatment unless otherwise instructed.

FOLLOW-UP

1. When returning the bird to its cage:
   a) Place the bird on the floor of the cage.
   b) Release its feet, allowing it to stand.
   c) Slowly release the bird.
   d) Remove your hand from the cage and secure the cage door.
2. Did the bird return to its perch without hesitation, or did it need a minute to regain its bearings? If it is the latter, evaluate your hold and ease up on the body more as you may have held it too tightly.

RESOURCES

Fowler, M. E. (2008). *Restraint and Handling of Wild and Domestic Animals*, 3rd ed. Ames, IA: Wiley-Blackwell.

Sheldon, C. C., Sonsthagen, T., & Topel, J. A. (2006). *Animal Restraint for Veterinary Professionals*. St. Louis, MO: Mosby Elsevier.



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
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- Concept maps
- The figures from the chapter in PowerPoint
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CHAPTER

11

PATIENT CARE I

ORETA M. SAMPLES



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Identify parts of Subjective, Objective, Assessment, Plan (SOAP) notes.
   a) Correctly record observations of patients in medical records.
   b) Identify and follow treatment plans in medical records.
2. Meet patient needs for outpatient services.
   a) Appropriate stocking of the treatment room.
   b) Appropriate sanitation and disinfection of the treatment room
   c) Anticipate the needs of the veterinarian and have all supplies available.
   d) Initiate a smooth transition of appointments through the treatment area.
3. Meet patient needs for intake services.
   a) Appropriate housing for a patient to include
      i. Cage: size, temperature, and ventilation
      ii. Bedding
      iii. Reduced stress through noise reduction
      iv. Reduced odors in the environment
      v. Room: temperature and ventilation control
      vi. Minimized visual threats
      vii. Provision of appropriate light/dark cycles.
   b) Provide correct feeding for a patient.
      i. Entice a reluctant patient to eat.
      ii. Force-feed a patient safely.
      iii. Provide water at all times for a patient.
   c) Provide socialization for each patient.
   d) Provide safe exercise for patients as appropriate.
   e) Safely walk dogs outside for defecation and urination.
   f) Collect fecal samples while walking dogs outside or during exercise.
   g) Provide safe health care for feral and quarantined animals.
   h) Provide in-house grooming for hospitalized patients.

INTRODUCTION

Patient care is required for restoration of health, the prevention of disease and the preservation of the mental and physical well-being of patients served by the veterinary medical team. *Disease* is simply defined as "any deviation from the normal." Although an infection such as parvovirus is readily recognized as a disease, the general public may not recognize a broken leg as a disease. The truth is that a fracture requires as much care as an infection or other disease process.

There are many classifications of disease. These specific disease groups are summarized by the acronym TANDIM:

T—Toxins: These are the numerous poisons found in an animal's environment from plants to snake bites to a variety of chemicals products. *Trauma:* Includes such situations as a dog hit by car, a cat falling or being dropped from a window, and a bird caught by a cat.

A—Anatomical Abnormalities (Such as Patent Ductus Arterosis): Allergic reactions from localized to *anaphylaxis* and autoimmune diseases such as *discoid lupus*.

N—Nutritional Diseases: Obesity remains one of the most common pet diseases while many exotic animals suffer malnutrition through the owners' failure to understand the nutritional and hydration needs of their pet.

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D—Drugs: Adverse drug reactions are a form of disease. *DNA:* Genetic diseases due to abnormalities of nuclear and mitochondrial DNA. These diseases often overlap into other disease categories of disease. However, this is not always the case; therefore, there is a separate category.

I—Infectious Diseases: These are what most people regard as "disease" and may run the gamut of all classifications of living organisms except plants, although some are not actually classified as "living" as they do not meet all criteria. Infectious organisms include *prions*, viruses, bacteria, *protists*, fungi and other phyla of the kingdom Animalia including ecto- and endoparasites, which have the ability to cause illness.

M—Metabolic Diseases: Examples include hypothyroidism and diabetes mellitus in cats. *Mental:* This includes behavioral problems encountered in some patients.

Now that patient care and disease are defined, look at the phrase "restoration of health." *Health* is defined as "optimal physical, mental, and social well-being; not merely the absence of disease." It should be noted that optimal physical, mental, and social well-being varies by species and must be addressed accordingly; this includes the many veterinary procedures of preventive medicine.

Concept: The veterinary assistant must know the normal characteristics of all the species encountered in order to recognize the abnormal.

Discussion: Patient care requires knowledge of how to meet the diverse needs of common small animal species. In order to detect abnormal health conditions, one must be inherently familiar with the normal, healthy appearance of the species they work with. The assistant who is proficient in a variety of care procedures will soon find himself or herself adding to the repertoire of skills and branching out to provide care for additional species and conducting additional procedures. Veterinary medicine demands a continuing expansion of knowledge and lifelong learning both didactically and by hands-on experience.

This book does not attempt to describe the countless patient care procedures encountered in a modern veterinary practice, just those most commonly encountered.

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TASK 11.1
MEDICAL RECORDS

Introduction: The medical record is regarded as a legal document that must be presented in its entirety in the event of questions over treatment outcomes of patients.

The assistant has the same responsibility for recording patient care in the record as anyone else in the veterinary facility. Anything that is done to or observed of the patient must be recorded in the record; any conversation with the client must also be written in the record.

Tip Box 11.1: **If it is not written down, it never happened in the eyes of the law.**

Concept: Typically, the assistant does not enter observations during an appointment.
Discussion: This is the purview of the veterinarian. Only in unusual circumstances might an assistant enter observations before the veterinarians' observation. This is usually in the form of a "warning" notation or behavior of a potentially dangerous or unpredictable patient. Other times, notation of a particularly effective restraint is recorded. These are recorded in red ink.
Concept: The veterinary technician enters observations/treatments in the medical records during patient hospitalization.
Discussion: The two circumstances should not be confused. Assistants are more likely to find themselves recording data in the records of hospitalized patients as opposed to outpatients.
Concept: Patient care is entered into the medical record as SOAP notes.
Discussion: SOAP in a medical record is an acronym that stands for specific information:

S—Subjective: These are observations made by the client. This is often under "chief complaint" and includes the patient history as repeated by owner.
O—Objective: These are notes made by the veterinarian during the physical examination as well as the part of the form in which vital signs and systems reviews are entered.
A—Assessment: This is the where the diagnosis is entered and may be a tentative diagnosis or differential diagnosis made only by the veterinarian.
P—Plan: This is the plan of action which may include further diagnostic tests, treatment protocols, and procedures to be completed. Follow-up appointments and prescribed drug therapies are listed here. Dated daily progress notes for hospitalized patients are listed here with entries concerning nursing care. The assistant may be asked to record food and water consumption, elimination pattern, exercise, grooming, and other care provided.

Concept: Medical records are a legal document.
Discussion: All medical records are regarded as legal documents to be used in a court of law in the event of legal proceedings.
Rules:

1. Always use permanent ink, either black or dark blue. Never use erasable ink or pencil.

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2. All entries are dated and initialed.
3. An incorrect entry has a single line drawn through it, followed by the date and initials of the individual making the correction.
4. The corrected information follows the incorrect entry.

Procedure

PREPARATION

1. Secure and use a blue or black pen.
2. Review normal behavior and appearance for species and breeds customarily treated at the clinic/hospital as discussed in Chapter 10.

PROCEDURE

1. Record patient observations while providing inpatient care in the daily progress notes.
2. Do not record observations during the examination process unless they facilitate patient handling or are requested by the veterinarian.
3. Be to the point; write legibly with proper spelling and grammar.
4. Use red ink for warnings such as *bites* or *needs muzzle* or *is allergic to* ___.
5. Caution: Never overstep your boundaries. Ask if unsure of an appropriate action to take.
6. Never discuss health care, treatment options, or your personal opinions with a client. If asked, refer the client to a veterinarian or a veterinary technician.
7. Never discuss clients or patients with anyone outside of the treatment setting.

FOLLOW-UP

1. Did you fulfill your role within the hospital setting?
2. Did you correctly record patient observations within the record without error?
3. Did you maintain patient and client confidentiality?

TASK 11.1.1
TREATMENT PLAN

The treatment plan for any patient begins with diagnosing the disease, identifying the *etiology* of the disease, and monitoring patient changes during therapy.
Concept: The assistant does not create the treatment plan; the veterinarian does. This information is placed in the P—Plan section of the SOAP format.

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Discussion: The assistant is a key player in the delivery of the treatment plan and in monitoring patient changes during therapy. This is based on the input of the assistant's observations of the patients. Observation is not just visual; it includes the use of touch, hearing, and smell.
Concept: Observation starts with the recording of basic physiological functions, called vital signs: temperature, pulse, respiration, weight, and pain score.
Discussion: The vital signs taken as part of the examination room procedures are the first observations made of a patient. If the patient is hospitalized, physiological data are recorded throughout the patient's stay in the O—Objective section. Other observations include appetite, bowel movement, water consumption, urination, attitude, pain levels, and vital signs.
Concept: Observations are recorded in the patient's records following the hospital's chosen format.
Discussion: A cage card and records can range from simple to complex. Some cage cards have blank columns in which the staff fills in the observations along with the date and time of the observation, while others may have circled abbreviations to choose from. It is imperative that assistants follow the format chosen by the hospital to avoid confusion.
Concept: Recording physiological functions requires descriptive data.
Discussion: To note the bowel movement as normal makes the assumption that the observer knows what a normal bowel movement looks like for that individual. To record the stool as firm is incomplete; rather, record the degree of firmness. This can be in the form of plus signs (+, ++, or +++). It is important to know what the hospital policy is on such notations. Ask for clarification of hospital practices before writing in records to avoid errors.

Descriptive notations are better than the use of the word "normal," which is subjective. Record the volume of water a patient consumed in the past 24 hours with measurements. Note the volume and type of food offered and how much the animal consumed. Wasted or unconsumed foods are not counted toward the daily food intake.
Concept: Observation occurs throughout the day and during the many encounters, however brief, the assistant has with all hospitalized patients.
Concept: Any changes from prior observations are recorded with the time of observation included.
Discussion: If a downward trend is noted, the veterinarian is promptly notified.
Concept: The veterinarian will record the daily plan in the patient's record and may also write on the treatment board in the treatment room.
Discussion: A whiteboard is used on which the hospitalized individual's name, the location of the patient, the treatment to be rendered throughout the day, and any special instructions are listed. As each treatment is performed, it is noted within the patient record and checked off the whiteboard with initials by the staff member completing the task.

As new patients are hospitalized throughout the day, their names and treatments are added to the board. Treatment plans are updated each day after the veterinarian completes the morning examinations. The board becomes a form of communication between the entire staff about what needs to be done, what has been done, and who did it.

Some treatment boards are electronic. The information is entered into them and then stored in the hospital database where it is also integrated into the patient record. Other treatment boards are actually projected onto a wall, but the information is entered onto a screen at a nurse's station in the treatment room. Regardless of the composition of the treatment board, it is an essential form of communication between all team members that should be checked frequently. The treatment board should not be relied on exclusively; patient records are regarded as the legal record for medical activity and should be regularly consulted and updated.

The daily treatment plan should be reviewed several times during the day in the event that changes are made.

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Procedure

PREPARATION

1. Review the format for recording patient observations used at the worksite.
2. Carry a functional pen with dark nonerasable ink in your pocket at all times.
3. Discuss the expectations of the technician or veterinarian for the assistant's contribution to daily patient observation.
4. Observe the patient when it first enters the veterinary facility know what is normal for individuals of that species.
5. Observe each patient throughout the day even if only briefly.

PROCEDURE: Medical Records

1. Compare patient behavior and appearance with the normal for that species and individual.
2. Record observations and changes according to hospital policy and procedures then initial/date entry.
3. If a downward trend or any complication is noted, notify the veterinarian immediately, making an entry into the patient records of the observation and time noted as well as the time when the veterinarian was alerted.
4. Record observations in measurable descriptors or in degrees (e.g., *vomited at 1:00 p.m.; volume approximately 200 mL; mucous only, no food present)*.
5. If mistakes are made, cross out with a single line and initial. Then, write in the correct information and initial.

FOLLOW-UP

1. Learn basic descriptive abbreviations used in a veterinary practice as well as those related to prescriptions, treatment, and the metric system. Refer to Appendices D and H.
2. Individualize the frequency of patient observations. A critically ill patient is observed more frequently than the recovering patient now ready to return home.
3. Never assume an animal is "fine"; take a "Moment of Time" to do a quick check on all clinic patients/occupants.

Procedure

Treatment Board

PREPARATION

1. Prepare a card for your reference book entitled "Treatment Board."
2. Mark your card as you learn the expectations regarding the use of the treatment board. Learn if color coded according to priority or the patient's severity of illness; others are electronic. Know how to correctly use the workstation and always ask for guidance if unsure.

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PROCEDURE: Treatment Board

1. As each patient is taken from the examination room to the hospital wards, enter the patient's name on the treatment board, the location where the patient is housed, what treatment is expected for the day, and any special request to collect specimens for testing, food/water requirements and other diagnostics, and so on.
2. As a procedure or treatment is performed, place a check mark by the treatment, the time performed, and your initials. Enter the same data in the patient's record.
3. Use the comment area for such information as "the patient is ready to go home; Dr. X wants to talk to the owner; surgery is complete, and so on." Also, place warnings such as patient "bites" or "allergic to ___" in the comment section.
4. Erase the patient's information from the board when the patient is discharged but not before ensuring that all information has also been transcribed into the patient's permanent record.

FOLLOW-UP

1. Check the board throughout the day. Treatment plans are modified, new patients are hospitalized, and patients go home.

TASK 11.2 WORKING IN THE TREATMENT ROOM

Introduction: What needs to be done is ever changing as patients are treated and/or admitted. Changes frequently occur in treatment protocols based on changes in health status. The sequence of treatment is routinely stable and is usually dependent on the veterinarian's schedule. However, as is the nature of veterinary medicine, an arriving emergency will throw the schedule out of sequence. It pays to expect the unexpected.

The needs and preferences of individuals in various situations usually are the most stable. One veterinarian may be left handed and so reverses the direction of every task compared with the right-handed practitioner. Of course, the moment that you think you have figured something out, it changes. And when a veterinarian goes to a professional meeting, upon their return all sorts of new and different things will be happening, so be prepared.

Concept: Working in the treatment room requires constant attention to work flow.

Discussion: This requires knowing what needs to be done, the sequence in which it will be done, and who will be doing it.

Concept: The most basic function of the assistant is that of preparation, procedure, and follow-up phases of all procedures.

Discussion: Anticipate who is doing what. Lay out all supplies and equipment in the order that the veterinarian prefers and needs. During the procedure, provide the necessary restraint; afterward, clean everything, put it away, sanitize the treatment/exam area, and prepare for the next procedure. Repeat this cycle all day long whether assigned to work with one veterinarian or in a specific area of the hospital such as the surgery or laboratory.

Be cognizant of the area in which you are assigned and remain available. Let others know if you are leaving your area to go for supplies, to assist in other areas, and so on, and

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then be quick to return. Those whom you support should not have to look for you when needed.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Preferences—Vets" and another for "Preferences—Vet Techs," both followed by their names.
2. Make notes on the cards as to the preferences of each with whom you are working and accommodate those preferences.
3. Find where all the equipment, medications, and other supplies are located throughout the hospital.
4. Analyze the treatment board.
   a) Note priorities such as the severely ill or injured patients.
   b) Note which patients have not yet been treated or examined.
   c) Note which patients need intermittent treatment throughout the day.

PROCEDURE

1. Lay out all anticipated drugs and equipment for a procedure.
2. Confirm the team member is ready to perform the procedure.
   a) Bring the patient to the treatment room.
   b) Confirm the patient's identity.
   c) Restrain the patient appropriately throughout the procedure.

FOLLOW-UP

1. Return the patient to housing.
2. Clean and put away any materials and equipment used.
3. Clean up the treatment area with appropriate disinfectant and paper towels.
4. Confirm treatment was recorded on the treatment board and in the patient's medical record.
5. Check on the animal later to be certain no adverse reactions are suffered; notify the veterinarian immediately if any posttreatment concerns are noted.
6. Mark your task card with preparations in an order to insure future work flow for the veterinarian or the technician with whom you were working goes smoothly.

TASK 11.3
EXAMINATION ROOM PREPARATION

Concept: The clinic exam room is stocked in such a manner as to support the most commonly performed outpatient procedures.

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Discussion: For successful use of this room, it must be well stocked, clean, and free from nonessential items; counters should be uncluttered. Well-maintained treatment rooms allow clients, patients, and veterinary personnel to move through in an accommodating fashion.

Examination rooms are typically smaller than other areas in a veterinary facility, yet they should be as inviting to the client and patient as the reception area.

Concept: The examination environment facilitates the work of the veterinary team members to care for patients.

Discussion: Think of examination room preparation in terms of "general" and "specific" preparations that occur before and after each patient use. Ensure that the room is kept in a state of sanitary readiness at all times.

General Examination Room Care

Concept: Each exam room may have a small refrigerator to store vaccine and other medications that require refrigeration.

Discussion: Check at the beginning of the month the expiration dates of all items in the exam room refrigerators. Make sure the *oldest* vaccines and medications are utilized before "newer" products. Promptly remove expired drugs, replace these with fresh stock if available, and alert the inventory manager.

Concept: Examination rooms are always cleaned and restocked at the conclusion of each appointment.

Discussion: This means a general cleaning removal of *gross contaminants* and disinfection of all surfaces and objects that came into contact with the patient, including examination table, scales, counters, sinks, and faucets. Check the floor and walls for any contamination and clean as needed. Minimally, floors are dust mopped twice daily, after morning appointments, and again after afternoon appointments. Floors should be wet mopped at least once daily (at the end of the day) or anytime there is biological contamination with a sanitizing disinfectant.

All nondisposable equipment such as otoscope cones and clippers are cleaned and disinfected before being returned to their proper locations. Containers and drawers are checked to ascertain if applicator sticks, bandaging materials, routinely stored medications, and chemicals are in sufficient supply. This includes examination gloves being present in appropriate sizes. Remember the individuals with latex allergies and have nonlatex gloves in the appropriate sizes on hand.

If a particular odorous material is present in the waste container, promptly dispose of it outside the building in the designated refuse container. Use odor eliminators if needed.

Specific Examination Room Care

Concept: Before bringing a client and patient into an examination room, the patient record is reviewed to determine which equipment, materials, and drugs are needed.

Discussion: Anticipated materials are placed on the countertop for ready use. The appropriately prepared examination room frees the veterinarian from either leaving the room for additional equipment or waiting while the requested materials are obtained.

Concept: General examinations, eye, ear, skin equipment and products are maintained in each examination room.

Discussion: In order to begin the diagnosis of disease conditions, the veterinarian will require standard equipment and several specific items for more specialized examinations. See Table 11.1 for a list of suggested equipment and supplies maintained in examination rooms and in treatment areas.

All of these items have a "home" in the examination room and treatment area. They may be grouped in bins or in certain drawers and cupboards. The ophthalmoscope and otoscope may be interchangeable heads for the same rechargeable handle. Be sure to keep this instrument on the charger so that it is ready at a moment's notice.

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Table 11.1
Suggested Equipment and Supplies in Examination Rooms and Treatment Areas

Standard Equipment and Supplies				
Stethoscope	Thermometers	Otoscope	Ophthalmoscope	Scalpel blades
Exam gloves, (sizes for each person on staff)	Suture removal scissors	Bandage scissors	Toe nail trimmers	Electric clipper
Lubrication jelly	Silver nitrate sticks or blood stop power	Hypodermic needles (25, 23, 22, and 20 ga)	Syringes (3–20 mL)	Adhesive tape 1″ and 2″ rolls
Vetrap/coflex 2″ and 4″ rolls	Microscope slides	Tongue depressors	Cotton-tipped applicators	Gauze sponges
Cotton balls	Alcohol	Mineral oil	Hydrogen peroxide	Diluted disinfectant spray
Paper towels				
Ophthalmic Examination Equipment and Supplies				
Schirmer Tear Test Strips	Topical ophthalmic anesthetic drops (usually refrigerated)	Rose bengal stain	Fluorescein stain or strips	Saline solution in a dropper bottle or commercial bottle of artificial tears
Schiotz tonometer or a tonopen				
Ear/Otic Examination Equipment and Supplies				
Sterile swabs	Ear cleaning solution	Ear bulb syringe	Antibiotic ointment formulated for ears	Hemostat to pluck hair

Concept: Often it is the duty of the assistant to greet the client and the patient once the receptionist has indicated their readiness for moving into the examination room.
Discussion: Both client and patient along with their record are escorted into the prepared exam room. Before entry into the room, a patient is customarily weighed and the body condition score determined (see Chapter 13, Task 13.1.1, "Determining the Body Weight and the Body Condition Score") and entered into the patient's record. Any laboratory samples a client brings are labeled regarding the source and the date collected; they are then placed in the lab area for processing at the veterinarian's request. If a lab logbook is used, enter the sample data in the log. Any samples delivered are always noted on the patient record and room is left in the SOAP notes for notation of results.

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Procedure

Location: Examination room and treatment area

PREPARATION

1. Prepare three cards for your reference book entitled "Exam Room Setup," "Exam Room Inventory," and "Procedure Setup—Eyes, Ears, and Skin."
2. Clean a room immediately after a client and patient vacate it.
3. Wear examination gloves and use disposable paper towels to clean and disinfect the exam table and counter.
4. Keep the door closed until cleaning is finished to avoid confusion.

PROCEDURE: GENERAL CARE

1. First thing in the morning, examine the exam rooms and treatment area: Examine cabinet doors, walls, doors, doorknobs, and light switches. Spot clean with a disinfectant and paper towels.
2. Disinfect the examination table; make sure the edges and the base of the table are included.
3. Put away any items left on the counter. Nondisposable items are disinfected and returned to their proper locations. Disposable items are placed in the waste container. Needles and blades are placed in the sharps container and microscope slides/cover slips in broken glass containers.
4. Wipe down the otoscope handle with a disinfectant. Check that the handle is plugged into an electrical outlet to maintain the charge.
5. Mercury thermometers are disinfected with an alcohol-soaked cotton ball and returned to the proper container.
6. If a digital thermometer is used, spot clean and check for an adequate supply of probe covers. Replace batteries as necessary.
7. Clean and disinfect the sink and faucets, pick up any items on the counter, and clean under them. Remember edges.
8. Check drawers and countertops to determine if all customary items are present and in adequate supply. Restock as needed throughout the day. Remember to use your reference book to double check!
9. Check the floor, dust mopping and spot cleaning as needed.
10. Check for odors; if necessary, remove garbage to the outside refuse container. Place a new liner in the container.
11. Use an odor eliminator if needed.

PREPARATION: ROOM SETUP

1. Determine the reason for the patient visit. This is best accomplished by reading the appointment book or the chief complaint on the patient record.
2. Refer to the card in your reference book entitled "Exam Room Setup." Lay out items needed for this specific patient before calling them into the room.
3. Be available to assist without being in the way.

FOLLOW-UP

1. Be aware of the number of clients in the reception area. Try to move them into available rooms as promptly as possible. Try to think ahead based on the possible needs of the veterinarian.

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2. Observe what is used during each type of appointment.
3. Make a notation of any items that were needed during the examination but were not present. Ask if these items should be in the room during future appointments of a similar nature and change your reference book card as needed.

TASK 11.4 PATIENT DISCHARGE OR HOSPITALIZATION

Concept: One of two things happens at the end of the examination: A patient will be discharged or hospitalized. The veterinary assistant has different duties to accomplish depending on the outcome.
Concept: Discharging the patient to return home with the client.
Discussion: After the examination, the veterinarian will discuss treatment options with the client and, if necessary, prescribe medications. The client is informed as to whether another appointment is needed and when.
Concept: Usually, the record is turned over to the veterinary technician if a prescription is to be filled.
Discussion: Once the prescription is filled, the veterinary technician reviews with the client the reason for giving the medication and instructions for administration. The veterinary assistant may aid in the demonstration of how to administer the medication by giving the first dose to the patient. If laboratory results are pending, the owner is told when they will be ready and how they will be informed of the results. The client and the patient are escorted by the assistant to the front desk where the medical record is turned over to the receptionist after which the client and the patient are thanked for coming in. The assistant then excuses herself, returning to begin cleanup of the examination room.
Concept: Client noncompliance or simply client confusion creates a serious problem regarding patient health, especially where medications are concerned.
Discussion: Compliance is improved whenever the owner has written directions to which they can refer. A preprinted form with fill-in blanks or check-off boxes can be used. Either format is effective if consistently provided to the client. The assistant may be asked to review the completed form with clients before they depart. The client contact information should also be reviewed and updated as necessary in the event of the need for emergency contact. This information should be prominently displayed in the record.

Hospital Admission

If the veterinarian decides that a patient requires hospitalization, the client is informed as to when and what to expect next. The assistant will help move the patient to the hospital ward. Speaking softly to the patient eases the separation from the client. Remember to slip a leash on the patient and to remove its collar and leash and give these to the owner. The patient and its medical record are taken into the treatment area. An identification collar is immediately placed on the patient and a cage card is prepared and attached to the kennel or run. The patient is then placed in the previously prepared kennel with appropriate comfort and nutritional requirements.

The assistant enters the patient information onto the treatment board. This includes the patient's name, location, treatments prescribed, and the admitting doctor's name. The medical

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record is placed in a centralized location with the medical records of other hospitalized patients. This may include the ward where the patient is housed, the cage, or the treatment room. Once the animal is secured, the assistant returns to the examination room for general cleanup.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Hospitalized Patient" on one side and "Discharging Patient" on the other side.
2. List the procedure for each process as per your facilities protocols.

PROCEDURE

Discharge

1. Assist the veterinary technician in filing any prescriptions as per the veterinarian.
2. Assist in demonstrating how to administer the medication for client education.
3. Provide information on follow-up reporting of laboratory results.
4. Escort the client and patient from the room.
5. Review the completed take-home form with the client, hand it to them, and thank them for coming in.
6. Give the patient records to the receptionist.
7. Inform the receptionist if a follow-up appointment is needed or if lab results are pending.
8. Thank the client and patient for coming.
9. Return to the examination room and begin general cleanup.

Hospitalization

1. Review with the client the next steps in the patient's care.
2. Establish if the patient is housebroken and prefers to defecate/urinate on a pad or outside. Does the animal respond to leash walking or must it be off-leash to perform? Notate in records.
3. Place your leash on the patient.
4. Remove the owner's leash and collar and return to the owner. Animals arriving in carrier should be removed from the carrier and the carrier returned to the owner. These steps prevent utilization of the limited space of the hospital as well as possible misplacement.
5. Speak softly to the patient to ease separation from the owner.
6. Take the patient and medical records to the treatment area.
7. Prepare an identification collar and place this on the patient immediately.
8. Prepare a cage card including special instructions such as nothing per os (NPO), special diet, and save feces, and place these on the cage.
9. Place the patient in the kennel with the appropriate cage card attached (kennel should be previously supplied with appropriate bedding).
10. Provide fresh water.
11. Provide food if appropriate (check with the veterinarian if unsure).
12. For cats, provide a fresh litter box.
13. On the treatment board, enter the patient's name, location, prescribed treatments, and the admitting veterinarian.

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14. Place the medical record in an appropriate location.
15. Return to the examination room to begin general cleanup.

FOLLOW-UP

1. Return to examination room as quickly as possible as the client is most likely waiting.
2. Complete general cleanup and check to make sure supplies and equipment are stocked and cleaned properly.

TASK 11.5
MEETING A PATIENT'S BASIC NEEDS

Regardless of the reason for a patient's hospitalization, there are three basic needs that must be met: food, water, and safe and secure housing. The veterinary assistant is often at the forefront of providing these needs throughout the stay of the animal.

Concept: Part of returning a patient to optimal health is to provide appropriate and safe housing.

Discussion:

1. A kennel or run must be large enough for the patient to stand, move, and turn around easily.
2. The bars must be close enough so that the patient cannot squeeze through them. Small kittens and puppies may require a barrier placed over the lower half of the bars to prevent escape or injury.
3. Barrier panels are necessary between runs to prevent direct patient contact or spreading disease through the chain link.
4. Chain link kennels (often used for larger dogs) must be routinely inspected for sharp edges or wires. These should be capped or bent inward so as to avoid puncture of a patient.
5. The lock should be of a type that a patient cannot open or the latch must have the ability to have a padlock or clip inserted to provide extra security to thwart an escape artist.
6. Always keep a minimum of two closed doors between the patient and the outside of the hospital.
7. Kennel or run surfaces should be constructed of impervious material to ease cleaning and to prevent infectious materials from becoming embedded in cracks and small pits. Kennels are damp after washing down and such surfaces tend to be cold and hard, adding to a patient's discomfort.
8. Clean, soft, dry bedding large enough for an animal to comfortably stretch out on should be provided for each patient and changed regularly. Rubber mats with holes allowing for air circulation while keeping the patient above any moisture on the kennel floor may be available. These mats must have a smooth surface that is easily disinfected.

Concept: Some patients will tear at their cage floor, disturbing the newspaper and the bedding.

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Discussion: Bedding disturbance is usually an indication the patient needs additional bedding under which to hide (i.e., cats). Sometimes, the patient is trying to escape or is frustrated by confinement. Placing a towel or blanket over the outside of the kennel or run door to provide the patient with a quiet, dark place in which to rest may be helpful. The edge of the towel is placed over the top of the door with the remainder of the fabric hanging on the outside of the door. The towel is secured between the top of the door and the kennel or run itself.
Concept: The recumbent patient needs extra thick padding to prevent the formation of *decubitus ulcer*.
Discussion: In addition to providing thick bedding, the patient's position is changed several times daily by rolling the patient over and using foam blocks and wedges to prop the patient up in sternal recumbency so it can safely eat and drink. Be mindful to replace soiled items to avoid *urine scald*.
Concept: Small pocket pet patients such as rodents should be housed in a typical rodent cage away from other animals that may be natural predators of the rodent patient and therefore induce stress. Ideally, pocket pets are brought from home in their own travel cages, which may be left for use during the hospital stay.
Discussion: Bedding chosen should be appropriate for the species. Corncob bedding should be placed on the bottom of the cage floor. Be mindful of the nocturnal nature of many rodent species and adjust their living quarters accordingly by providing a hiding place for the patient.
Concept: Ideally, birds are brought from home in their own travel cages and these are left for use of the hospitalized patient.
Discussion: If the cage is small enough, it can be placed inside of a ward cage. Ideally, birds are not housed with dogs and cats as this is frightening to them and distracting to other patients. Keep the cage clean and sanitary; this will aid in the birds' recovery.
Concept: Many birds will begin to mimic the sounds of their surroundings; be mindful of this when speaking around avian patients.
Discussion: Be mindful of language which may be picked up by birds. Do not accidentally "color" their vocabulary with words or phrases that may be considered offensive to owners. Remember birds seldom "unlearn" what they have learned.

Procedure

PREPARATION

1. Prepare a card for your task box entitled "Daily Duties—Hospital Wards."
2. As part of your orientation to a new practice, make it a point to count the number and sizes of all housing units in the facility including locations of specialized housing units. Mark your card with the sizes and numbers of each kennel and run available.
3. Check the hospital wards to determine the number and size of empty kennels or runs available.
4. Check the hospital bedding supply and start a load in the washer if necessary.
5. Note available specialized housing units and their locations for housing of pocket pets and avian species.
6. Note the availability of isolation kennels.

PROCEDURE

1. As each new patient is brought into the hospital area, locate a kennel or run of an appropriate size. The patient must be able to stand up easily, turn around freely, and

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stretch out within the area while still having room for food and water dishes as well as litter pans for cats.
2. Bedding is placed on the floor of the kennel or run. If a platform is available, the bedding can be placed upon it.
3. Bedding must be clean, dry, and of a size to provide room for the patient's entire body to rest upon.
4. Provide the nutritional/hydration needs for the patient. If a specific prescription diet is needed, check the storage room to make sure there is enough on hand for the length of the patient's expected hospital stay. Alert the inventory manager if an order needs to be placed.

FOLLOW-UP

1. Check on the wards at least once daily and straighten or clean as it becomes soiled or messy. A patient should never be left to rest in a dirty or soiled kennel or run.
2. Replace bedding as soon as it becomes damp or soiled.
3. Monitor water source frequently; an animal should have at least two complete water changes daily, more if it becomes fouled.
4. Inspect regularly all fences for sharp edges or wires and repair them by bending away from the interior. Alert the hospital manager for repairs.

TASK 11.5.1 ENVIRONMENTAL CONSIDERATIONS

Concept: Think of patient needs from the perspective of the individual patient.
Discussion: Environmental factors influencing patient well-being are not limited to housing.

Airflow into a cage is very limited, tending to be warmer than the environment around it. Because the air within the cage may become stagnant, odors and humidity are increased. Obese patients with heavy hair coats are warmer that smaller patients with short, flattened hair coats. The patient recovering from surgery needs to be warmer than the patient that is active; placing blankets over the postsurgical patient is beneficial. Very young and elderly animals may enjoy towels and blankets to "burrow" into for body warmth and comfort. Additionally, other heat sources can be used such as water pad, warm air pad, or intensive care unit (ICU). If a heat source is used, always monitor it carefully at all times to prevent hyperthermia and burns. Heat sources with electrical cords are never acceptable due to possible electrocution from chewed or frayed cords.

Concept: The lifestyle of all terrestrial creatures is influenced by light and dark cycles.
Discussion: Body temperature and activity levels are influenced by exposure to light. The artificial environment of the veterinary hospital alters exposure to light and dark. Animals housed in the facility should have the lights on during normal daylight hours and the lights off during normal nighttime hours.

Concept: Noise is tiring for all of us, including veterinary patients.
Discussion: The strange noises within a veterinary hospital are frightening and distracting to patients. Housing and wards should be soundproofed as much as possible. Animals that are noisy should be isolated from other patients whenever possible. Employees should be coached to observe "quiet zones."

Concept: Just as noise is distracting, so is odor, more so for animals than people due to an acute sense of smell.

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Discussion: Animals "read" their environment from the odors in it. The odor of a bitch in heat makes the intact male dog restless and may even decrease his appetite in his frustration to mate. Cats may become stressed by odors of canines in close proximity that they cannot readily see; likewise, rodents or birds may stress over the nearness of feline patients. Attempts should be made to house like species together in a bank of kennels to avoid environmental stress.

Concept: While animals use their sense of smell more acutely to evaluate the world around them, they use their vision as much as we do.

Discussion: The sight of a large dog frightens a small kitten housed across the room; likewise, the dog is frustrated by the fact that it cannot get to the cat it would like to chase.

Concept: The thoughtful assistant considers the environmental needs of each patient; this entails being able to "see" the facility through the patients' eyes and other senses to identify stress factors.

Discussion: The choice of optimal housing is made from what is available then modified for the individual. Cats are best kept in a ward separate from dogs, birds, and rodents, but for different reasons. The bitch in heat is kept in a separate room from the intact male dogs. Animals should never share housing when boarding or hospitalized (even if those from the same household). If animals are comforted by one another's presence, arrange that they are in close proximity to one another.

The veterinary staff is challenged with meeting the needs of patients who cannot verbally express themselves. Patient needs must be met with the resource available, which in turn challenges the assistant to be carefully creative. It is important to recognize physical signs of stress as exhibited by different animal species and to alleviate the identified cause.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Patient Care."
2. Think about the needs of each patient as an individual.
3. Note the size and number of available housing units.

PROCEDURE

1. Make a checklist on your card of environmental factors to consider when choosing housing for each patient and use it as a guide. It should include
   a) kennel or run size/species
   b) bedding requirements and availability
   c) room temperature/ventilation/type of patient—young, old, species, surgery
   d) lighting, light/dark cycle
   e) noise.
2. As part of your daily routine, walk through the wards first thing and last thing each day:
   a) Note the temperature and airflow of the wards.
   b) Note the general appearance of each patient.
   c) Note any special problems existing for individual patients such as a need for increased warmth or cooling, odors from urine or feces, and visual threats.

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FOLLOW-UP

1. Sanitize and disinfect units as soon as patients are discharged to reduce spread of disease and contamination of *fomites*.
2. Check the reference at the end of each day and compare it to how well you have met the needs of each patient.
3. Always try to improve a patient's environmental comfort.

TASK 11.5.2 FEEDING THE HOSPITALIZED PATIENT

Concept: There are a number of factors influencing patient feeding and appetite in the veterinary hospital.
Discussion: These include the age of the patient, the additional nutritional requirements, the specific challenges that illness imposes on the patient, and the patient's decreased appetite due to the illness as well as the unfamiliarity of the food and the environment in which it is offered. These five factors are working against maintaining the patient's well-being. First, begin with an age-appropriate diet. Is the patient young, an adult, or geriatric? Age influences the diet chosen. No one formulation meets the needs of all age groups.
Concept: Illness and health status influence the diet chosen.
Discussion: A patient with congestive heart failure needs a diet low in salt. A patient in renal failure needs a diet low in protein. The veterinarian chooses the appropriate prescription diet. Care must be taken to ensure that the diet ordered is on hand and is in appropriate quantities to sustain the patient through its entire hospital stay.
Concept: Taste and "mouthfeel" are important to patients and can influence appetite.
Discussion: Find out if the patient prefers moist or dry food, brands, or flavors from the owner upon admission. The size and shape of dry formulations also influence palatability. If all else fails and the desired food is not in the hospital inventory, consider asking owners to bring in some of the patients normal diet to mix with what is ordered and pique their appetite.
Concept: Some owners cook for their pets.
Discussion: In this instance, the only way to find an acceptable food is to use the owner's own preparation. This is a decision that the veterinarian will make. Never feed any food that is supplied by the owner without the veterinarian's knowledge.
Concept: Environment plays a factor in an animal' appetite.
Discussion: A dog may feel threatened by others and need to eat in privacy, while other patients behave in an opposite manner. The threatened animals may rapidly consume their food if placed adjacent to a good eater to ensure the other animal does not get their portion. Be mindful of eating behavior and make environmental adjustments to avoid a stressful dinnertime.
Concept: Being away from home inhibits the appetite of some patients.
Discussion: It may help to have the owner bring a piece of personal clothing worn by the owner in which the patient can snuggle. Some patients are treated on an outpatient basis to ensure that they eat despite the need for hospitalization.
Concept: Two simple tricks of the trade to increase the palatability of foods are heat and water.

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Discussion: Gently heating food increases its aroma. Be mindful if using a microwave that food is only brought to room temperature and never served hot as this is not only unappetizing but also can cause painful burns. Mixing a small amount of water into a patient's food (by the use of a blender, food processor, or by hand) sometimes increases acceptance. It should have the consistency of baby food remaining soft but not watery. The smoothness will tempt animals to lick it up. Placing a small amount of food on the paw or on the tip of the nose will often tempt a finicky eater to taste the food and subsequently begin to eat.

Concept: If all else fails, force-feeding the patient may be necessary.

Discussion: Place the food and the patient at eye level. Gently open the patient's mouth and rub a fingertip of food against the roof of the patient's mouth. Work slowly so that each bite of food is swallowed. Another way to force-feed a patient is to liquefy the diet enough so that it will pass through the tip of a 12-mL or larger syringe (no needle). The syringe is filled with the food and the tip of the syringe is placed in the corner of the mouth adjacent to the back teeth. The corner of the lip is pulled outward, creating a small pouch. Tip the nose slightly upward and squirt the food slowly into the area, monitoring for swallowing action. The patient should be allowed to swallow between squirts.

Concept: Rather than tiring the patient by trying to feed the entire meal at once, break up the feeding sessions into smaller periods. Avoid stressing the animal at all costs as this contributes to further refusals to eat.

Discussion: Be patient; always feed slowly to prevent *aspiration* of food. Some patients will begin to eat on their own after the first few mouthfuls or feeding sessions, while other animals may fight the process so much that force-feeding becomes counterproductive.

Concept: The veterinarian may decide to place a *nasogastric tube* or a *pharyngostomy tube* into these patients.

Discussion: The veterinarian will start the nasogastric tube into the anterior *nares*, passing it through the nose, pharynx, and into the esophagus until the tip enters the stomach. The tube is sutured over the top of the patient's head. Liquefied food is injected through the tube, allowing for easier feeding of the patient.

Placement of a pharyngostomy tube requires anesthetizing the patient for a brief time. This requires a surgical prep, followed by an incision just posterior to the angle of the left jaw. A tube is inserted through the small incision, passes through the pharynx and into the stomach similar to a nasogastric tube. The tube is sutured into place and a bandage is placed around the neck to secure the opening of the tube toward the base of the skull. This procedure is useful when long-term feeding is anticipated, such as during recuperation from a broken jaw.

Concept: The formulation of liquid foods should be discussed with the veterinarian so the total caloric needs of the patient are met as well as the special needs that disease itself imposes.

Discussion: Once the formulation and amount are determined by the veterinarian, the assistant can feed the patient through the pharyngostomy or nasogastric tube.

Concept: Cats smell their food more than taste it.

Discussion: This requires special consideration in feeding cats with nasal congestion. Simply clean the nose with a warm washcloth, gently clearing both nostrils. Sometimes, using nonsterile saline nose drops helps to clear a nasal passage. A nasal bulb, used for children and available at most drugstores, can be used to withdraw some discharges, especially the less viscous forms or after application of saline drops.

After the nares are cleared, offer food at room temperature. If there is no response, then an odiferous food or warming the food may help. This may necessitate a trip to the supermarket to purchase canned cat food in fish flavors or canned mackerel and sardines.

Concept: Cats cannot go without eating for more than a day.

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Discussion: When cats refuse to eat, they may develop a potentially fatal condition known as *hepatic lipidosis*. Never let a cat displaying *anorexia* go without eating for more than 48 hours. Alert the veterinarian immediately and keep them informed if the cat continues to not eat.

During the first 24 hours of hospitalization, a patient may not consume the normal amount of food; this is due to the patient orienting itself to its new surroundings and is not normally a cause for alarm. The exceptions are when a patient is admitted in a state of starvation or is very small and subject to hypoglycemia.

There are no hard and fast rules to feeding hospitalized patients. It requires flexibility, creativity, patience, persistence, and adaptation to the individual's unique needs.

Procedure

PREPARATION

1. Keep a variety of meat-flavored baby foods, small cans of specialty dog and cat foods, and a can of sardines or mackerel in inventory.
2. Refer back to your reference book for the card entitled "Prescription Diets."
3. Review and monitor expiration dates on all food; be familiar with hospital protocol for disposal of out-of-date food. *Never* feed patients out-of-date food products.
4. Review the patient's cage card and/or medical record for any special feeding instructions; remember that this can change on a daily basis due to health conditions.
5. During the first 24 hours of hospitalization, feed only small amounts of the regular hospital diet or prescription diet as ordered by the veterinarian to see how the patient responds.
6. If the patient eats the offered diet, feed a little more.
7. If the patient does not eat the offered diet, make a notation in the medical record.
8. If dietary enticements do not increase appetite, discuss the matter with the veterinarian and prepare to force-feed the prescribed diet.

PROCEDURE: FORCE-FEEDING

Technique 1

1. Prepare an approved diet.
   a) Determine the original volume of food to be consumed within 24 hours.
   b) Add a small amount of water.
   c) Blend it until smooth and soft.
   d) Place approximately one-fourth of the volume in a small container.
   e) Gently warm the contents to room temperature.
   f) Refrigerate the remainder of the food. Label with the patient's name, food type, as well as date/time placed in refrigeration.
   g) Take the warmed food in the container to the patient.
2. For small patients, work at the cage with the door open.
3. For large patients, sit on the kennel floor at the animal's level.
4. Place a dollop of food on a gloved finger.
5. Allow the patient to briefly smell it.

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6. If the patient does not lick it off the finger, gently open the patient's mouth, insert the finger to the roof of the mouth, and scrape it along the incisors as you remove it to deposit the food inside of the mouth.
7. Gently cup the muzzle, keeping it closed until the patient swallows the food.
8. Often this will stimulate them to take a bite on their own, if not continue slowly, allowing the patient adequate time to swallow.
9. Repeat the process until the patient refuses further feeding or the food is consumed in its entirety.
10. Repeat the process periodically throughout the day until the refrigerated remainder is consumed.

Technique 2

1. Prepare the food as in Technique 1 except add more water until it is liquid enough to pass easily through the tip of the syringe or use a food designed for syringe feeding. It must be absolutely smooth; this may be aided through the use of a blender or a food processor.
2. Fill the syringe with the gently warmed liquid. The syringe should be of a size to fit easily into the patient's mouth but not so small that it needs frequent refilling. Begin with one-fourth of the volume of food prepared.
3. Again work with the patient in its housing unit (refer to Technique 1, steps 1–3).
4. Tilt the head up slightly, pulling the corner of the lip outward to form a pouch.
5. Gently squirt the liquid into the pouch between the cheek and back molars.
6. Allow the food to ooze between the teeth, keeping the nose tilted upward.
7. Permit the patient time to swallow before administering more liquid.
8. Repeat the process periodically throughout the day until all of the food is consumed.

FOLLOW-UP

1. Clean the patient and the area up after each feeding.
2. Wash and disinfect any containers and utensils used and put them away.
3. Do not share refrigerated food between different patients to avoid cross contamination.
4. Consider using supplements such as Nutri-Cal® to provide nutrients and to stimulate appetite. This should be approved by the veterinarian before trying.
5. Monitor fecal and urine outputs whenever food changes are initiated.
6. Record on the treatment board, the patient's record, and the cage card the volume of food actually consumed throughout the day (spilled food does not count).

TASK 11.5.3
WATER AVAILABILITY AND CONSUMPTION

Water is not considered a nutrient, but it is essential to life. Without consuming an adequate volume of water, the patient quickly becomes dehydrated. Severe dehydration can lead to

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death much sooner than starvation. Small pocket pets such as guinea pigs will die quickly without adequate water availability.

Concept: Water must be accessible and of adequate volume at all times unless otherwise specified.

Discussion: Two problems occur in the veterinary hospital. Patients readily spill water bowls or are unable to access the container. To counter spilling, water bowls are placed in a metal ring secured to the front of the kennel door. In runs, the bowls are placed directly on the floor. These are more readily spilled or contaminated than the ones mounted on the cage doors. Ideally, they should be constructed of heavy material so that they are not easily tipped over. The bowl must be of adequate size to provide water freely for a 12-hour period.

Concept: Some patients require more water than others.

Concept: Check water frequently and refill a patient's water container when it is low, before it is empty.

Discussion: Access is not a problem unless the patient is very small or unable to stand. Kittens or very small puppies in a cage with a water bowl secured at the conventional height cannot get to the water to drink. Place a small container of water on the cage floor for small patients; however, make sure that it is shallow enough that small animals cannot fall in and drown when left unattended. Alternatively, the screws on the mounting ring can be loosened and the ring lowered. The bowl is then at floor level but attached to prevent spillage. Keep a few small water bowls or large jug lids for the very small patients even if placed on the cage floor. A few heavy crockery or weighted water bowls with flat bottoms are also useful for larger dogs and will not tip over as easily as lightweight stainless steel bowls. Keep water bottles for mounting on caging for hospitalized pocket pets and rabbits in the event they are not transported to the hospital in their own housing. Monitor for constant supply of water as some pocket pets such as guinea pigs become ill and may die if deprived of water.

Concept: Monitor the sipping tubes in water bottles daily and test when refilling to ensure that they are not blocked and water flows easily.

Discussion: The sipper tubes can become blocked, making water unavailable. When cleaning, pass a small bristle brush down its length to remove any mold or foreign particles. Ideally, water bottles should be sanitized and flushed daily.

Concept: If a patient is unable to drink or is dehydrated, subcutaneous or IV fluids are administered.

Discussion: The technician or veterinarian will insert an IV catheter. It may then become the responsibility of the veterinary assistant to monitor the fluid flow (see Chapter 13, Task 13.04).

Concept: Subcutaneous fluids are administered when IV administration to maintain a patient's hydration.

Discussion: The assistant may assist in restraining animal for administration of subcutaneous fluids. Under direct supervision they may administer fluids subcutaneously (see Chapter 12, Task 12.9.5). Assistants should never administer fluids unsupervised.

Concept: Oral liquids can be given in a manner similar to force-feeding.

Discussion: In addition to oral liquids, remember that the foods used in force-feeding also contain liquid, which compensates, in part, for the fluid not being consumed through drinking by the patient and must be factored into the overall daily fluid intake.

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Procedure

PREPARATION

1. Review the patient record to check for instructions to withhold water and food.
2. Maintain an inventory of clean, disinfected water bowls of varying sizes.

PROCEDURE

1. As soon as the patient is placed in hospital housing, provide water unless restricted.
2. If a metal ring is attached to the cage door, place an appropriate sized bowl in the ring. Never leave a ring empty with a patient in the cage as they may potentially hang themselves.
3. Check to see that the patient can reach the bowl of water. Modify the location and container height if needed.
4. Monitor and refill the water bowl as needed throughout the day.
5. Make certain that all patients have full bowls before ending each work shift.
6. If the water container is spilled:
   a) Clean and dry the housing as soon as the spill is noticed.
   b) Replace the water bowl with one less likely to be tipped over.
   c) Replace water as soon as possible.

FOLLOW-UP

1. Note how much water is consumed in a 24-hour period. Record the amount in the patient record and on the cage card. If the bowl is empty in the morning when you arrive, replace it with a larger bowl to ensure that the animal has adequate hydration during the entire night.

Tip Box 11.2: **Measure the volume of water in milliliters each bowl will hold, then write the amount in permanent marker on the outside of the bowl. Use a clear, plastic measuring pitcher marked in milliliters to refill bowls. Record on the cage card the amount of water that was used to refill to the recorded level on the bowl and the time at which it was refilled.**

TASK 11.5.4 SOCIALIZATION AND EXERCISE

Concepts: Pets are accustomed to human–animal interaction. Hospitalization alters the customary human contact.

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Discussion: It is important to provide positive social interaction for each patient whenever it is handled during treatment, cage cleaning, or at other opportunities. Talk to patients with a gentle, soothing voice. Baby talk may be effective as is stroking the animal calmly. Scratch them gently behind the ears and over the back, hold them if they will allow it even if briefly. Cuddling and praise will go a long way in gaining cooperation and trust; these positive reinforcements put patients at ease.

Concept: Patients are more likely to eat, rest, and respond positively if they are psychologically at ease.

Concept: Exercise and play are important for the confined pet.

Discussion: For dogs, exercise twice daily should be the minimum. Due to housebreaking, many hospitalized dogs will not urinate or defecate in their kennel or run and must be taken to an enclosed yard area for regular bathroom breaks. This may require brief walks or allowing the animal off leash in an enclosed area under continual supervision. Animals should never be left alone in enclosed areas outside of the hospital.

Concept: Always place a choke leash on the patient for transport to other areas of the hospital or outside areas.

Discussion: For large, rambunctious dogs, double leashing with two choke leashes provides added safety. Never attach a leash to the patient's own collar or use its own leash. The sturdiness is unknown and it is unwise to work with unfamiliar equipment. It is not uncommon that patients may slip out of their own collars.

Concept: Always maintain positive control of a dog when leash walking.

Discussion: Always walk at a normal pace and do not allow a rambunctious dog to pull you along. Never run or jog with a dog on a leash as falls and injuries may occur. Never wrap a leash around your hand so that you cannot quickly let go if the need arises without causing injury.

If an outside area for walking is not available, provide exercise within the hospital wards. Ideally, this means housing dogs in runs. If this is not available, be creative. Close off doors to a hallway of the ward and release the dog for a short exercise period if possible. Throw a ball or toy for the animal to chase and retrieve.

Concept: Be careful to indicate whenever an animal is freely roaming in an area.

Discussion: Label doors whenever a patient is not in its cage or engaging in exercise or lock the door from the inside. This prevents someone from inadvertently opening a door and having the patient escape. These periods can be as brief as 3–5 minutes, but the benefits are immeasurable.

Concept: Check the patient's file and cage card to confirm that it can go out for exercise or if a fecal or urine sample is needed.

Discussion: When walking any dog outside, carry a plastic bag that can be used for picking up the patient's feces. Once the dog has defecated, insert your hand into the bag, grasp or scoop up the feces, and then turn the bag inside out with the contents safely inside as you remove your hand. Tie a knot at the end of the bag and return to the hospital. Make sure that a fecal specimen is not required for gastrointestinal parasite evaluation before you dispose of the bag in the outside trash dumpster.

Always note in animals' records the date, time, and normalcy of the bowel movement as well as urine excretion. To catch a urine sample, a dipper with a long handle works well. It is slipped under the patient as it urinates. Allow the first few mills to go on the ground before catching the rest. This is called a "mid-stream" sample.

Concept: Exercise for cats is not as important as it is for a dog's mental well-being.

Discussion: For cats, a cage of sufficient size to allow for movement without being inhibited by the presence of bedding, litter pan, food, and water bowls is basic. The ideal cat cage has a perch on which cats can rest and see all around them. Some manufactures make cat cages on two levels with a round opening between them through which the cat can move. A paper

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bag makes a good hiding place for a cat. For the feline patient hospitalized for extended periods, taking it from the cage periodically and throwing a small toy increases exercise and social interaction. If the cat is to be hospitalized for only less than a week, this is not necessary if sufficient space is available within the housing; however, a small, feline-approved toy will be appreciated to alleviate boredom.

Concept: Exercise and socialization is pet dependent.

Discussion: As with all other phases of animal care, the astute veterinary assistant evaluates and meets needs according to the individual. A "one size fits all" mentality does not adequately meet patient needs. Let the patient set the tone for the appropriate amount of social interaction.

Procedure

PREPARATION

1. Review each patient record to determine limitations on exercise.
2. Do not interact unnecessarily with patients that are aggressive, fearful, or feral.
3. Adhere to hospital policies on patient exercise.
4. Provide appropriately sized housing for all patients.

PROCEDURE

1. Dogs taken outside
   a) Use a hospital choke leash.
   b) Carry a plastic bag and/or a urine sample collection container.
2. Dogs exercised inside
   a) Move from a kennel to a large run or securely enclosed location.
   b) Provide social interaction, brushing, playing, or petting.
3. Cats
   a) Provide a cage of sufficient size to accommodate bedding, litter pan, and food and water bowls and still provide room to move around.
   b) Ideally, provide a perch or two-tiered housing.
   c) Approved toys should be offered.
4. All patients
   a) Speak to them.
   b) Gently stroke them.
   c) Always interact positively with patients.

FOLLOW-UP

1. Wash your hands between handling each patient to prevent cross contamination.
2. Mark the patient's file and cage card with the time and type of exercise or stimulation provided.
3. If a sample was collected, indicate that in the file and cage card, properly label the sample with the patient's name and date, then place it in the laboratory's refrigerator or alert the technician that the sample has been collected.

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TASK 11.5.5
IN-HOSPITAL GROOMING

Basic care includes basic grooming, keeping a patient clean and brushed daily. Parasite control is important not only to the patient but to all other patients in the hospital as they may have the potential for cross contamination.

Concept: Whenever a patient is to be hospitalized, make a quick examination of the skin to determine if fleas, ticks, or other *ectoparasites* are present.

Discussion: Set the patient on an exam table, place a white paper towel under the patient, then fluff the hair. Take note of any debris on the towel; spritz it with water. If the debris turns a rusty red, that is "flea dirt." Notify the veterinarian asking which product is prescribed for parasite control on that individual. Treat the patient before placing in the wards. Some patients are so debilitated that any parasiticide is potentially harmful. A bath using a mild shampoo to mechanically remove the parasites or the use of a flea comb is helpful in such circumstances. Under no circumstance should any product be used on an animal without veterinarian approval.

Concept: Daily care requires keeping the patient clean.

Discussion: White animals are not placed in cages with newspaper as newsprint comes off and makes their coats gray. Use unprinted paper or white butcher paper instead; the cage can be lined with towels or other bedding.

Concepts: Part of nursing care includes coat care.

Discussion: Urine, feces, *vomitus*, blood, and medications may soil the coat. If the coat is dirty, clean it. This might only require using a warm, damp towel to clean the feet of a patient who walked in its food dish. Fur dirtied by blood oozing from a wound is best cleaned with hydrogen peroxide then rinsed with water.

Concept: Recumbent patients need extra attention so they do not lie in their feces and urine.

Discussion: Shaving the fur around the anus and genitourinary openings facilitates cleaning. The patient should be placed on an elevated metal or rubber rack with the rack padded in all areas except the area where the most caudal portion of the patient will lie. This allows the urine and feces to fall through the rack and prevents urine scalding of the skin. Additional protection to the skin is provided with a heavy coat of petroleum jelly or lanolin around the *peritoneum*.

If a patient has a long coat and a paralyzed tail that falls into the stream of urine and feces, bandage the tail. Wrap the full length of the tail with Vet Wrap or gauze. Then overwrap with waterproof adhesive tape. Allow the tape to adhere to the fur on the most cranial portion of the tail. It is easier to replace the bandage than to clean the fur. However, be mindful of tightness of the bandage and check often to ensure adequate and uncompromised blood flow.

Concept: Large or recumbent patients need extra thick bedding to prevent *decubitus ulcers*.

Discussion: In addition to padding, patients must be turned and repositioned regularly to prevent pressure sores/ulcers.

Concept: Never send a patient home in an unkept condition.

Discussion: The coat must be clean, free of mats and objectionable odors. If a patient has developed an odor or has become dirty while hospitalized, it should be bathed before going home. Optionally, an odor eliminator spray can be applied and the patient brushed out. Before using the spray, check the hospital policy on the use of these products as some clients may object for allergenic health reasons.

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Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Incoming Patients." Check and stock the following:
   a) identification collars and waterproof indelible pen
   b) blank cage cards
   c) a parasiticide that will kill fleas, ticks, lice, and mites carried by the hospital. Mark each product as being "in-house use only" to prevent accidental resale or use by the treatment team of the same product from inventory.
2. Prepare a card for your reference book entitled "In-house Patient Grooming." Check and stock the following:
   a) a variety of combs and brushes
   b) several clean washcloths
   c) a spray bottle, one of diluted soapy water and one of plain water for spot cleaning; make sure to label the bottles
   d) a bottle of hydrogen peroxide to clean blood from fur
   e) Create the same items for the isolation area. These are never removed from the isolation ward to avoid possible contamination of other nonisolated patients.

PROCEDURE

1. Note the condition of the incoming patient's coat on the cage card.
2. Maintain the coat condition throughout hospitalization by cleaning or washing the coat as soon as it becomes soiled. Keeping a patient clean is easier than trying to clean one with the owner waiting!
3. Always bathe the patient (unless contradicted by veterinary orders) on the day that it is to go home. It should leave the hospital looking better than it did upon arrival.
4. Brush or comb the patient as needed but at least every other day and before returning it to the owner.

FOLLOW-UP

1. Refill and restock all of the supplies as needed.
2. Mark the cage card that a bath and brushing was done prior to the owner's arrival.

TASK 11.6
CARING FOR THE FERAL OR QUARANTINED ANIMAL

Concept: On occasion, *feral* animals may be brought into the clinic or hospital for observation. These animals require special attention due to the possibility of bites and exposure of staff to zoonotic diseases.

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Discussion: Special considerations are given as to the care of feral animals or those under medicolegal *quarantine* (i.e., rabies observation). These patients require stringent handling and care; the potential for *zoonotic disease* transmission must be in the forefront of everyone's mind. For legal reasons, animals with an unknown health status may be quarantined for observation for an extended period of time.
Concept: Feral animals may carry zoonotic diseases that can be passed through waste products or by bites or scratches.
Discussion: Animals with no prior medical history of vaccinations should be handled carefully to avoid bites and scratches which may transmit zoonotic disease. Always be on guard against possible "fear biting" with unfamiliar animals.
Concept: Feral animals may harbor ectoparasites as well as endoparasites.
Discussion: Upon admission, an animal is assessed for parasites and the proper parasiticides administered as per veterinarian's orders. To avoid contamination of other animals, new arrivals are placed immediately in the isolation/quarantine ward. All rules on handling waste, bedding, and comfort measures should be observed as previously described.
Discussion: To protect employees and to prevent accidental injury, kennels or cages containing quarantined animals should be prominently labeled. Records should be kept in close vicinity of the animal and labeled accordingly.
Concept: Feral and quarantined animals may harbor diseases that can be spread by fomites.

Procedures

PREPARATION

1. Prepare a card for your reference book entitled "Isolation Ward."
2. Mark the card with your facility's isolation ward procedure. Review Chapter 5 as well.

PROCEDURE

1. Upon an animal's arrival to quarantine:
   a) List the animal on the whiteboard with cage number, description, reason for quarantine, and who is the assigned caretaker.
   b) Assemble all medications, food, and other supplies ordered for the animal and label accordingly.
   c) Attach the cage card and denote if feral (for the safety of others).
   d) Always wear gloves, and if the animal is feral, handle it with as much care as possible!
   e) Set up fresh food and water for the animal according to medical instructions.
   f) Place the animal in a cage, speaking softly and without quick movement.
   g) Make regular notations within the animal's record of input, output, and so on.
   h) Be mindful that it may take two people to work with feral patients and plan accordingly. Establish a schedule of assistants assigned to the animal's daily care and keep safety in mind.

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FOLLOW-UP

1. Upon the animals' discharge from the quarantine facility:
   a) Remove all items from the cage, discarding all disposable items to outside waste disposal.
   b) Immediately wash and sanitize towels, blankets, and food and water bowls to return to the quarantine stock area.
   c) Clean and sanitize the cage in readiness for the next animal tenant.

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
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CHAPTER

12

PATIENT CARE II

PAULA PATTENGALE



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Comb and brush a patient and remove mats.
2. Clean normal ears in a patient.
3. Trim nails in patients.
4. Express anal sacs in a dog.
5. Bathe and dip patients.
6. Provide proper maintenance of clippers and blades.
7. Clip the flight feathers for show and home-based birds.
8. Correctly mix vaccine and fill a syringe.
9. Apply the five patient "rights" whenever medicating a patient.
10. Administer medications including
    a) oral
    b) aural
    c) topical
    d) ophthalmic
    e) subcutaneous (SC) injections and fluids (optional)
    f) intramuscular (IM) injections (optional).

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TASK 12.1
GROOMING OF OUTPATIENTS

INTRODUCTION

Grooming by a veterinary assistant is limited. The true grooming performed by a professional groomer is the domain of a trained professional with entirely different skills and perspectives than the veterinary assistant.

Concept: Grooming by the assistant is focused on improving the well-being of patients, not necessarily their appearance.

Discussion: If appearance is improved, this is a secondary bonus. The clients will notice and will feel good about their pet being cared for in your practice. Amazing medicine may have been performed to heal that patient but if it looks like it has survived a train wreck that is all the client sees.

Grooming can include

1. combing, mat removal, and brushing
2. ear cleaning
3. nail clipping
4. expressing anal sacs
5. bathing: cleaning and therapeutic
6. therapeutic dips (optional)
7. drying
8. final comb-out and brushing.

TASK 12.2
COAT GROOMING TOOLS

Curries, brushes, combs, rakes, slickers, and mat splitters should be available for use in the veterinary facility to remove mats, plant materials, and foreign substances from the coat before bathing.

Concept: Combs and brushes come in many sizes, shapes, and materials.

Discussion: A strong comb with wide-spaced, blunt teeth is used to break apart mats and coarse tangles. Flea combs have teeth that are very close together to work out the adults and *nits*. Some combs have teeth wide apart allowing for the breaking apart of mats and coarse tangles.

Brushes are used after the bath and are used to give the coat a final fluff. Brushes come in all sorts of configurations too. A slicker brush has multiple rows of wire teeth that are available for short, medium, and long hair. This brush is used on double-coated hair coats. The wire teeth will pull dead hair from the undercoat and allow the guard hairs to slide through. Be careful when using slicker brushes as they can scratch thin skin. Curry brush is made of rubber and short, soft bristle brushes are good to use on short hair coats. Widely spaced bristles are used for medium to long hair. Grooming rakes are used on medium to

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long hair and a mat splitter is designed to cut through a mat in order to break it up. Just be certain it does not injure the skin of the patient.
Concept: Always choose grooming tools that fit the needs of the individual and the hands of the groomer.
Concept: Have a variety of grooming tools available to groom a variety of coats. Disinfect all tools after each use, even after use on apparently healthy individuals.
Discussion: This can mean soaking in a container of diluted disinfectant, cleared of hair and then put through a cycle on the dishwasher or sprayed with diluted disinfectant and allowed to air-dry.
Concept: Combing precedes bathing and is considered an integral part of a bath.
Discussion: Any patient scheduled for a therapeutic bath is expected to be combed and dematted first. Medicinal soaps and dips cannot penetrate a hair coat that is matted until it is free from tangles and knots.

Basic rules:

1. Begin at the back of the body and work forward.
2. Begin at the feet and work upward.
3. Break down mats by spraying conditioning spray on the mat, then working across the mat with a wide-toothed comb until the mat is freed from the underlying skin.
4. A mat splitter can be used to separate a mat into several smaller ones. Be careful, they are sharp and can injure both the groomer and the patient.
5. If a mat splitter is used, work with a rake or a wide-toothed comb to remove the now smaller individual mats.
6. Mats can be clipped out. Unless an overall clip is performed, clipping mats results in a moth-eaten look to the coat. Use the lowest blade number possible. (A no. 5 blade leaves a longer coat length than a no. 10 blade. The surgical clip is done with a no. 40 blade.)
7. To avoid clipper burns, keep the blade flat, or parallel, with the skin. Do not tip the blades into the skin.
8. Note the condition of the skin when combing especially under mats. Look for irritated, inflamed areas of skin, any *ectoparasites*, wounds, or abnormal skin or hair. Report observations to the veterinarian unless the veterinarian has already seen the animal and that is why the grooming procedure has been prescribed.

After the combing procedure, the patient is bathed. After the patient is bathed and is partly dry, comb again. Once the patient is completely dry, brush the coat.

Procedure

Location: Grooming area

PREPARATION

1. Have appropriate tools at hand.
   a) Optional:
      i. Muzzle
      ii. Grooming table

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b) Essential equipment:
   i. Combs, strong and blunt toothed
   ii. Matt splitter
   iii. Brush with bristle of length and firmness to penetrate the coat
   iv. Scissors, blunt over blunt
   v. Clippers with assortment of blades
   vi. Use only sharp clipper blades of a size that blends into the patient's coat length.

Make certain grooming tools have been washed, disinfected, and rinsed with water.

PROCEDURE

1. Combing out before bathing
   a) Confirm the five patient rights.
   b) Check the patient's medical record to confirm the grooming procedure to be completed.
   c) Place the patient on the grooming table.
   d) Use a muzzle (optional).
2. Begin combing the back and sides of the patient, working from the tail forward to the head. If the coat is long, part the fur and expose the skin. This allows for complete penetration of the comb through the coat.
3. Do the legs working proximally from the feet. Comb the medial aspect of each limb while standing on the opposite side of the body and after combing the lateral aspect of the limb nearest you.
4. Comb the axillary and groin areas with the patient standing.
5. Do the tail, working cranially from the very tip. Do the ventral portions of the tail last, again working from the distal to the proximal end of the tail.
6. Comb or clip mats as appropriate. Be patient when working through mats. Take time. Be careful. *Do not tear the skin*.
7. Bathe only after the comb can pass freely throughout the entire coat.

After Bathing

1. Repeat full body combing while the coat is still slightly damp.
2. After the coat is completely dry, do the full body brushing using the same pattern as for combing.

FOLLOW-UP

1. With the exception of the clipper blades, when through with the grooming tools, wash them with a disinfectant soap and firm bristled brush, then rinse well. Place in a disinfectant solution to soak for the manufacturer's recommended contact time.
2. Clipper blades are put into the manufacturer's recommended wash product for recommended time. Rinse. Dry, lubricate, and place in a blade storage container.
3. Remove the grooming tools from the disinfectant solution.
4. Rinse well with tap water.
5. Dry and put away.
6. Vacuum or dust mop the floor.

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TASK 12.3
EAR CLEANING

Concept: Ear canals and the inside of the *pinna* need to be cleaned before the bath.
Discussion: The opening of the ear canal is bordered cranially by a furred structure called the *tragus*, a firm cartilaginous, furred, "U"-shaped projection. It is bordered caudally by the unfurred portion of the pinna. The ear canal itself is shaped like the letter "L" beginning with a longer, vertical portion of the canal and a shorter, horizontal portion that ends at the eardrum, known as the *tympanic membrane*. It is easy to puncture. Likewise, it is easy to pack debris further into the canal. Therefore, do not use a cotton-tipped applicator to go down the ear canal. Cotton applicator sticks are only used to clean in the creases and crevices of the upper ear canal.

The ear canal can be palpated, or felt, through the skin, below the opening for the ear canal and extending in a downward path toward the lower jaw. The canal is made of cartilage so it is softer than bone but is firm enough to keep its shape. It feels like a firm rubber tube.

Concept: Some ears have hair growing in the canals as part of the breed characteristic.
Discussion: The poodle is one such breed. There is controversy over whether the hairs should be plucked. Check with the veterinarian for preference. If the hairs are plucked, remove the hairs in the horizontal canal with your fingertips or with a pair of forceps such as a mosquito hemostat. If hairs are plucked, apply a broad-spectrum antibiotic to the canal after the ear-cleaning procedure is complete. Clip the fur on the tragus and beneath the opening to the ear canal itself.

Concept: If inflammation is present, a strong odor or discharge of any sort is visible. Notify the veterinarian before beginning the ear-cleaning process.
Discussion: The ear will probably still need to be cleaned, but special cleaning solutions can be ordered and medicated ointments might follow the cleaning. Infected ears also have a strong odor, often described as a "rotten cheese" smell. If this is noted, also ask the veterinarian to examine the patient's ear canals before they are cleaned.

Concept: When using an ear-cleaning solution or an antiseptic solution, fill the ear canal in its entirety. (Fig. 12.1).
Discussion: Palpate the cartilage of the ear canal underneath the skin just ventral and slightly anterior to the opening of the ear canal. Massage the cartilage well. If this is done correctly, you will hear a sloshing sound as the fluids move within the canal. Place a cotton ball over



Figure 12.1. Cleaning the ears of a dog. Photo courtesy of Teresa Sonsthagen.

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the opening of the canal. Hold it in place while you tip the head sideways with the opening of the canal facing ventrally. The fluid will drain out onto the cotton ball.

Repeat the filling of the canal, massaging of the canal, and then the draining the canal until the fluid comes out clean and the canal itself looks clean.

Concept: Dry the canal with a cotton ball as far as you can reach with a cotton-covered fingertip but no further.

Repeat the cleaning procedure with the other ear canal.

Concept: Use large cotton balls to put into the ears before bathing.

Discussion: This prevents soapy water from entering the canals. Be sure to remove the cotton balls after the bath. The ear canals should be dried thoroughly after the bath. Again put a cotton ball at the opening of the canal, tip the head, drain the canal, and dry it thoroughly after the bath just in case water did enter the canal.

Concept: Moisture left in the ear canal serves as a medium in which bacteria grow, so thorough drying is essential.

Procedure

Location: Treatment and grooming areas

PREPARATION

1. Prepare a card for your reference book entitled "Cleaning Ears."
2. Mark the card with the list of materials needed:
   a) cotton balls
   b) ear-cleaning solution
   c) antiseptic solution
   d) cotton-tipped applicator sticks
   e) forceps for plucking hair
   f) broad-spectrum antibiotic ointment
   g) exam gloves.
3. Recheck the patient record to confirm if ear cleaning is prescribed.

PROCEDURE

1. Confirm patient identity.
2. Examine the ears.
3. Contact the veterinarian if there is
   - redness
   - swelling
   - discharge
   - odor
   - pain.
4. Pluck hair from the ear canals (optional).
5. Fill the ear canal with cleaning solution or antiseptic solution and massage the canal.
6. Wipe the pinna and the ear canal with cotton balls to clear debris and solution from the ear. (If there is any evidence of disease, notify the veterinarian before cleaning the ears.)

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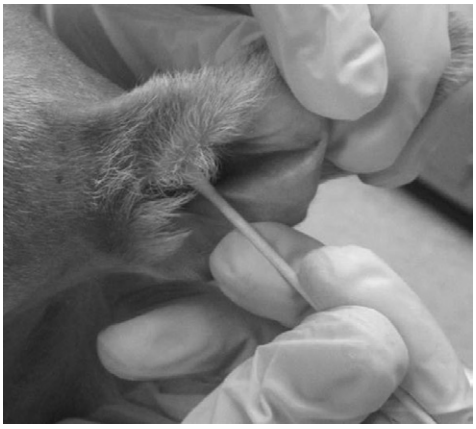


Figure 12.2. Using a cotton swab to clean the pinna. Photo courtesy of Teresa Sonsthagen.

7. Repeat until the cotton balls come away clean.
8. The creases in the upper ear canal are cleaned with a cotton-tipped applicator stick soaked in cleaning solution (Fig. 12.2).
9. Use a dry cotton ball to dry the ear canal as far as the index finger can reach.

FOLLOW-UP

1. If bathing follows, place a large cotton ball in each ear to prevent soapy water from entering the ear canal.
2. After bathing, remove the cotton balls.
3. Dry the ear canals thoroughly using a dry cotton ball.
4. Apply antibiotic or antiseptic ointment as prescribed or if ear canals were plucked.

TASK 12.4
NAIL TRIMMING

Nails grow continuously and are used for traction and defense. In cats, they are used for climbing as well.
Concept: The nails on all pets can become overgrown.
Discussion: When they do, the toes splay. The nails can even grow into the footpad, creating very painful feet and lameness.
Concept: The nails of all species, except for hoofed animals, are similar in anatomy.
Discussion: The nail covers the quick (*ungual process*), which contains the blood and nerve supply to the nail. The nail arises from the nail bed at the junction of the haired and hairless portions at the end of the toe.

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Concept: The goal in a nail trim is to cut the nail immediately distal to the quick.
Discussion: In an unpigmented nail, this is easy to see as a faint pink triangular area within the toenail.
Concept: In a heavily pigmented nail, it is not possible to see the quick.
Discussion: If the quick cannot be seen, make a series of small cuts until the quick is seen at the cut end of the nail as a small white spot surrounded by the dark keratin of the nail. Use this nail as a guideline for the amount to cut from the other nails.
Concept: Since the hind nails are the primary nails of traction, they are shorter and have less to be removed.
Discussion: The front nails require more to be removed.
Concept: If dewclaws are present, they must be trimmed too.
Discussion: Dewclaws do not bear weight and often can grow into the pad. All nails are trimmed immediately distal to the quick. *Polydactyl* cats can have extra nails between the first and second digits, so check the feet carefully for extra nails.
Concept: If the quick is accidentally cut, the nail will bleed.
Discussion: It is also painful for the patient. To stop the bleeding, apply a styptic powder or silver nitrate stick. Styptic powder comes as a loose, yellow powder in a small wide-mouth container. To apply the powder to a nail, fill the small end of a needle cover (the short part that covers the hub) with the styptic powder. Store it in the original styptic container. When the styptic powder is needed, just use the powder-filled small container and place it over the bleeding nail end until the powder attaches to it. Any portion of the styptic powder still in the needle hub cover is thrown out. Then apply pressure to the powder-covered nail end with the end of a wooden applicator stick.

A silver nitrate stick may also be used to stop bleeding, but silver nitrate tends to stain the hands, clothing, counters, and sinks. It also tends to sting, so be careful when using it.

Concept: In severely overgrown nails, the animal is anesthetized.
Discussion: A tourniquet is placed on each leg in turn and the nails cut well into the quick. The quick is *cauterized* to stop the bleeding. The veterinarian, not the assistant, does this procedure. The patient's feet are painful afterward, so the patient must receive pain medication for several days.
Concept: There are several tools used to trim the nails.
Discussion: A frequently used trimmer called a Resco (a guillotine-style nail clipper) is held below the nail and the nail pushed through the opening. The blade side is closest to the toe. The handles are squeezed and the blade moves upward through the opening, cutting the nail. These clippers come in two sizes, regular and large, used for larger dogs. The blades can be replaced when they become dull. There is a blade replacement kit. Follow the directions that come with the kit (Fig. 12.3).
Concept: The scissor-like nail clipper known as a White nail or bird beak clipper.
Discussion: These are particularly useful for ingrown nails as they will go around the nail. They are also useful for trimming back the nail by taking small bits of nail off and "whittling" back the nail to expose the ungual process. They come in three sizes and are useful for birds and pocket pets.
Concept: Human nail clippers are used for trimming thin, small nails such as those on a cat or a lizard.
Concept: A rotary Dremel tool with a sand paper surface or a rough emery board is used to shorten and smooth nails after trimming. Some handlers of show dogs prefer to use a Dremel to keep short nails very short, giving the foot a more rounded appearance.
Concept: To accomplish the nail trim, the foot is held and pressure is applied to the top of the toe to extend the nail.

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Figure 12.3. Nail trimming, removing small pieces at a time. Photo courtesy of Teresa Sonsthagen.

Discussion: The nail is then cut. A dog can be in a sitting or standing position. Cats are more easily trimmed if they are restrained with their back to the seated groomer. The arms are around the cat and one hand applies pressure to the dorsum of each toe as the other hand uses the nail trimmer. Cats can also be restrained on the examination table in sternal recumbency for a nail trim. Birds and pocket pets are restrained on their backs. Rabbits can be in a normal standing position but should be restrained firmly over the rump to prevent kicking.

Procedure

Location: Postoperative, treatment, and grooming areas, sometimes examination rooms

PREPARATION

1. Prepare a card for your reference book entitled "Nail Trimming."
2. Mark the card with the equipment required for trimming nails:
   a) nail trimmer to fit the size of the patient
   b) Dremel or emery boards
   c) styptic powder (or) silver nitrate sticks
   d) wooden applicator sticks and cotton balls.

PROCEDURE

1. Restrain the patient.
   a) Put them in a sitting or standing position; if trimming a cat's claws, place the patient in your lap or on the examination table.

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2. If using a guillotine-type trimmer, place the curved portion of the handle against your thumb and the straight handle in your palm. Place the hole over the nail with the blade side closest to the toe.
3. Other trimmers as described.
4. Grasp the foot with one hand.
5. Apply pressure to each toe in turn to extend the nail.
6. Use the other hand to clip the nail just distal to the quick.
7. Remember to trim the dewclaws if present.
8. If bleeding occurs, use styptic powder and apply pressure until bleeding ceases.
9. Check all feet for bleeding after completing the trim.
10. Clean all bloody toes with hydrogen peroxide and water, then dry the feet.

FOLLOW-UP

1. Clean trimmers with a disinfectant spray, wipe dry, and put away.

Tip Box 12.1: **Practice nail trimming on an anesthetized patient first. This benefits the patient, pleases the client, and gives you no pressure practice! Have an experienced team member critique your work.**

TASK 12.5
EXPRESSING ANAL SACS

Concept: Expressing anal sacs is a malodorous, messy task, but it has to be done.
Discussion: Fortunately, dogs are the only ones that routinely need their anal sacs expressed. The anal sacs are rudimentary scent sacs located on each side of the anus. The sac itself lies ventrally and slightly cranially under the skin in the 5 and 7 o'clock positions. A duct travels upward from the sac to a small opening at the 3 and 9 o'clock positions adjacent to the border of the rectal mucosa and the anus. Ideally, the material secreted by the sacs is forced through the ducts when the animal has a bowel movement. If the material becomes thickened, infected, or the muscles in the area are weakened, the sacs do not empty properly. They can even become abscessed and rupture.
Concept: There are two techniques for expressing anal sacs. Wear gloves for either procedure.
Discussion: The first technique requires palpating the sacs exteriorly (Fig. 12.4).

Gently pass your fingertips slightly ventrally and laterally to each side of the anus. After locating the sacs place a large tissue or damp paper towel between your index finger and thumb. Move your hand over the area. Press over the lateral aspect of each sac by pressing your index finger and thumb medially. Move your fingers upward going deeply then outward in a semicircular fashion. This forces the contents of the sacs through each duct. The secretion is caught in the paper towel.

After completing the procedure, replace the towel with a clean, damp towel and clean the fur in the area. Enclose the towels inside the gloves and tie a knot in the gloves to contain

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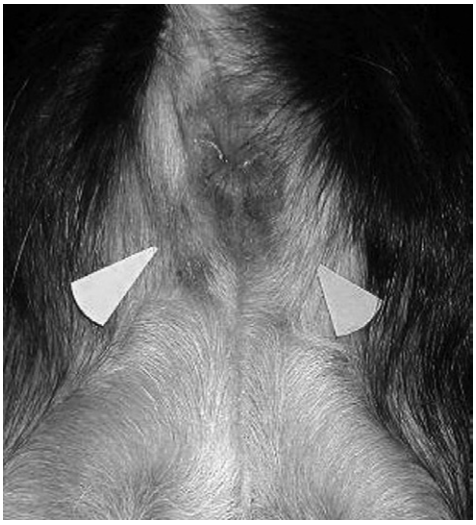


Figure 12.4. Anal gland positions around the anus. Photo courtesy of Teresa Sonsthagen.

the odor. If the odor is pervasive, take the tied gloves outside to the trash receptacle as soon as completing the procedure.

The second technique requires insertion of the gloved index finger into the rectum (Fig. 12.5).

Place a large piece of cotton batting or a damp paper towel between the index finger and the thumb. Lubricate the end of the index finger and gently insert it into the rectum. Angle the thumb over one of the sacs and press it against the index finger. Squeeze the fingers together then upward, forcing the contents through the duct. Rotate the finger inside the rectum and repeat the procedure with the remaining sac. This technique provides greater pressure to the sac and is useful when the contents are thickened or the duct is blocked.

Notify the veterinarian if the contents expressed are bloody, yellow, and pus-like or thick and gritty.

Concept: All dogs scheduled for a bath are expected to have their anal sacs expressed.
Discussion: Always express the anal sacs just before bathing the patient.

Procedure

Location: Grooming area, possibly the treatment area

PREPARATION

1. Prepare a card for your reference book entitled "Anal Gland Expression"
2. List the following materials at hand when preparing for the procedure:
   a) exam gloves
   b) lubricant such as K-Y jelly

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Figure 12.5. Expressing anal glands using the internal technique. Photo courtesy of Teresa Sonsthagen.

c) paper towels, cotton batting, or large cotton balls
d) odor elimination spray.

PROCEDURE

1. Express the anal sacs after cleaning the ears and completing the nail trim and immediately before bathing.
2. Wear gloves.
3. Restrain the patient.
   a) Restrain the patient on the grooming table or have another team member restrain the patient.
   b) Take care—some dogs object strongly to this and may bite!
4. Exterior technique:
   a) Place a damp paper towel between the gloved index finger and the thumb.
   b) Locate the two sacs by palpating laterally and slightly ventrally to the anus at the 5 and 7 o'clock positions.
   c) Place the thumb over the lateral aspect of both sacs, then squeeze the fingers together.
   d) Push fingers deeply and upward toward the middle of the anus in a semicircular fashion.
   e) Replace a paper towel with a clean, damp one and clean the area around the anus.
5. For interior technique:
   a) Lubricate the gloved index finger.
   b) Place cotton batting, large cotton ball, or paper towel between the index finger and the thumb.
   c) Gently insert the index finger into the rectum. Palpate a sac on one side of the rectum with the index finger; simultaneously palpate the same sac with the thumb exteriorly and laterally.
   d) Apply pressure on each side of the sac with the finger and thumb by pressing the fingers together.
   e) Move the fingers deeply and upward, forcing the contents outward to the middle of the anus.

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f) Rotate the finger to repeat the procedure on the other side.
g) Clean the fur around the anus after completing the procedure.

FOLLOW-UP

1. If the room is malodorous, use the odor eliminator spray.
2. Dispose of anything contaminated by the secretions outside as soon as possible.

TASK 12.6
BATHING AND DIPPING

Concept: Bathing and dipping are done for a number of reasons.
Discussion: Bathing is most frequently done to clean the skin and coat. The second purpose is to treat the skin and coat for diseases or conditions. Dipping is the application of a pesticide or medicament to the skin and coat after the bath also to treat infestations or diseases. It is usually allowed to dry on the patient.
Concept: A bland ophthalmic ointment is applied to both eyes to protect them from the soap and dip solutions.
Concept: Before the patient is ever placed in the tub, everything must be in readiness.
Discussion: A cage is set up with towels and a dryer if a cage dryer is used. If a blower is used, the blower is plugged in. A towel is placed on the grooming table to absorb water from the feet. Towels and a washcloth are placed adjacent to the tub. The prescribed shampoo is placed beside the towels. If cream rinse or a detangler is used, it should be placed next to the shampoo. Dilute both if necessary. Any dips needed are diluted and prepared for application, and a timer is placed on the counter for timing any applications. Place a drain strainer over the drain to prevent the accumulation of hair in the drain and the resultant clogging of the plumbing.
Concept: Personal protective equipment (PPE) includes waterproof apron, goggles, and gloves.
Concept: The patient is placed in the tub with a hospital leash around the neck. The other end is tied in a halter tie to a ring on the tub or wall to prevent the patient from jumping out.

At this point, do not leave the patient for any reason.

Concept: First, thoroughly soak the coat with warm water. Pour a small amount of shampoo in your palm and rub your palms together to break the shampoo down.
Discussion: Breaking the shampoo down will prevent flakes and will suds up better when shampooing. The first lathering breaks down the oils in the coat, allowing for better penetration of the second soaping. Work the shampoo thoroughly throughout the coat. In male dogs, try to avoid the prepuce as the soap stings the penis. Soap well between the toes, under the tail and each leg, and behind the ears. Take care not to get soap and water inside the ears. Wash the face with a washcloth and a small amount of shampoo, rinse the cloth out, then wipe the soap away from the face. Stay away from the eyes.
Concept: After the patient is well lathered, do a thorough rinsing with special attention to the areas between the toes, under the tail, under the legs, and behind the ears.
Concept: If a medicated shampoo is prescribed, use it after the first shampoo and rinse.

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Discussion: Medicated shampoos often have directions indicating how long it is to remain on the skin. If it is a timed one, set the timer.

If the second lather is just a regular shampoo, then lather the coat up well. Then start rinsing. Use copious amounts of water, especially between creases and folds in the skin. Stop rinsing when the water runs clear again, making sure to get under the tail and ears as well as the toes.

Concept: If a rinse or dip is used, it is applied after the shampooing and rinsing.

Discussion: Follow the directions. If a cream rinse is used, comb the rinse through the coat before rinsing off. If a dip is used, sponge it well onto all of the body parts. Use a cloth or sponge to place it on the face.

Concept: Some dips are simply left on and others are rinsed off. If the dip is timed, set the timer.

Discussion: After rinsing or the time is up for the dip, wrap the patient in towels and carry the patient to the grooming table and start drying. Remove the cotton balls from the ears. After towel drying, the patient is placed in a cage with the cage dryer placed on low heat, *never high heat*, and the timer set.

With a cage dryer, many patients tend to sit in the corner of a cage or lie down when it is used so only the dorsal and cranial portions of the body are dry. It is often necessary to remove the patient from the cage and to blow-dry the remainder of the coat anyway.

Concepts: Blow-drying is a convenient and quick way to dry a coat, especially a long one. It is safer than the dryer, which uses heat.

Discussion: Comb the coat while it is being blown dry. There is less chance of overheating a patient when using the blower. As mentioned before, work from distal to proximal and from caudal to cranial on the patient. Dry between the toes, the underside of the body, behind the ears, and under the tail. The blow-dryer is best for drying the underside of a patient.

Concept: On all products used (shampoos, rinses, and dips), read the label three times.

Discussion: Follow the directions carefully. If dilution is required, dilute properly. More is not better; it can be poisonous. Less is not safer; it is ineffective. Use products only on the species for which it is formulated. If it says for dogs, use only on dogs.

Concept: Hot water and hot dryers burn the skin. Patients left in a cage dryer will quickly die of *hyperthermia*, a situation in which the animal becomes too hot.

Discussion: Do not leave animals in dryers unattended. Check them every 5 minutes. Use low temperatures to dry. There is less chance for a patient to become hyperthermic with a handheld blower, but again, set it at low temperatures or the skin becomes burned.

Tip Box 12.2: **Hot water and hot air = hyperthermia = dead or injured patient.**

Concept: Once the patient is dry, do a final combing and brushing.

Discussion: Replace the owner's collar or harness. Place the now-ready patient in the hospital ward. Indicate on the treatment board that the patient is ready to go home.

Concept: After the patient is returned to the cage, begin the clean-up process.

Discussion: There is usually hair everywhere, the tub, the drain strainer, and the floor. If there is a wet/dry vacuum, use it to suck up the hair. Use a mop around the tub to pick up excess water. Wipe the counters. Place wet towels in the laundry; start a load if there are enough soiled towels. Put all shampoos, rinses, and other items away if they will not be used again during the day. All grooming tools are washed, disinfected, dried, and put away. Clean the grooming table and put the dryer away.

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Procedure

Location: Grooming area

PREPARATION

1. Prepare a card for your reference book entitled "Bathing and Dipping."
2. Review the patient record to determine whether the patient needs a shampoo or a dip.
   a) Select the ordered product then *read* the label, checking for
      i. species for which it is formulate
      ii. quantity used including dilution if needed
      iii. method of application
      iv. when in the grooming process it is used
      v. duration on skin if specified.
3. Lay out all materials needed before getting the patient:
   a) shampoo, cream rinse, or dip by the tub
   b) dilute if necessary
   c) sponge if a dip is being applied
   d) towels and washcloth by the tub
   e) timer if applications are timed
   f) cage with towel on the floor and dryer on the door if appropriate
   g) Plug in blower if appropriate.
   h) Have a comb and brush for the type of coat available on the table
   i) cotton balls for the ears
   j) bland ophthalmic ointment for the eyes
   k) hair strainer in the drain
   l) hospital leash.
4. Put on
   a) a waterproof apron
   b) gloves
   c) goggles.
5. Confirm patient identity.
6. Remove collar or harness, label, and place with the patient record. Put your leash on the patient.
7. Complete all combing, ear cleaning, and nail trim before bathing. Express anal sacs just before bathing.

PROCEDURE

1. Place cotton balls in the ears.
2. Apply eye ointment to the eyes.
3. Place a leash on the patient.
4. Place the patient in the tub.
5. Tie the end of the leash to the ring with a halter tie.
6. Wet coat thoroughly.
7. For initial cleaning, use mild shampoo.
8. Break the shampoo between your hands then lather well.
9. Rinse thoroughly.

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10. Use medicated shampoo for second lathering if prescribed. Leave on for the time indicated in the directions.
11. Repeat with the second application of the regular shampoo.
12. Apply cream rinse especially in long-haired patients.
13. Rinse thoroughly.
14. If a dip is prescribed:
    a) Dilute the dip correctly; these are toxic and can cause harm. Time accurately if rinsed.
    b) Apply the dip with a sponge saturating the coat well. Massage into the coat.
    c) Leave on for the designated time or allow it to dry on the patient.
15. Squeeze excess moisture from the coat.
16. Remove the cotton balls from the ears.
17. Untie the leash.
18. Wrap the patient in towels and remove from the tub to the table where it is towel dried.
19. Begin the drying process.
    a) Place the patient in the cage with a cage dryer set on low heat for 10 minutes. Recheck every 5 minutes until the coat is damp dry. (Or - then)
    b) With patient on the table, blow-dry at low to medium temperatures. Comb during the blow-drying process.
20. Once dry:
    a) Do the final combing and brushing.
    b) Replace the owner's collar or harness.
    c) Return the patient to regular housing.
21. Indicate on the treatment board that the patient is ready to go home.
22. Make appropriate entries into the patient's record and cage card.

FOLLOW-UP

1. Clean and dry the tub.
2. Remove hair from the strainer. Rinse.
3. Dry the counters and the floor.
4. Put wet towels in the laundry. Start the washer if there are enough wet towels to start a load.
5. Put the cage dryer and the blower away.
6. Put all shampoo, rinses, or dips away if not being used again on the same day.
7. Disinfect, dry, and put away all grooming tools.
8. Disinfect and dry the table.

TASK 12.7
CLIPPER MAINTENANCE

Concept: Clippers receive a great deal of hard use. To optimize their performance, a few things must be taken into consideration.

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Discussion: There are three things to remember when maintaining clippers:

1. Read the manufacturer's instruction booklet kept in the equipment binder or in the box where the clipper is stored.
2. Keep a backup supply of sharp blades on hand, lubrication oil, clipper blade wash, and cool lube on hand.
3. Store clipper blades in cases that will keep them sorted and safe from damage.

Concept: Clippers come as corded or cordless models.
Discussion: Corded models should be checked periodically to make sure the cord is in good condition. Cordless models are replaced in the charger immediately after each use. Some clippers have two speeds.
Concept: There are air-cooled clippers and oil-cooled clippers.
Discussion: The air-cooled clippers have vents at the base of the clipper that become blocked by hair and dirt. This will cause the motor to overheat. Clean the air filter off with a brush; set up a weekly schedule for cleaning the filter.

Oil-cooled clippers require a drop of oil between the blades before they are started for the first time each morning and then repeated as the clipper gets warm. Air-cooled clipper blades are sprayed, with the blades running, with the recommended lubricating spray every 5–10 minutes or the clipper will become overheated. Never use WD 40 as a substitute.
Concept: New blades require special care as do used blades.
Discussion: New blades come with a coating that must be cleaned off with blade wash before use. Immerse the blade in the manufacturer's recommended blade wash. Blade cleaning cases are made in which the blades are placed face down into slots in the case, which is filled with the manufacturer's recommended cleaner/disinfectant. The cover is locked and the case gently agitated by hand. These cases hold multiple blades and conserve blade wash. Dry the blades after cleaning.

After general use of the blade, push the release lever or just push it backward to open the blade away from the clipper. Slip the clipper blade off the peg, then slide the top blade to the side so it is half off the blade base. Clean the teeth with a bristled brush then slide it the other way and repeat. Clean the hair out of the clipper with the brush. Replace the clipper blade, plug the clipper in, turn it on, then snap the blade back into place. Store extra blades in a clean, dry place to prevent corrosion from developing on the blades.
Concept: Check each blade for missing or damaged teeth.
Discussion: If there are broken or missing teeth, the blade will cut the skin. Take the broken blade to the office manager for replacement.
Concept: Once or twice a year, apply the manufacturer's recommended grease to the drive gear.
Discussion: Follow the manufacturer's instructions. Periodically, the clipper and the blades need to be serviced by a repair specialist. If the clipper fails to cut or jams and the blades are lubricated correctly and are sharp, the clipper needs to be professionally serviced.

Blades do become dull with use. A dirty, bloody, or damp coat dulls blades. If possible, avoid using clippers in such circumstances. As blades become dull, give them to the office manager to be sent out for sharpening.
Concept: Because blades will be gone for a time, it is prudent to keep extra blades of sizes typically used on the premises at all times.
Concepts: Clipper blades come in different lengths.

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Discussion: The lower the blade number, the longer the length of the clip. A no. 40 is used for removing all of the hair down to the skin. Lower numbers, such as a no. 10 or a no. 5, will leave hairs at longer length.

Blades come in variable widths. The narrower widths are used for areas such as between the toes. There are combs that fit onto the blades. These have long teeth and fit over the blade. Snap-on combs are available in various sizes, but the no. 1 is the most frequently used. When snapped onto a no. 10 blade, it leaves a 1-in. coat length.

Supplement clipping with scissoring to blend lines or to shape areas such as around the pom-pom on the tail of a poodle, or to trim the hair from between toes and foot pads.

Procedure

Location: Treatment, surgical prep, and grooming areas

PREPARATION

1. Prepare three cards for your task box entitled "Clipper Care—Daily, Weekly, and Yearly."
2. Mark the clipper care information on the cards and file them in the appropriate sections.
3. Read the manufacturer's instruction booklet; learn maintenance procedures and frequency and how to change and care for clipper blades.
4. Have clipper supplies available including
   a) a clipper lubricant/coolant, blade wash, oil, grease, and disinfectant spray
   b) a container for washing clipper blades and storage case for protecting the blades
   c) a stiff bristled brush
   d) assorted blades and combs to fit over the blades
   e) a chart and pen for recording dates of filter cleaning, greasing, and professional servicing. In the footnote on the chart, list the frequency these tasks must be performed.

PROCEDURE

1. Before use, check the cord and the blade. Turn it on and lubricate the blades.
2. Hold the clipper with it cupped in your palm and fingers wrapped around the barrel.
3. When clipping, the flat blade section is laid flat on the skin to keep from gouging or cutting the skin. Spray the clipper blade with lubricant every 5–10 minutes or sooner if the clipper becomes hot.

FOLLOW-UP

1. Remove the clipper blade and clean it with a stiff bristled brush.
2. Place the blade in a clipper wash. Agitate gently.
3. Remove, dry, and place in a storage case.

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TASK 12.8 CLIPPING A BIRD'S FLIGHT FEATHERS

Concept: Birds are now the third most popular pet in the United States. The clipping of the flight feathers is performed to inhibit flight but does not completely eliminate it.
Discussion: The birds can still fly, albeit shorter distances and in a somewhat unbalanced manner.

Before cutting any feathers, check for blood feathers. The shaft of the feather will be bright red. These should not be cut as the bird can bleed profusely. Small birds will require 8–10 of the flight feathers cut from the distal to proximal. Large birds need four to six flight feather cut.

A sharp pair of scissors is used and the bird is restrained chest down rather than up so the assistant can extend the wing by grasping it at the carpal joint. This is the last large joint in the wing where the radius and ulna join the small fused bones of the wing tip. The cutter approaches the wing from the dorsal aspect starting distally and working proximally. The scissor blade is slipped underneath the edge of the overlying contour feathers so they are not cut. This is a smoother look; if the bird is shown, the first two or three flight feathers are left uncut. This leaves the bird with a more naturally appearing wing when it is folded against the body. Clip feathers on both wings in the same manner. Feathers are replaced, so make sure the owner understands they need to check the feathers frequently especially if they allow the bird outside.

Owners can be taught to clip the primary flight feathers if they wish to learn. This is a simple but very useful task for the assistant to perform.

Procedure

Location: Primarily the examination rooms

PREPARATION

1. Have a pair of sharp scissors, preferably blunt over blunt, at hand.
2. A cloth for restraining the bird if needed.
3. Make sure the doors and windows are closed.

PROCEDURE

1. Restrain the bird in sternal recumbency.
2. Extend one wing at the carpal joint, exposing the primary flight feathers and the overlying contour feathers.
3. Check for blood feathers before cutting.
4. For show birds:
   a) Starting at the distal fourth flight feather, cut underneath the edge of the contour feathers. Cut all remaining flight feathers.

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5. For pet birds:
   a) Follow the procedure for show birds, but trim the complete row of flight feathers.

FOLLOW-UP

1. Return the bird to its cage, thank the bird and the client, then escort them to the receptionist.
2. Sweep up the feathers, disinfect, and put the scissors away.

TASK 12.9 ADMINISTRATION OF MEDICATION

Concept: Before administering any medication to a patient, check the five patient rights.
Discussion:

The Five Patient Rights When Medicating a Patient

1. The *right* patient. Locate the correct patient receiving the medication.
2. The *right* drug. Locate the drug. The label must match the order. Read the label three times.
3. The *right* strength. Determine the proper drug strength.
4. The *right* dose. Calculate the quantity/amount to administer.
5. The *right time.* Confirm it is the correct time to administer the medication.

Concept: The assistant's duties often include administration of medications to hospitalized patients.
Discussion: Assistants often teach clients how to give medications to their own pets; therefore, knowing how to administer medications by various routes becomes essential.

TASK 12.9.1 ADMINISTRATION OF MEDICATION: ORAL

Concept: Oral medications are given by mouth.
Discussion: The "how to" depends on the following:

1. The species of animal
2. The disposition of the animal
   a) For tractable animals, the hand can be used to administer tablets and capsules.
   b) For intractable animals, you will need a pilling device such as a pilling gun used in small animals or a balling gun used in large animals.
3. The formulation (tablet, capsule, liquid, paste) of the medication
   a) Tablets and capsules can be coated with mineral oil to make them slippery, thereby easing the passage of the medication down the throat.

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b) Tablets can be coated with a tempting food or inserted into a "pill pocket," a hot dog, or a piece of cheese. The animal is then allowed to eat the disguised medication. *Caution*: Many animals will eat only the coating and spit out the medication.
c) Tablets can be crushed into a fine powder, mixed with water, and administered in the same manner as any liquid. Check first as some medications are slow-release formulas and should not be mixed with water.
d) Liquids are given with a syringe without the needle. This allows for accurate measurement of the volume to be drawn up.
e) Pastes are usually squeezed from their original container directly into the mouth or onto an index finger, which is scraped against the upper incisors between the teeth into the patient's mouth.

Concept: A bit of anatomy: the trachea, or windpipe, is located centrally behind the base of the tongue. The esophagus is located to the *left* of the trachea.
Discussion: Medication or feeding tubes risk going down the trachea if directed centrally. This will cause choking, possible aspiration, pneumonia, and death from a form of drowning. Always direct medication off of center.
Concept: Medications can be given directly into a patient's mouth or administered directly into the stomach via a tube passed through the mouth, into the esophagus and terminating in the stomach.
Discussion: A serious consideration in passing anything through a patient's mouth is the risk that the patient might bite down on it. If it is severed, the end needs to be retrieved; this is difficult. At the least, instruments and tubing are damaged.

If a *nasogastric* tube or a gastric tube is being placed, the assistant is responsible for patient restraint. A mouth speculum is used when a patient is anesthetized. A roll of tape is used in the conscious small animal patient when a tube must be passed through the mouth. The roll of tape is placed between the upper and lower canines. The hole faces outward so the tubing can be passed through it. The mouth is held securely closed around the tape with the fingers. Alternately, a long strip of tape can be used to secure the mouth around the tape so the roll of tape is not forced out by the patient's tongue or by simply opening the mouth.
Concept: For intractable animals, place the medication in a pilling gun and administer through the instrument into the open mouth.
Concept: After administration of any oral liquid, rinse the patient's mouth with plain water to wash the medication down the esophagus.
Discussion: This is very important in cats as medication can become lodged in a cat's esophagus, causing damage to the esophagus. Even when the medication is dissolved and eventually reaches the stomach, the drug may have caused damage to the lining of the esophagus or worse, a deeper lesion resulting in esophageal stricture.
Concept: To medicate horses, simply place the container holding the liquid or paste through the left *commissure* of the mouth. Direct it toward the center of the mouth.
Discussion: Slowly administer the medication.

Procedure

Location: Examination rooms, treatment area, and animal wards

PREPARATION

1. Confirm the five patient rights.
2. Confirm patient identity (check the hospital collar and the cage card).

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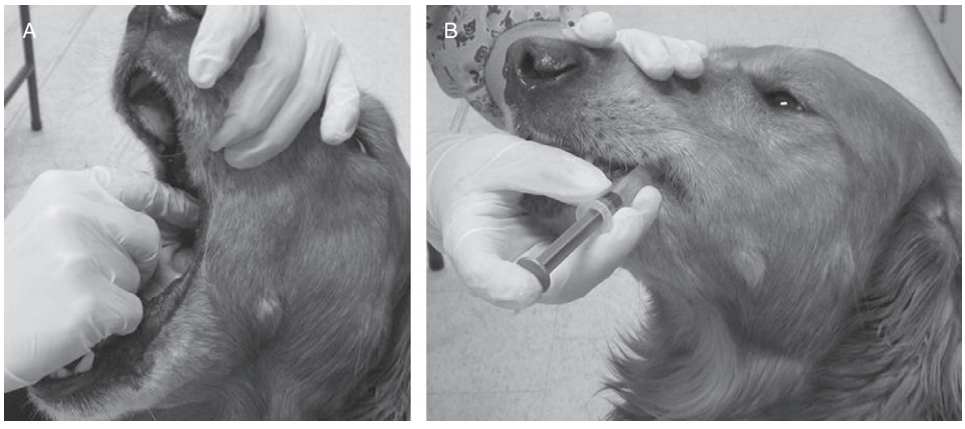


Figure 12.6. A. Giving solid medication to a dog. B. Giving liquid medication to a dog. Photo courtesy of Teresa Sonsthagen.

3. Have the medications at hand.
4. Know how to administer the formulation of the medication.
5. Have a syringe full of water adjacent to the medications.
6. Wear examination gloves.

Administration of Tablets and Capsules

PROCEDURE

1. Use nondominant hand to roll the lips of the top jaw over the molars and point the nose at the ceiling.
2. Hold the medication between the index finger and thumb of the dominant hand.
3. Use the middle finger of the same hand placed on the lower incisors to force the lower jaw downward.
4. Place the medication as far over the base of the tongue and toward the left as you can push it even further with your index finger.
   a) Withdraw your hand.
   b) Close the mouth and stroke the throat to stimulate swallowing.
5. Administer the water by slipping the syringe into the cheek pouch toward the back and slowly depress the plunger.
6. Allow the patient time to swallow (Fig. 12.6A,B).

Liquids

1. Tilt the patient's head upward slightly.
2. Slip the syringe or dropper into the pouch between the teeth and the cheek.
3. Depress the plunger or squeeze the dropper to deliver the liquid into the pouch, allowing the patient to swallow.

Pastes

1. Place the prescribed amount on the index finger of your dominant hand.
2. With the nondominant hand, tilt the head upward over the nose, wrapping the lips around the molars.

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3. Scrape the index finger against the upper incisors, depositing the paste into the patient's mouth.

FOLLOW-UP

1. Return the patient to its cage.
2. Immediately record the administration of medication on the patient record, treatment board, and cage card.
3. Clean the area and instruments.
4. Put everything away.
5. Remove and dispose of gloves. Wash your hands.

Procedure

Administration of Medication to Birds

Location: Examination rooms and treatment areas

PREPARATION

1. Confirm the five patient rights.
2. Depending on bird's size, have either a small or large paper clip, or a small wooden perch adjacent to the medication.
3. Have the medication at hand in a syringe with a metal avian feeding tube attached.
4. Have another syringe with a metal feeding tube attached filled with water adjacent to the medication.
5. Wear examination gloves.

PROCEDURE

Small to Medium-Sized Birds

1. With one hand, restrain the bird on its back, with the head between the thumb and the index finger.
2. With the other hand:
   a) Holding the paper clip flat, approach the beak from the left side.
   b) Wedge the paper clip between the upper and lower beaks.
   c) Rotate the paper clip to pry the beak open (Fig. 12.7).
   d) Slip the tip of the feeding tube between the upper and lower beak, again on the left side, behind the paper clip.
   e) Move the syringe toward the center of the beak (this forces the beak to widen and increases visibility).
   f) Gently slide the feeding tube down the esophagus, which is to the left of the *syrinx*.
   g) Palpate the tip of the feeding tube in the crop located at the base of the neck. The rings of the larynx should be felt just medially.
   h) Slowly force the medication through the feeding tube.
   i) Kink and then withdraw the tube.
   j) Administer water.
   k) Remove the paper clip.

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Figure 12.7. Using a paper clip to hold a bird's beak open. *Source*: Sheldon, C. C., Sonsthagen, T., & Topol, J. A. (2006). *Animal Restraint for Veterinary Professionals*. St. Louis, MO: Mosby Elsevier. Reproduced with permission from Elsevier.

Large Birds

1. Have someone restrain the bird on its back.
2. Using the small perch or a metal rod, allow the bird to grasp the rod in its beak.
3. Approach the beak from the left side with the syringe.
4. Follow the procedure as for smaller birds.

FOLLOW-UP

1. Return the patient to its cage.
2. Immediately record the administration of medication on the patient record and treatment board.
3. Clean the area and instruments.
4. Put everything away.
5. Remove and dispose of gloves.

Tip Box 12.3: **Never apply so much pressure to the thorax of a bird that respiration is impaired.**

TASK 12.9.2 ADMINISTERING MEDICATION: AURAL

Concept: There are many reasons for treating ears.
Discussion: Medications are often placed deeply within the ear canal or superficially on the *pinna*, the earflap. (*Caution*: Both "oral" and "aural" sound similar when pronounced.

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Read the prescription carefully or have your supervisor specify which route is to be used.)

Discussion: Ears often develop infections, especially in long-eared dogs, which keep them from having good ventilation, promoting the development of infections. Both dogs and cats are subject to parasitic infections, such as ear mites and ticks, deep in their ears. Flies can bite at the edges of the ear causing it to bleed and become crusty. Grass awns and foxtails can become lodged deep within the ear canal. Fight wounds can damage the pinna and surrounding tissues. When an animal with dependent ears shakes its head violently, there is the risk of a *hematoma* forming between the skin and cartilage of the pinna.

Concept: Head shaking is associated with irritation, so the hematoma is usually secondary to a primary disease process.

Discussion: Treatment of both the primary and secondary disease processes is necessary.

Concept: Aural medications are usually in a liquid form, either as a solution or as an ointment.

Discussion: Some medications are packaged in tubes, others in bottles with droppers, and even bottles with a nozzle.

Concept: Medication is packaged for single-patient or multiple-patient uses.

Discussion: Materials commonly needed for the treatment of ears consist of

1. the otoscope with appropriately sized cone for the examination of the ears either disposable or nondisposable; a video otoscope may also be used in which case follow the manufacturer's directions for care
2. cotton balls
3. cotton-tipped applicator sticks
4. medications; there can be more than one medication needed such as an ear-cleaning solution followed by an antibiotic ointment.

Concept: The veterinarian or veterinary technician usually performs the initial cleaning of infected or inflamed ears while the assistant restrains the patient.

Discussion: The assistant only administers the prescribed medications after the initial diagnosis or performs cleaning of normal ears during grooming. If an abnormal ear canal is noted during the grooming process, the veterinarian is promptly notified.

Procedure

Location: Animal wards, treatment area, examination room, and grooming area

PREPARATION

1. Place the patient's record on the counter near the examination table.
2. Open the record to the prescribed treatment.
3. Place all needed materials next to the record.
4. Work with another person, as the animal will need to be restrained. Restrain the head according to the directions in Chapter 9.
5. Place the animal on the examination table.
6. Confirm the five patient rights.
7. Put on exam gloves.

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PROCEDURE

1. Make sure the ear is clean before placing ointment into the canal. If it isn't clean, refer to back to Task 12.3.
2. Place the nozzle or dropper deep inside the ear canal but only to the depth of the vertical portion, not into the foot of the "L."
3. Squeeze a small amount of medication into the ear until you see the medication well up near the upper opening of the ear canal.
4. Remove the medication dispenser.
5. Massage the outside of the ear canal to work the medication into the ear canal. If you are doing this correctly, you will hear squishing sounds and possibly note medication moving up and down near the opening of the ear canal.
6. Use a cotton ball moistened with ear cleaner to clean the inside portion of the pinna.

FOLLOW-UP

1. Return the patient to its assigned housing.
2. Date and initial the treatment performed in the patient's record, treatment board, and cage card.
3. Put all materials away and clean the area.

TASK 12.9.3
ADMINISTERING MEDICATION: TOPICAL MEDICATIONS

Concept: Injuries and infections on the surface of the skin often require application of medications directly to the affected area.
Discussion: Before beginning applying medication to any diseased surface, the area must be cleaned. How to clean the skin over and around a wound is described in Chapter 13, Task 13.5.1. If the skin is clean and has remained so, it is not necessary to repeat the cleaning procedure before each application of topical medicament.
Concept: If ordered by the veterinarian, crusts and scabs are soaked to soften them before removal. This is accomplished using warm water, sterile saline, or an antiseptic solution. Soak a washcloth with the desired liquid and place it on the lesion until it softens. This may take several minutes and soakings. Never pull scabs off without express permission from the veterinarian. Once the area is clean, pat it dry with a clean, dry sponge. Application of topical medicaments can be a one-person task if the patient is tractable. Large dogs are tied to the chain link of the gate on the run in which they are housed. Smaller animals are treated in their cages without restraint.

Management Tips

1. If the medication comes in a single-patient container, do not use it on any other patient.
2. The specified medication for a patient can be stored in an unsealed envelope labeled with the patient's name.

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3. Attach the envelope to the patient's record with a large paper clip. This makes the medication readily available and helps to limit the drug's use to the patient specified.

Reminders:

1. Wear gloves while cleaning and treating the skin.
2. Do not cause further injury to the skin. Treat it gently. *Tissues are fragile*.
3. All infected materials are considered biohazards, so dispose of them accordingly.

Concept: Never place a contaminated item into any container of medication such as a jar of ointment.
Discussion: For example: a dirty or nonsterile gloved finger, a used tongue depressor, or a dirty applicator stick is never placed in any container of medication.

Procedure

Location: All hospital treatment areas

PREPARATION

1. Place the medication and materials you will use near the area where you are working.
2. Either bring the patient to the treatment area or work in the patient's housing, if feasible.
3. Examine the skin surface for cleanliness. If needed, clean the area to be treated first. Any changes in the lesion should be noted in the patient's record.
4. Wear gloves.
5. Check the five patient rights.

PROCEDURE

1. Using a clean tongue depressor, transfer the required amount of medication to your gloved index finger.
4. Using a circular motion, start at the center of the lesion and in ever-widening circles progress to the margins of the clipped area.
5. If you need to place additional medication on the skin, remove the medication from its container using a clean tongue depressor or syringe without a needle if liquid. Do not use your contaminated glove or the contaminated end of the tongue depressor.

FOLLOW-UP

1. Date and initial the entry treatment into the patient's record, treatment board, and cage card.
2. Return the patient to its assigned housing if appropriate.
3. Clean and put all items away.
4. Contaminated materials are placed in a biohazard waste container.

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TASK 12.9.4 ADMINISTERING MEDICATION: OPHTHALMIC

Concept: Ophthalmic medication is administered to the eye.
Discussion: Ophthalmic medications are usually in the form of liquids, given as drops, or ointments; both are placed directly on the surface of the cornea.
Concept: Because of tears, ophthalmic medications have to be administered frequently.
Discussion: Adhere to the time intervals and the number of treatments prescribed per 24-hour period.
Concept: Ophthalmic medications are packaged for a single patient.
Discussion: This means a container or tube of medication should be used only for the specific individual for whom it is prescribed. After removing the cap, care is taken not to contaminate the tip by touching it to the eye or with fingers. As with the otic medications, the container can be placed in an envelope and attached to the patient's record.

Caution: Never touch the surface of the eye with the end of the medication container; it contaminates the container and may scratch the surface of the eye.

Procedure

Location: Animal wards, treatment area, and examination rooms

PREPARATION

1. Check the patient record to confirm the prescription order.
2. Lay the medication beside the record.
3. Bring the patient to your work area.
4. If there is any discharge, wipe it away from the eye with a cotton ball moistened with room temperature sterile saline solution or warm water. Do not touch the cornea itself.
5. Record any changes in the appearance of the eye on the patient's record.
6. Check the five patient rights.

PROCEDURE

1. With one hand resting on the skull, use the index finger and the thumb to pull the lids apart.
2. Using the other hand, hold the medication in your index finger and thumb.
3. Pull the lower lid downward with your middle finger.
4. Rest the fourth and fifth fingers of your hand holding the medication on the cheekbone below the eye.
5. Tilt the patient's muzzle upward toward the ceiling.
6. With the head upward and eyelids parted, drop or squeeze the prescribed amount of medication onto the surface of the eye (Fig. 12.8).

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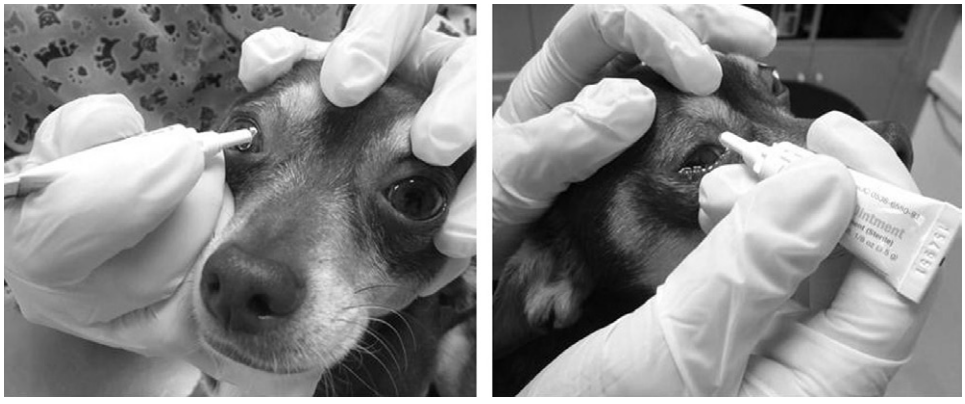


Figure 12.8. Administering eye ointment. Photo courtesy of Teresa Sonsthagen.

7. Do not touch the surface of the eye with the container or your fingers.
8. Release the eyelids and allow the head to return to its normal position.

FOLLOW-UP

1. Date and initial the entry treatment into the patient's record, treatment board, and cage card.
2. Return the patient to its assigned housing.
3. Return the medication to the envelope on the patient's record.
4. Clean all work surfaces.
5. Dispose of gloves in a biohazard container.

TASK 12.9.5 ADMINISTRATION OF MEDICATIONS: PARENTERAL

Concept: Parenteral means administration of injectable drugs, vaccines, or solutions with a needle and syringe.
Discussion: Parenteral routes include subcutaneous (SC or SQ), intramuscular (IM), intradermal (ID), intravenous (IV), intracardial (IC), intraperitoneal (IP), and intranasal (IN).
Concept: There are two rules to follow before performing an injection:
Discussion:

1. The chosen site is cleaned with alcohol. Alcohol is a good disinfectant and degreaser. The skin is cleansed to prevent the introduction of bacteria in tissues, which can cause an abscess to develop. The only time alcohol is not used to prep the skin is if the patient is being tested for allergies or tuberculosis.

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2. After the needle is inserted into the tissues, you must aspirate. To aspirate, the plunger is pulled backward and is an essential part of the injection process. Aspiration prevents *accidental* injection of a drug into a blood vessel and to check for insertion placement. If the needle is in the tissues, there will be a vacuum; if it is through the skin, air will be pulled into the syringe. Aspiration will confirm placement of the needle in a vessel if performing an IV injection.

Concept: The SC injection is administered under the skin.
Discussion: SC injections are frequently used for the administration of vaccinations. Small animals have loose skin over and along the trunk of the body, making the dorsolateral area between the shoulders and hips or between the shoulder blades easy sites for SC injections.
Discussion: The concept is to pick up the loose skin to form a triangle on the trunk of the patient's body. The needle is inserted into the skin below the fingers at the base of the triangle. The needle is inserted parallel to the body up to the hub. Aspirate if no blood is drawn into the syringe, then inject the medication. Withdraw the needle and briefly apply pressure to the needle entry site and praise the patient.
Concept: Maintenance fluids are often administered subcutaneously.
Discussion: SC fluids are placed anywhere along the back or side of the animal in several locations. The amount prescribed is divided into several doses administered at several different sites. Some references will cite a certain amount per site based on the patient's size. A rough guideline is to feel the site as the fluids run in and when it gets taunt move to an adjacent site. The fluid bag is hung up and an 18-ga capped sterile needle is attached to the end of the tubing. An alcohol skin prep per site is all that is needed. Insert the needle as previously described, turn the fluids on; once the site is extended, turn the fluids off, remove the needle, prep a new site, and repeat.

Often this is a one person job as it does not seem painful to the patient, so minimal restraint is needed. After removal of the needle, pinch the injection site firmly closed so there is no fluid backflow through the site.
Concept: The fluid is absorbed much more slowly than with IV fluids especially in obese and slightly dehydrated patients.
Discussion: The fluid is initially a soft "lump" at the site of administration but soon disperses and gravitates downward on the body until it is absorbed.
Concept: IM injections require placement of the needle into the muscle.
Discussion: There are many sites on a patient's body where IM injections can be placed. The most common site is the hind limb on small animals and the neck for horses and livestock. The injection is usually placed in the biceps femoris, quadriceps, or epaxial muscles (Fig. 12.9).

If using the rear limb muscles, care must be taken not to insert the needle into or through the sciatic nerve. This nerve runs down the length of the caudal surface of the rear limb between the sartorius and semimembranosus/semitendinosus muscles. Avoid it by placing your needle at a 45° angle into the muscle groups, directing it from lateral to medial, aiming for the opposite hip.
Concept: A needle-free, transdermal system of vaccine administration is available.
Discussion: This is based on a CO_2 cartridge that forcefully propels the vaccine across the skin into the SC tissues. This provides a more consistent administration of vaccine and is less painful to the patient. Follow the manufacturer's instructions for setup and use of the system.
Concept: IN injections are given without a needle.
Discussion: A number of vaccines are formulated for IN administration. After the solution is drawn from the vial with the needle, it is removed. A diffusion tip is often used when squirting the vaccination into the nares. Intranasal vaccines for horses and livestock are

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Figure 12.9. Administration of an IM injection. Photo courtesy of Teresa Sonsthagen.

administered by using a long straw. Alcohol and aspiration is not necessary for this route of administration.
Concept: Other routes of parenteral administration.
Discussion: The other routes are usually used for specialized medications or procedures that the assistant will probably not be allowed to perform.

Reminder: Before attempting any injections, have the approval of the veterinarian.

TASK 12.9.6
FILLING SYRINGES

Concept: Filling syringes with medications or vaccines must be done in an aseptic manner.
Discussion: Before even beginning to fill a syringe, there are some things to consider.

1. *The Exterior:* The exterior of any vial is contaminated. To prevent contamination of the sterile contents, the rubber top should be wiped with alcohol immediately before every penetration with a needle. The only exception is if the vial contains a "live" vaccine.
2. *Syringe Size:* Choose a syringe that will accommodate the volume of drug needed. This facilitates aspiration.

Tip Box 12.4: **Always aspirate prior to actually injecting a medicament.**

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3. *Needle Gauge:* The diameter of a needle is given in gauges. The greater the diameter, the lower the gauge number. For example, a 16-ga needle has a much greater diameter than a 25-ga needle. The *viscosity* of the drug and the rate at which the drug is administered limit the gauge of the needle. The more viscous the drug, the lower the gauge. The more rapidly the drug is administered, the lower the gauge of the needle.
4. *Needle Length:* The length of the needle chosen is based on the depth to which the drug must be administered. A short needle is used in thin-skinned animals in which the medicament is actually placed within the skin or immediately underneath it. A longer needle is used for IM injections or in very thick skinned animals such as cattle.
5. Never mix different drugs or vaccines in the same syringe unless otherwise directed because this may create untoward chemical reactions.
6. The contents of any filled syringe are always labeled. The initials of the person filling the syringe follow the contents.
7. As the contents of a vial are withdrawn, a vacuum is created. This makes it increasingly difficult to continue removing medication from the primary container. To prevent this, draw air into the syringe at the same amount as the required dose. Insert the needle into the stopper then inject the air. If you need to, you can also detach the syringe from the needle still penetrating the vial top and allow the vacuum to escape from the container. Securely reattach the syringe to the needle and continue to withdraw the solution.

To fill a syringe:

1. Hold the vial containing the desired medication upside down in one hand. The fingers should curl around the vial with the little finger closest to the top of the vial.
2. The other hand holds the syringe with the needle uncovered and pointing upward.
3. The needle just penetrates the rubber stopper of the vial. If the needle penetrates too far into the vial, it will go above the level of the medication being withdrawn. In such an instance, the full contents of the vial cannot be withdrawn.
4. Inject an equal amount of air into the vial before withdrawing the solution to prevent a vacuum from forming, which then pulls the vaccine out of the syringe and back into the vial.
5. Withdraw the desired volume. Injectable medications come in four volume types:
   a) *Multidose Bottle, Premixed:* Withdraw the prescribed volume, usually found on the container or as prescribed by the veterinarian.
   b) *Single-Dose Vial, Premixed:* Withdraw the entire contents of the vial.
   c) *Single-Dose Vial with Diluent Provided:* Withdraw all of the diluent, then inject it into the vial containing the powdered (often *lyophilized*) vaccine. Gently invert to mix. Withdraw the entire contents of the second vial for injection.
   d) *Multiple-Dose Bottle with Diluent Provided:* same as for a single dose, but the vial will have many doses. These will usually need to be stored in the refrigerator and have a short shelf life.
6. Before the needle is withdrawn from the vial, gently tap on the side of the syringe to force any air bubbles to rise to the base of the needle. Gently push on the plunger to force the air bubbles out; pull the needle out of the bottle.
7. Recap the needle by placing the needle cover on the counter. The index finger of the free hand braces the cover to keep it from moving. The needle is then slid into the opening of the needle cover and firmly secured.
8. Check to make sure the correct amount is in the syringe.

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9. Label each syringe with either the peel-off label from the single-dose vial or place a short piece of adhesive tape with the contents of the syringe and your initials written on it. *Alternate Procedure for Vaccines:* Some veterinarian's prefer to have the filled syringe left in the vial. This eliminates the need for a label and recapping the needle. Instead of inverting the vial to mix the diluent and powder, the vial is rolled across the palm.

Procedure

Performing Injections
Location: Treatment area

PREPARATION: GENERAL

1. Confirm permission to give injection from the veterinarian.
2. Review patient treatment plan for drug/vaccine, dose, and route of injection.
3. Remember to read the label of the medication three times.
4. Wipe the top of the vial with alcohol.
5. Select a syringe to accommodate the prescribed dosage. Vaccines usually use 3-mL sterile plastic disposable syringes.
6. A needle may or may not be attached. If one is not attached, select a 23 or 22 ga by ¾ or 1 in. for small animals and a 20 or 18 ga by 1.5 in. for large animals.
7. Fill the syringe. Recap and label the syringe.
8. Practice the five rights whenever administering drugs to a patient.
9. Prepare alcohol-soaked cotton balls or have an alcohol spray bottle at hand. Place this next to the syringe.
10. Have someone ready to restrain the patient.
11. Wear examination gloves.

PROCEDURE: SC INJECTION

1. Confirm patient identity.
2. Have the patient restrained in the manner appropriate for injection to be given.
3. Lift the skin between the thumb and the forefinger forming a triangle or a tent anywhere there is loose skin between the shoulder and hips.
4. Wipe the skin with the alcohol-soaked cotton ball or spray the area using the alcohol-containing spray bottle.
5. Remove the needle cap then direct the needle into the skin parallel to the body and beneath the thumb and forefinger.
6. Once the needle is placed, aspirate; if no blood or air enters the syringe, inject the medication.
7. Withdraw the needle and recap or put the entire thing into a sharps container.
8. Praise the patient.

PROCEDURE: IM INJECTION USING THE BICEPS FEMORIS MUSCLE

1. Place the patient parallel to you with the restrainer on the other side of the table.
2. Grasp the back leg at the knee to stabilize the femur.
3. Press the thumb on the outer surface of the thigh over the midpoint of the femur.

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4. Rub or spray the skin with alcohol to clean the injection site.
5. Insert the needle slightly above the thumb at a 40–45° angle to the skin.
6. Direct the needle into the muscle mass between the knee and hip joints.
7. Aspirate—if no blood enters the syringe, inject the medication.
8. Withdraw the needle and recap or put the entire thing into a sharps container.
9. Praise the patient.

FOLLOW-UP

1. Return the patient to its assigned housing.
2. Date and initial the entry treatment into the patient's record, treatment board, and cage card.
3. Clean the table and put everything away.

TASK 12.10
MIXING VACCINES

Concept: Vaccination appointments occur frequently.
Discussion: For young patients of most species, there are usually a series of injections required. Adult animals have boosters at varying intervals depending on the vaccines being administered and the patient's exposure level to various diseases. Vaccines are considered biologics and, as such, are stored under refrigeration.
Concept: For vaccination appointments, the prepared vaccine should be among the materials laid out on the examination room counter in preparation for use.
Discussion: Determine which vaccines are to be administered by reading the patient's record. If there is a question as to whether a vaccine will be administered, as in the presence of concurrent illness or impending surgery, it is prudent to have the unmixed vaccine vials on the counter with an unfilled syringe next to it. If the vaccination is administered, the materials are present. If the vaccination is not administered, the materials are readily returned to inventory.
Concept: Vaccines come either in single or multiple-dose vials.
Discussion: They can be premixed in one vial or comes in two vials, a *diluent* and a powder, which must be combined to form a usable vaccine. The diluent is a liquid that may be no more than sterile water or is actually an active component of the vaccine itself. Always mix the diluent provided for the vaccine, never one from another vaccine. Never mix vaccines together in the same syringe. To do so may render them useless or, worse, toxic.
Concept: The diluent must be withdrawn from its vial using a needle and syringe and injected into the vial containing the powdered portion of the vaccine.
Discussion: The reconstituted vaccine vial is gently inverted several times to ensure complete mixing. This usually occurs rapidly. The vaccine is then ready to be administered. Once a vaccine is reconstituted, it must be used within 1 hour unless labeling states otherwise.

Reminder: Whenever preparing or giving medications, remember the five patient rights:

1. *The right patient.*
2. *The right drug.*
3. *The right drug strength.*
4. *The right dose.*
5. *The right time.*

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TASK 12.11
DAILY DENTAL CARE

Concept: There is an increasing demand for dental care in all pets from large animals to pocket pets.
Discussion: Client education on dental care and the prevention of dental injury often fall to the veterinary technician and assistant. This includes information on daily brushing of teeth, feeding a dry diet, and providing routine professional scaling and polishing.
Concept: Preventive dental care is the most important factor in promoting oral health.
Discussion: Brushing the teeth is an important component of a pet's oral health. Owners have a tendency to think of dental care for their pets as being identical to their own dental care. If the owner does not make appropriate modifications in pet dental care, there is poor pet acceptance and the owner soon eliminates this healthful procedure.
Concept: Start with a toothpaste formulated for animals; human toothpaste should not be used.
Discussion: Animal *dentifrices* are flavored to increase patient acceptance. Flavors include fish, poultry, beef, and malt. While this may seem unappetizing to us, to the animal this is more acceptable than mint. The toothpaste also does not foam!
Concept: Selection of a toothbrush is the next point of information to share.
Discussion: Adult human toothbrushes are too large for any cat or small dog. A toothbrush designed for cats and dogs come in a variety of sizes and shapes. There are two alternatives to a toothbrush; a plastic, thimble-like device that fits over the index finger or the use of a gauze sponge wrapped around the index finger.

The toothbrush or finger brush is inserted between the upper and lower arcades, rotated upward to brush the upper *buccal* surfaces of the teeth, and then rotated downward to brush the buccal surfaces of the lower teeth.

The *lingual* or inner surface of the teeth may be difficult for owners to get the pet to open its mouth and permit brushing on the lingual surface of the teeth. With patience, this is accomplished, but it takes time. To start, have the owner concentrate on the buccal surface only.
Concept: Owner and patient acceptance of brushing is dependent upon making the experience a positive one for both.
Discussion: Pets should be introduced to daily dental care at an early age. In time, they look forward to the human–animal interaction, and the process becomes pleasurable for both the pet and the owner. It takes time and patience to reach this stage, but the owner should be encouraged to persist.
Discussion: Patient acceptance at any age begins with the owner and the pet in a comfortable position, toothpaste and brush at hand. A small amount of toothpaste is placed on the tip of the finger and the pet is allowed to smell it. All the time, the owner is softly talking to the pet and giving it encouragement and praise. Often the pet will actually lick the paste off the fingertip. If not, wipe a small amount of the toothpaste on the inside of the lip; this will often stimulate the pet to try the toothpaste. Once the pet familiarizes itself with the paste, the owner places a small amount on the brush. Again the pet is allowed to sniff the paste. After a moment the brush is inserted into the pet's mouth and just held still. If there is acceptance slowly move the brush up and down on the buccal surface of the teeth. If the patient struggles, the owner should stop moving the toothbrush. Allow pet to grow accustom to the brush once more. The process is repeated until all

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teeth are cleaned. At least once daily, brushing is recommended to improve gingival health and to prevent mineralization of plaque.

Concept: There are other products that can be used if the owner is unwilling to take the time to brush the pet's teeth. These are also an alternative for an obstinate or resistant pet.

Discussion: Chlorhexidine rinses can be used once or twice daily. It can be spritzed or smeared on the tooth surfaces with a sponge-like applicator. It reduces the bacteria that cause plaque for up to 12 hours. Some animals do not like the taste.

Special chews can be used such as Greenies or Dentistix, which have the ET enzymatic product impregnated into the chew. Kongs or rawhide chew toys will also clean the buccal surfaces. Care must be taken if using these items as large pieces softened by chewing are pulled from the toy and can be swallowed and can cause an intestinal obstruction.

Dental wipes impregnated with a chemical to help prevent the formation of calculus. As the name implies, they are simply wiped over the dental surfaces.

Prescription diets and pet store brands formulated to inhibit the development of plaque contain phosphorous compounds. This slows the mineralization of plaque into the harder calculus and is designed to make brushing more effective.

A friendly phone call from the veterinary assistant during the first weeks of orientation to dental care encourages the owner, reduces problems, and helps to establish a lifelong habit of daily dental care.

Concept: Client education also covers prevention of dental injuries.

Discussion: Dental fractures are associated with chewing on hard substances such as whole bones and hooves. Cooked or raw bones of any size are a risk of dental fractures. *Animals should never be allowed to chew on anything harder than their own teeth.*

Concept: Prepare a client education bin of hospital-carried dental products for use in the examination rooms.

Discussion: Include a daily dental care sheet describing how to brush a pet's teeth. A set of dental models to demonstrate brushing is also a helpful teaching device when describing the process to the owner. Have a sample of all the products the facility dispenses and/or recommends in the dental bin.

Concept: The veterinary assistant can introduce hospitalized patients to daily dental care.

Discussion: Discuss with the veterinarian a procedure for introducing each patient to dental care while hospitalized. An in-hospital dental bin is prepared to use with hospitalized patients. The toothbrush used and a sample of toothpaste are then sent home with the patient at the time of discharge.

Procedure

Location: Kennels and wards, examination rooms

PREPARATION

1. Prepare a "demonstration dental care" bin to be used in the examination rooms. The list of items can come from the Veterinary Oral Health Council (VOHC) Seal of Approval http://www.vohc.org/:
   a) dental models, one each of a dog and a cat
   b) home dental care sheets (Make several copies and place a master in the manila folder.)

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c) every one of the dental items carried by the veterinary facility including brushes, toothpastes, and dental diets
d) 1×1 in. ga squares in a small ziplock bag
e) a squeeze bottle of tap water (Label it as such.)
f) Clipboard with paper and pen for recording client demonstration information.

2. Using items in the Dental Demonstration bin, practice demonstrating and explaining dental brushing to someone until you feel comfortable.

PROCEDURE

1. When you feel you are ready, ask the practice manager or the veterinarian if you can speak with every new client and every new puppy or kitten owner about dental care.
2. Demonstrate the brushing process to the owner using a dental model before the patient is brought into the examination room.
3. Explain the home dental care sheet; make recommendations for patient acceptance.
4. Show the client the products available and, if switching the diet, how to accomplish this.

FOLLOW-UP

1. Make at least two follow-up phone calls to the owner during the first 10 days after discharge. Discuss any problems encountered in patient dental care, especially patient acceptance of the procedure. Encourage the owner to persist in daily brushing.
2. Replenish supplies in the dental bin, especially the handouts.
3. Maintain a list of clients and follow up on your demonstrations. You are now the marketing expert for the practice of dental health.

Tip Box 12.5: **Encourage every owner to clean their pet's teeth on a daily basis.**

RESOURCES

Bassert, Joanna M., & Thomas, John. (2013). *McCurrin's Clinical Textbook for Veterinary Technicians*, 8th ed. St. Louis, MO: Elsevier.

Bonham, Margaret H. (2006). *Dog Grooming for Dummies*. Somerset, NJ: Wiley.



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

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CHAPTER

13

PATIENT CARE III

NATALIE CLAWSEN



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Determine and record a patient's vital signs:
   a) body weight
   b) body condition score (BCS)
   c) respiratory rate
   d) pulse and heart rate
   e) body temperature
   f) monitor a patient's pain level.
2. Accurately sex mammals including
   a) cat
   b) rabbit
   c) rats, mice, and gerbils
   d) guinea pigs.
3. Prepare and restrain a patient for IV catheterization.
4. Maintain catheter patency.
5. Replace a bandage at the catheter site.
6. Evaluate the catheter puncture site.
7. Clean a wound.
8. Apply a simple bandage.
9. Remove a simple bandage.
10. Maintain a crash cart and emergency station.
11. Assist effectively during a patient emergency.
12. Support a patient's emotional well-being.
13. Comfortably maintain the recumbent patient.
14. Prepare for placement of a feeding tube.
15. Maintain and manage a feeding tube.
16. Assist throughout the euthanasia process.

INTRODUCTION

Vital signs are parameters that are measured each time a patient is evaluated, be it a routine visit, a sick appointment, or hospitalization. These parameters may be measured repeatedly during hospitalization and surgery to monitor trends.

Vital signs include

1. body weight
2. body condition score (BCS)
3. pulse or heart rate
4. respiratory rate
5. temperature
6. pain evaluation.

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TASK 13.1
VITAL SIGNS

Concept: Learn to take and record all patient vital signs.
Discussion: Often, the assistant or a credentialed technician performs the initial vital sign assessment in an exam room before the veterinarian sees the patient. Likewise, when patients are hospitalized, the assistant is usually responsible for monitoring vital signs and recording the information.
Concept: Establish a routine for determining vital signs.
Discussion: An assistant should consider ways to reduce time and effort in every task performed. Establishing a routine creates efficiency and prevents oversight in most cases. Consider placing scales outside the exam room so the patient can be weighed before it enters the room. Place the patient record and pen within reach. Once in the exam room, begin with the vital signs that can be monitored with observation only (respiratory rate/effort and BCS), allowing the patient a moment to adjust to the new setting. Using a "head-to-tail" order, continue the assessment for the remaining vital signs by first introducing yourself to your patient. As you pet the patient on the head and talk to it, move backward to the chest, obtaining a heart rate and respiratory rate or back to the groin for a pulse rate, leaving body temperature for last. All veterinary assistants must keep nursing supplies with them at all times to allow efficiency. Review the detailed list of nursing supplies recommended in Chapter 2. Refer to Appendix G for normal vital signs in common animals.

TASK 13.1.1
DETERMINING THE BODY WEIGHT AND THE BODY CONDITION SCORE

Concept: A patient's weight is a valuable information when monitoring health trends as well as a necessity for calculating drug dosages.
Discussion: Weight is measured in both kilograms and pounds. Veterinary facilities usually have two scales, one for patients weighing less than 20 lb and a platform scale for heavier patients. Operation of the scale depends on type. After weight determination, take a quick BCS (see Appendix H).
Concept: BCS is based on a five or nine-point score, depending on the scale being used.
Discussion: This system can be used for all animals from cats to sheep. Scoring is as follows:

5—*Obese:* The back is broadened when observed from above. The ribs are covered with a heavy layer of fat, making them hard to palpate. A heavy fat layer covers the bony prominences from the hips to the shoulder. In cats, the belly is pendulous.

4—*Overweight:* The back is slightly broadened when viewed from above. There is a moderate layer of fat over the bony prominences. The ribs are still difficult to palpate. The tail base is thickened with fat in dogs as is in the cow.

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3—*Ideal:* The ribs are easily palpated under a thin layer of fat. Bony prominences are visible but have only a slight layer of fat over them. Both dogs and cats have a visible waistline.
2—*Underweight:* When viewed from above, the patient develops an hourglass shape due to the tuck between the thorax and the pelvis. No fat is felt over the bony prominences and ribs.
1—*Very thin:* The hourglass shape over the back is very pronounced. The ribs are prominent. When viewed from the side, the abdomen is more severely tucked up toward the back.

BCS charts can be purchased through many major food companies or you may visit reputable websites such as www.vet.osu.edu/1851.htm or www.uaex.edu/other_Areas/Publications/PDF/FSA-4008.pdf to review both small and large animal charts.

Procedure

Location: Scales may be located in the lobby area near the examination rooms or in the treatment room. BCS is evaluated in the examination room.

PREPARATION

1. Based on the size of your patient, select the appropriate scale.
2. Know how to use each scale. Know if it records in the metric system (kilograms), the American system (pounds), or both.
3. Have the patient record in hand.
4. Check the scale to determine cleanliness. Sanitize if needed.
5. Know the body condition scoring system. Have a copy of the BCS diagram nearby for reference.
6. Balance the scale to zero before placing the patient on the scale.

PROCEDURE

1. Place the patient on the scale, providing minimal restraint.
2. Determine the patient's weight.
   a) If using a digital scale, allow time to reach and maintain the maximum weight.
   b) If using a bathroom scale, weigh yourself first then reweigh yourself while holding the patient. The difference between the two weights is the patient's weight. This technique is useful for animals that will not stay on a scale long enough to determine a weight. It is not used for very lightweight or very heavy patients.
3. Record patient's weight on the medical record. Record as kilogram or pounds. *Example*: weight: 10 kg/22.2 lb.
4. Stand above the patient and notice its body shape from above.
5. Observe the patient from the side.
6. Palpate the ribs and bony prominences.
7. Determine then record the BCS. *Example*: BCS: 3/5 or 5/9.

FOLLOW-UP

1. Clean and disinfect the scale.

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Tip Box 13.1: **Keep spray bottles of disinfecting cleaning solution, paper towels, and a box of examination gloves adjacent to the scales for quick and easy cleaning.**

TASK 13.1.2 DETERMINING THE RESPIRATORY RATE

Concept: Respiratory rate is measured by observing the number of breaths in one minute. One inhalation and exhalation cycle equals one breath.
Discussion: A panting or frightened patient can breathe so rapidly that accurate measurement is difficult. In this circumstance, simply note on the medical record that the patient was panting. Shallow respirations are difficult to see. Observe the abdomen just caudal to the rib cage to facilitate visual determination of the respiratory rate or auscultate the patient using a stethoscope over the dorsolateral aspect of the thorax.
Concept: Stress can increase heart rate and respiratory rate.
Discussion: In response to stress, epinephrine may be released from the adrenal glands. Following the surge of epinephrine (also known as adrenaline), a patient's heart rate will likely increase, leading to an increase in oxygen demand, thereby increasing the respiratory rate. Always consider ways to minimize stress for patients. If possible, attain a respiratory rate while the patient is comfortable and relaxed with the owner. Perhaps the pet is asleep in the owner's lap or in a carrier. Reducing stress for the patient reduces time and effort in the exam room, freeing you for another task.
Concept: Note the rhythm, sound, and effort of the respiratory cycle.
Discussion: Because assistants and licensed technicians often see the patient before the veterinarian, it is important to note any abnormalities and to report them immediately to the doctor. Is the rhythm regular? Are there any abnormal sounds with the patient's breathing? Is there increased effort? Is the patient *orthopneic* (sitting or standing, neck extended, front legs abducted from body)?

TASK 13.1.3 DETERMINING THE PULSE AND THE HEART RATE

Concept: A pulse and a heart rate are not the same thing.
Discussion: A pulse is a palpable measurement created by the combination of *cardiac output* and *systemic vascular resistance*. It is defined as the difference between peak *systolic* and minimal *diastolic* pressures. A heart rate is defined as the number of heartbeats per minute. It is possible to have a heartbeat that does not create a pulse. This is called a pulse deficit.

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For this reason, it is important to compare the two by palpating the pulses while auscultating the heart.

Concept: The pulse in small animals is most commonly felt along the femoral artery deep within the groin.

Discussion: Use the fingertips placed along the medial aspect of the thigh above the knee and close to the hip joint. Apply light pressure. Once the pulse is located, count the number of pulses felt during a 15- or 30-second period. Multiply the number of pulses by 4 for a count of 15 seconds and by 2 for a count of 30 seconds. This equals the number of pulses per minute. The level of difficulty in obtaining a pulse rate can increase with patient motion, hypotension, patient obesity, and so on.

The characteristic of the pulse is described using terms such as thready, bounding, weak, strong, irregular, or regular. While learning to correctly describe a pulse, have a knowledgeable team member check your determinations.

Concept: Once the femoral pulse has been felt, use a stethoscope and listen to the heart, counting the number of heartbeats, and listen to the heart sounds.

Discussion: When using a stethoscope, the ear tips of the stethoscope are placed facing forward in the wearer's ear canals. The diaphragm of the scope is placed over the left side of the chest just above the sternum, near the *costochondral* junction, and behind the left elbow. Once the heart sounds are located, the number of heartbeats per minute is determined (using the same multiplication instructed earlier) and recorded. If this technique is used, record it as a heart rate rather than a pulse rate. Occasionally, it will seem like the heart skips a beat while you are listening. If this occurs, watch the animal; if it is taking a breath as the heartbeat disappears, this is called sinus arrhythmia and is considered normal.

The arteries in horses are so large that there are any number of locations for pulse determination varying from the coccygeal artery under the base of the tail and the dorsal metatarsal artery on the lateral aspect of the hind limb near the hock. The most convenient artery is the facial artery as it runs along the medial aspect of the mandible.

Procedure

Respiration and Heart Rates

Location: Performed every day in the examination room, treatment area, or surgery room

PREPARATION

1. Prepare a card for your reference book entitled "Normal Values."
2. Use Appendix G to prepare a table on your card that lists these animals with their vital signs: cat, cow, dog, ferret, goat, horse, pig, sheep, and rabbit.
3. Have the patient's medical record at hand.
4. Wear a wristwatch that measures seconds.
5. Keep your personal stethoscope around your neck at all times.

PROCEDURE

1. Have the patient stand if possible.
2. Locate the femoral pulse; note the characteristics of the pulse.
3. Count the number of pulses in 15 seconds.
4. Multiply by 4 and record the pulse as ___ppm, and characteristics.

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5. Using a stethoscope, auscultate the heart and check for pulse deficits.
6. Count the heartbeats for 15 seconds and multiply by 4; record your results as ___ bpm.
7. Using a stethoscope, auscultate the lungs; listen for breath sounds in all four quadrants.
8. Mark the record with clear breath sounds or describe the sounds you hear. If the animal is struggling to breath, describe that as well.
9. Watch the rise and fall of the chest that is one respiration; count for 15 seconds and multiply by 4; record your results as _____ rpm.
10. Record the data on the patient medical record under "Pulse" or "Heart Rate," depending on which you obtained.

FOLLOW-UP

1. If in doubt about the rates, repeat the observation or auscultation for a longer period (30 or 60 seconds).
2. If the heart rates are too fast, you can count for 6 or 10 seconds and multiply by 10 or 6, respectively. This is not as accurate, but neither is losing your place when counting for 15 seconds!
3. Always have a credentialed technician or fellow team member check your observations if you are not certain of the results.

TASK 13.1.4 DETERMINING THE CORE BODY TEMPERATURE

Concept: Core body temperature in animals is usually determined rectally. More recently, veterinary facilities have begun using ear thermometers to measure body temperature by measuring infrared heat in the ear canal. An aural temperature is not considered to be a core body temperature; however, the results are considered accurate enough by comparison.
Concept: Digital thermometers and the standard glass mercury thermometers are used rectally.
Discussion: Human thermometers are used in veterinary patients. Thermometers are calibrated in either Fahrenheit or Celsius scale. A Fahrenheit thermometer has numbers from the 90s to the low 100s. In the Celsius scale, numbers are in the 30s and 40s. Temperatures are recorded as degrees F or C, respectively.

The thermometer tip is well lubricated using a water-soluble lubricant, such as K-Y Jelly, before being inserted into the rectum. Alternatively, a prelubricated protective sheath can be placed over the thermometer. Gently rotate the thermometer during insertion to ease entry. Do not force the thermometer into the rectum. Make certain the probe is placed deeply enough to have entered the pelvic canal but not beyond. Maintain the thermometer in the patient long enough to get an accurate reading. Most digital thermometers have an internal timer; however, a wristwatch is needed when a glass mercury thermometer is in use. Hold the thermometer in place by simultaneously wrapping the fingers of the freehand around the thermometer and the base of the patient's tail. If the patient moves, the thermometer moves with the patient. If the thermometer is not held in place, the patient can force it out.

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Digital Rectal Thermometer

The digital thermometer is the quicker and easier method of temperature determination. The probe is lubricated or better covered with a prelubricated, disposable, plastic sheath before insertion into the rectum. If the sheath is not prelubricated, lubricate in the same manner as the glass mercury thermometer. A beep or flash will indicate when the temperature measurement is complete.

Glass Mercury Thermometer

Before each use, the glass thermometer is shaken down using a series of quick snaps of the wrist until the mercury line is below the markings of the scale. Use caution when doing this. Stand away from all objects and solid surfaces. The accidental hitting of an object will result in breaking the thermometer. In addition to the actual cost of replacing the thermometer, valuable time is lost cleaning the debris. Mercury is a hazardous waste, and cleaning requires the use of a special mercury spill kit.

Glass thermometers are customarily stored in a disinfectant-containing holder on the counter of the examination room. When the thermometer is removed from the holder, it is wiped down with a cotton ball soaked in alcohol. The glass thermometer is lubricated, inserted into the rectum, and held in place similarly to the digital thermometer. It is retained within the patient for an absolute minimum of 2 minutes timed by a watch or a clock. Once it is removed, the thermometer is wiped down with the previously used, alcohol-soaked cotton ball or the protective sheath removed.

In large animals, the thermometer has a small loop at the end to which a length of string is tied. The opposite end is attached to an alligator clip or hemostat. The thermometer is inserted rectally and the clip is attached to the hair on the tail. This prevents the thermometer from falling out onto the floor or being lost within the patient's rectum.

Concept: To read a glass mercury thermometer, rotate it until the colored bar, which is usually white or silver, lies on the side directly opposite the number scale.

Discussion: The mercury bar is seen between the two surfaces. The thermometer is marked in 0.2 of a degree. The longer line denotes the full degree. Many thermometers only have every other degree written out. For example, 100°, 102°, and 104° are adjacent to the long line. Between the long degree lines, the short lines each represent 0.2 of a degree. Once the thermometer is read, it is returned to its holder on the counter.

Digital Ear Thermometer

Very much like the ear thermometer used in children, there is a digital ear thermometer that can be used in animals. It does not record core body temperature but is accurate enough for everyday use. Do not use an aural thermometer in an ear showing signs of infection or inflammation. Most will object to this method more than the rectal thermometer. Be sure to disinfect or discard disposable tips after each use.

Procedure

Location: Performed every day in the examination room, treatment room, or surgery room

PREPARATION

1. Have the patient's medical record at hand.
2. Know how to use each thermometer available in the facility.

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3. Have all the materials needed on the counter and ready to use:
   a) *Digital Thermometer:* alcohol-soaked cotton ball and lubricant and disposable protective sheaths
   b) *Glass Thermometer:* alcohol-soaked cotton ball and lubricant
   c) *Ear Thermometer:* alcohol-soaked cotton ball or disposable probe.
4. Place the patient on examination table, unless it is too heavy to lift.
5. Have the patient restrained in the standing position or in lateral recumbency.

PROCEDURE

1. Make certain the thermometer is calibrated to zero or, if glass, shaken down below the lines on the scale.
2. Place one hand around the base of the patient's tail. Elevate the tail, exposing the anus.
3. Gently insert the thermometer into the rectum deeply enough to completely cover the recording portion of the probe in patients weighing less than 5 lb and more deeply in larger patients.
4. Hold the thermometer in place by simultaneously wrapping your fingers around the base of the tail and the thermometer.
5. Allow the thermometer to remain in place long enough to determine an accurate recording: a minimum of 3 minutes for a glass mercury thermometer or until the thermometer beeps for a digital thermometer.
6. Remove the thermometer. Either remove the protective sheath or wipe with the alcohol-soaked cotton ball as appropriate.
7. Read the thermometer.
8. Record the reading in the patient's medical record. Remember to indicate whether Celsius or Fahrenheit. *Example*: $T = 102.2$°F.

FOLLOW-UP

1. Clean and disinfect the instrument used.
2. The disinfectant in the thermometer holder is replaced daily to weekly depending on frequency of use, and the interior and exterior surfaces of the holder cleaned with soapy water and rinsed well before refilling with disinfectant. Create a task card as a reminder of this maintenance procedure in your weekly section.
3. Return to the proper location.

TASK 13.2
PAIN EVALUATION AND MONITORING

Concept: Animals suffer pain.
Discussion: Pain may or may not be a vital sign depending on the authority cited. Regardless, alleviating pain and suffering is an important and essential job within the veterinary profession. In order to alleviate it, we must first recognize it then monitor it during treatment.

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Concept: Various pain scales have been developed in an effort to standardize pain evaluation; however, no gold standard has come forth.
Discussion: If your workplace uses a specific pain assessment evaluation, then memorize it and apply it to all patients. A credentialed veterinary technician or veterinarian is responsible for scoring a patient's pain level; however, assistants are vital in recognizing symptoms of pain through monitoring. Review Appendix J for an example of a pain scale for dogs and cats. These are only two of many. None are perfect.

1. Pain can be chronic or acute.
2. How pain is exhibited is influenced by the environment.
3. How pain is demonstrated varies by species, breed, sex, age, and the presence of fear.
4. Pain causes behavioral changes, increased heart rate, respiratory rate, arterial blood pressure (BP), and pupil dilation.

Concept: Pain evaluation is subjective.
Discussion: Pain evaluation is prone to error because it is very objective. Lack of change in a patient's behavior does not mean pain is absent. Prey animals mask pain as a protective mechanism. If you show pain you are targeted by predators for supper!
Concept: Pain delays healing.
Discussion: Learn to recognize patient behavior and to consider pain as an underlying reason for changes in behavior. The rule of thumb is "If a procedure would hurt you, it hurts your patients." Keep a painful patient in a clean, quiet environment. Uncontrolled pain can cause tachycardia, tachypnea, and hypertension in addition to behavioral changes. The altered blood circulation, BP and the brain's chemical response to pain slows healing.
Concept: Pain can cause a change in behavior.
Discussion: Changes in behavior are often subtle. Common observations are vocalization, fear of being touched, shivering, reluctance to move, restlessness (cannot get comfortable), facial expression, mental depression, poor attitude, and of course, vital signs. Eating and self-grooming will be diminished to absent in the presence of pain.
C**oncept:** Many disease processes cause pain.
Discussion: Do not consider trauma or surgery as the only causes of pain. Table 13.1 provides a wider perspective of potential pain-causing processes.

Review the pain control management with the veterinarian. Follow it scrupulously. It is much easier to stay on top of pain control than trying to play catch-up. Occasionally, animals will not "follow" the rules, and if breakthrough pain is noted, alert the veterinarian to the change.
Concept: Psychological pain exists.
Discussion: Currently, there is no mechanism to measure it.

Procedure

Location: Every patient should be evaluated for signs of pain. Monitoring may occur in the examination and/or treatment rooms or cage side in the wards.

PREPARATION

1. Locate individual pain management procedures under the date and "P" of the patient's SOAP notes in the medical record.

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Table 13.1
Frequently Overlooked Causes of Pain

Type of Pain	Cause
Cardiopulmonary	Congestive heart failure (pulmonary edema and pleural effusion); pleuritis, cerebral vascular accident, thromboembolism (clot)
Oncological	Any and all cancer.
Dermatologic	Otitis, severe pruritus, burns, chronic wounds; abscess, cellulitis, clipper burns, urine scalding, severe chin acne
Dental	Oral tumors, feline oral resorptive lesions ("neck" lesions), fractures (no matter how small), tooth abscess, ulcers, stomatitis
Gastrointestinal	Constipation, obstipation, obstruction, megacolon; anal sac impaction; hemorrhagic gastroenteritis, pancreatitis, gastric dilatation and volvulus (GDV), foreign body
Musculoskeletal	Most often overlooked in cats; muscular soreness, arthritis, degenerative joint disease, tendon or ligament injury, intervertebral disk disease, facet pain of spondylosis, osteodystrophy, dislocations
Ocular	Corneal disease and ulcers, glaucoma, uveitis
Urogenital	Uroliths, ureteroliths, queening/whelping, feline lower urinary tract disease/interstitial cystitis, acute renal failure, enlarged kidneys (capsular swelling), lower urinary tract infections, urinary obstruction, vaginitis (especially in obese cats)
Hospital procedures	Restraint (examination, obtaining blood samples, radiographs, and ultrasound; even gentle handling and hard surfaces can increase pain in an already painful animal); urinary/IV catheterization, bandaging, surgery, thoracocentesis, chest tube placement and drainage procedures, abdominocentesis; manual extraction of stool and anal sac expression (especially in cats)
Surgical procedures	Ovariohysterectomy, castration, onychectomy,[a] growth removal, and all other surgical procedures
Neurological	Diabetic neuropathy

[a]Regardless of the method used, onychectomy causes a higher level of pain than spays and neuters.
Source: Reprinted with permission from the AAHA Pain Management Guidelines. Copyright ©2007 American Animal Hospital Association (http://www.aahanet.org/publicdocuments/painmanagementguidelines.pdf). All Rights Reserved.

2. Observations of the patient regarding pain are entered into the SOAP notes under the date and after the "O."

PROCEDURE

1. Whenever interacting with the patient, consider pain as part of your evaluation.
2. Patient observation is continual. Observe, observe, observe.
3. Follow the pain management plan scrupulously.
4. If breakthrough pain is noted, advise the veterinarian immediately of the change.

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FOLLOW-UP

1. Were all changes in behavior noted and recorded?
2. Was the pain management plan followed on time and as prescribed?

TASK 13.3
SEXING ANIMALS

Concept: Appropriately sexing an animal can prevent accidental breeding.
Discussion: Accidental breeding can easily occur when owners bring an animal into their house that they believe to be of the same sex as their present pet but happens to have been incorrectly sexed. This tends to be more of an issue in immature animals that are difficult to sex (i.e., cats and gerbils).
Concept: Sexing an animal is an important skill for veterinary assistants and technicians alike.
Discussion: It is common for an owner to rescue an animal, either a stray or by private purchase, and not be able to determine the sex of the animal. Larger species of mammals are fairly easy to sex from birth. Described in the following section are those species that are not as straightforward.

TASK 13.3.1
SEXING A CAT

Concept: Although it may seem humorous at first, owners often fail to correctly identify the sex of a cat, especially a young kitten.
Discussion: This may result in inappropriately naming a pet. Part of the problem arises from the fact that a very young cat's testes are small and barely visible. In a neutered adult cat, the testes are absent.
Concept: Think of a cat's genital openings as if they are punctuation marks.
Discussion: To sex a cat, gently lift the tail at its base and reflect it upward. Examine the distance between the anus and the genital opening, which is referred to as the *anogenital distance*. Determine the shape of the genital opening. The *preputial* opening in a male cat is round. It looks like a period. In the female, the vaginal opening is a slit. It looks more like a comma. The anogenital distance in the male is longer than that in the female, just as in writing there are two spaces after a period and one space after a comma. (Fig. 13.1).

Male

1. The genital opening is round.
2. The distance between the anus and the genital opening is relatively long.

Female

1. The genital opening is a slit.
2. The distance between the anus and genital opening is shorter than a male's.

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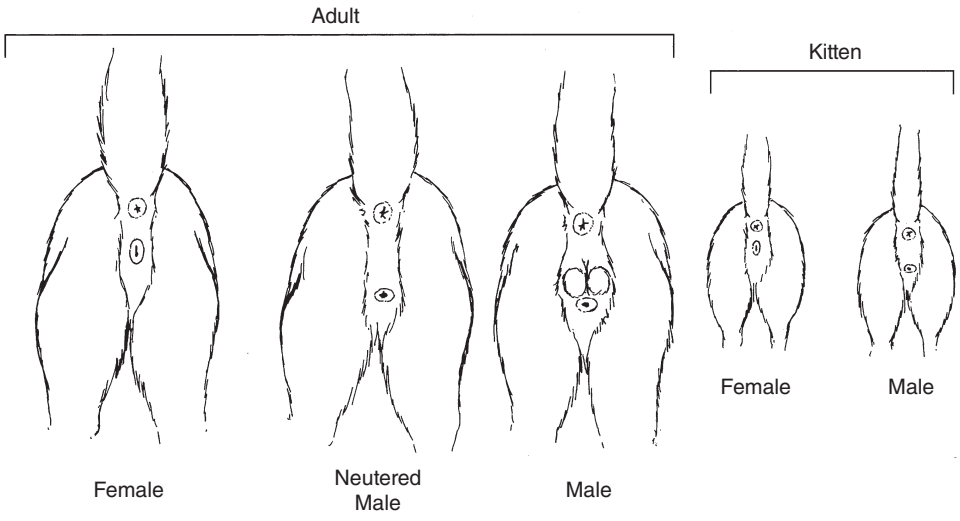


Figure 13.1. Sexing cats. A. Male. B. Female cats.

TASK 13.3.2 SEXING A RABBIT

Concept: Male rabbits have many anatomical differences, making sexing relatively easy in mature animals.
Concept: A buck's testes descend at approximately 12 weeks of age.
Discussion: The inguinal canal in a buck remains open, even after the animal has reached maturity. This allows the testes to involuntarily pass through the inguinal canal from the abdomen. Gentle pressure may be applied caudally to the abdomen causing the testes to descend.
Concept: Bucks do not have a scrotum.
Discussion: A male rabbit does not have a scrotum as with other mammalian species; however, they do have two hairless scrotal sacs that house the testicles when they descend from the abdomen.
Concept: Females have a prominent vulva.
Discussion: Due to the similar location of male and female genitalia, a female's prominent vulva may be mistaken for a prepuce. Observe the abdomen for other anatomical features like scrotal sacs if you are unsure of sex. Gentle digital pressure can be placed near the genitalia, aimed cranially to extrude the penis, if present (Fig. 13.2).

Suggestion: For pictures, check out www.per-informed-veterinary-advice-online.com/sexing-rabbits.

Male

1. Presence of two hairless scrotal sacs
2. Retractable testicles
3. The penis is caudal to the testicles and overlies the anus when held on its back.

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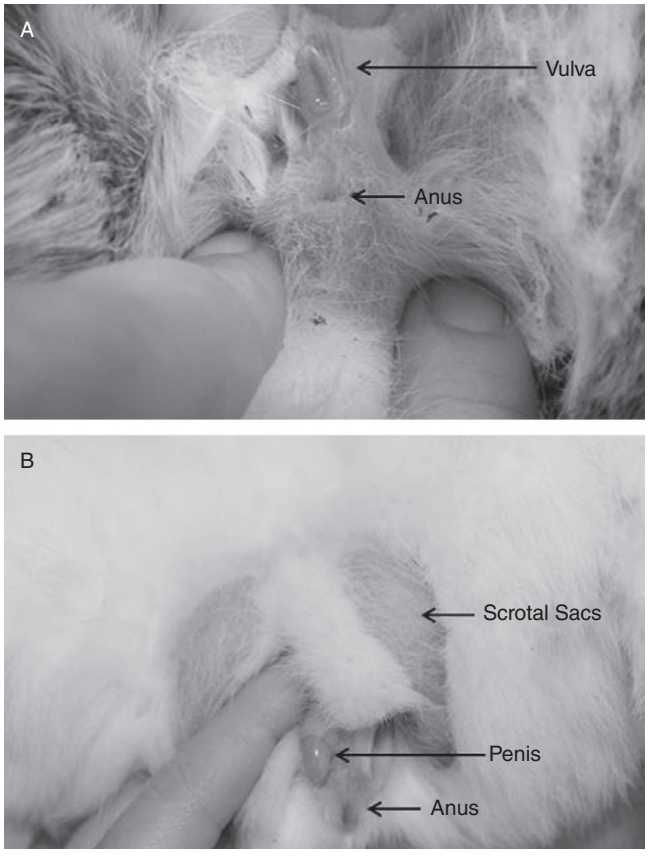


Figure 13.2. Sexing rabbits. A. Male penis is caudal to the testicles and overlies the anus. B. Female with prominent vulva. Photo courtesy of Jill Murray, Oklahoma State University.

Female

1. Prominent vulva
2. Prominent dewlap present under the neck.

TASK 13.3.3
SEXING RATS, MICE, HAMSTERS, AND GERBILS

Concept: Sexing of small mammals like rats, mice, and gerbils is generally easier in mature animals.

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Discussion: There are many differences between mature males and females of these species; however, sexing a young animal can be challenging. Female rats, mice, and gerbils have separate vaginal and urethral orifices. It can be difficult to identify the vaginal orifice in a small, immature pup. However, females of these species have nipples that are grossly observable by 10 days of age, making determination of sex generally easier.

Concept: Just as with sexing cats, the anogenital space in the male is longer than that in the female.

Concept: The absence of visible testicles does not equal a female in these species.

Discussion: The inguinal canal in males of these species remains open even after the animal has reached maturity. This allows the testes of a male to pass through the inguinal canal from the abdomen, caudally into the testicular sac. To expel the testicles, place gentle pressure below the genitalia caudally on the abdomen (Fig. 13.3).

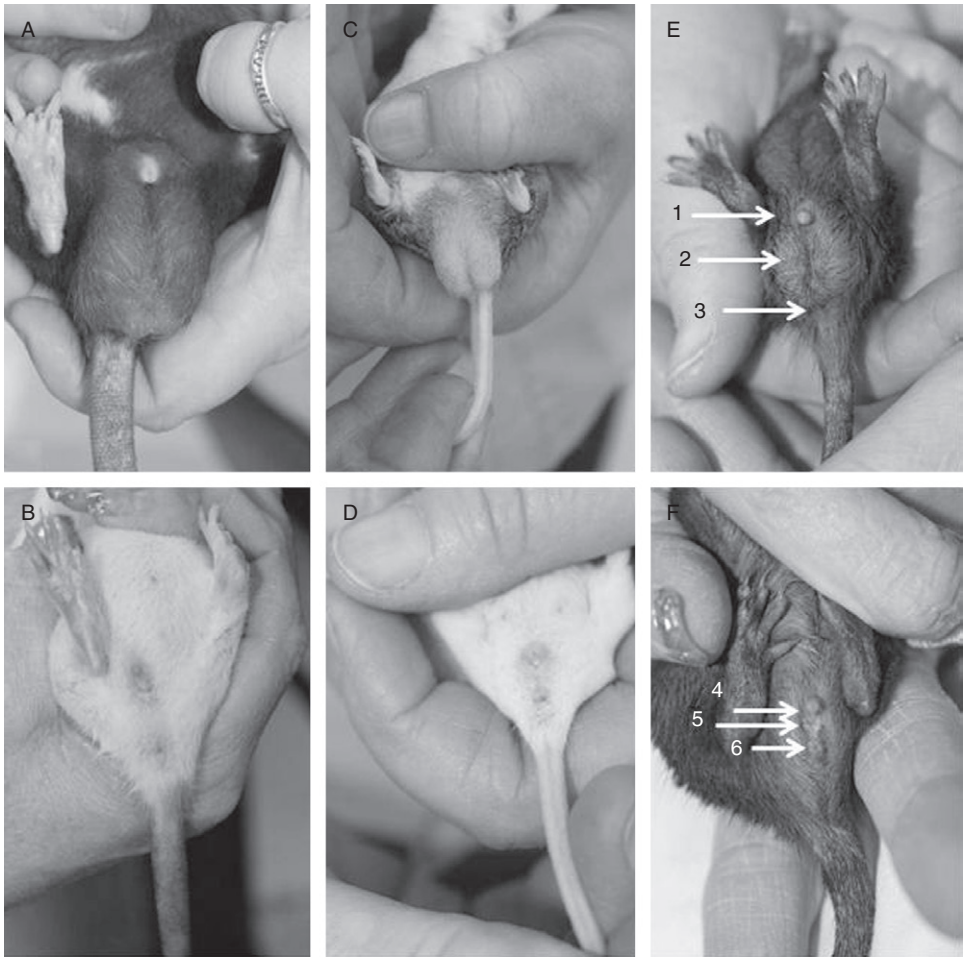


Figure 13.3. Sexing rats, mice, and gerbils. A. Male: The distance between the anus and the genital opening is relatively long. B. Female: The distance between the anus and the genital opening is shorter than a male.

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Suggestion: For pictures of sexing gerbils, check http://www.gerbils.pwp.blueyonder.co.uk/gerbils/gender.htm.

Male

1. The genital opening is round.
2. The distance between the anus and the genital opening is relatively long.
3. The testicles may or may not be observable externally.
4. Larger midventral scent gland than females (gerbils only).

Female

1. There are three separate orifices (anus, vagina, and urethra).
2. The distance between the anus and the genital opening is shorter than a male.
3. The nipples of females are grossly observable by 10 days of age in mice and in rat pups.
4. Smaller midventral scent gland than males (gerbils only).

TASK 13.3.4
SEXING A GUINEA PIG

Concept: Guinea pigs are easily sexed regardless of maturity.
Discussion: Male guinea pigs, known as boars, and female pigs, known as sows, have very distinct differences in genital anatomy.

Male

1. Large testes with obvious scrotal pouches evident in maturity (10–12 weeks of age)
2. Easily protruded penis with gentle digital pressure in immature males
3. A shallow slit running along the midline perianal tissues lies between the urethral and anal orifices (Fig. 13.4).

Female

1. There are three separate orifices (anus, vagina, and urethra) marked by a "Y"-shaped depression in the perianal tissues. This depression is evident in immature or mature sows.
   a) The vulva is located at the intersection of the "Y."
   b) The anus is located at the base of the "Y."
   c) The urethral orifice is surrounded by the "Y" branches.

Suggestion: For pictures of sexing cavies, see http://www.cavyspirit.com/sexing.htm.

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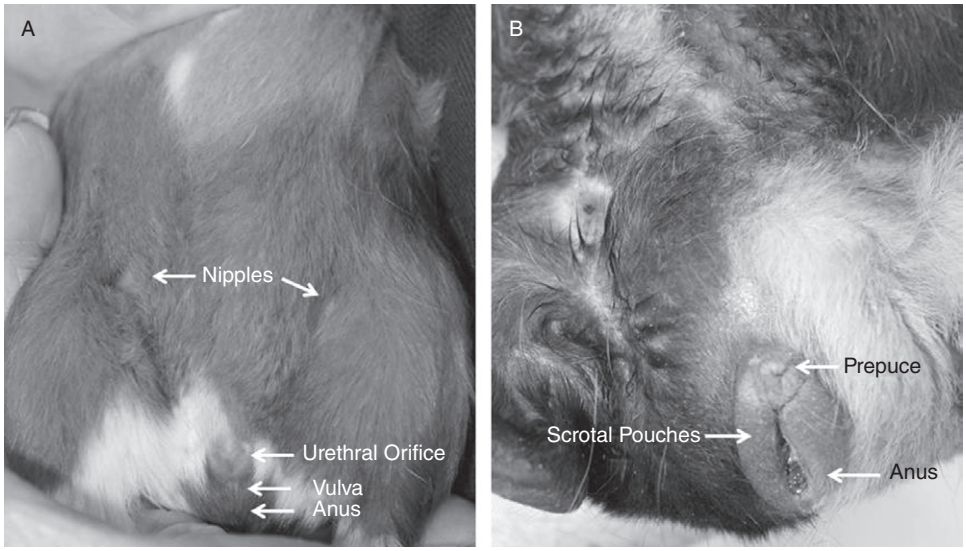


Figure 13.4. Sexing guinea pigs. A. Female guinea pig. Note the "Y" shaped depression marking the three separate orifices. B. Male guinea pig. Digital pressure may be applied to protrude the penis.

Procedure

Location: Examination or treatment room

PREPARATION

1. Have the patient's medical record on hand.
2. Locate the appropriate place to enter the patient's sex on the record.
3. Put on exam gloves.
4. Place the patient on the examination table.

PROCEDURE

Cats

1. Place hand at the base of the tail, curling your fingers around it.
2. Elevate the tail gently, exposing the anus and genitalia.
3. Note the distance between the anus and the genital orifice.
4. Observe the shape of the genital opening.

Rabbits

1. Restrain the rabbit in dorsal recumbency using extra caution to support the patient's back.
2. Elevate the tail gently, exposing the anus and genitalia.
3. Observe the patient's genitalia and the presence or lack of scrotal sacs.

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Guinea Pigs, Gerbils, Hamsters, Rats, and Mice

1. Restrain the patient in your hand in dorsal recumbency.
2. Observe the anogenital distance, the genitalia and the presence or lack of nipples.
3. Note distance between the anus and the genital orifice.
4. Observe the shape of the genital opening.
5. In guinea pigs, specifically, observe the genitalia: perianal tissues for a longitudinal slit or a "Y"-shaped depression and the presence or lack of a scrotal pouch.

FOLLOW-UP

1. Enter observations in the patient's medical record.
2. While learning to correctly sex a small mammal like cats and pocket pets, have a knowledgeable team member check your determination.

TASK 13.4 MONITORING IV FLUID ADMINISTRATION AND IV CATHETER MAINTENANCE

Concept: The cephalic vein is most frequently used for IV catheterization, allowing fluid and drug administration, but the saphenous and jugular veins are also used for this purpose.
Concept: The primary functions of the assistant relative to IV catheter placement are setup, checking patency, and monitoring the flow rate of fluids through the catheter.
Concept: *Phlebitis* can develop at a puncture site.
Discussion: The assistant is responsible for evaluating the IV catheter site daily. The IV bandage should be removed and the insertion site inspected daily. Watch for signs of infection: inflammation (redness, heat, swelling, and pain) and fever. The IV indwelling catheter should be replaced every 48–72 hours, even if inflammation or infection does not develop; the veterinarian or credentialed technician does this.
Concept: Many animals are curious about the tubing attached them.
Discussion: Patients often chew or lick at the bandaging or IV tubing itself. This is important to monitor not only to avoid the added cost of replacing IV tubing but also to avoid ingestion of a foreign body as well. An Elizabethan collar or a basket muzzle on the patient will prevent oral access to the site. Noxious substances applied to the bandage are also deterrent for some patients.

Flow Rate

Concept: The veterinarian determines the total volume of fluids to be administered to a patient and the amount of time over which it is administered.
Discussion: There are two ways in which these fluids can be administered: (1) by using a drip set attached to the bag and manually setting the drip rate by counting the number of drops per second and (2) by using a fluid infusion pump to regulate the flow rate of fluids into the patient. The flow rate is adjustable and each pump will have directions for adjusting the flow rate. Infusion pumps also have an alarm that sounds when fluids are no longer passing

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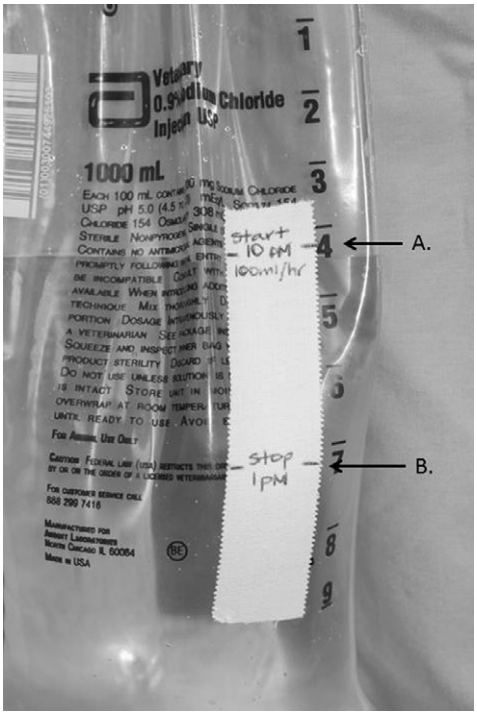


Figure 13.5. Marking the fluid bag. A. The initial volume and time are marked in pen on the tape at the top level of the fluid line. B. The final volume desired and the time administration should be completed are marked on the tape adjacent to the final fluid level.

through the tubing, as when an obstruction occurs or when the IV fluid container/bag is empty. Caution fluid pumps can stop working properly and should be monitored closely.

The assistant sees the order carried out by adjusting and monitoring the flow rate of fluids through the catheter. A piece of adhesive tape is placed along the length of the IV fluid container/bag. The initial volume and time are marked in pen on the tape at the top level of the fluid line. The final volume desired and the time administration should be completed are marked on the tape adjacent to the final fluid level (Fig. 13.5).

TASK 13.4.1 PREPARATION OF A PATIENT FOR IV CATHETERIZATION

Concept: The aseptic technique is always used when a catheter is placed for any reason other than euthanasia.

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Discussion: Cather placement is highly specialized. It is limited to the credentialed technician or the veterinarian. IV drug administration for induction of anesthesia, blood products, and for chemotherapy should also be limited to the technician or the veterinarian. The assistant can be of help in getting supplies laid out for the procedure. These would consist of

- two or three IV catheters 24 ga for cats, 22 ga for small- to medium-sized dogs, and 20 ga for large dogs.
- one injection cap or T-port
- 3 × 3-in. gauze sponges
- a roll of 1-in. adhesive tape—tear a length to go around the leg at least twice
- a roll of elastic or Vet Wrap
- antiseptic ointment
- container of alcohol and cotton balls
- container of surgical scrub-soaked gauze sponges
- vial/container of heparinized saline (1–5 IU/mL): Inject 100–500 IU heparin into 100 mL NaCl
- vial of sterile saline (10–50 mL)
- bandage scissors
- one to two 3-mL syringes with needles
- bag of fluids as per veterinarian's orders
- IV drip set
- IV pump, if available
- electric clipper.

TASK 13.4.2 MAINTAIN CATHETER PATENCY, SITE, AND BANDAGE

Concept: There are several problems associated with fluid administration that the assistant can watch for and help with.

Discussion: Flow has stopped because the catheter or tubing is kinked. This often happens when the patient holds its front leg tucked in tight against its body. This is corrected by placing the animal's leg in an IV splint that is produced specifically for extending the forelegs of patients to prevent the elbow from bending.

The flow has stopped because a clot has formed inside the catheter. When this occurs, the catheter is removed and placed in a different vein. To prevent this from happening, the catheter is flushed with 0.9% sterile saline (sodium chloride) or *heparinized saline* to remove any backflow of blood remaining in the catheter when it is placed. It is also flushed every time the IV set is detached from the catheter or every 4 hours if the patient is not receiving IV fluids. The volume of flush administered depends on the size of the patient, the fluid flow rate, and the medical condition being treated. If a small kitten is receiving 3 mL/h of IV fluids, consider flushing with 0.5 mL saline. Likewise, if a giant breed dog is receiving 144 mL/h of IV fluids, flushing the catheter with 3 mL saline is acceptable for the patient's size and flow rate.

Concept: IV bandage maintenance is an important part of an assistant's duties.

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Discussion: Observe how the bandage around an IV catheter is placed to determine how it is removed. Only the *tertiary* wrap is removed each day and is usually a nonadhesive tape like Vet Wrap. Do not disturb the catheter or the adhesive tape that immediately attaches the catheter to the skin.

Palpate over the catheter. Note any redness, firmness, swelling, *pitting edema*, or increased heat in the area. Note any discharge from the puncture site visible on the adhesive tape. If any of these conditions are seen, notify the veterinarian or credentialed technician before rewrapping. If everything looks good and the catheter is patent, replace the tertiary wrap. Every third day, a new catheter is inserted even if no complications around the catheter site are seen.

The technical skills of catheter maintenance, adjustment of flow rate, and maintenance of patency all begin with the basic skill of patient observation.

Procedure

Location: Treatment room or cage side in an animal housing area

PREPARATION

1. Confirm patient identity and have the patient's medical record at hand.
2. Gather supplies:
   a) adhesive tape
   b) Vet Wrap or other elastic wrap
   c) bandage scissors.
3. Prepare a 3-mL syringe with a needle filled with sterile flush of saline solution, heparinized saline solution, or lactated Ringer's solution.
   a) To prepare a heparinized saline solution, you pull 1 cc of heparin into a syringe and then shoot it all back into the heparin bottle. Then, using the same needle, pull 3 mL of saline into the syringe. Enough heparin stays in the needle hub to make the correct dilution.
4. Have someone restrain the patient.
5. Put on gloves.

PROCEDURE

1. Observe the flow of IV fluids. If the flow has stopped, diagnose the problem.
   a) Extend the patient's leg by grasping the foot to extend the elbow, and if fluid flow returns, place an IV splint or Mason-Meta splint to extend the elbow.
   b) Remove the IV tubing from the infusion pump and rethread.
   c) Detach the IV fluid line, capping it to prevent contamination; occlude the vein and try to draw blood into the catheter. If blood flows, flush the catheter with sterile saline or heparinized saline and reattach the line. If no blood can be pulled, the catheter needs to be removed and placed in a different vein.
2. Using the blunt end of the bandage scissors, cut through the tertiary bandage layer. The IV tubing may be taped to the tertiary bandage to reduce tension on the catheter so be careful not to cut it as you remove the wrappings!
3. Unwrap the secondary bandage (gauze wrap). Do not remove the primary tape holding the catheter to the skin.

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4. Examine catheter site visually and by palpation. If it is normal, rebandage by replacing each of the bandage layers. Inform the veterinarian or the technician if the following occurs:
   a) swelling, pitting edema, inflammation, *or* the skin has a bruised catheter that is no longer in the vein and needs to be removed and placed in another vein. The veterinarian will prescribe antibiotics for the patient if necessary.
5. After the examination, follow the veterinarian's directions for continuing care and use of the venipuncture site.

FOLLOW-UP

1. If you are uncertain about the appearance of the site for any reason, have it examined by the veterinarian or the technician.
2. Do not place the bandage on so tightly that it impairs circulation. Monitor the patient's toes throughout the day for swelling, a sure sign the bandage is too tight.
3. Use little or no adhesive tape on the tertiary layer to adhere to the skin. It makes it too difficult to remove the bandage and risks dislodging the catheter.

Tip Box 13.2: **Always leave a small tab at the end of tape, both on the roll and on a patient's bandage. It is not only courteous to your teammates, but also reduces time and effort in finding the end of the tape.**

TASK 13.5
WOUND CARE AND BANDAGING

Concept: Wound care begins with clipping and cleaning.
Discussion: Cleaning a wound entails a sequence of prescribed steps.
Discussion: While performing them, remember that tissue is fragile. Do not cause further damage by handling the area roughly. Always wear gloves to protect yourself.
Concept: Wound edges are clipped to remove hair.
Discussion: The hair is removed to facilitate cleaning and healing. If the wound is caked with mud or debris, it should be rinsed off as this will damage your clipper. Place a water-soluble lubricant (sterile K-Y jelly—do *not* use the same tube used for lubricating thermometers!) or saline-soaked gauze sponges in the wound prior to clipping to prevent further contamination of the wound with the clipped hair. Using clipper lubricant on the clipper blade also aids in keeping the clipped hair in a clump rather than individual loose hairs that can contaminate the wound further.
Concept: The area is clipped using a no. 40 blade.
Discussion: The outside edges extend several inches beyond the borders of the wound and have a neat border. Often, the hair around the edges of an open wound is difficult to remove with a clipper. In such a case, patience and care are needed to get all of the hair removed. Some may use a pair of scissors to cut the hair. Vacuum the loose hairs all around the wound and the surrounding area so they do not drop into the wound.
Concept: The varying ways in which wounds are cared for require the ability of the assistant to rapidly locate and bring all requested supplies to the veterinarian.

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Discussion: Know where fluids, antiseptic solutions, suture materials, and wound packs are located. The most frequently used items should be stored in a convenient place in the treatment area and supplies replenished as needed.

TASK 13.5.1 CLEANING A WOUND

Concept: Open contaminated wounds require *lavaging* with sterile saline solution or a disinfectant-laced saline solution. This is done by the veterinarian or credentialed technician after the wound is clipped and cleaned.
Discussion: A folded towel is placed adjacent to the wound to absorb the lavaging fluids. Use a 60-mL syringe with an 18-ga needle or IV tubing with an 18-ga IV catheter to flush the wound of clipped hairs, lube, and loose dirt. This will be repeated after the wound site is fully prepped.
Concept: The surgical scrub begins after the wound flush.
Discussion: The same technique for a surgical site preparation is used for wound preparation. The scrub solution is applied in a circular motion in ever-widening circles from the edges of the wound to the unclipped areas of the skin using a gauze sponge. Scrub application is repeated a minimum of three times until the wound and the surgical shave site are free of debris and dirt. Sterile saline is applied after the scrub cycles to remove the soapy substance. Review Chapter 18 for complete site preparation.
Concept: After wound preparation, open wounds are draped, *debrided*, probed, or flushed again by the veterinarian for possible drain placement and suturing.
Discussion: Debriding removes any devitalized tissue. A scalpel handle and blade, Metzenbaum scissors, thumb forceps, and gauze sponges are needed to perform debridement. All supplies should be sterile so the wound can heal.
Concept: Abscesses will need to be opened to drain the *purulent* materials it contains.
Discussion: Abscesses occur frequently in outdoor cats. They are the result of bite wounds. Once the wound is opened, the abscess is drained and then flushed with normal saline solution or diluted antiseptic solution. Any *necrotic* tissue is removed. The wound may be sutured closed with the placement of a *Penrose drain*. The drain remains in place until wound drainage resolves, at which time it is removed. *Fluid drains around not through the tubing*, making it necessary to keep the skin around the openings of the drains clean. Client education will be the technician or the assistant's responsibility.

Procedure

Location: Treatment area

PREPARATION

1. Prepare a card for your reference book entitled "Wound Preparation."
2. Mark the card with the facility's wound cleansing with the lavaging solutions preferred and the dilution factor.

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3. Gather all supplies and place on the counter near the workspace:
   a) clean towels of sufficient size to absorb the lavaging fluids; alternatively, you may work on a "wet" table, a long table with water supply, drain, and a metal rack over it on which the patient is placed
   b) vacuum
   c) clippers with a no. 40 blade, clipper lubricant
   d) surgical scrub solution and saline-soaked gauze
   e) surgical antiseptic spray or application wand
   f) 1 L of sterile saline solution
   g) 60-mL syringe with 18-ga needle
   h) drapes and wound pack
   i) sterile, nonadherent wound dressings of sizes sufficient to cover and clean the wound
   j) exam gloves.

PROCEDURE

1. If gross debris is present, rinse the area with warm water.
2. Place a water-soluble lubricant (sterile K-Y jelly) or saline-soaked gauze sponges in the wound.
3. Clip the hair from around the wound, clipping against the growth pattern of the hair.
4. Vacuum loose hair from the patient and work area.
5. Flush the wound with sterile saline or dilute disinfectant solutions. Repeat until the wound is clean.
   a) Begin the scrub process, with scrub-soaked gauze sponge, beginning at the margins of the wound; scrub in an ever-widening circle to the edges of the clipped area. Repeat the process a minimum of three times.
   b) Apply surgical antiseptic over the clipped area.
   c) Alert the veterinarian when the patient is ready.

FOLLOW-UP

1. Clean workspace and equipment. Empty the vacuum; clipper blades are removed, cleaned and disinfected according to the manufacturer's directions. Instruments are cleaned, placed in the ultrasonic cleaner, lubricated, repacked into the wound pack, and autoclaved.
2. Put other unused materials away. If stock supplies are low, write them on a want list or notify the practice manager.

TASK 13.5.2
APPLYING A SIMPLE BANDAGE

Concept: Bandaging is used to protect and/or immobilize an area.
Discussion: Some wounds and minor fractures are bandaged. The bandage is used to protect an area from additional injury such as chewing of sutures by patients, licking areas that need to heal, or using a limb with a minor fracture.

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Concept: Bandage variations depend on the purpose and the area to which they are applied.
Discussion: If a wound is present, there are multiple techniques employed to clean and prepare the wound for bandaging.
Concept: Bandages are to be wrapped taut not tight.
Discussion: The goal is for the bandage to be taut enough to remain in place but not so tight that circulation is impaired. Monitor for swelling, discoloration, and cooling of body parts distal to the bandage. These are indications that the bandage is too tight.
Concept: It is easy to mistakenly place a bandage too tightly. Make the time to take the necessary precautions, thereby preventing the need to replace the bandage, saving time and bandage materials.
Discussion: Bandage material should begin on the down side of the roll, adjacent to the patient during bandage placement. Applying the bandage with the material on the top side of the roll often causes the bandage to be too tight. When using elastic wrap, the bandage material should be unrolled and rerolled prior to wrapping the bandage. Placing the elastic wrap directly off the roll without loosening the material first increases the tension of the wrap
Concept: Utilize the two-finger rule when placing any bandage.
Discussion: When checking the tautness of a bandage, two fingers (the index and middle fingers) can be used to slide under the bandage layers up to your second knuckle. If the two fingers cannot fit under the bandage layers, then the bandage is too tight. Conversely, if more than two fingers easily fit under the bandage layers, then the bandage is too loose.
Concept: Bandages consist of multiple layers, each with a specific purpose (Fig. 13.6).

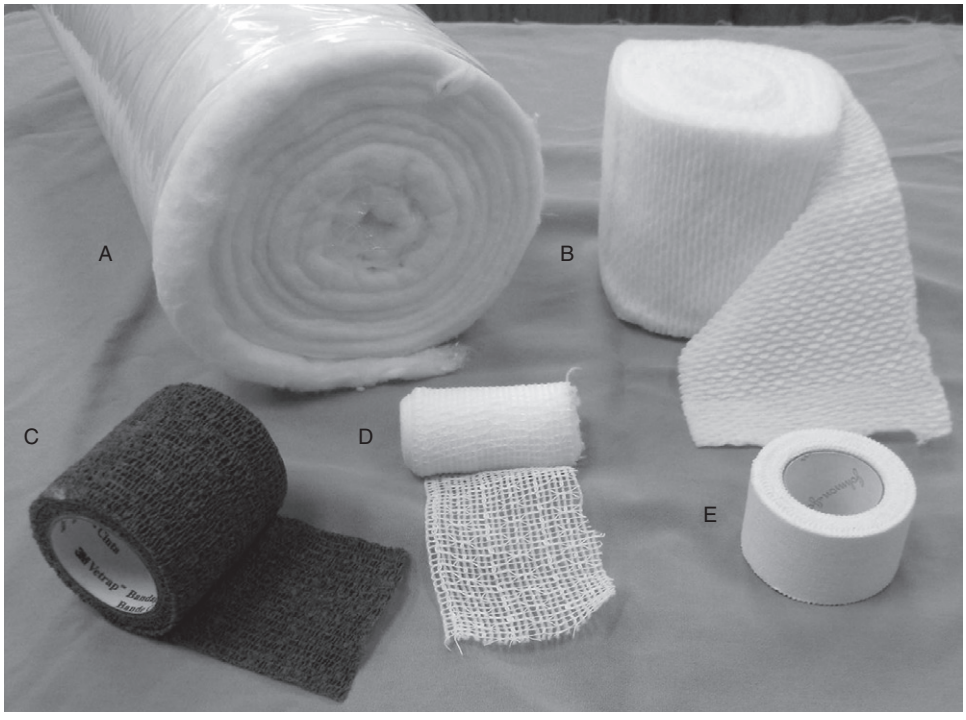


Figure 13.6. Types of bandage material. A. Rolled cotton. B. Cast padding. C. Elastic water-resistant wrap (i.e., Vetrap). D. Soft conforming gauze or Kling. E. Porous adhesive tape.

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Discussion: There are many types of bandages and bandaging materials. Always check with the veterinarian as to the bandaging materials desired. The veterinarian or licensed technician may do the actual bandaging. To prepare for a bandage application, the assistant readies a variety of materials. The steps and related materials in bandaging include the following:

1. *Adherent Strips:* This layer is often referred to as "stirrups" and may or may not be used. It is particularly helpful in preventing slipping of bandage on the limbs. Adhesive tape is applied directly to the skin on opposite sides of the distal limb, either anterior and posterior or medial and lateral. Allow the tape to extend 3–5 in. beyond the paw, leaving a tab on both ends of the tape for easy separation later. The primary and secondary layers are then placed and the adherent strips are incorporated by reflecting, then twisting and pressing the sticky sides of the tape to the respective sides of the secondary bandage layer.
2. *Primary Bandage Layer:* This is the layer closest to the skin and, in particular, must be over the wound. This may or may not be used depending on the characteristics of the wound or the reason for the bandage. The wound dressing is typically a nonadherent gauze pad with or without antimicrobial additive; however, there are a number of types used. Each has a specialized role in aiding tissue repair.
3. *Secondary Bandage Layer:* This layer holds the primary layer in place. It consists of a nonadherent wrap (i.e., soft conforming gauze, Kling), often stretchy in nature, extending proximally and distally beyond the borders of the primary layer. Cast padding is used if padding of the area is required. If this is a bandage to immobilize an area, heavier materials such as rolled cotton or splints may be incorporated into the bandaging.
4. *Tertiary Bandage Layer:* This final layer actually holds the bandage on the animal. It is usually water resistant to protect the underlying layers. It extends proximal and distal to the borders of the secondary layer. To prevent slipping of the bandage, a strip of adhesive tape may be used on the proximal and distal borders of the tertiary bandage. The contact should be 50% on the bandage and 50% directly on the patient's body.

Concept: Bandages must be kept clean and dry throughout all layers.
Discussion: Frequent bandage changes for draining wounds and recheck appointments for outpatients with bandages are necessary. Discuss the importance of a dry bandage with the client, especially during times of the year when weather is a factor (precipitation and mud). Provide the client with ideas for keeping the bandage dry.

Tip Box 13.3: **To secure any cloth bandage, such as gauze, cut the ends half-lengthwise until two strips are long enough to go around the limb. Tie an overhand knot at the base of the cut. Take the two ends, wrap it around the limb in opposite directions, then tie the two ends together in a square knot. Trim the ends closely.**

Concept: Animals are notorious for chewing or licking at bandages.
Discussion: It is important to monitor patients to keep them from doing further harm to the wound, but also to avoid ingestion of bandaging materials, which creates an additional problem.
Concept: Noxious, nontoxic substances applied to the tertiary layer of the bandage are deterrents for some patients.

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Discussion: Such products as Bitter Apple, Tabasco sauce, and products to deter young children from thumb sucking can be applied to the outer surface. These may need to be reapplied. Such products are not always successful deterrents. In that case, more drastic measures must be taken.

Concept: An Elizabethan collar, a basket muzzle, or other restraint devices on the patient will prevent oral access until the bandage is removed. Refer to Chapter 9 for the placement and fitting of these devises.

Discussion: Patient ingenuity should *never* be underestimated. They often outsmart veterinary staff. Be forewarned.

Suggestion: View http://www.youtube.com/watch?v=EOWJ2upiaZk for the application of a Robert Jones bandage used for immobilization of a limb. An additional video is available at http://www.youtube.com/watch?v=JwNviZyvzaM for bandaging a wound on a pet's foot.

Procedure

Note: Before you even begin, check the most up-to-date practice act to see if an assistant is permitted to apply a bandage. Some veterinary practice acts limit application of bandages and casts to technicians and veterinarians.

Location: Treatment area

PREPARATION

1. Prepare a card for your reference book entitled "Bandaging Procedure."
2. As you learn what materials and equipment are required for various bandages, mark these on your card.
3. Use your reference book card to lay out materials and equipment in order of use:
   a) wound cleaning supplies
   b) bandage supplies: primary, secondary, and tertiary products
   c) container of antibiotic ointment and clean tongue depressor for application to the wound
   d) bandage scissors.
4. Ask the veterinarian if medications will be required and gather everything that will be needed.
5. Provide patient restraint as appropriate.

PROCEDURE

1. If bandaging a limb, adhesive tape stirrups are applied to the distal portion of the limb. Hold the leg to facilitate the application of these stirrups (Fig. 13.7A).
2. If wound dressing is applied, it will be over any exposed wounds, then the primary bandage layer will go over that.
3. For the secondary layer:
   a) If a layer of padding is needed to provide immobilization, cast padding is now applied. Note that each wrap overlaps by 30–50% (Fig. 13.7B).
   b) If immobilization is not needed, gauze is wrapped using the same pattern described earlier.
4. The tape stirrups are reflected, twisted, and adhered to the secondary layer. Leave "courtesy" tabs on the ends of the adhesive tape placed on the patient. This is done

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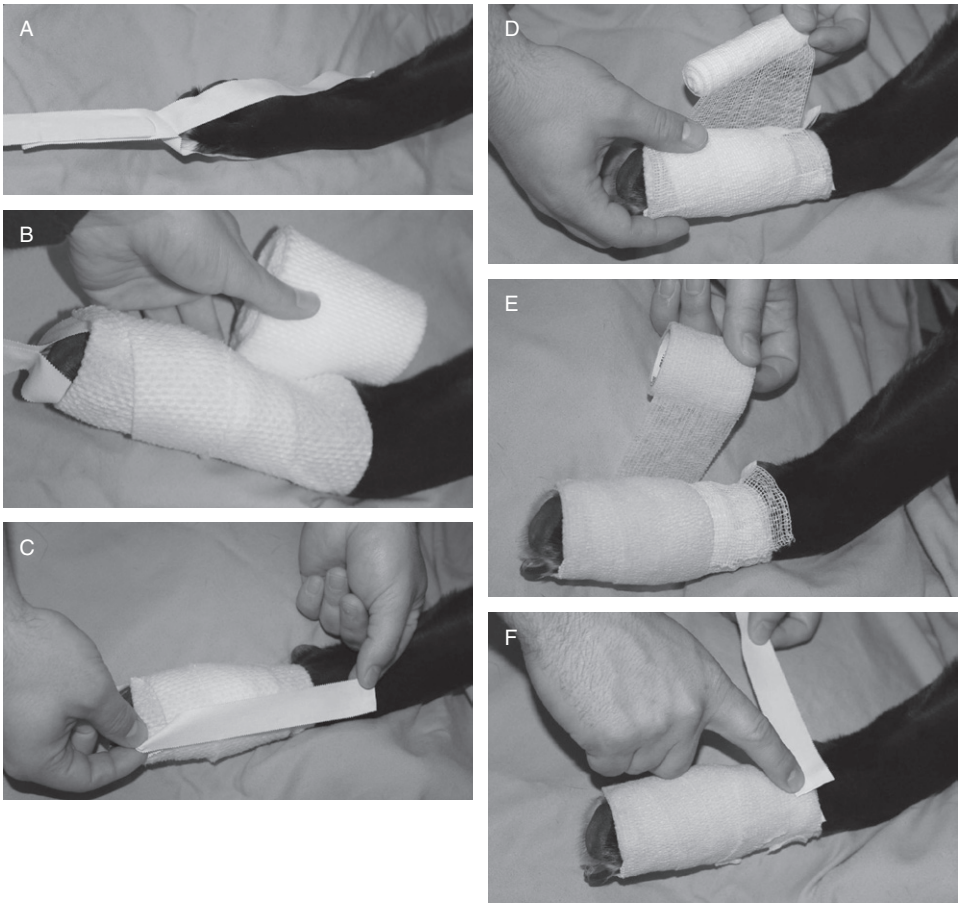


Figure 13.7. Applying a simple bandage. A. Stirrups are applied on opposite sides of the limb. B. Starting distally, moving proximal, cast padding is applied with or without the primary nonadherent gauze pad. C. Reflect, twist, and adhere the stirrups on to their respective sides of the secondary bandage layer. D. The secondary layer, conforming gauze is then applied. E. The water-resistant tertiary layer is finally applied. F. A strip of adhesive tape is applied, with 50% contact on the bandage and 50% on the patient to prevent slippage.

by folding over a small tab on the end of the tape. It facilitates removal of the tape (Fig. 13.7C).

5. The next layer is cling gauze it is wrapped firmly yet to cover the tape stirrups and to add another layer of protection (Fig. 13.7D).
6. A layer of elastic wrap or Vet Wrap with or without an added adhesive tape is added. This is started distally and with 30–50% overlap, applied to the proximal end of the bandage (Fig. 13.7E).
7. Finally strips of adhesive tape are placed at the proximal and distal edges of the bandage if necessary. These should overlap the bandaging materials and furred portions of the limb by about ½ and ½ (Fig. 13.7F).

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FOLLOW-UP

1. Check the bandage for tightness using the two-finger rule. If the bandage is around the neck, thorax, or abdomen, two fingers should be able to fit between the skin and the bandage. If the bandage is too loose or too tight, notify the veterinarian; it can be inspected. For a limb squeeze the bandage; it should "give" like it would if you squeeze a foot or leg without a bandage.
2. Use a permanent marker to write the date of bandage placement and your initials on a small piece of adhesive tape. Apply this tape to the bandage.
3. Put bandage materials away. If stock supplies are low, write them on a want list or notify the practice manager.

Tip Box 13.4: **Save the litter bags of used or outdated IV fluids. Cut the port end off to empty and allow them to dry. Use a scissors or a scalpel blade to cut slits around the circumference of the cut end, then thread a shoelace in and out of the slits. This turns the bag into a "plastic sock" that can be placed over the bandaged foot and tightened around the leg with the shoelace.**

TASK 13.5.3
REMOVING A SIMPLE BANDAGE

Concept: The veterinarian decides when to remove a bandage. If prescribed, rebandage using the appropriate dressing.
Discussion: Bandage scissors are the only scissors to be used to remove bandage materials away from the patient. The blunt tip of the scissors is kept adjacent to the skin to prevent injury to the patient. If the layers are too thick to easily cut the bandage layers simultaneously, cut each layer individually or cut the tertiary layer and simply unwrap the remaining layers.
Concept: Skin can become irritated with multiple bandage changes.
Discussion: With the repeated placement and removal of adhesive tape and bandage materials, a patient's skin can become inflamed and irritated. To ease the removal of adhesive tape, it is recommended to use an adhesive remover. Soak a cotton ball or gauze with liquid adhesive remover and apply liberally to any adhesive. Slowly and gently peel back the adhesive tape.

Procedure

Location: Treatment area

PREPARATION

1. Set out bandage scissors and adhesive remover on the counter.
2. Consult the patient's medical record to confirm if the bandage is to be removed.

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3. If the task requires pain medications or anesthetics, alert the veterinarian that everything is ready.
4. Wear gloves.
5. Provide patient restraint as appropriate.

PROCEDURE

1. Adhesive remover on a cotton ball or gauze is applied liberally to the adhesive tape.
2. The bandage scissors is started at the distal end of the bandage, working the rounded tip of the scissors under bandage layer and cutting proximally.
3. Peel the adhesive away from the patient's hair using a swift, firm motion.
4. Unpeel or cut any layers not cut during the initial process.
5. If stirrups are present, remove them with additional adhesive remover and another swift, firm peeling motion.
6. Gently remove the primary layer.
7. If the veterinarian wants the area under the bandage to be cleaned, be prepared to do so.

FOLLOW-UP

1. Clean, disinfect, and put the scissors away.
2. Dispose of bandage materials. If they are infected, place in a biohazard container. Infected materials tend to be malodorous; seal and remove the hazardous waste liner from the container. Place a new liner in the container. Place the removed liner in the designated area.

TASK 13.6
EMERGENCY SUPPORT

Concept: Unfortunately, emergencies are a fact of life in every veterinary facility.
Discussion: The arrival of patients suffering from acute injuries, hemorrhage, respiratory distress, shock, or poisoning necessitates life-saving measures.
Concept: Staff members need to work together as a team under the leadership of the veterinarian if resuscitative measures are to be successful.
Discussion: While the veterinarian and the technician are providing the hands on care, the ancillary staff moves into action. The veterinary assistant is responsible for bringing the emergency equipment and drugs to the area of patient treatment and provides supplementary support to the caregivers. To be effective, the assistant must

1. know where the crash cart or emergency kit is located
2. maintain equipment, drugs, and supplies in the crash cart or emergency kit
3. update the emergency supplies as deficiencies are noted, newer drugs become available, and equipment is purchased
4. be able to retrieve emergency equipment not usually stored on or with the emergency equipment; this can include laryngoscopes with blades, circulating water blankets, clippers, IV catheters, IV fluids, bandaging materials, urinary catheters, instrument packs, monitoring equipment, and stomach pumps

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5. provide patient restraint and positioning as requested
6. complete skin preparation if requested.

Concept: To avoid additional injury to a patient, a gurney for patient transport is recommended.
Discussion: Patients can be placed on backboards or gurneys to facilitate handling. Use duct tape or buckles to secure the patient to the gurney. Commercial backboards are radiolucent so a patient can be radiographed while on the board. Patient handling is minimized when using a backboard, thus reducing additional patient injury.

TASK 13.6.1
MAINTENANCE OF A CRASH CART AND EMERGENCY STATION

Concept: One of the primary functions of the assistant relative to emergency support is to maintain the facility's crash cart and emergency station.
Discussion: It is vital that the crash cart and emergency station be organized and stocked with currently dated materials. All items are to be in their designated places and all equipment batteries charged and ready for use. Establish a routine for checking and changing the battery supply weekly for all electrical equipment (i.e., defibrillator and electrocardiogram [ECG]). If materials and equipment are taken from the cart during treatments, they are immediately cleaned and replaced on the cart. When an emergency arises, every second counts and time must not be lost in trying to locate supplies.
Concept: Update emergency supplies as deficiencies are noted, newer drugs become available, and equipment is purchased.
Discussion: Maintenance of a well-equipped emergency cart and station is not a task to be overlooked. Preparedness saves patients' lives. Current editions of *The Handbook of Veterinary Procedures and Emergency Treatment* and *Clinical Textbook for Veterinary Technicians* include lists of recommended equipment and drugs. If the veterinarian is a member of the Veterinary Information Network (http://www.vin.com), charts of drug doses and lists of emergency equipment are readily downloaded. A review of these references enables the assistant to develop a checklist and schedule for maintenance of emergency supplies. Compare this information with existing hospital procedures, equipment, and supplies.
Concept: Save time during the emergency and keep a list of emergency phone numbers at the designated emergency station.
Discussion: A list of phone numbers, "Important Resources for Veterinarians", is available at https://www.avma.org/KB/Resources/Reference/Pages/Important-Resources-for-Veterinarians.aspx. This includes the ASPCA Poison Control, Blood Bank, and Disaster and Emergency Response hotlines. Include local phone numbers on this list that may be helpful during an emergency situation (i.e., local poison control and send-out laboratory). Print a list of these numbers and hang them on a wall in the designated emergency station or store them with the crash cart.
Concept: The emergency station and crash cart should be easily accessible and centrally located.
Discussion: A central location with easy access around all sides of the treatment table, ample room for emergency equipment (ECG, BP, oxygen supply, etc.), and electrical outlets is a

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necessity. Ideally, all of the equipment and supplies are stored in the anesthesia induction area, providing rapid access to an anesthetic machine, clippers, endotracheal tubes, and laryngoscopes.

Concept: The contents of the crash cart are ideally stored on a shelved, wheeled cart.

Discussion: This allows for bins to hold syringes and needles, IV catheters, administration sets, gauze, adhesive tape, and so on. Larger items can be stored on the open shelving such as an Ambu bag, masks, endotracheal tubes, and assorted fluids.

Concept: Access to an oxygen supply is an absolute necessity for flow-by oxygen and manual or mechanical ventilation.

Discussion: Ideally, an anesthetic machine in surgery has a ventilator for mechanical ventilation and the machine may simply be wheeled to the treatment site for use, then hooked up to an oxygen source such as a portable E tank or H tank drop line. A portable oxygen tank (E tank with a regulator) on a wheeled caddy should be available with or without access to a central oxygen supply (H tank with drop lines). Include a daily oxygen level check on the facility's checklist for routine maintenance. It is also recommended to have a suction unit available; however, sponge forceps and gauze can be substituted if the facility does not have such a unit.

Concept: Drugs can be kept in alphabetical order in a fishing tackle box with shelving.

Discussion: Larger vials are kept at the bottom and smaller vials in the smaller shelves of the tackle box. It is necessary to establish a routine for checking the presence, quantity, and dating on all drugs maintained with the emergency supplies. Charts with protocols, emergency drug dosages, and defibrillator settings can be on the cart or mounted in the treatment area and surgery room. Such charts list the patient's weight and the dose in milliliters precalculated so filling of a syringe is quickly accomplished. Ask the veterinarian or the hospital manager for the preferred emergency text/information.

Concept: Sterile packs containing *lap pads*, towel packs, a wound pack, and an assortment of suture materials with swaged-on needles, both tapered and cutting-edge, can be on the shelving.

Concept: A variety of patient monitoring and diagnostic equipment is utilized during emergencies. This equipment may or may not be stored in the emergency station.

Discussion: A defibrillator is highly recommended. Various monitors such as an ECG, a capnograph, a pulse oximeter, and a BP monitor are often kept near or on the cart. Ultrasound equipment can be wheeled to the patient's location for assessment of thoracic and abdominal structures and the diaphragm.

TASK 13.6.2
ASSISTING EFFECTIVELY DURING A PATIENT EMERGENCY

Concept: Ideally, the staff takes time to practice emergency procedures.

Discussion: Regrettably, this is done infrequently because of seemingly more pressing matters during each day. It is too late to be trained during an emergency. The assistant must make time to determine where potentially requested equipment and drugs are located. Knowing common emergency procedures enables the assistant to anticipate team needs.

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Concept: Keep a book for current protocols for emergency situations in the crash cart or emergency station.
Discussion: This includes a prioritized list of procedures, patient evaluation and monitoring, as well as staff assignments. The presence of a protocol will prevent overlooking important steps in the rush of an emergency situation. Ask the veterinarian for one or ask that one be developed. This enables the assistant to anticipate team needs.
Concept: It is easy to cave in to the adrenaline and rush to complete a task during an emergency.
Discussion: Take a moment to gather yourself and remember that while we aim to move quickly during an emergency, we also aim to work efficiently and effectively.

Tip Box 13.5: **"Slow and steady is fast and accurate."**

Always read the drug label three times and perform the "five patient rights," adhered to even in the rush of an emergency. The few seconds it takes to read a drug label *three* times can and will not only save time but will also prevent errors from being made. When to read the label:

1. when you pick it up
2. when you fill the syringe
3. when you put the drug down/away.

Concept: Once the patient is stabilized, the assistant provides supplementary nursing care and patient monitoring under the guidance of the veterinarian and technician.

Procedure

Location: The designated emergency station in your facility; often the anesthesia induction area and treatment area

PREPARATION: BEFORE AN EMERGENCY

1. Prepare a card for your reference book entitled "Emergency Preparation."
2. Follow the facility's checklist and schedule routine maintenance of crash cart, equipment and drug supply presence, quantity, and expiration dates.
3. Learn what is expected of the assistant during an emergency.
4. Mark your card with the general procedures for common emergencies seen by your facility to help anticipate needs.
5. Practice current facility protocols for emergency situations on a routine basis with other team members.

PROCEDURE: DURING AN EMERGENCY

Be a LARK:

1. *L*isten actively.
2. *A*nticipate needs.
3. *R*espond quickly
4. *K*now what you are doing.

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For patient evaluation, the mnemonic A CRASH PLAN is often used. The veterinarian or technician will perform this evaluation; however; you may be asked to assist:

1. *A*irway
2. *C*ardiovascular
3. *R*espiratory
4. *A*bdomen
5. *S*pine
6. *H*ead
7. *P*elvis
8. *L*imbs
9. *A*rteries/veins
10. *N*erves.

FOLLOW-UP

1. Clean the treatment area.
2. Put all equipment and drugs in their designated locations.
3. Restock the crash card or the emergency station.
4. Seek improvement. Ask how you can provide more effective support to the veterinary team during similar circumstances.
5. Seek knowledge. At a later time, read a reference about the emergency you assisted with. Understanding what the veterinarian or the licensed technician was looking for and why he or she requested certain things will help you to better anticipate needs in the future.

TASK 13.7
VETERINARY HOSPICE CARE

Hospice care is a controversial topic in veterinary medicine. As veterinary medicine advances and veterinarians are able to offer more medical options, animals are living much longer lives. Occasionally, a prolonged life leads to an increase in the pet's need for general, sometimes intensive care.

An owner's denial of the prognosis, personal emotions, or fear of losing the pet may play a part in the decision for continued care over euthanasia. For these reasons and many more, hospice care is becoming more and more common in the veterinary community.

Concept: The decision for hospice care versus euthanasia can be a heavy burden for an owner.

Discussion: Many people share an indescribable bond with their pets. It can be a difficult decision for an owner to decide when to stop medical treatment. When the decision is made to continue medical treatment, despite the poor prognosis, hospice care begins.

Concept: Members of the veterinary team may not always agree with an owner's decision to continue treatment and begin hospice care.

Discussion: It can be difficult for members of the veterinary team to put aside their personal values and to accept an owner's decision during this stressful time. The veterinarian's job is

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to present and explain the options; the veterinary team's job is to provide love and care to the pet and to accept that the decision as ultimately the owner's.
Concept: Owners may select home care over hospitalization during the hospice period.
Discussion: Owners may opt to take their pet home and to perform general nursing, emotional and physical support for the terminally ill. The pet's emotional needs can easily be met, being surrounded by family and familiar surroundings. The veterinary team continues medical care through the owner. For this reason, communication and regular visits with the veterinarian are essential to prevent suffering and unnecessary prolonging of life. Both the owner and the veterinary team must remember that the main goal of hospice care is the patient's comfort and quality of life.

TASK 13.7.1 SUPPORT OF A PATIENT'S EMOTIONAL WELL-BEING

Concept: Meeting a patient's emotional needs while hospitalized is equally as important as meeting their physical needs.
Discussion: As in human medicine, the emotional well-being of a patient can and often does affect the physical health of a hospitalized patient. The veterinary team should consider handling the patient not only for medical treatment but also for the tender personal connection a companion pet yearns for. This helps provide a safe environment for patients, allowing them to bond with and trust their caretaker during medical treatment.
Concept: "Sunshine therapy" is a positive way to brighten a patient's spirits.
Discussion: Even when a patient is unable to walk or is too weak to stand for a prolonged period of time, sunshine therapy is an excellent treatment to provide mental and emotional stimulation. Take the patient outdoors two to three times a day, even if only to lie on your lap and be petted. The patient benefits from the vitamins absorbed by natural sunlight, the physical stimulation of being moved outdoors, and the emotional stimulation from physical contact with the veterinary team member.
Concept: Visits from the owner or loved ones can lead to improvement or setbacks in the patient's emotional state.
Discussion: Most often, patients are mentally brighter during and following a visit from their two-legged family members. Occasionally, patients are found to have increased anxiety following an owner's visit. The patient may be anxious about the owner leaving and not taking them. When this occurs, the patient's anxious behavior and increased thrashing and mobility may be destructive to the healing process. If this is the case, the patient may need to be sedated until the anxiety has passed. If the veterinary team finds this occurs after each visit from the owner, the veterinarian may discuss the unfortunate need to halt visits until the patient can respond more positively to the visits.

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Procedure

Location: Anywhere, anytime, with *every* patient under your care

PREPARATION

1. Ask the owner what is a favored toy or activity of the patient.
2. Ask the owner to provide an item that may carry a familiar scent for the pet (i.e., favorite blanket or pillow cover from the owner's bed).

PROCEDURE

1. Provide the patient's mental stimulation during the day.
2. Keep a familiar item that smells like home in the patient's kennel.
3. Take the patient outside for sunshine therapy two to three times a day. Use a gurney or carry the patient outdoors if it is unable to leash walk.
4. Handle the patient gently and with tender loving care at all times.
5. Encourage owners to visit as often as they wish and when convenient for the veterinary team's schedule.

FOLLOW-UP

1. Note any changes in emotional behavior and when they occur on the patient's record and cage card.
2. A pet "Quality of Life and Daily Diary" has been developed that aids owners in monitoring and assessing a pet's quality of life. It is available at www.LapofLove.com.

TASK 13.7.2
BEDDING AND RECUMBENCY CHANGES

Concept: An immobile patient requires frequent bedding changes.
Discussion: When a patient is unable to move, frequent bedding changes are required to prevent urine scalding, fecal matting, and out of respect for the patient. As with human patients, no one deserves to lie in their own excrement. Using disposable diapers or potty pads may help keep the bedding dry but still requires routine changing. It is best to rinse the patient with a moist washcloth, baby wipes, or a partial bath to remove any urine or feces from the coat and skin.
Concept: Record excrement (urine or feces) found in the bedding on the patient's medical record and cage card.
Discussion: When a patient is incontinent or soils its kennel, it is important to record the excrement on the patient's medical record so the veterinarian is aware the patient is urinating

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and defecating. Monitoring a patient's food and fluid intake as well as output of urine and feces is an important guide to a patient's hydration and medical status.

Concept: Patients unable to move require routine changes in position and extra padding in bedding.

Discussion: Changes of bedding are considered basic in nursing care and are essential to the mental and physical well-being of a patient. When a patient is unable to move, the weight of their body is felt in pressure points that may become *decubitus ulcers*, also known as bedsores. Offering extra padding in the bedding and changing the patient's position every 3–4 hours may prevent such sores.

Concept: Occasionally, even with diligent bedding changes and additional padding, a patient may develop decubitus ulcers.

Discussion: Notify the veterinarian or the technician if you see any signs of pressure sores or new wounds on a hospice patient. The sooner these wounds can be treated, the better the odds they will not get infected. These are treated much like an open wound from trauma. Follow the veterinarian's prescribed plan for treatment.

Procedure

Location: Animal housing areas

PREPARATION

1. Keep an ample supply of towels, soft blankets, and large comforters available for animal housing.
2. Note the patient's existing wounds upon admittance to the facility, allowing you to recognize any new wounds.

PROCEDURE

1. Check a patient's bedding hourly for urine or fecal soiling; change out if found wet.
2. Provide disposable potty pads to patients with urinary or fecal incontinence.
3. Provide extra padding to thin or nonmobile patients to prevent decubitus ulcers.
4. Cleanse the patient's coat and skin, removing any urine or feces, if they have soiled themselves.

FOLLOW-UP

1. Record any excrement urine or feces on the patient's medical record and cage card.
2. Report any pressure sores, urine scalding, and so on, to the veterinarian; scrupulously follow any prescribed treatment plans.
3. Wash soiled bedding when removed from a patient's kennel so it will be available when necessary for another patient.

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TASK 13.8
EUTHANASIA

Euthanasia comes from the Greek words *eu*, meaning "good" or "right," and *thantos*, meaning "death." Therefore, euthanasia means a painless or easy death. Certainly, anyone who has watched someone die recognizes a natural death is rarely easy or without pain.

Concept: When an owner chooses to end a pet's life, it is not always a medical decision but one based on personal values, religious values, previous experiences with death and dying, and, the hardest of all, for economic reasons.

Discussion: Although there are times when someone in the veterinary profession may not agree with an owner's decision, the pet belongs to the owner. The owner must be informed of alternatives to euthanasia and the final choice is theirs. If the veterinarian chooses not to perform the procedure, the owner will simply take their pet to another clinic down the street that will.

The process is difficult for the owner and the veterinary staff alike. Euthanasia is made more difficult for staff if the owner's decision is not in agreement with the veterinary team members' own values.

Concept: The process is designed to reduce stress and pain for the patient.

Discussion: Conversely, this is an extremely stressful time for the owner. There is often indecisiveness as to when to make the determination for euthanasia and how to recognize the appropriate time for action.

TASK 13.8.1
PREPARATION FOR EUTHANASIA

Concept: Once the decision for euthanasia is made, an appointment for the procedure is scheduled.

Discussion: The receptionist is often the first team member to speak with owners about their decision to euthanize their pet; however, the veterinarian may speak to the owners on the phone (i.e., for a hospitalized patient) and schedule the appointment. Try to schedule the appointment for the end of the day.

Concept: The receptionist or the team member who schedules the euthanasia appointment has the responsibility of gathering all the necessary information for the preparation of the procedure.

Discussion: The receptionist or other team members query the owner about the following:

1. Do you wish to be present throughout the procedure or would you like to drop the pet off?
2. What are your wishes considering the patient's remains?
   a) General/group cremation with the ashes scattered at the pet cemetery for $*X*
   b) Private/individual cremation with the ashes returned to you or your clinic for you to pick up for $*Y*

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   c) The owner is advised that burial of pets is not allowed within city limits. (Check to confirm the legal restrictions in the owner's area of residence. Some restrictions are countywide.)
   d) Private burial. This is the telephone number of the pet cemetery where you can make arrangements directly with them.
3. Before the owner's arrival, all paperwork is prepared. This includes the consent for euthanasia form.
4. If the owner wishes to remain with the patient during the procedure, then the examination room needs to be prepared.
5. The owner should be taken straight to the examination room upon arrival at the clinic.
   a) Have the owner sign any necessary paperwork in the privacy of the exam room and make payment prior to the procedure.

Concept: The assistant readies the examination or treatment room for the procedure.
Discussion: An examination room should be set aside 10 minutes before the owner's scheduled arrival. Inform the veterinary team that preparations are being made for a euthanasia appointment so staff members are aware to remain quiet in hallways and rooms adjacent to the examination room in use. The goal is to create a private, comfortable setting for the owner's final moments with the pet. Tissues, a glass or bottle of water for each family member, and a nice towel for the pet are comfort measures that should be made available.

Procedure

Location: Preparation takes place in the treatment room, examination room, and front desk areas

PREPARATION

1. Prepare a card for your reference book entitled "Euthanasia Procedure."
2. The patient's medical record is pulled after scheduling of the euthanasia appointment.
3. The necessary paperwork is prepared and requests the veterinarian to finalize any hospital charges so the bill can be paid prior to the procedure
4. Look up the patient's most recent weight in the medical record.

PROCEDURE

1. Prepare the examination room with comfort measures: nice blanket or towel for the pet to lie on, tissues, water, and a chair.
2. Additional supplies should be in the examination room out of the client's sight (in a cupboard, drawer, or adjacent room):
   a) A folded cadaver bag with a roll of adhesive tape and completed cadaver ID tag
   b) The veterinarian's drugs of choice:
      i. The desired volume of euthanasia solution in a labeled syringe with a needle of appropriate size
      ii. If the facility's protocol includes tranquilization prior to euthanasia, include the desired prefilled, labeled syringe next to the euthanasia solution.

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c) If the procedure includes the placement of an IV catheter, the catheter and all materials needed for its placement are set out either on the examination room or the treatment area counter, depending on the facility's protocol.

FOLLOW-UP

1. Have an experienced team member critique the completeness of the room preparations.

TASK 13.8.2 ROLE DURING THE PROCESS OF EUTHANASIA

Concept: During this time, all veterinary team members must handle the owner with sympathy and support.
Discussion: It is important to create an emotionally safe environment for the owner to begin grieving. While it seems comforting to offer words like "I know how difficult this must be for you," consider that the owners may be feeling isolated due to their emotional pain and loss. They may believe that no one could possibly understand how they feel at that moment. If you feel the need to say something, it is best to simply offer your condolences and thank the owner for the pleasure of working with and caring for their beloved pet.
Concept: This is also a time of increased stress for all veterinary team members.
Concept: Be prepared for your own emotions.
Discussion: It can be difficult to maintain composure in an examination room when an owner may be displaying any variety of behaviors from stoicism to hysterics. This may be especially difficult if you have a close relationship with the owner, the pet, or have recently experienced a loss yourself. If your emotional state is such that you are not able to assist with euthanasia, it is best to discuss this with the veterinarian prior to entering the examination room.
Concept: Owners often want to hold their pet during the procedure, in the pet's final moments of life.
Discussion: While it is understandable why owners may want to hold their pet in their arms during the procedure, it is highly recommended for liability reasons that the assistant, or a member of the veterinary team, restrain. Assistants should position themselves during restraint in a manner that still allows the owner to feel connected to the patient. Consider positioning your body at the patient's caudal half so the owner can be at the head.
Concept: When the patient is pronounced deceased following the procedure, owners' reactions can be variable.
Discussion: They may release a simple sigh of relief or may even faint. Be prepared at this point to deal with the owners' reactions whatever they are. Make them feel as comfortable as possible. Try to meet their needs. This may include a few minutes alone with the deceased pet. The collar can be removed and given to the owner. Offer to refer the client to a pet loss support group.

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Procedure

Location: Examination or treatment room

PREPARATION

1. Once the owner and the pet arrive, immediately escort them into the reserved examination room.
2. The patient is placed on the towel or blanket on the examination table or in the owner's arms and is made as comfortable as possible.
3. Any necessary paperwork is signed while in the exam room and payment is accepted.
4. The veterinarian is notified that everything is ready.

PROCEDURE

1. Once the veterinarian enters the room, the assistant remains in the room to restrain the pet.
2. If a tranquilizer is administered, the patient and the owner will remain in the room together while it takes effect. The owner can be left alone with the pet while the tranquilizer takes effect. The assistant should check on them briefly every few minutes during this period. Ask if there is anything you can do for the owner or if there are any questions or problems.
3. If the facility's protocol includes the placement of an IV catheter, the veterinarian or technician will do so either in the treatment or examination room, depending on protocol. The assistant restrains the patient for catheterization. This may be done while the tranquilizer is becoming effective.
4. If simple venipuncture is used without catheter placement, the assistant restrains the patient for administration of the euthanasia solution IV.
5. As the drug is injected, the assistant will feel the patient's body relax.
6. At the moment the needle is withdrawn, the patient is placed in lateral recumbency.
7. There may be a few *agonal* respirations or muscle twitches. The patient's pupils dilate; mucous membranes become cyanotic then whiten. The patient might lose bladder and bowel control.
8. The veterinarian checks for residual heartbeats and reflexes and the patient is pronounced deceased.
9. If the owner needs a few minutes to say their goodbyes privately, all team members vacate the examination room.
10. When ready, the owner is escorted out of the room to exit the facility by a side door if at all possible.

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TASK 13.8.3
FOLLOW-UP AFTER EUTHANASIA

Concept: The grief suffered by the owner must be handled with great sensitivity.
Discussion: Grief evolves through a series of stages that are well discussed in literature. The stages of anger, denial, bargaining, depression/guilt, and acceptance can occur in sequence, concurrently, or are delayed. It may take as long as 12–18 months for normal grief to resolve. In the case of sudden death, grief may take longer than when the owner has become prepared for the eventual loss of the pet through an extended illness. Often, the veterinary team is the only source of support for owners. Be patient; understand where the behavior is coming from and do not take anything personally.
Concept: Learn to recognize grief and stress in yourself.
Discussion: Seek support from others who are also suffering these feelings, but always respect the rule of confidentiality.
Concept: Recognize that all persons respond to grief and stress in varying ways.
Discussion: Experienced team members will have more patience with others and themselves during this period. Because of the need to respect patient and owner confidentiality, it is best to limit any discussions about the case with a team member who has also been involved with the patient. A break during the day or activities after work with a team member is helpful in diffusing emotions. Continuing staff responsibilities and the lack of privacy in a veterinary facility only compound the problem. The depth of feelings will vary depending on how long the team members have known the patient and the owner as well as the circumstances bringing the patient to this point.

Procedure

Location: Follow-up takes place in the treatment room, examination room and front desk areas.

PREPARATION

1. The necessary supplies for the body identification and disposal should already be in the exam room from preparation for euthanasia:
   a) cadaver bag
   b) white tape
   c) cadaver ID tag.
2. Be aware of and follow the facility's policy and protocol for handling and disposal of a body.
3. Be sensitive that, although deceased, this animal belongs to someone and is loved. It is always necessary to respect an animal and to be gentle in handling, even after death.

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PROCEDURE

1. The body is placed in the cadaver bag, sealed with white tape, and labeled as to the contents and instructions for disposition of the remains on the ID tag.
2. The remains are transported to the freezer.
3. If a necropsy is to be completed, set up for necropsy. Once the procedure is completed, continue with the following steps.
4. Return to the examination room to begin general cleanup.

FOLLOW-UP WITH THE OWNER

1. Follow-up with the owner may include all or part of the following:
   a) A follow-up phone call later in the day to see how the owner is doing. Confirm that the owner has done the "right thing" for the patient and has been a caring and responsible owner throughout the pet's life.
   b) A sympathy card is written and signed by all the staff members. It should be completed and mailed on the same day so the owner receives it within 1–2 days of the procedure.
   c) A donation is made to a research organization to sponsor research for the disease from which the patient suffered. A donation to the American Veterinary Medical Association (AVMA) Foundation or the local humane organization may also be made in memory of the patient. A card will be sent to the owner from the organization informing the person of the memorial gift.
   d) A gift such as a paw print made after death, a locket with a piece of hair cut after death, or flowers maybe given. There are many ways of letting owners know you and the rest of the veterinary team recognize their grief.

RESOURCES

Bistner, Stephen I., Ford, Richard B., Raffe, Marc R., & Mazzaferro, Elisa (2012). *Kirk and Bistner's Handbook of Veterinary Procedures and Emergency Treatments*, 9th ed. St. Louis, MO: Elsevier.

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

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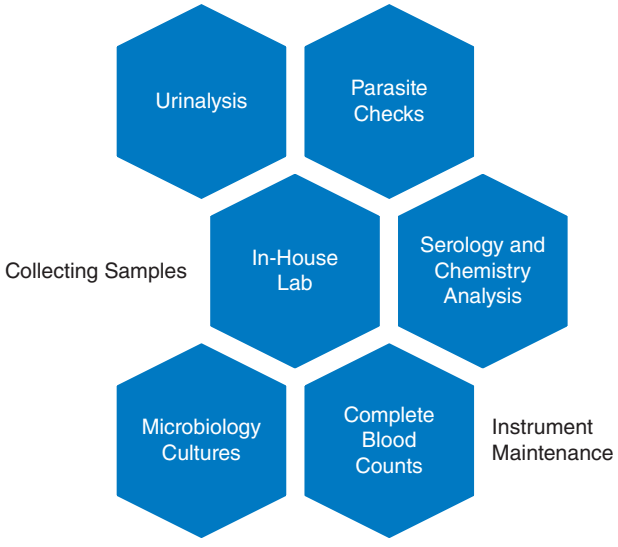
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CHAPTER

14

LABORATORY SKILLS

ELOYES HILL AND TERESA SONSTHAGEN



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Clean and maintain a binocular microscope.
2. Use a centrifuge.
3. Calibrate a refractometer.
4. List common ectoparasites.
5. Prepare and maintain a skin tray.
6. Collect and prepare feces for analysis.
7. Conduct a gross examination of feces.
8. Prepare a fecal smear.
9. Set up a fecal flotation.
10. Set up a fecal flotation using the centrifuge technique.
11. Assist in blood collection and handling.
12. Prepare a blood sample for shipment to a reference laboratory.
13. Use an in-house hematology analyzer to run a complete blood count (CBC).
14. Prepare a usable blood smear.
15. Stain a blood smear.
16. Complete a packed cell volume (PCV).
17. Determine plasma protein using a refractometer.
18. Use in-house analyzers to conduct blood chemistries and electrolyte determinations.
19. Use assorted serological test kits.
20. Collect a midstream urine sample and assist with other collection techniques.
21. Conduct a gross examination of urine.
22. Determine urine specific gravity.
23. Conduct urine chemistries.
24. Prepare urine sediment for microscopic examination.
25. Assist with sample collection for culture and sensitivity.
26. Prepare a Gram stain.
27. Inoculate microbiological media; assist in the identification of unknown organisms.
28. Set up an antibiotic sensitivity test.
29. Set up equipment and materials needed to complete a necropsy.
30. Properly pack samples for shipment to a reference laboratory.

INTRODUCTION

Concept: Laboratory test results aid in the diagnosis, prognosis, and course of therapy for veterinary patients. There are a many tests done in a veterinary laboratory.
Discussion: Blood chemistries, electrolytes, hematology, parasitology, urinalysis, serology, cytology, and microbiology tests can all be done in a well-equipped veterinary clinic laboratory. Most laboratory work occurs after the history and physical examination. Although it is not the responsibility of the veterinary assistant to determine which tests to run or to interpret their results, it is the duty of the assistant to properly prepare samples for analysis, conduct simple in-house laboratory tests, record laboratory results, stock supplies, and clean and maintain instruments.
Concept: The veterinarian depends on the accuracy of the assistant in completing laboratory tasks to provide timely and appropriate care for patients.
Discussion: All laboratory tests must be run according to set protocols and procedures.

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Concept: Part of the advancement in medicine is the ability to measure and monitor changes within the body not otherwise discernible on physical examination.
Discussion: Chemical changes in the body indicate alterations in organ function; these changes are hallmarks of disease and its progression. The presence or absence of disease-producing organisms may be determined and drug levels measured. Blood, urine, feces, and other bodily secretions are the source for these analyses. The tasks in this chapter will help the veterinary assistant master certain laboratory work.

Tip Box 14.1: **Personal protective equipment (PPE) must be worn when working in the laboratory. Exam gloves, goggles, and a laboratory coat are the minimum requirements.**

Concept: Continuing changes in testing within the veterinary world are manifestations of advances in and availability of new technologies. Likewise, there are multiple manufacturers of testing supplies and equipment.
Discussion: Each facility has its unique equipment, but changes in technology and testing procedures bring about new assays and instruments. This requires flexibility on the part of all veterinary team members, so staff members must continue to learn. They can do this by taking advantage of the many continuing educational opportunities for veterinary personnel.
Concept: Laboratory services are performed either within the veterinary facility, referred to as in-house testing, or sent off-site to a commercial laboratory, referred to as a reference laboratory.
Discussion: The equipment available and the test itself determine which tests are run in-house and which are sent to a reference laboratory. The modern veterinary clinic laboratory is equipped with a suite of instruments. The veterinary assistants may use, clean, and maintain these pieces of equipment. Common equipment includes microscope, centrifuge, and refractometer. More advanced equipment includes hematology, blood chemistry, electrolyte, coagulation, and blood gas analyzers. Also, there are instruments that simply read results like urinalysis strip and serology test readers. Some are stationary, such as the larger hematology analyzers. Some analyzers are portable, such as those measuring blood gases and electrolytes wherever the patient is located.
Concept: Know which piece of equipment performs each test and where it is located.
Discussion: In addition, each piece of equipment requires a specific type of sample. Confirm what the sample should be by checking the instructions for each test or analyzer being used.
Concept: If a piece of equipment uses a control reagent to test the accuracy of the machine, use it according to the manufacturer's recommendations.
Discussion: Control reagents are customarily used whenever a new batch of reagents or test slides is used. Follow recommendations for the frequency and circumstances for using controls if they are part of the equipment's routine use. Note the date the control was used, the lot number, and the results in the instrument's logbook. If the results are not in accordance with the results designated for the control sample, either follow the instrument's protocol or notify the practice manager immediately.
Concept: Instrument manuals and logbooks should be kept in readily accessible places, near the instruments. Some laboratories have one central notebook in which testing information is kept.
Discussion: Instrument manuals contain important information such as directions for use, maintenance, and troubleshooting. An instrument logbook is a place for control results, instrument maintenance records, and other information that may be important to save. Patient data and results could also be recorded here.

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Concept: The best veterinary practice cannot obtain reliable results if reliable materials are not used. Stains, reagents, test strips, and miscellaneous equipment need to be available and maintained to ensure accurate results.
Discussion: Typical stains are those used for hematology and cytology smears, Gram stain for microbiology stains, and new methylene blue for manual reticulocyte counts and cytology specimens. Stains tend to precipitate or evaporate. Alcohol fixatives pick up moisture from the air. Stains lose their potency and become contaminated with use.
Discussion: Precipitates can be removed by allowing the stain to flow through a filter paper into a clean container. It is a messy process and anything the stain touches leaves its color. Wear gloves and work on a nonporous tray. To avoid evaporation and to keep out moisture, always recap stain bottles after use. Since stains are reused, such as those maintained in heavy glass, lidded Coplin jars, contamination can occur. Change stains on a regular basis or according to amount of use. Do not add new stain to old stain.
Concept: Reagents and test strips are used for a variety of tests and for some pieces of equipment.
Discussion: Notice the expiration date and replace as needed. Keep them tightly capped to avoid moisture in the air from contaminating the chemicals. Store away from light and fumes and at the manufacturer's recommended temperature.
Concept: Each lab will be stocked with miscellaneous equipment.
Discussion: Each test will require certain supplies. Microscope slides, pipettes, test tubes, and sample containers are just a few of the items that need to be available. Learn the proper name for each item, how it is used, and where it is stored.
Concept: Laboratory results are always recorded in the patient's file and frequently in an additional laboratory log or computer.
Discussion: Test results may be entered into the patient's file manually; a results printout sheet may be put in the file, or if the veterinary practice has a computerized information management program, the results from the various analyzers go automatically from the instrument to the patient's electronic file. As soon as tests are completed, results are recorded, and follow-up recommendations are made by the veterinarian. The owner is then notified and the patient is treated accordingly.
Concept: Results are given in units.
Discussion: The units are always recorded with the numeric value of the test. If normal reference ranges are given, they, too, should be included. Enclose normal reference ranges in parentheses and to the right of the test result. Reference ranges vary by laboratory and instrument. Some test results are not numeric but are positive or negative.
Concept: Every sample tested must be prepared according to the directions for testing.
Discussion: This includes

1. accurate volume or weight measurements
2. time from sample collection until sample is tested
3. sample handling (refrigerated, room temperature, type of container in which it is to be collected, etc.)
4. sample type needed for the test (e.g., serum versus plasma)
5. lab procedures done on a nonporous tray that is easily cleaned, confines spills, and prevents possible staining and contamination of the counter.

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TASK 14.1 MAINTENANCE OF THE BINOCULAR MICROSCOPE

Concept: Learn to identify the various parts of the microscope.
Discussion: The head contains oculars and objectives. The oculars are what you look in to view what is under the objective. The objectives are used to magnify the image on the slides. There are usually four to five objectives; each is designated by a number and an ×. The × stands for a multiplication ×100. So 10× magnifies the image by 1000 times. The stage is where the slide is placed. There is a clip that holds the slide in place as the stage is moved. To move the stage left or right or forward and backward, the stage control knobs are usually directly under it. To move stage up, down, and to bring the image into focus, there are fine and course focus knobs usually on the right or left side of the scope base. Directly under the stage is the condenser lens equipped with an iris diaphragm. The condenser can be raised and lowered with a knob usually right under the stage. The condenser controls the amount of light refracted off of the mirrors inside the condenser. The light source control and power switch are on the base.
Concept: The microscope requires proper care and maintenance as does any other piece of equipment in the laboratory. Follow the manufacturer's instructions for cleaning and maintenance of the microscope. Routine care for the microscope after each use is necessary to stretch the longevity of the instrument.
Discussion: After each use the slides are removed and disposed of properly. If the 100× objective (sometimes referred to as the oil objective) is used, the oil should be removed after each use with lens paper. If the objective has sat in oil for a while, it may need cleaning. Lens cleaning is accomplished using lens paper and a small amount of commercial lens cleaner, alcohol, or xylene substitute as needed. Immersion oil is never used with any other lens, but sometimes, other objectives will slide through the oil so it never hurts to clean all of the objectives on a routine basis. "Park" the microscope by turning off the light source, point the lowest objective toward the stage, lower the stage to its lowest position, and replace the cover over the microscope. This may seem like a huge inconvenience, but it is the best procedure for maintaining the microscope.

Procedure

PREPARATION

1. Prepare a card for your task box entitled "Microscope Maintenance."
2. Determine with your supervisor if this is a daily or weekly task.
3. Gather the materials needed: lens cleaners, swabs, and lens paper. Have a test slide on hand.

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PROCEDURE

1. Check to see if the bulb lights up when the power switch is on; see the owner's manual for the replacement procedure.
2. Spritz lens cleaner on a lens wipe and carefully wipe each objective and ocular lens then dry with a clean lens paper. Dried immersion oil will require a stronger cleaner. Clean the microscope stage too with a dilute disinfectant spritzed on a paper towel.
3. Check stage controls, iris diaphragm, and coarse and fine focus knobs for proper movement; ensure the stage condenser raises and lowers smoothly and eyepieces can be adjusted easily.
4. Check the head of the microscope containing the eyepieces to confirm it is tightly secured.
5. Using the test slide, focus with each objective. Look for any lens abnormalities like chips, cracks, or blurred spots.
6. Check the electrical cord for wear.

FOLLOW-UP

1. Cover the microscope, making sure the light is off.
2. Restock the microscope counter with slides, coverslips, lens cleaner, lens paper, and immersion oil.
3. Alert the appropriate supervisor if there are problems with the microscope or supplies are needed.

TASK 14.2
USING THE CENTRIFUGE

Concept: Centrifugal force is used to separate undissolved solids from liquids, resulting in a sample material that can be analyzed.
Discussion: Samples centrifuged in the laboratory are clotted blood to obtain serum, unclotted blood to obtain plasma, urine to obtain sediment, and fecal solutions to obtain parasite ova.
Concept: There are three rules governing the use of every centrifuge.
Discussion:

1. Always balance the centrifuge before turning it on.
2. Always lock the lid.
3. Never try to stop or slow down a rotating centrifuge with your hand.
4. Wipe up any fluids that may have spilled in the centrifuge.

Concept: Types of centrifuges.
Discussion: Many practices have two centrifuges, one for small microhematocrit tubes and a standard-sized centrifuge with variable speeds (revolutions per minute), a timer, and different sized centrifuge tubes accommodating different volumes of fluid containers. The larger centrifuges can be either fixed slant or swinging bucket heads. Some centrifuges have interchangeable heads, and the heads are changed depending on the sample to be run.

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Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Centrifugation."
2. Mark the card with the speeds for each type of sample: urine, blood, feces, and the amount of time required.
3. Properly label tubes to be centrifuged: animal identification and sample type. Mixing up samples could prove deadly!
4. Choose balance tubes to match specimen tubes to be centrifuged, making sure the liquid levels in tubes are equal when placed opposite each other.
5. Balance the tubes in the centrifuge. This is usually done by placing the tubes opposite of each other.

PROCEDURE

1. Choose the appropriate speed and time, press start, or turn the timer button to start rotations. Times and speeds are found in the centrifuge procedure or in the owner's manual.
2. When the centrifuge comes to a stop, remove the tubes.
3. Separate the supernatant from the sediment, saving the desired portion. Turn the test tube completely upside down so you do not pour off the sediment. A small amount of sediment will remain in the tube. Depending on the sample, the supernatant can be poured off or drawn off with a disposable pipette. Fecal and urine samples are poured off and serum and plasma samples are pipetted off.

FOLLOW-UP

1. If a tube has broken during centrifugation, remove the tube holder and clean with a disinfectant, rinse, dry, and replace. Check for other spills or broken glass; clean as needed. If this is not done, the centrifuge will not balance on the next run.
2. Close the lid, then turn the power off.

TASK 14.3
CALIBRATING THE REFRACTOMETER

Concept: Refractometry is light passing through a liquid and refracted by dissolved substances in the liquid.
Discussion: Urine specific gravity and plasma total protein are both read on the refractometer, each on its own scale.
Concept: The refractometer should be calibrated to zero weekly using distilled water; sample specific gravities are compared with the specific gravity of water (1.000).
Discussion: If the refractometer is not properly calibrated, invalid results may occur. Record who did the calibration and when it was done. Maintaining an instrument log is a reminder to calibrate the refractometer on a regular basis.

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Procedure

PREPARATION

1. Prepare a card for your task box entitled "Refractometer."
2. Mark the direction for use on one side and the calibration technique found in the owner's manual on the other.
3. Check to see if the refractometer is clean before use by lifting the fill chamber lid.
4. Obtain distilled water for calibration, a pipette, and a bulb for dispensing the distilled water.
5. Calibrate the refractometer.

PROCEDURE

1. Load the refractometer by applying drops to the fill chamber under the lid. Add enough distilled water completely cover the chamber surface, usually a drop or two.
2. Hold the refractometer to the light and observe that the line where dark meets light is at 1.000 on the specific gravity scale.
3. If the reading is above or below that line, adjust the instrument to read 1.000 according to the manufacturer's directions.
4. Record the calibration in the instrument log.

FOLLOW-UP

1. Clean the refractometer after each use following the manufacturer's recommendations. Usually, a lens paper sprayed with disinfectant will suffice.
2. Put the refractometer in its case and put away.

TASK 14.4
IDENTIFICATION AND SAMPLING FOR ECTOPARASITES

Our patients are often infected or infested by parasites. Parasitism is the presence of organisms benefiting themselves while harming their hosts, the organisms off whom they live. There are two types of parasites commonly found: Ectoparasites are external parasites such as fleas, ticks, mites, and lice that infest patients. Endoparasites are internal parasites like; roundworms, hookworms, flukes, tapeworms and protozoans infect patients.

Identification of Ectoparasites

Concept: External parasites are commonly reported in animals as they cause and transmit diseases. Treatment and control of ectoparasites begin with diagnosis.

Discussion: External parasites vary by geographic region. These are the most common ones found in almost all parts of the world: fleas, ticks, mites, lice, flies, and mosquitoes. Some are visible to the naked eye; others are microscopic.

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Fleas

Adult fleas mate and feed on blood from their hosts. The average flea is about 5 mm in size. The exception is the smaller sticktight flea, which is 2–4 mm. The eggs are laid on the host but often fall off into the animal's environment, where they hatch into larvae that resemble fly maggots. Larvae, after feeding, create a cocoon and develop into the next stage of development called pupae, which later hatch into adults. Transmission is indirect, occurring when an individual enters a contaminated environment.

Concept: Adult fleas may or may not be visible on the host.

Discussion: Evidence of their presence is noted in the black excreta, called "flea dirt," left behind on the fur. When an infested animal's fur is parted, it can look like they have "pepper" in the fur. To confirm the presence of flea dirt, place a piece of white paper under the animal, brush the fur over the paper, then moisten the paper by spraying with water. The excreta dissolve, leaving a red to rusty colored spot from the undigested blood in the feces. The eggs are small (about 0.5 mm), white, oval, and are not sticky.

Lice

Concept: Unlike fleas, lice complete their entire life cycle on their hosts. There are chewing or biting lice that feed on skin scales and sucking lice that feed on blood.

Discussion: Most lice are about 3 mm in size. After mating, the female attaches her eggs, called nits, by sticking them on the hair shafts of the host. Nits are white and are about 1 mm in size. They hatch into nymphs followed by the adult stage. Lice are transmitted by direct contact between an infected host and an uninfected individual.

Flies

Concept: Flies can affect hosts during two phases of their life cycle, adults and larvae.

Discussion: Some adult flies feed on blood, tears, saliva, or mucus. The damage they cause to tissues may indicate their presence. Adult flies vary from the small sand fly, 1–3 mm in size, to the larger horsefly, which can be up to 3.5 cm in length. Depending on the fly species, some larvae develop in tissue where they can be seen as white, wormlike creatures called maggots that feed on dead tissue.

Ticks

Concept: Ticks are bloodsuckers, engorging themselves on their host's blood and then falling back into the environment. Their four life stages are eggs, six-legged larvae (also called seed ticks), eight-legged nymphs, and adults.

Discussion: The unfed nymph may be as small as 3 mm. The engorged adult may be up to three times larger than the nymph. Transmission is indirect, occurring when an individual enters a contaminated environment. Their presence is noted when a tick is seen attached to the skin. When the tick drops off, it leaves a reddened, raised area of skin where it was attached. Ticks can transmit diseases such as Rocky Mountain spotted fever, *Ehrlichia*, mycoplasmas, and Lyme disease.

Mosquitoes

Concept: In addition to being irritants and voracious bloodsuckers, mosquitoes are most noted for their transmission of diseases such as heartworms and West Nile disease.

Discussion: Mosquitoes are commonly found around areas of water, especially stagnant water. They are more active in the evening and early morning hours. Topical and oral medications and vaccinations are used as preventatives for the diseases they transmit.

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Mites

Concept: Mites feed on tissue fluids and skin cells. They can cause severe dermatitis accompanied by pruritus (itchiness) and hair loss.

Discussion: The diagnosis of most mites requires the use of the microscope. A skin scraping is necessary to diagnose such mites as *Demodex*, *Notoedres*, and *Sarcoptes*. The walking dandruff mite, *Cheyletiella*, is visualized using a cellophane tape preparation. Diagnosis of *Otodectes*, ear mites, requires an ear swab rolled onto a slide to diagnose their presence, although the mites can be seen with an otoscope.

TASK 14.4.1
PREPARATION OF AN ECTOPARASITE SAMPLE COLLECTION TRAY

Procedure

PREPARATION

1. Prepare a card for your task box entitled "Ectoparasite Collection."
2. Mark the materials needed:
   a) roll of cellophane tape, clear
   b) wax pencil used for labeling slides
   c) one box of microscope slides
   d) one box of coverslips
   e) white paper towels
   f) small bottle of mineral oil
   g) cotton tipped swabs—unsterile
   h) rubber bands
   i) several no. 10 scalpel blades
   j) collection tubes for large specimens—outdated red top blood collection tubes work well
   k) one mosquito hemostat
   l) labels
   m) Wood's lamp
   n) dermatophyte test media (DTM), Sabouraud's agar, or other agar used for fungal culture
   o) package of sterile cotton swabs.
3. Organize the kit:
   a) Use a permanent marker and label "Ectoparasite Sample Collection Tray."
   b) Place a rubber band around the scalpel blades, collection tubes, and both sterile and unsterile cotton swabs.

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4. Place the remaining items in a skin tray and store in the laboratory.
5. Whenever a patient is examined for a skin problem, place the skin tray on the examination room counter.
6. Clean and replenish the contents as needed.

TASK 14.5
IDENTIFICATION AND SAMPLING FOR ENDOPARASITES

Endoparasites infect internal organ systems that may result in diarrhea, weight loss, or anemia; therefore, the fecal exam is an important and common laboratory test.
Concept: There are many different endoparasites that are worldwide or may be confined to smaller areas of the country. Become familiar with the endoparasites that are the most common in your area.
Discussion: Some of the most common ones with large geographic territories are roundworms, hookworms, tapeworms, flukes, and protozoans (one-celled organisms).

Roundworms
Roundworms are very commonly found in young puppies and kittens because the larval stage can cross the transplacental and transmammary barriers. If there are high numbers of adults in the youngsters, you will often see extremely large potbellies on these animals. The transmission of roundworms to adults is by ingesting the eggs found in the feces of infected animals.

Hookworms
Hookworms can infect an animal and human by skin penetration by larva or ingestion of eggs passed in feces. This sand-loving nematode is why many beaches ban dogs! A heavy infection of hookworms often cause bloody diarrhea or black tarry stools because they attach to the intestines and suck blood.

Tapeworms
Tapeworms are flat worms that absorb nutrients through their bodies so they get quite large. Their bodies are made up of segments called proglottids that are shed when gravid or full of eggs. The proglottids are often found around the anus or in bedding and look like small, white, moving grains of rice. The flea is often an intermediate host to the tapeworm and so the owners need to take care of those as well as the tapeworm. Take note that some types of tapeworms can affect humans.

Flukes
Flukes are more common in areas of the country that have many wetlands and lakes. They require water to reach their intermediate hosts, which are often snails, crustaceans, or fish. If a dog or cat happens to eat an infected intermediate host, the fluke larva migrates to the

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liver or lungs, attaches, and starts to suck blood. If the adult population is great, the patient may show signs of anemia.

Protozoans

Protozoans are either unicellular or multicellular organisms that for the most part cause profuse diarrhea and sometimes even bloody diarrhea. The most common culprits are coccidia and giardia. There are also species that parasitize the blood cells. Giardia can affect humans usually by ingestion of contaminated water.

Concept: Diagnosis of intestinal parasites is made through the identification of the ova, and occasionally the adults, in or on the feces. Laboratory examination of feces occurs in three parts.

Discussion: The first part is the collection of the feces. The second part is the gross examination of feces, that which you can visibly see. The third part is setting up the fecal smear and the fecal flotation procedure. All materials needed for these procedures are kept in the lab. The microscopic examination of the smear and the flotation slide is the responsibility of the veterinary technician.

TASK 14.6
COLLECTION OF FECES

Concept: Feces should be as fresh as possible.

Discussion: Using newly passed feces is important because ova continue to develop or start to disintegrate with time. Either of these change their appearance and interfere with proper identification.

Concept: Clients are often asked to bring a fecal sample to the clinic at the time of their appointment or to be dropped off for analysis.

Discussion: Instruct the client to watch the animal defecate to be certain it has come from their animal. Have them place the feces into a clean, airtight, leak-proof container and keep it cool. If the sample is collected the night before the appointment, it must be placed in a refrigerator or in an ice chest. Otherwise, the eggs will hatch and the larva will die.

Concept: Many of the diseases diagnosed in a fecal examination are zoonotic, meaning they can affect humans if the eggs or larvae are ingested.

Discussion: For dogs, take them out for a walk to collect a voluntary sample; remember to bring a pickup bag to gather the entire sample. With cats, a fresh litter box is often very tempting and they will oblige you with a sample.

If a sample is not forthcoming, use a gloved, lubricated finger or a fecal loop gently insert into the rectum to collect a sample. This only results in a small amount of feces for analysis and there is some question as to the validity of the analysis.

Bring the entire sample to the laboratory. Mark the patient's identification on the bag and, if you cannot continue with the preparation of the sample, place it in the refrigerator for laboratory specimens. Mark in the patient's file that a sample has been collected and indicate where it is stored.

Handle feces with care; always use PPE and *wash your hands*!

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TASK 14.7
EXAMINATION OF FECES

Procedure

PROCEDURE

1. Prepare a card for your reference book entitled "Fecal Analysis."
2. Mark the card with the following information.
3. Put on gloves, goggles, and a lab coat.
4. Enter the patient's name/ID in lab record; use the facilities method of recording results either on paper or in the computer as you proceed.

PROCEDURE

1. Conduct gross examination noting:
   a) Color—ranges from white/gray to black; normal is brown.
   b) Consistency—ranges from hard pellets to normal firm, formed stools to runny, watery puddles.
   c) Odor—some diseases like parvovirus diarrhea has a distinct smell.
   d) Presence of blood and its color, which can range from bright red to dark and tarry. Bright red is usually fresh blood. Dark or tarry (black) color is often digested blood.
   e) Presence of mucus can often mean internal parasites or an absorption issue.
   f) Select one or two wooden sticks from the kit to probe feces. Sometimes, adult worms or tapeworm segments will be present in the feces. Tapeworm segments are flat and resemble grains of rice and roundworms are thin and white.
   g) If adults are found, collect and place them in a sample container and cover with saline or fecal flotation solution.
   h) Presence of any foreign material or undigested food. Use a forceps to collect the foreign object for possible identification.

FOLLOW-UP

1. Proceed to preparing the sample for analysis by a veterinary technician if he or she is available.
2. If not, place the sample in the laboratory refrigerator after labeling it with the animal's name/ID and date.
3. Clean the workspace as per the protocol in your facility.

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TASK 14.7.1
PREPARATION OF THE FECAL SMEAR

Concept: The fecal smear or a direct prep is examined for protozoans, bacteria, and white blood cells (WBCs). There are two ways of preparing the smear, one dilutes the feces more than the other and therefore diminishes the chance of seeing some cellular structures. It will depend on what needs to be looked for that will determine which method to use. The veterinary technician will be examining the smear.

Procedure

PREPARATION

1. Continue the entering this procedure on your task card entitled "Fecal Analysis."
2. Gather the materials: one or two slides.
3. Use a wax pencil to mark the slides with the animal's identification.
4. Put on PPE.

Fecal Smear:

1. Use an applicator stick get the stick "dirty" to transfer a very small amount of feces directly onto the labeled slide.
2. Add a small drop of saline solution to the slide; mix it with the feces using the applicator stick. Optional: Use new methylene blue or Lugol's solution instead of saline to stain the cells.
3. Cover the diluted feces with a coverslip.
4. Place next to the microscope and notify the technician when the smear is ready.

Direct Prep:

1. Place a small amount of feces into a small paper cup. Add an equal amount of saline solution to the cup. Mix well with the end of an applicator stick.
2. Place a drop of the mixture on a clean slide.
3. Cover the prep with a coverslip.
4. Place next to the microscope and notify the technician when the smear is ready.

FOLLOW-UP

1. After the smear has been read, assist by noting the finding in the patient's chart.
2. Disinfect the area and reset the microscope to its proper "resting" position.
3. Restock fecal examination supplies if necessary; otherwise, store it in its proper place.
4. Dispose of or return feces to the refrigerator.
5. Wash your hands!

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TASK 14.7.2
STANDARD FECAL FLOTATION

Concept: The fecal flotation procedure prepares the fecal sample for microscopic examination for parasite ova.
Discussion: Called a concentration method, fecal flotation is based on the principle that ova are lighter in weight than the solution into which they are mixed and will float. Therefore, ova will concentrate on the top of the solution where they become attached to a slide or coverslip. The slide or coverslip with the attached ova is examined under the microscope by the veterinary technician.
Concept: Fecal flotation can be accomplished in two slightly different ways, but the principle is the same.
Discussion: The standard method is where ova are simply allowed to float to the top of a test tube and the centrifuge method is where ova are centrifugally separated and concentrated at the bottom of the test tube. Commercial flotation kits, such as Ovassy Plus or Fecalyzer, are available and are easy to use for the standard method as described.
Concept: There are many different fecal flotation solutions; most are available commercially. Some clinics prefer to make their own solutions.
Discussion: Flotation solutions:

a) Sheather's solution (100 g sugar, 640 mL water, 13 g phenol): Heat gently until sugar is melted. Specific gravity: 1.026. This solution is often used if whipworms are an issue in your area.
b) Sodium nitrate is another commonly used solution that is available premixed; specific gravity is 1.200 and will float most common parasites.
c) Zinc sulfate solution, also available commercially, works particularly well on the protozoan *Giardia*. Specific gravity: 1.018–1.026.

Fecal flotation solution is usually decanted into a secondary container that is a squeeze bottle. Remember to label the secondary container appropriately.

Procedure

PREPARATION

1. Continue marking this information on your task card entitled "Fecal Analysis."
2. Put on PPE.
3. Set out patient feces.
4. Gather the materials: 15-mL conical test tube, two paper cups, strainer, coverslip, microscope slide, two applicator sticks, test tube rack, fecal flotation solution, and timer. Depending on the option used in your facility, you may also need a glass rod.
5. Label the test tube and the microscope slide with the patient's ID.

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PROCEDURE

1. Use applicator sticks to remove a gram of feces (about the size of a dime) from the sample and place in one of the paper cups.
2. Add 15 mL of fecal solution; mix well with the applicator sticks.
3. Place the strainer over the second cup and pour the fecal mixture into the strainer.
4. Make a bend in the rim of the second cup to fill the test tube with the sample.

Option 1

Technique A

1. Place the partially filled test tube into the centrifuge.
2. Add enough flotation solution to the tube to make a meniscus.
3. Gently place a coverslip over the top of the fluid.
4. Balance the centrifuge with a test tube filled with water and coverslipped directly opposite the test sample.
5. Spin for 3–5 minutes at 1300–1500 rpm.
6. After the centrifuge has come to a complete stop, carefully remove the coverslip and place it on the labeled microscope slide.

Technique B

1. When the centrifuge has stopped, do not remove the test tube; use a loop or a glass rod to touch the surface of the solution, placing the small drop on a slide. Repeat a couple of times.
2. Place a coverslip over the sample; start at one edge and slowly lower the coverslip to reduce air bubble formation, then alert the technician when it is ready.

Option 2

1. Place the sample in the centrifuge and spin at the correct speed and time as per the centrifuge manufacturer's recommendation.
2. Remove the test tube and place it in a test tube rack.
3. Add enough fecal solution to make a *meniscus* or dome at the top of the tube.
4. Gently place a coverslip over the test tube.
5. Set a timer for 5–10 minutes to alert you that time is up. If left too long, the eggs become "water" logged and sink; also, the edges under the coverslip will start to dry out, forming crystals from the solution.
6. Carefully remove the coverslip and place it on a labeled microscope slide.
7. Place the sample adjacent to the microscope and alert the technician that it is ready to read.

Option 3

This is the same as Option 2, only the sample is not centrifuged. The centrifugation method is the preferred technique for conducting a fecal flotation. It retrieves more parasite eggs than does the standard flotation procedure and is recommended by the Companion Animal Parasite Council.

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TASK 14.8 BLOOD COLLECTION AND HANDLING

Concept: Blood collection is a two-person process, one for the restraint of the patient and one as the venipuncturist.
Discussion: Restraint techniques during venipuncture are described in Chapter 8. The role of the venipuncturist is described in the following section.
Concept: When drawing blood, there are multiple factors to keep in mind.
Discussion: Tips for drawing blood on admitted patients:

1. Handle the patient quietly and gently. Avoid unnecessary stress as stress can actually alter blood results.
2. If using a peripheral vein for venipuncture, use the distalmost portion of the vein. This allows for reentry of the vein proximally if initial venipuncture fails.
3. Do not try to enter a vein over a hematoma.

Discussion: Tip for collecting blood from an outpatient:

1. Take the patient out of the examination room, away from the owner, and into the treatment area. Patients are usually more cooperative away from their owners. Owners are usually less distressed if they do not see the actual blood collection procedure itself. Blood collection is one of the most frequently occurring tasks during the day of any veterinary technician and assistant. Done properly, it becomes the basis for reliable laboratory results.

TASK 14.8.1 COMPONENTS OF A BLOOD SAMPLE

Concept: Depending on the laboratory test, whole blood, plasma, or serum is used.
Discussion: The liquid portion of the blood can be altered by the way a blood sample is collected. If a whole blood sample is drawn into a tube with anticoagulant, the liquid portion is called plasma. If a whole blood sample is drawn into a tube with NO anticoagulant, then the blood clots and the liquid portion is called serum. Many tests require one or the other, and it will say which in the instructions with the test kits.
Concept: Serum and plasma are separated from the blood cells by centrifugation.
Discussion: The WBCs and the red blood cells (RBCs) must be removed from the liquid portions as soon as possible. This is to prevent these cells from absorbing nutrients, that is, glucose, from the liquid portion and thus affecting the results. Also, RBCs tend to break up outside of the body and will cause the liquid portion to become *hemolyzed*.

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Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Blood Collection Procedure."
2. Mark the card with the materials required:
   a) Appropriate needle size and syringe or a blood collection system needle attached to a holder with an appropriate size and type of vacuum tube for the sample needed and the size of the animal
      i. 22 ga. by 3/4- to 1-in. needle are the smallest size that is used for drawing blood. Anything smaller results in a *hemolyzed* sample which can render it useless.
   b) Determine the volume of blood needed. The rule of thumb is to collect at least 2.5 times the amount of whole blood as the amount of serum or plasma required.
   c) Determine correct type(s) of vacuum vials for blood storage. See recommendations from the reference lab for tube type and blood quantity required for the tests requested. For in-house samples, consult the user's manual for blood chemistry analyzer or test kit instructions. The most frequently used tubes are red top, lavender top, tiger stripe top, and green top tubes. Refer to Appendix I for tube descriptions and uses. Refer to Appendix J for blood collection protocols.
   d) Alcohol, in either a spray bottle or a saturated cotton ball to clean fur and to enhance the visibility of the vein
   e) Labels and pen. Label all tubes with the patient's name and date/time of sample collection before the actual collection of the sample.
3. Confirm if the correct patient is being collected from the patient's record or the requisition form if samples are to be sent to a reference laboratory.
4. Put on examination gloves.

PROCEDURE

1. Position the animal for either a cephalic or jugular venipuncture as per the instructions in Chapter 10, Task 10.7.5, "Restraint for IV Injections, Venipuncture, and Catheterization." Jugular venipuncture is preferred for small animals and when collecting quantities of 2 mL or more of blood.
2. Occlude the vessel to make it stand up by applying pressure over the vein proximal to the puncture site. In the case of jugular venipuncture, pressure should be applied to the jugular vein as it enters the thoracic inlet.
3. Part the fur and wipe over the vein with a cotton ball soaked in alcohol. If visibility is inadequate, clip the fur over the site using a no. 40 blade. Make sure the clip is as small as possible and neat looking.
4. Position the needle with the bevel up, parallel to, and centered over the vessel.
5. Slide the needle into the vessel and gently aspirate or pull back on the syringe plunger or engage the vacuum tube by pushing it up to the top of the holder. If using a vacuum collection, allow the tube to fill completely. This is especially important if there is an anticoagulant in it.
6. As the syringe or tube fills, hold the needle position very still so that it does not move out of the vein.
7. When there is sufficient sample, press a dry cotton ball over the insert point and pull the needle out. The restrainer will need to maintain pressure over the insert point for 30–60 seconds. Apply pressure bandage if bleeding persists.

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8. If drawing the sample into a syringe, quickly transfer it to a blood collection tube by removing the cap on the tube, remove the needle from the syringe, and then deliver the blood into the tube. Mix thoroughly.
9. If blood is in a tube with anticoagulant, immediately, gently rotate the tube 7–10 times to mix it with the tube's contents.
10. If the vacuum tube is a red top, set the tube at an angle for at least 20–60 minutes to allow it to fully clot.

FOLLOW-UP

1. Make sure the patient has stopped bleeding and clean any blood off with hydrogen peroxide and a cotton ball.
2. Return the patient to the ward or the examination room as appropriate.
3. Mark in the patient's file that the sample was drawn, being specific about which vein was used.
4. Deliver the sample to the lab or prepare it for shipment to the reference laboratory. Notify the reference laboratory for pickup if appropriate. Follow hospital procedures for after-hours pickup of samples.
5. If the sample is clotted for a serum sample or if plasma is needed from a whole blood sample, proceed with taking the serum or plasma from the cells.
   a) On a clotted sample, remove the cap and ring the clot by sliding an applicator stick around the inside of the tube. This will release the fibrin and allow the clot to settle to the bottom of the tube.
   b) Place the tube in the centrifuge, balance it with another tube filled with water to the same level, then close the lid to the centrifuge and turn it on.
   c) Centrifuge according to manufacturer's recommendations for time and speed if serum or plasma is desired.
   d) Draw off the serum or plasma from the cells with a disposable pipette, being careful not to suck up any RBCs. Transfer the serum or plasma into another red top tube or a collection tube.
6. Label as serum or type of plasma according to the anticoagulant used, the patient's name, and the date and time collected.
7. Refrigerate the samples if not running tests immediately.

Sample Handling

Concept: Improper handling can result in rendering the sample unfit for analysis.
Discussion: Rough handling or use of a needle that is too small can cause hemolysis. Hemolysis is the rupture of RBCs, which imparts a red color to the serum or plasma. Hemolysis may interfere with some test results; consult the instructions that accompany each test.
Discussion: Tips for the prevention of hemolysis:

1. Use a needle at least 22-g or bigger on either a syringe or in a vacuum tube holder.
2. Collecting blood directly into a vacuum tube is preferred to minimize hemolysis. It will also prevent the formation of clots that may form as the handler is trying to get the cap off the tube and the needle off the syringe.
3. Avoid excessive pressure when collecting blood into a syringe and when ejecting blood from a syringe (remove the needle) into a collection tube. This can be avoided by collecting directly into the vacuum tube.
4. Handle blood gently. Rotate; do not shake the blood collection tube to mix with the anticoagulant.

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5. If centrifuging, allow the sample to clot completely, approximately 20 minutes, but no more than 60 minutes. If longer, the glucose levels will be affected and possibly will increase hemolysis.
6. Centrifuge the sample according to manufacturer's recommendations for time and speed.
7. Refrigerate the samples if tests will not be run right after collection.

TASK 14.8.2
COMPLETE BLOOD COUNT

Concept: The complete blood count (CBC) is run using whole blood collected in a lavender top tube. It is composed of a group of tests that is used in wellness exams, as a screening test before surgery, and as a tool to evaluate disease states.
Discussion: The individual tests of the CBC are the following:

1. total WBC count
2. total RBC count
3. total platelet count
4. hemoglobin
5. hematocrit or packed cell volume (PCV)
6. RBC indices such as the mean cell volume (MCV)
7. differential
8. plasma protein.

Concept: Some of the tests that make up a CBC can be run manually, but the rest require a hematology analyzer. CBCs run on analyzers are often called hemograms.
Discussion: The tests that can be done manually are the PCV, the differential, and the plasma protein. The PCV reflects the percentage of RBCs in whole blood. The differential is done on a blood smear to determine the percentages of the various types of WBCs, blood cell morphology, WBC and platelet count estimates, and examination for blood-borne pathogens. The plasma proteins are proteins found in the blood and the test is done using the refractometer. This is the only test that an analyzer does not do. Whole blood is sent through the analyzer where the various blood parameters are determined. Blood analyzers take less time to determine the full CBC than doing it manually.
Concept: Some clinics will choose to send the blood to a reference laboratory.
Discussion: Because of costs and a small number of samples run CBCs are sent to reference laboratories and require the following steps:

1. Complete requisition form using the patient's file to fill in the information.
2. Prepare blood smear (see Task 14.8.3); do not stain it; package in a slide container.
3. Place all the samples from the same patient in a Ziploc bag with the requisition form.
4. Put the bag in the refrigerator.
5. Contact the laboratory to schedule the sample pickup.
6. Make certain the sample is picked up before the end of the business day.

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Concept: If the entire CBC is run in-house, the veterinary assistant can start the preliminary setup of the tests.
Discussion: Ideally, the blood sample is run immediately after being drawn. If not, it should be placed in the refrigerator. If that is the case, it needs to be brought to room temperature before running the tests. If the clinic has a rocker, set it on the rocker for 20–30 minutes. If the clinic does not have a rocker, you can roll the tube between your hands until it feels warmer. This is also done to mix the blood before starting any of the following tests. Once the blood is warm, the blood smear, PCV, and plasma protein can be started for the veterinary technician.

TASK 14.8.3
PREPARING THE BLOOD SMEAR

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Preparing Blood Samples for Analysis."
2. Mark your card with the materials required:
   a) two clean, unchipped microscope slides
   b) a lead pencil for writing on the thick end of the smear
   c) patient's file
   d) blood sample
   e) pipette or two wooden applicator sticks
   f) exam gloves.

PROCEDURE

1. Mix the blood thoroughly then quickly take the cap off, and using a pipette, aspirate a small amount of blood and place a small drop on the end of one or two slides.
   Option 1
   Make the smear immediately after the blood draw with the needle and syringe after filling the vacuum tubes. Remove the needle from the syringe and place the small drop of blood remaining at end of syringe onto the slides.
   Option 2
   If blood collection was with a vacuum tube holder, immediately upon withdrawal of the needle from the vein, touch the end of the needle onto the slides.
2. To make the smear:
   Maintain continuous pressure on the second slide during the spreading process. If done properly, the blood smear will have a thumb-shaped feathered edge at the end opposite the drop of blood. The remaining blood from the drop will form a half-circle adjacent to the beginning of the smear.
   a) Take one of the slides and set it on the surface of the other slide, holding it at a 45° angle back it into the drop then push it forward with a quick, firm motion,

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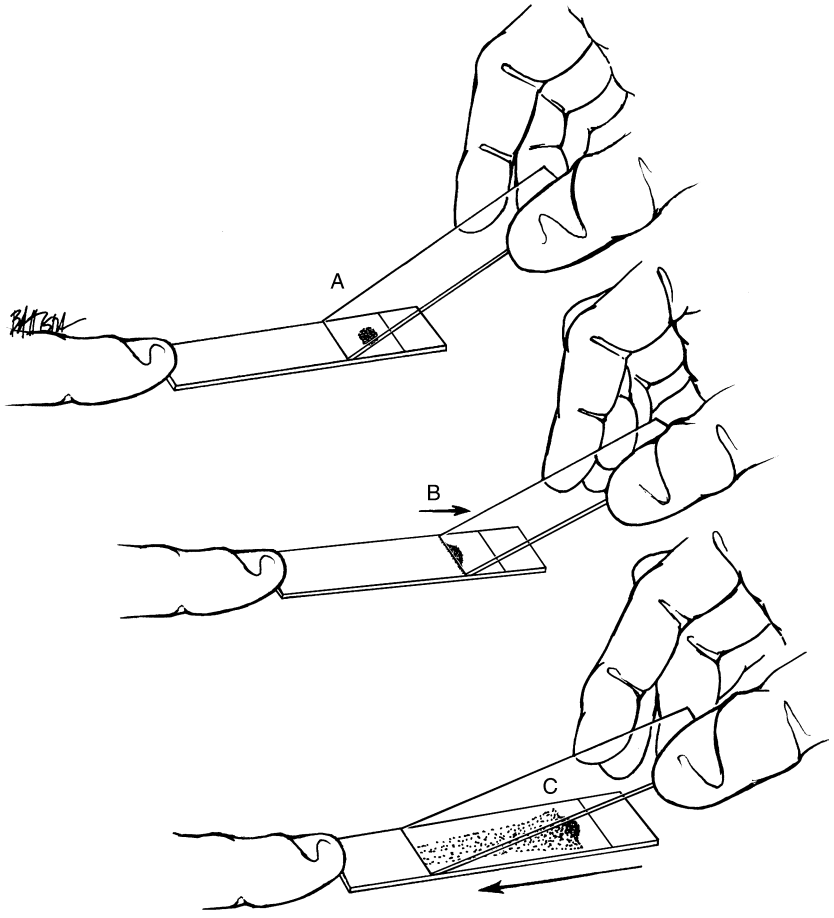


Figure 14.1. Making a blood smear.

"smearing" the blood along the entire length of the slide. Switch and make the second smear (Fig. 14.1).

3. A good slide will have a "feathered edge" that looks like a rainbow when held up to the light. If not, repeat the process with two new clean slides.
4. Place the slides aside to dry.
5. After the slide is dry, use the lead pencil to label it with the patient's ID on the thick end of the slide.

FOLLOW-UP

1. Continue with the remaining blood work such as the PCV and plasma protein determination, as required. Stain the smear after it has completely dried.

Concept: There are many ways to make errors when making a blood smear.
Discussion: Some of them are the following:

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1. Use of slides that are chipped or are not absolutely clean. There should be no residues on the surface of the slides.
2. Blood drops too large or too small
3. Not backing the edge of the spreader slide far enough into the drop of blood; backing too far into the drop of blood. Just back in far enough to have the blood wick across three-quarters of the width of the spreader slide.
4. Failure to keep the second slide at a 45° angle
5. Failure to maintain constant pressure on the second slide throughout the full length of the slide
6. Making the smear too slowly. The movement across the slide by the spreader slide is quick.
7. Pulling instead of pushing the spreader slide.

TASK 14.8.4
STAINING THE BLOOD SMEAR

Concept: The purpose of the blood stain is to facilitate differentiation of WBC types and other cellular structures when the smear is examined under the microscope.
Discussion: The hematology stains usually consist of a methyl alcohol fixative, an eosin (reddish-orange) and methylene blue (purplish-blue) dyes. Most practices use "quick" stains that are modifications of Wright's or Romanowsky stains such as the Dip Stat or Diff-Quick stains, respectively.

The procedure may vary slightly depending on the stain used. Always refer to the manufacturer's instructions when staining a blood smear. The immersion of the blood smear in each chemical is timed. The steps include fixing the smear using methyl alcohol, and staining first with the eosin stain and then the methylene blue stain. There may be a distilled water rinse between the two stains but always one at the end. The water should have a pH of 6.4–6.8.

The cytoplasm of RBCs is stained pink or salmon colored with blue nuclei if nuclei are present. The leukocytes have dark blue to purple nuclei, and the platelets are violet to purple. The cytoplasm and cytoplasmic granules will vary in color from pink to purple, depending on their ph. A good slide should have an overall coloring of purple with pink overtones when examined with the naked eye.

The stains are maintained in tightly capped Coplin jars. The distilled water should be replaced frequently because of contamination by the stains or it can be kept in a squirt bottle and just replenished. The stains should be replenished to maintain a depth to completely cover the smear. The alcohol should be absolute methanol, acetone free. The jars should be kept capped as methanol especially picks up moisture from the air, resulting in RBC artifacts (false structures).
Concept: The veterinary technician examines the blood smear under the oil immersion lens of the microscope.
Discussion: This procedure is called the differential cell count. It is done to determine the percentage of each WBC type present, the morphology of all cells seen, and the presence of any infectious organisms.
Concept: The veterinary assistant is responsible for making a readable slide.

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Discussion: If the quality of the smear and stain is suboptimal, the technician cannot make accurate observations.

Procedure

PREPARATION

1. Mark your reference card entitled "Blood Sample Analysis" with the staining procedure.
2. Put on PPE.
3. Prepare a blood smear with a feathered edge that is labeled and thoroughly air-dried.
4. Review the manufacturer's directions or the clinic's protocol for the staining procedure.
5. Set out the fixative, stains, and rinse solutions in order with the lids off on a nonporous tray with a small lip. If spilled or drips from the slide hit the counter, it will stain it permanently.
6. Grasp the slide by the very end with fingertips or use a forceps to lower the slide into the stain.

PROCEDURE

1. Lower the slide into a fixative so it is immersed completely for 1 second; repeat five times.
2. Lift the slide up, tilting to drain excess fixative back into the jar for just a second or so.
3. Lower the slide into the eosin stain so it is immersed completely for 1 second; repeat five times.
4. Lift the slide up, tilting to drain the excess stain back into the jar for just a second or so.
5. Lower the slide into the methylene blue stain so it is immersed completely for 1 second; repeat five times.
6. Lift the slide, tilting to drain the excess stain back into the jar for just a second or so.
7. Immerse the smear completely up and down five times in the distilled water to rinse excess stain from the slide.
8. Place the slide upright on a paper towel and leaned against another object.
9. Allow the slide to air-dry completely.

FOLLOW-UP

1. Once the slide is dry, place it and a bottle of immersion oil next to the microscope.
2. Notify the veterinary technician when the slide is ready to read.
3. Clean the work area.
4. Be sure the lids to the Coplin jars are tightened.
5. Put everything away, clean, and disinfect the area.

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TASK 14.8.5
PACKED CELL VOLUME

Whole blood is composed of RBCs, WBCs, platelets, and a liquid component containing dissolved materials, referred to as plasma.

Concept: The PCV is a measurement of the percentage of RBCs in whole, unclotted blood.

Discussion: The RBCs, called erythrocytes, are the oxygen-carrying component of the blood. The test is simple, rapid, and only requires a small amount of blood. It is referred to as the PCV or the "crit," which is short for hematocrit. PCV and hematocrit are used interchangeably; however, PCV usually refers to the manual method and hematocrit the calculated value from a hematology analyzer.

The materials needed to perform this test include a microhematocrit centrifuge, microhematocrit tubes, and a clay sealant.

As with any centrifuge, it must be balanced, so fill two microhematocrit tubes, then follow the manufacturer's recommendations for timing and rate of spin.

Concept: There are two types of capillary or microhematocrit tubes.

Discussion: A plain tube is used with whole blood containing an anticoagulant. A heparinized capillary tube is used with untreated whole blood. The heparin in the capillary tube keeps the blood from clotting. It can only be used immediately after the blood is drawn; otherwise, the blood will clot. Remove the needle from the syringe; slip the end of a heparinized tube into the tip of the syringe.

Concept: Capillary action pulls the blood into the tube by placing one end of the tube in the blood. It stays in the blood until the tube is at least three-fourths full.

Discussion: Some tubes have a black line indicating how high the tube should be filled. Allow the blood to rise to that mark, although it is not necessary to be exact. Hold your finger over the end of the tub to prevent the blood from running out until it is plugged with the clay. Gently wipe the bloody end of the tubes clean using a lab wipe, taking care not to touch the tube opening as that can wick your sample out of the tube. Plug the empty end of the tubes with clay sealant. Plugging the empty end prevents blood from contaminating the clay. Place both tubes opposite each other in the centrifuge with the clay end facing outward. *This is important*. Failure to place the clay end outward will result in loss of the sample as it spins. Note the number on the slot in which the tube is placed. Write the patient's name on a piece of paper with the tube location. This is especially important if running several samples at the same time. After tightening the lid, set the timer. Do not forget the lid, the tubes will spin out of the slots and break apart in the centrifuge.

Once the centrifuge stops, unscrew the lid and remove the tubes.

Concept: The sample will have changed from a homogeneous red color to one with three different colored layers.

Discussion: There will be a dark red layer composed of RBCs nearest the clay sealant. Just above it, a barely visible white line is the buffy coat composed of the WBCs and platelets. In normal blood, there is a clear to golden liquid above the buffy coat. This is the plasma.

Concept: To determine the percentage of RBCs, a microhematocrit reader is used

Discussion: This can be linear or circular in form. With either type of reader, align the top of the sealant on the zero and the top of the plasma on the 100. The line running through the interface of the RBCs and the buffy coat is the percentage of RBCs. The PCV is recorded as "% RBCs."

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After recording the PCV, retain the hematocrit tube. The plasma from it will be used next to determine the plasma protein.

Procedure

PREPARATION

1. Mark your reference card entitled "Blood Sample Analysis" with the PCV procedure.
2. Gather the materials:
   a) two capillary tubes appropriate for the blood sample
   b) clay sealant
   c) blood sample
   d) microhematocrit reader
   e) Kem-wipes.
3. Wear PPE.
4. Set up near the microhematocrit centrifuge.

PROCEDURE

1. Fill both capillary tubes with patient blood to an equal amount.
2. Wipe ends of tubes with a Kem-wipe.
3. Push the end of the tubes into the clay sealant.
4. Balance the centrifuge by placing the tubes with the sealant ends facing outward.
5. Put lids over the tubes and secure tightly.
6. Run according to the manufacturer's directions for time and speed.
7. After the centrifuge has stopped, remove the tube of patient blood.
8. Place the tube on the microhematocrit reader to read % PCV.

FOLLOW-UP

1. Record results as PCV: ___% in the patient's record and laboratory logbook if appropriate.
2. Clean and disinfect the work area.
3. Put materials away.
4. Discard blood-contaminated materials in a biohazard waste container.

TASK 14.8.6
PLASMA PROTEIN DETERMINATION

Concept: Plasma protein is determined using an instrument called a refractometer or total solids meter (Fig. 14.2).
Discussion: The refractometer measures the refractive index of a solution. This is the ratio of the bending of light rays in air to the bending of light rays in the solution.

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Figure 14.2. A refractometer is used to measure specific gravity and plasma protein. The fluids are deposited under the clear plastic shield. Photo courtesy of Teresa Sonsthagen.

Concept: Refractometers are calibrated to zero by using distilled water.
Discussion: Ideally, a refractometer should be calibrated daily before its first use. Follow the manufacturer's recommendations for the calibration procedure.
Concept: Typically, refractometers are used to measure urine specific gravity and plasma protein. The dissolved substances in each of these determine the refractive index.
Discussion: Refractometers with a scale for urine specific gravity and one for serum or plasma protein are required. Refractometers are made specifically for different substances and will therefore have different scales.
Concept: To determine plasma protein, break the spun capillary tube, place the plasma on the refractometer and read the result.
Discussion: The break should be near the interface of the plasma just above the buffy coat.

Allow the plasma to drip onto the prism or use a small capillary tube bulb to force out the plasma. Also, remove any glass chips that may be present from breaking the tube. Lower the cover plate, making sure the plasma completely covers the plate. If not, add more from the second capillary tube; insufficient plasma will not give a proper reading. Direct the refractometer toward bright light and focus to read the plasma protein scale at the interface of the dark and light areas. Record the results in gram per deciliter (g/100 mL). This is a simple and quick screening test that every veterinary assistant should be able to perform.

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Procedure

PREPARATION

1. Mark your reference card entitled "Blood Sample Analysis" with the "Plasma Protein Procedure."
2. Once daily, calibrate the refractometer according to the manufacturer's directions using distilled water.
3. Clean the prism and cover the plate according to the manufacturer's directions.
4. Use one or two spun capillary tubes to make certain there is ample specimen to obtain a good reading.
5. Put on PPE.

PROCEDURE

1. Break capillary tubes between the buffy coat and the plasma.
2. Completely cover the prism surface with plasma.
3. Lower the cover plate.
4. Hold the refractometer to the light, focus, and take the reading.
5. Record the results in gram per deciliter in the patient's record.

FOLLOW-UP

1. Mark the results in the patient's file and in the laboratory log.
2. Clean the refractometer according to the manufacturer's directions.
3. Put the refractometer in its case and put away.
4. Clean the area.
5. Place any blood-contaminated materials into the hazardous waste container.

TASK 14.9
BLOOD CHEMISTRY AND ELECTROLYTE DETERMINATIONS

Concept: In the past, blood chemistries and electrolyte determinations were sent to commercial laboratories called reference labs.
Discussion: While some veterinary facilities continue to do so, the increasing availability of in-house analyzers has resulted in the expansion of on-site veterinary laboratory capabilities. The advantage is more rapid access to results. With the availability and ease of in-house testing, it is possible to conduct more rapid health screenings of all patients. Preanesthetic panels are conducted before routine spays or neuters to detect abnormalities in surgical patients. Geriatric panels can detect developing diseases in older patients before the patient actually becomes clinically ill. Seemingly healthy patients may have a diagnosable disease identifiable during routine wellness screening.

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Concept: The in-house chemistry analyzers measures serum samples for glucose, blood urea nitrogen (BUN), creatinine, and others. The electrolyte analyzers measure sodium, potassium, and chloride in serum, plasma, or whole blood. Analyzers for serum chemistries can run single tests or groups of tests referred to as panels. These chemical evaluations provide specific organ function information; for instance, certain values are elevated in liver disease.

Analyzers are increasing in technical capabilities. Expect to see upgrades in the current equipment in veterinary laboratories, resulting in expanded capabilities for testing. Tests will be faster, more test types will be available, test errors will be reduced, and ease of use will increase.

Concept: The veterinary assistant is an operator of this equipment and may be responsible for its maintenance. Follow the manufacturer's recommendations for maintenance and use.

Discussion: Make this a part of your routine. These instruments use either liquid reagents or dry test strips of some form, which are usually refrigerated. They are dated and should be checked before use. Keep an adequate inventory of test materials most frequently used on hand.

Concept: There are many manufacturers of instruments in the veterinary field.

Discussion: It is only possible to provide general information about them:

1. The instruments may print out patient results, which are secured to the patient's record.
2. The instruments may be interfaced with hospital management software and results will be sent directly to the patient's electronic file.
3. There are reference ranges (normal values for each test for healthy patients of each species). Reference values are dependent on the laboratory or the equipment used.
4. Some equipment requires periodic calibration; all require some maintenance. Keep a record of who did these procedures and when. Carefully follow the manufacturer's directions when doing so.
5. Never use expired reagents. As with all medical supplies and drugs, reagents must be monitored for expiration dates.
6. Run the correct test(s). Review the patient's record to ascertain which tests or panels are ordered.
7. Determine which reagents are needed for the tests requested. Read labels three times.
8. The equipment must be kept clean. Follow the manufacturer's directions for maintenance.
9. Handle carefully. These are expensive, complex pieces of equipment.
10. Accuracy is essential. Measurements and timing must be exact.
11. Read and follow the directions.

The validity of test results is determined by the skill of the person performing the tests.

Procedure

PREPARATION

1. Read the patient's record to determine which tests are requested.
2. Review analyzer use and specific instructions related to the test(s) to be run.
3. Have the appropriate patient sample at hand. (A sufficient volume of serum, plasma, or whole blood is required to conduct all requested tests.)

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4. Gather and label the required materials.
5. Check the expiration date of reagents.
6. Put on gloves.

PROCEDURE

1. Turn on the equipment.
2. Allow warm-up time if necessary.
3. Follow the manufacturer's directions exactly.
4. Prepare the patient sample according to the directions.
5. Insert the sample into the machine.

FOLLOW-UP

1. If results are not sent electronically to the patient's file, attach a printout of the results to the patient's record. If a printout is not available, accurately copy results from the instrument screen.
2. Clean the equipment.
3. Put all materials away.
4. If additional reagents or materials of the type used are needed, add to the want list. (Infrequently used tests should not be kept in excessive inventory as they tend to expire.)
5. Clean and disinfect the area.
6. Place blood-contaminated materials and disposable items in the hazardous waste container.
7. Prepare a card for your task box entitled "Serum Analyzer Maintenance."
8. Mark the card for daily/weekly/monthly maintenance of the machine.

Observe an experienced team member using the instrument before attempting it on your own. The first time you run a test, have someone observe your work. Always ask questions if you are in doubt. It is better to ask a question than to make a serious mistake.

As with all other laboratory tests, some clinics keep test instructions in clear plastic sleeves in a "test instructions" binder in the lab. File all test instructions alphabetically to aid in location.

TASK 14.10
USING SEROLOGICAL TEST KITS

There are an increasing number of commercial serology test kits available for specific diseases. These tests are quick and easy, ranging from brucellosis in cattle to Lyme disease in dogs.

Concept: The basis of the test principle is an antigen–antibody reaction followed by a color change on the test pad if the antibody or antigen is present.

Discussion: These are single-use kits. Some kits test for the presence of more than one disease. For example, feline leukemia virus antigen, feline immunodeficiency virus antibody, and feline heartworm antigen can all be detected in the same test kit.

Concept: These test kits use serum, plasma, or whole blood, depending on the test and the manufacturer.

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Discussion: Use the specified sample type. Most test results are available in 8–10 minutes. Because results are so rapidly available, a test result will be ready by the time the veterinarian has completed the patient examination.

The kits come packaged with all the materials needed for conducting the tests. A pamphlet is enclosed that gives step-by-step instructions for setting up the tests and interpreting the results. As with other laboratory instructions, a copy of the directions for each kit can be kept in a clear plastic sleeve in a three-ring binder. Keep the binder in the laboratory area for ready reference. Switch out the instructions with each new box.

Concept: Read all the accompanying information about the test.

Discussion: Read the box when unpacking kits from the wholesaler to ensure proper storage. Some kits need to be refrigerated; others do not. These kits do have expiration dates, so be sure to check the date before storing the kits and before actual use.

Be certain to draw the appropriate quantity and type of sample (plasma versus serum or whole blood) needed to run the test. Refrigerate the labeled sample if the test is not run immediately.

The veterinary assistant will find these tests easy to run with a minimal margin for error. Because of the differences between test kits, however, the assistant must pay close attention to directions. As with all laboratory work, accuracy and attention to details are the key to success.

Procedure

PREPARATION

1. Review the patient's record to determine which test to run.
2. Chose the correct test kit.
3. Check the expiration date of the kit.
4. Review procedure instructions that come with test kits.
5. Collect the appropriate sample of sufficient volume to run the test.
6. Timer.
7. Put on PPE.

PROCEDURE

1. Prepare the sample for use.
2. Follow the manufacturer's instructions.
3. Use correct reagents.
4. Add reagents to the test pad or patient sample as required.
5. Once the test has been set up, begin timing.
6. Once the timer has rung, read the test.
7. Interpret the test results according to the description given in the kits instructions.

FOLLOW-UP

1. Record the results in the patient's medical record and in the laboratory record.
2. Dispose of all blood-contaminated materials and chemicals in a hazardous waste container.

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3. Put the materials away.
4. Clean the area.

Have a knowledgeable team member observe your work the first few times you use one of these kits.

TASK 14.11
URINE COLLECTION

The role of the veterinary assistant may be one of restraint during the process of urine collection. The exception is collection of urine during normal *micturition* (urination) or use of a litter pan. The following is a brief overview of techniques for urine collection.

Concept: The veterinary assistant can collect a voided urine sample from dogs.

Discussion: When possible, the best sample is "midstream," where just the middle portion of the voided sample is collected, not the very first and last portions of urine. For dogs, use a small plastic cup in which to collect the sample. Insert the cup into an appropriately sized wire loop attached to an appropriately bent coat hanger or a commercially available urine collection cup with a long handle. This allows the assistant to collect the sample without interfering with the patient's normal posture during urination. Dogs should be taken outside where they can walk around until they begin to urinate. The cup is slipped under the patient and the urine sample collected. With female dogs or short dogs, a shallow dish can be slipped under them during urination.

Concept: A cleaned litter pan can be used to collect urine samples from cats.

Discussion: The cat may be willing to use the pan without litter being present. Special beads are available just for feline urine collection. They are a nonabsorbent material that are placed in a clean litter pan and are referred to as "pearls." It gives the cat the feeling of digging a hole before urinating. The urine is poured off into a clean dry container with a tight-fitting lid. This pan is cleaned and refilled with the usual litter. The nonabsorbable beads are discarded or washed, dried, and saved for reuse. There is also nonabsorbent litter box sand, but it is expensive. The urine pools on top of the sand and can then be collected. Cotton balls also work; they can be squeezed out into a cup. Remember to wear gloves!

Concept: Urine may be collected when the bladder is expressed.

Discussion: The veterinarian or technician applies external pressure to the bladder through the abdominal wall while the assistant collects the sample. The sample should be midstream as well unless the bladder contains only a small amount of urine, in which case all the urine is collected.

Concept: The technique chosen for urine collection depends on the reason it is being collected. A sample to be checked for microorganisms is best collected by cystocentesis.

Discussion: An invasive technique, cystocentesis, prevents urine from washing through the urethra and from being contaminated by organisms normally residing in that structure. A needle is passed through the abdominal wall directly into the urinary bladder. Urine is aspirated into the syringe attached to the needle. A veterinarian or veterinary technician performs this procedure. The assistant restrains the patient.

Concept: Catheterization is another aseptic technique used for urine collection. Since this is another invasive technique, the assistant restrains the patient while the veterinarian or veterinary technician proceeds with the catheterization.

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Discussion: A urinary catheter is a long, thin tube of rubber or plastic that is inserted into the bladder through the urethral opening. The assistant restrains the patient and retracts the prepuce on the male dog while the catheter is placed. A syringe is attached to the ending of the catheter, and the urine is aspirated. In the female, the catheter is passed through the vulva and enters the external sphincter located on the floor of the vagina. In the male, it is passed directly into the urethral opening at the end of the penis. It is much easier to catheterize a male than a female patient.

Concept: Patient restraint during urine collection depends on the technique being used and the preference of the veterinarian or veterinary technician.

Discussion: For instance, a veterinarian may prefer to have the patient lying on either its side or back. Another may prefer a patient in a standing position. Once the assistant becomes familiar with a veterinarian's preferences, it will no longer be necessary to ask the preferred restraint position for each technique. Until such time, ask.

Procedure

Canine Urinary Catheterization

PREPARATION

1. Prepare a card for your task box entitled "Urine Collection."
2. Mark one side with the procedure and on the other the materials needed:
   a) Labeled urine collection container and cup holder or cup with long handle
   b) The patient
   c) Use hospital lead on the patient.
   d) Check the patient's record to ensure the correct sample type is collected.
   e) Check the identification collar on the patient.
   f) If at all possible, collect urine first thing in the morning or late in the afternoon. These times are more likely to yield greater volumes of concentrated urine.
   g) Put on PPE.

PROCEDURE

1. Securely leash the patient.
2. Take the collection container with you.
3. Take the patient outside.
4. Allow the patient to leisurely explore along the perimeter of the dog walking area.
5. Once the patient assumes the posture for urination, prepare to slip the collection container into the stream of urine.
6. After the patient begins to urinate, quickly slip the cup into the stream of urine.
7. Withdraw the container after the cup is at least half full and before the patient finishes urinating.
8. Allow the patient to finish urinating.
9. Return the patient to its housing within the veterinary facility.
10. Mark the patient's file that the urine has been collected.
11. Place the labeled container of urine in the laboratory area.

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FOLLOW-UP

1. Begin the analysis of the urine that the assistant performs.
2. Prepare the sample for microscopic examination.
3. Clean, disinfect, and put away the urine cup holder.

Tip Box 14.2: **If the exercise area is not fenced, a double leash should be used, one hooked to the ring on the collar and your hospital slip leash.**

Procedure

Feline Urine Collection

PREPARATION

1. Confirm the patient identity.
2. Remove the litter pan and label with the patient's cage and ID.
3. Prepare a different litter pan, preferably plastic, to collect the urine.
   a) Wash with soap and water.
   b) Rinse with a disinfectant, remembering contact time.
   c) Rinse liberally with sterile water.
   d) Allow to air-dry or use a hair dryer to speed-dry.
   e) Add the nonabsorbent materials to the litter pan.
4. Put on exam gloves.

PROCEDURE

1. Put the litter pan in the patient's cage.
2. Wait for the cat to urinate, checking frequently.
3. Once the cat has urinated, remove the pan from the cage.
4. Replace with the original litter pan.
5. Transfer urine into a labeled test tube or clean container with a lid, take to the lab, and alert the veterinary technician the sample is available.
6. Refrigerate urine no more than 30 minutes if testing is not done immediately.
7. Mark in the patient's file that the urine has been collected.

FOLLOW-UP

1. If pearls were used, clean and place in a disinfectant or throw away, depending upon product and hospital policy.
2. Return to laboratory to assist with the sample testing unless already done.
3. Discard disposable materials in the biohazard container.
4. All other materials/equipment are cleaned, disinfected, and put away.

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TASK 14.12
URINALYSIS

Concept: The examination of urine is divided into four parts: the physical characteristics, specific gravity, chemical assay, and microscopic examinations.
Discussion: The proper name for the examination of urine is urinalysis. The assistant is responsible for conducting and recording the urinalysis with the exception of the microscopic examination of the sediment. Ideally, a urinalysis is conducted within 30 minutes of sample collection. If unable to run the sample, immediately place it into the lab refrigerator in a labeled, sealed container. Indicate on the patient's record and treatment board that the sample has been collected and is in the lab.
Concept: The first part of the urinalysis is to record the physical characteristics of the urine: color, clarity, odor, and foam.
Discussion: Under the heading "Urinalysis" in the patient's record, simply create a list: color, clarity, odor, and foam. Record your observations after each. Normal urine is yellow and clear. Urine can range from colorless to almost brown. Drugs can alter coloration, as can some disease states.

Normal urine is clear, but clarity can range from cloudy to flocculent, in which large particles of sediment are suspended in the urine. The odor is usually not diagnostic, but the presence of bacteria imparts an ammonia-like odor and ketones impart a fruity or sweet odor.

Vigorously shaking a urine sample (remember to cover the top) usually produces a small amount of white foam. High levels of protein in urine create a larger volume of foam that lasts longer. Bile pigments color the foam greenish yellow.
Concept: The urine specific gravity is determined using a refractometer or a urinometer. Specific gravity is the comparison of water to other liquids such as urine or plasma. Dissolved substances in the sample determine the specific gravity. Urine specific gravity is used as a measure of hydration state and kidney function.
Discussion: The specific gravity is conducted on room temperature urine. It is never less than 1.000, which is the specific gravity of distilled water. The specific gravity is read in decimals, for example, 1.023, with no units.

The refractometer, the same instrument used for plasma protein determination, is used to read the specific gravity. The procedure is identical except that the urine specific gravity scale is used to read the result. The advantage to using the refractometer is that only a few drops of urine are needed, whereas the urinometer requires using a greater volume, up to 10 mL, of urine depending on the size of the urinometer.

Often, the specific gravity is too high to be read on the refractometer scale and the urine must be diluted. Mixing one part urine to one part water results in a dilution factor of two. The specific gravity reading is multiplied by two. (The 1 before the decimal point always remains 1.) For example, if the dilute urine sample read 1.36, then the correct specific gravity would be 1.72 g/dL.

The urinometer is in two parts: a freestanding cylinder and a float containing a scale for the specific gravity. The cylinder is filled with enough urine so the float does not touch the bottom. The float is then placed in the cylinder, spun so it does not cling to the sides, and read at the base of the meniscus of the urine.

After the specific gravity has been determined and recorded, chemical tests are run.
Concept: Chemical tests are usually accomplished by using a reagent strip, referred to as a chem strip or dip stick.

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Discussion: The number of tests depends on the chemistry strip used—minimally strips with pH, glucose, protein, blood, and bilirubin are used. Each test is no more than a single chemically treated square of paper attached to a plastic strip. There can be from 1 to 10 tests on one strip. The outer label on the container of these strips provides the interpretation of the color changes for each test and a time in seconds when each is read. Carefully match the sequence of tests to the sequence on the outer label and record the results. Each color corresponds to a certain concentration of chemical in the urine.

First, record the name of each test on the reagent strip on the patient's record just below the recording of the urine specific gravity. Make a mental note of the time each test square must be read. Dip the strip in urine, saturating each square. Carefully follow the manufacturer's instructions for reading, remembering to correctly align the order of the tests with the order on the label.

Record results according to the scale provided. Some tests will have numerical values; others are recorded as negative or 1+, 2+, 3+, and so on.

In fully automated veterinary labs, the test strip is placed in an analyzer that reads the strip and prints the results. This provides more consistent results than does just comparing the pictures on the label.

Concept: Preparation of the sediment is the final test.

Discussion: A test tube with a tapered end is filled with urine and placed and balanced in a standard centrifuge. Run the centrifuge according to the manufacturer's direction as to time and the rotations per minute (rpm) for urine. The recommended rpm is usually 1000–2000 rpm for 3–6 minutes. Once centrifugation is complete, remove the test tube. Decant the urine. This is done by simply turning the test tube upside down, pouring the urine off the sediment at the very bottom of the tube. Do not tip the test tube on its side or the sediment will pour out! Gently flick the bottom of the test tube with the end of a finger to mix the sediment with the remaining urine.

At this point, a stain may be added to the urine. This can be a small drop of methylene blue or a commercial stain made specifically for staining urine such as Sedi-Stain. Some veterinary technicians prefer reading the slide without any stain at all. If a stain is used, mix it well with the urine by flicking the bottom of the tube with a finger.

Using a clean and labeled slide, pour a drop of urine on the center of the slide. Place a coverslip over it to minimize the formation of bubbles under it. Place the slide next to the microscope with the patient's medical record. Notify the veterinary technician when the slide is ready to read.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Urine Analysis."
2. Mark one side with the procedure and on the other the materials needed:
   a) pen
   b) gloves
   c) test tube rack
   d) two test tubes with tapered ends
   e) slide and coverslip
   f) wax pencil to label slide
   g) urine stain (optional)

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h) refractometer or urinometer
i) chemical assay strips
j) Write the heading "Urinalysis" on the record or place a "Urinalysis" sticker on the patient's record under "O" of the SOAP notes.
k) Beneath it, list all tests to be conducted and recorded unless an automated urinalysis is conducted, in which case the report is simply attached to the notes.

3. If refrigerated, bring the sample to room temperature.
4. Check the patient's record to confirm what texts need to be run.
5. Put on PPE.

PROCEDURE

1. Conduct an examination of the physical characteristics:
   a) color
   b) transparency
   c) odor
   d) foam
2. Specific gravity
3. Chemical assay dip strip in urine to the appropriate time according to the label on the test strip container (Fig. 14.3).
4. Time and read each test according to directions on the label.
5. Compare color changes to the chart on the label.
6. Record all of the test results on the patient's record.

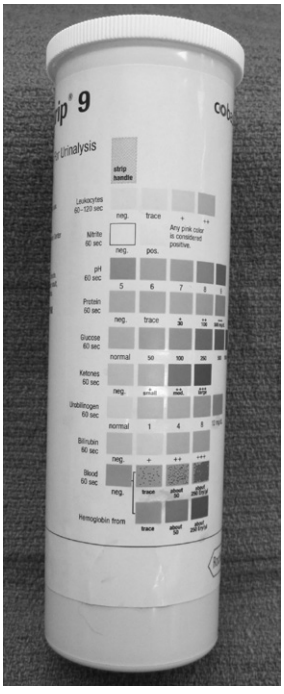


Figure 14.3. Urine chemistry strips with the comparison chart on the bottle. Photo courtesy of Teresa Sonsthagen.

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7. Preparation of urine sediment:
   a) Fill one tapered-end test tube with urine.
   b) Fill a second test tube with an equal amount of water.
   c) Place tubes opposite each other in centrifuge. Secure the top.
   d) Set dials for revolutions per minute and time for urine, not blood. Confirm the manufacturer's recommendations.
   e) After the centrifuge stops, decant urine.
   f) Mix droplet of urine with sediment.
   g) Add a droplet of the preferred stain (optional).
   h) Place the droplet of prepared sediment on the clean, labeled slide.
   i) Cover the sediment with a coverslip.
8. Place the patient's record and prepared slide adjacent to the microscope.
9. Notify the veterinary technician that the slide is ready.

FOLLOW-UP

1. Clean the refractometer or urinometer. Put away.
2. Discard the remaining urine down the drain. Flush the drain with cold water.
3. Put away chemical assay strips.
4. Clean the test tubes with hot soapy water and a small bottle brush, rinsing well and drying upside down in a test tube rack.
5. Discard used chem strips in a biohazards container.
6. Clean and disinfect the counter.
7. Put away any remaining items.
8. Remove and discard gloves in a hazardous waste container.

TASK 14.13 MICROBIOLOGY: SAMPLE COLLECTION

Concept: Accurate diagnosis and the optimal choice of drugs for treatment begin with proper sample collection for microbiology testing. The goal is to collect a sample that contains the causative agent of disease. Then, the identification process and antibiotic sensitivity testing can proceed.

Discussion: Most veterinary clinics approach the process in two ways. Preliminary diagnostic work, such as the commonly used Gram stain for microbiology samples, is conducted in-house. Then, the culture and sensitivity can either be sent to a reference laboratory or be conducted in-house. The culture is the growth of the organisms in the sample. The sensitivity test indicates which antibiotic would be of use against the identified pathogen. The choice depends on the veterinarian's preference, available equipment, and skills of the staff. The potential for infection to staff handling these samples is high, so use of cautious laboratory techniques and PPE are of the utmost concern.

Concept: Bacteria that cause disease in animals can cause disease in people.

Discussion: Wear gloves when handling any infectious materials. A lab coat should be worn to prevent contamination of clothing. Goggles and a mask are worn if there is the potential for splashing or inhalation of infectious materials.

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Keep the work area clean and uncluttered. Use a disinfectant when the work is completed. Leave the disinfectant on surfaces allowing it to air-dry.

Concept: Samples must be collected aseptically.

Discussion: Careful technique in collection and handling is essential. If contaminants are accidentally introduced into the sample, whether it is to be stained or cultured, the results are invalid. Therefore, samples are collected aseptically. When bacterial infections are suspected, the first sterile swab used for sample collection is the one cultured. The second swab from the same site is used for the Gram stain. Only the end farthest from the cotton tip is handled.

Concept: If the specimen is to be sent to a reference laboratory for workup, a technique for shipping swabs is to use the culturette system.

Discussion: Culturettes are sterile swabs in sterile plastic tubes. The swab is attached to the inside of the tube top. The top of the tube with the swab is removed, the sample is swabbed, and the swab is reintroduced into the tube with the top securely replaced as well. Pressure is then applied over the end of the tube. Crushing the end releases a liquid nutrient media soaking the tip of the cotton swab. The whole tube is then sent to the lab.

Concept: The veterinarian or veterinary technician will be collecting the sample. The assistant will gather the equipment needed, restraining the patient, and prepare the samples for shipping to the reference laboratory if not run in-house.

Procedure

PREPARATION

Prepare a card for your reference book entitled "Sample Collection for Culture."

1. Determine the type of materials needed by checking the patient's chart.
2. Mark one side with the procedure and on the other the materials needed:
   a) examination gloves
   b) antiseptic solution or alcohol
   c) gauze sponges or cotton balls
   d) sterile cotton swabs
   e) wax pencil for labeling slides and petri dishes
   f) clean slides and coverslips.
3. If culturing in-house when bacterial infection is suspected:
   a) blood agar plate
   b) two sterile swabs
   c) microscope slides
   d) Gram stain
   e) incubator set to body temperature.
4. If sending the sample to a reference laboratory:
   a) transport media or culturette tube
   b) requisition slip
   c) slide container for holding slides
   d) Ziploc bag for enclosing the above-mentioned items.
5. If fungal infection is suspected, set out the following:
   a) Wood's light
   b) 10% potassium hydroxide
   c) clean, labeled slide

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d) coverslip
e) heat source
f) DTM or other fungal culturing agar
g) sterile forceps
h) alcohol-soaked cotton ball.

6. Have the patient's record at hand.
7. Put on PPE.

PROCEDURE

Bacterial Cultures

1. Confirm patient identification.
2. Restrain the patient while the sample is being collected.
3. If sending the sample out to a reference laboratory, roll one swab on a labeled microscope slide, put it in a slide holder, then include it with the other swab or sample and the completed requisition form in a Ziploc bag and seal. Call the laboratory for a pickup and confirm the storage requirements for the sample.
4. Label a blood agar plate and lay one of the two swabs next to it so it can be inoculated by the veterinary technician.
5. Roll the second sterile swab on a clean, labeled slide to be stained. Allow slide to air-dry.

For Fungal Identification

1. Lay out the Wood's light. This will be passed over the patient's body, looking for fluorescence on the hair.
2. Have the sterile forceps available to pluck a few hairs.
3. These are placed on a clean, labeled slide.
4. Have a pipette, the 10% potassium hydroxide, and coverslip available.

FOLLOW-UP

1. Return the patient to its housing or owner.
2. Clean the area, then remove gloves and dispose of properly.
3. Make an initial entry into the patient's record and laboratory logbook as to when and how the sample was collected.
4. Any items contaminated with infectious materials are placed in the hazardous waste container.
5. After all of the tests are done, spray the area with disinfectant and allow it to air-dry.

TASK 14.13.1
THE GRAM STAIN

Concept: The Gram stain consists of four solutions and most bacteria will stain as either gram positive (take up purple dye) or gram negative (take up red dye).
Discussion: A Gram stain may be done from the original sample and later from growth on the blood agar plate. The Gram reaction helps determine how to proceed with identification of the bacteria.

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Concept: Care must be taken when preparing the specimen slide. Swabbed samples can be rolled onto the slide. From an agar plate, touch a sterile wire to the desired colony and mix into a drop of water or saline on the slide.
Discussion: A common mistake is applying too much inoculum on the slide, resulting in uneven staining.

Procedure

PREPARATION

1. Prepare a card for your reference Book entitled "Gram Staining."
2. On one side of your card, mark the materials needed:
   a) labeled slide containing the material to be stained
   b) stains either in dropper bottles or Coplin jars
   c) staining rack if Coplin jars are not used
   d) gloves
   e) immersion oil
   f) patient's record.
3. On the other side of the card, place the technique your practice uses to Gram stain.
4. Fix the materials on the slide by passing it over a hot flame briefly. This is usually accomplished with a Bunsen burner. Fixing adheres the sample to the slide and preserves the morphology (shape) of the bacteria.

PROCEDURE

Technique 1: Staining Rack

1. A slide staining rack is placed over the sink. Stains are applied using dropper bottles containing the stains.
2. Procedure:
   a) Place the dry slide on a rack.
   b) Apply crystal violet; let it sit on the slide for 30 seconds.
   c) Gently rinse with tap water.
   d) Apply iodine solution; let it sit on the slide for 30 seconds.
   e) Gently rinse with tap water.
   f) Wash the slide with decolorizer for approximately 10 seconds or until no more purple coloring washes away. (Do not overdo.)
   g) Gently rinse with tap water.
   h) Apply Safranin; let it sit on the slide for 30 seconds.
   i) Gently rinse with tap water.
   j) Air-dry or blot-dry.

Technique 2: Stain in Coplin Jars

1. Use forceps or spring-type clothespin to movethe slide from jar to jar.
2. Procedure: The slide is moved according to the sequence and times listed. Drain the end of the slide on the edge of each jar before moving to reduce cross contamination of solutions.
   a) crystal violet stain: 30 seconds
   b) tap water rinse

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c) iodine solution: 30 seconds
d) tap water rinse
e) 95% ethanol (decolorizer): 10 seconds
f) tap water rinse
g) Safranin counterstain: 30 seconds
h) tap water rinse.

FOLLOW-UP

1. Prop slide upright on a paper towel to dry or dry using blotting paper.
2. Once dry, place beside the microscope with the bottle of immersion oil.
3. Place the patient's record beside the slide.
4. Notify the veterinarian or technician when the slide is ready to read.
5. If the sample is being sent to the reference lab, put the dry slide in the slide holder with the unstained slide. Seal in the Ziploc bag with the reference lab requisition.

TASK 14.13.2 INOCULATION OF MEDIA

Concept: Inoculating media is the transferring of specimen onto media that will support bacterial growth. Culturing (growing) bacteria may take 24–48 hours in an in-house incubator.
Discussion: Blood agar is commonly inoculated initially since many types of pathogens will grow on it. It contains 5% sheep blood.
Concept: If the specimen is going to be worked up in-house, the first swab taken is used to inoculate the blood agar plate. The quadrant streak method is commonly used to end up with isolated colonies of bacteria growing in the last quarter of the plate. Isolated colonies are necessary so they can be picked out from other colonies as cross contamination from different bacteria can complicate the identification procedures.
Discussion: Lift the lid using the free hand. Only tip one side of the lid upward enough to slide the culture swab between the upper and lower portions of the plate without touching either part. Removing the lid completely will allow room air contaminants to settle onto the media. The swab is swept across one quarter of the plate, with a back-and-forth motion. Flame a wire loop, rotate the plate a quarter turn, slide the loop into the previous quadrant, then sweep it back and forth in the second quadrant. The process is repeated flaming the loop and streaking material from each quadrant of the plate. In the fourth quadrant, a single squiggled streak is used. Care must be taken to not put too much inoculum (sample) on the plate initially as it may run across the surface as the plate is tilted. Flaming the wire between streaks is a must to thin out the sample so the final streak results in single colonies.

After streaking, the plate is labeled and placed upside down in the incubator to avoid condensation on the agar surface that would cause the bacteria to mix.
Discussion: If there is no growth after 24 hours, the blood agar plate is reincubated for another 24 hours. If there is still no growth, then the specimen is reported as "no growth."
Concept: If there is growth, representative colonies from the plate will be selected for a Gram stain by the veterinarian or the veterinary technician.
Discussion: Based on the Gram stain result, identification procedures using selected media will be started.

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Procedure

PREPARATION

1. Set the incubator at 98–100°F, containing an open petri dish filled with water if the incubator has no built-in humidity control.
2. Gather the materials:
   a) Bunsen burner, match, and inoculating loop or package of sterile glass rods with rounded ends if a Bunsen burner is not available
   b) wax pencil
   c) petri dish containing blood agar
3. Put on exam gloves.

PROCEDURE

1. Hold the petri dish in your nondominant hand, then partially lift the lid of the petri dish.
2. Use a cotton swab with the specimen to inoculate one-fourth of agar, streaking back and forth (Fig. 14.4A).
3. Flame the inoculating loop over the Bunsen burner (or use individual sterile glass rods). Cool until no longer red hot.
4. Rotate the petri dish one-quarter turn.
5. Enter the end of the first quadrant two or three times to streak the second quadrant, then streak the remainder of quadrant two (Fig. 14.4B).
6. Reflame and cool the inoculating loop.
7. Repeat the same procedure two more times, entering each previously inoculated quadrant once or twice but filling the entire area of each quadrant (Fig. 14.4C).
8. Lower the top lid of the petri dish.
9. If a loop is used, reflame and cool before putting down. If glass rods are used, place in the sink in a pan containing a disinfectant solution.
10. Invert the petri dish and label the bottom of the dish with the date and the patient's identification.
11. Place in an incubator upside down.
12. Incubate for 24–48 hours.
13. Check daily for growth by holding up to bright light and looking through the bottom of the plate.

FOLLOW-UP

1. Enter the date and time that the culture was set up in the patient's file and laboratory log.
2. If there is growth, the technician or the veterinarian will continue the identification process. (The assistant may help with some of these procedures.)
3. Enter a description of a typical colony in the patient's file and laboratory log. Remember to date and initial your entry.

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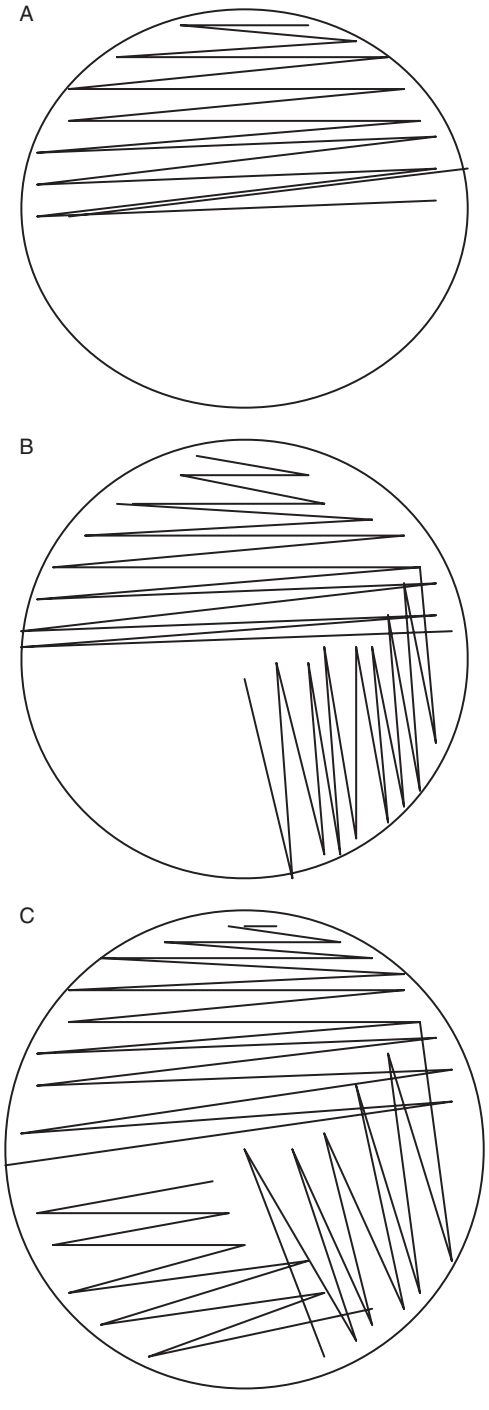


Figure 14.4. Inoculation of a medium plate.

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Procedure

Culturing for Dermatophytes

PREPARATION

1. Gather the materials:
   a) DTM or Synbiotics Fungassay tubes are commonly used media for fungi.
   b) alcohol-soaked cotton ball
   c) sterile forceps.
2. Put on exam gloves.

PROCEDURE

1. Restrain the patient so the area of concern is accessible.
2. The veterinarian or the veterinary technician will use a sterile forceps to pluck a few hairs around the periphery of the skin lesion.
3. With either product, the plucked hairs are gently pressed into the surface of the media.
4. The cap is loosely screwed back on the media-containing tube, but not so loosely placed that it falls off.
5. The container is labeled with the date of inoculation and the patient's identification.
6. The culture is stored at room temperature in a dark place such as a drawer or cupboard.

FOLLOW-UP

1. Return the patient to its owner or cage.
2. Assist with the record entries if needed.
3. Check the culture daily for at least 6 weeks. A color change in the agar around the hairs is considered positive for the presence of a fungus. The medium comes with a chart for interpreting the color change; timing of the color change with respect to the growth is important to determine if the fungus is a pathogen.

TASK 14.13.3
ANTIBIOTIC SENSITIVITY TESTING

Concept: Not all antibiotics work equally well on all organisms. Therefore, it is advantageous to test the bacteria isolated from the patient with different antibiotics to determine the best one to use.
Discussion: The efficacy of an antibiotic depends on the sensitivity or susceptibility of the pathogen to it. Isolated colonies of interest from the blood agar plate are selected and tested for antibiotic sensitivity. Identification of the bacteria should proceed at the same time.
Concept: The key to successful testing is to choose the mostly likely antibiotics to test because there are so many available.

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Discussion: The answer begins with the Gram stain. Therefore, the first step is to conduct a Gram stain examination of the colony of interest from the blood agar plate. If the bacteria are gram positive, the bacteria stain purple. If they are gram negative, they stain pink.

The shapes of organisms vary and serve as an additional aid to identification. Some antibiotics are effective against gram-negative rods, others against gram-positive cocci. The veterinarian will determine which antibiotic disks to use for testing after having examined the Gram stain.

A few colonies of the bacteria are transferred into a tube of broth media and the tube is incubated until its turbidity matches the turbidity of a standard. (Alternate method: If sufficient colonies are present, prepare the broth by adding enough bacteria to match the turbidity of the standard.) A sterile swab is dipped into the tube and spread evenly over the entire surface of Mueller Hinton agar, a special media used for sensitivity testing. Some organisms like streptococci (gram-positive, cocci-shaped bacteria) will not grow well on Mueller Hinton agar. For these, Mueller Hinton with 5% blood must be used and interpretation of results adjusted.

Small paper disks in plastic tubes, each saturated with a single antibiotic, are placed in a disk dispenser. Each hole in the dispenser holds one tube. The dispenser holds multiple tubes. It fits directly over the petri dish. The lever is pushed to one side releasing one disk of each type onto the surface of the agar. Each disk is coded with the antibiotic it contains. Compare the code on the disk to the code on the tube to determine the name of the antibiotic it contains.

The disks are pressed into the agar with a flamed loop or a sterile swab. The dish is inverted, labeled, and incubated.

Concept: After incubation, the plate is held to a bright light and zones of inhibition of bacterial growth are noted and measured around each disk.

Discussion: The antibiotic seeps out into the agar surrounding the disk. If the bacteria are sensitive to the antibiotic, they will not grow up to the disk. The diameter sizes of the zones are compared to the manufacturer's standardized chart to determine which antibiotic is the best. Some bacteria will be resistant to the antibiotics and will grow right up to the disk.

Procedure

PREPARATION

1. Check with the veterinarian for the list of antibiotic disks to be used.
2. Gather the materials:
   a) original culture plate
   b) Bunsen burner, match, and inoculating loop or package of sterile glass rods
   c) broth medium and Mueller Hinton agar plate or Mueller Hinton with 5% blood agar plate based on the Gram stain results
   d) disk dispenser filled with antibiotic disks
   e) sterile swabs
   f) wax pencil.
3. Put on PPE.

PROCEDURE

1. Using a flamed, cooled inoculating loop or a sterile glass rod, transfer the colonies to the broth tube.

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2. Select two or three isolated colonies of the same morphology from the blood agar plate.
3. Incubate broth (or use an alternate method if there are enough colonies) several hours until the turbidity matches that of the standard.
4. Dip a sterile swab into the broth, press against the sides of the tube to reduce the amount of broth on the swab and then streak the Mueller Hinton plate with the swab, covering the entire plate.
5. Rotate the plate; streak the entire plate again with the swab. (Do not dip into broth again.)
6. Repeat step 5 one final time to ensure complete coverage.
7. Place the disk dispenser over the plate.
8. Push the lever.
9. Use a cooled, flamed inoculating loop or a sterile glass rod to push each disk firmly onto the surface of the agar.
10. Replace the lid, then turn the plate upside down.
11. Label with patient's identification, time of inoculation, and date using wax pencil.
12. Place upside down in the incubator for 16–18 hours.

FOLLOW-UP

1. Examine the plate after incubation and measure the zones, including the diameter of the disk.
2. Compare zone sizes to chart and report the results to the veterinarian. Zone sizes must be measured and fall into the correct size ranges for the bacteria to be susceptible to the antibiotics. Simply seeing a zone of inhibition does not mean the antibiotic is a good choice for the bacteria.
3. Record the results in the patient's file and in the laboratory log.
4. After completion of testing, discard the agar plates into hazardous waste container.

TASK 14.14
NECROPSY: PREPARATION AND FOLLOW-UP

Necropsy is the term used to describe the examination of an animal's body after death. It is conducted in the same manner as a human autopsy.

Concept: The purposes are to aid the veterinarian in making a more complete diagnosis and to further professional knowledge.

Discussion: Necropsy is performed as soon as possible after death or euthanasia, provided the owner has given permission to do so. A delay in the necropsy procedure may result in postmortem *autolysis*, a breakdown of tissues, resulting in inconclusive results.

Tissue samples taken during necropsy are sent to a pathologist in a reference laboratory for microscopic examination. The packaging and shipping to the laboratory become the responsibilities of the assistant, as does the preparation for the necropsy. Reference

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laboratories usually provide containers for submitting tissue samples. If there are to be special requests, contact the laboratory before the procedure to determine how the specimens are to be collected, handled, and shipped.

Completion of the requisition slip must provide a history of the patient and a gross description of the tissues. Lay out all necropsy equipment and sample containers adjacent to the location where the necropsy is performed. The necropsy is performed in an area away from general clinic activities. It is best conducted on a rack over a sink with access to running water. The canine and feline cadavers are placed in left lateral recumbency with the ventrum facing the veterinarian.

A thorough necropsy is lengthy and detailed. The veterinarian may wish to have a tape recorder to dictate findings as the necropsy progresses. Ideally, the tape recorder is equipped with a foot pedal. Notes are then transcribed from the tape after the procedure and are entered into the patient's record. This reduces the chance for omission of key observations.

In the case of rabies suspects, the whole head is sent to the public health service for evaluation immediately upon the patient's death. While this may seem grotesque, it is necessary for the well-being of all people and animals exposed to the suspect because rabies is a fatal zoonotic disease. Zoonotic diseases can be transmitted from animals to humans. The public health service is notified that such a specimen is arriving. Confirm whether the whole head or just the brain is to be sent. Confirm details for labeling, packaging, and shipment.

After necropsy, all tissues and organs are placed within the body cavities. The body cavities are sutured closed. The cadaver is placed in a cadaver bag, sealed tightly, and tagged with the patient's and owner's names and the date of death. Special instructions for burial, cremation with return of the ashes to the owner, and group versus individual burial are entered onto the tag. The body is placed in the freezer designated for storage of cadavers pending pick up by the pet cemetery, animal control authorities, or the owner as is within legal constraints of the county. A log may be kept adjacent to the freezer for entry of each cadaver as it is placed into the freezer. Record the date, the patient's and the owner's names, and any special instructions for the disposition of the body.

Procedure

PREPARATION

1. Discuss with the veterinarian when and where the necropsy is to be performed.
2. Determine what special tests will be requested.
3. Contact the lab for additional instructions if special tests are requested.
4. Lay out all needed materials.
   a) For the veterinarian:
      i. waterproof apron
      ii. goggles or face shield
      iii. mask
      iv. heavy rubber gloves
      v. rubber boots or booties
      vi. tape recorder with foot pedal (optional)
      vii. patient's record and pen.

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b) For specimens:
   i. requisition slip
   ii. Ziploc bag
   iii. formalin-filled vials for tissues
   iv. transport media for cultures
   v. Bunsen burner and match
   vi. flat spatula for searing tissue surfaces
   vii. slides.
c) For the procedure:
   i. large, sharp knife
   ii. cleaver
   iii. rongeur for cutting bones
   iv. two flat containers for the tissues
   v. scalpel
   vi. forceps
   vii. scissors, blunt over sharp
   viii. needle holder
   ix. one-half circle, cutting-edge suture needles
   x. a piece of nonabsorbable suture material.
d) For the cadaver:
   i. cadaver bag
   ii. identification/instruction tag filled out with the patient's identification, the owner's name, and instructions for the remains.

PROCEDURE

Before necropsy:

1. Put on exam gloves.
2. Place the cadaver in left lateral recumbency with the feet facing where the veterinarian will stand.
3. Place all equipment for the procedure adjacent to the cadaver.
4. Place all materials needed for specimen collection on a nearby counter.
5. Place apparel for the veterinarian on the same counter.
6. Place the patient's record adjacent to the apparel.
7. Place a tape recorder close to where the veterinarian will be standing (optional).

After the cadaver has been sutured closed:

1. Put on exam gloves.
2. Place the cadaver in a cadaver bag.
3. Close the end tightly by twisting the excess bag tight and then tying a knot.
4. Attach an identification/instruction tag to the bag.
5. Place the cadaver bag in the freezer.
6. Make an entry into the freezer log.
7. Make a notation that the procedure has been completed, date, and initial.

FOLLOW-UP

1. Put on PPE, exam gloves, waterproof apron, and boots while cleaning.
2. Clean the instruments using the practice protocol.
3. Clean the sink and rack with disinfectant, allowing the disinfectant to air-dry.
4. Contact the lab for pickup of specimens or prepare them for shipment.

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TASK 14.14.1 PREPARING SAMPLES FOR SHIPMENT TO THE REFERENCE LABORATORY

Concept: Reference laboratories are often utilized by veterinary practices.
Discussion: Samples are sent to reference laboratories that are rarely done in the practice or it is too expensive to maintain the equipment and reagents. Necropsy samples are sent because of the veterinarian pathologists that are specifically trained to diagnose diseases and conditions from the samples.
Concept: Packaging the samples so that they arrive in good shape will increase the success of a diagnosis.
Discussion: Fresh tissue samples and body fluids must to be kept cool and packaged in leak-proof containers. Fixed tissue samples are placed in diluted formaldehyde. The reference laboratory will provide leak-proof containers. In addition to the samples, the submission form needs to be completed thoroughly. Regardless of the type of tissue, it all must arrive at the laboratory in the same shape that it was shipped.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Preparation and Shipping Tissues."
2. Mark one side of the card with the procedure and the other side with the materials:
   a) packing box—usually a Styrofoam container inside of a cardboard box (Save shipping boxes and ice packs that companies use to ship vaccines.)
   b) ice pack if sending fresh tissues or body fluids
   c) bubble wrap or shipping peanuts
   d) Ziploc baggie
   e) permanent marker
   f) shipping tape
   g) mailing label
   h) newspaper or paper towels.

PROCEDURE

1. Check that the submission form is completed. If not, ask the veterinarian to complete it or offer to fill it in using the patient's file.
2. Place the submission form into the Ziploc bag and seal.
3. Open the packing box and line the bottom with several layers of newspaper or paper towels.

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4. Place an ice pack on the bottom of the box, if necessary, for the tissues.
5. Check to make sure the samples are labeled properly with the patient's identification, the practice name, and the date of sampling.
6. Roll the bubble wrap or newspaper around each sample container.
7. Place padded samples into the box next to the ice pack.
8. Add packing peanuts or crumpled newspaper to keep the samples from bouncing around in the box. If it is warm outside, add a second ice pack on top of the contents.
9. Place the lid onto the Styrofoam box.
10. Place the submission form on top of the Styrofoam lid, then tape the cardboard box shut.
11. Add shipping label on top and place it in the clinic's pickup location for the shipping companies or take it to the shipping office or, if there is a pickup service, call them to schedule a pickup.

FOLLOW-UP

1. Mark the patient's file and the laboratory log that the samples were sent to the reference laboratory with the date, what tissues/fluids were sent, what method of shipment was used, the tracking number if available, and your initials.

RESOURCE

Hendrix, Charles M., & Sirois, Margi (2007). *Laboratory Procedures for Veterinary Technicians*, 5th ed. St. Louis, MO: Mosby.



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

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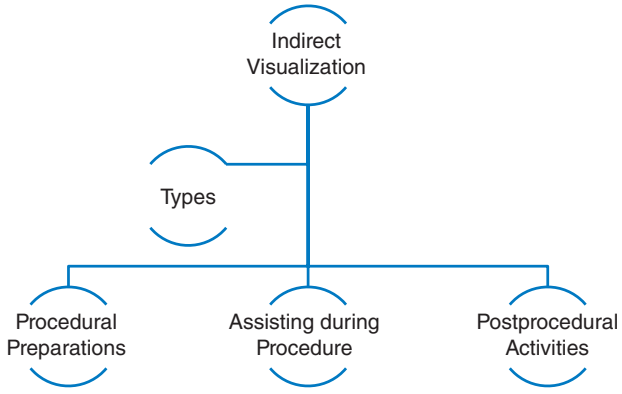
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CHAPTER

15

DIAGNOSTIC IMAGING

TERESA SONSTHAGEN



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Compare and contrast digital radiology and traditional radiology.
2. Practice radiation safety at all times, using personal protective equipment (PPE) and dosimeters.
3. Maintain a radiology log with every radiograph taken.
4. Use calipers to measure the thickness in centimeters of anatomic parts.
5. Use a technique chart to determine how to set the exposure factors on the X-ray console.
6. Use identification and directional markers for patient films.
7. Differentiate directional terms and abbreviations used in radiology.
8. Assist with patient positioning and apply positioning aids during radiographic procedures according to descriptions provided in a standard veterinary reference on patient positioning.
9. Develop films using an automatic and manual film processing.
10. Load and unload film from a cassette or load digital cassettes into a reader.
11. Maintain cassette and intensifying screens.
12. File patient films.
13. Maintain darkroom, automatic processor, and developing chemicals.

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TASK 15.1 INTRODUCTION TO DIAGNOSTIC IMAGING

Concept: Specific terminology is used when discussing diagnostic imaging.
Discussion:

- Radiology is the study of how radiographs are produced and used for diagnosing diseases or conditions of the body.
- A radiograph is the "photographic" record or image of a body part on film or in a digital format. Radiograph is preferable to the term X-ray; however, image, shot, and view are interchangeable terms indicating a radiograph.
- Radiography is the act of exposing a film to radiation.
- A radiographic study is a series of radiographs consisting of two or more views and may or may not include a contrast media.
- A grid, also referred to as a bucky, is located in a pullout frame to hold the cassette underneath the tabletop.
- View boxes are boxes with a light on the inside and a white opaque surface on the outside. The radiograph is placed in front of the light source, which illuminates the film for clearer viewing.

Concept: Through the use of radiography, both traditional and digitized, indirect visualization of patient anatomy is created.
Discussion: Traditional radiographs utilize silver halide film, which is X-ray and light sensitive. The film is placed inside a cassette, which is placed under a patient, exposed to radiation, and then developed using chemicals to fix the image to the film.
Concept: *Digital radiography* (DR) still utilizes radiation to produce an image; however, instead of film; the image is changed to a digital format.
Discussion: There are two types of digital systems used to produce a digital radiograph. DR uses a detector that transforms radiation into an electrical charge, which is sent to a unit that processes the image. The DR requires specialized equipment that is fairly expensive. A *computed radiograph* (CR) system utilizes a reusable phosphor plate inside a cassette that is sensitive to radiation but not to light. The plates are positioned and imaged like the silver halide cassettes using the traditional radiography machine. After exposure, the plate is loaded into a laser scanner that projects the digital image on a computer and resets the plate for the next image. The plates are more sensitive than film, which allows for a slightly lower radiation dose, reducing radiation exposure factors to staff and patients. Both systems project digital images on a computer monitor in about 30–90 seconds.
Concept: If the radiograph needs to be repeated because of movement or misalignment, it can be done immediately.
Discussion: The image can also be altered by increasing or decreasing the contrast and gray scale on the computer, which is call *windowing*. These radiographs can be sent via the Internet to a specialist, which is an example of *telemedicine* verses sending them in the mail. The digital images are stored in the patient's medical record using the practice's management software. Traditional films must be stored in a file cabinet so they can be retrieved as needed.
Concept: There are other advanced imaging technologies that provide different visualizations of body structures within a patient.

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Discussion: These include diagnostic ultrasound, computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET) scans.
Concept: Ultrasonography produces sound waves that interact with body tissues.
Discussion: The images produced are echoes converted to electronic signals and processed by a computer. Since veterinary facilities are acquiring these machines more frequently, they will be discussed in more detail later in this chapter.
Concept: CT scans use X-rays and yield multiple images along a single plane.
Concept: MRI produces images along three planes using strong magnetic and radio waves that are converted to images by a computer.
Discussion: Both CT and MRI images may use intravenous gadolinium-based contrast media that highlights specific structures. Each procedure requires anesthetizing or heavily tranquilizing the patient throughout the procedure as the patient must be absolutely still for the duration of the procedure, which can be quite lengthy. PET scans are rarely found in veterinary practices, primarily being used in teaching hospitals or research.
Concept: The usefulness of a radiograph is limited by the quality of the image itself.
Discussion: Since it is the veterinary technician and the assistant who actually take the radiographs, their ability to produce quality films is essential. A quality film has subtle shades of white to black contrasts depending on the density of the body parts. For example, a leg bone is mostly white with shades of gray because of its different densities, whereas muscle tissue is a fairly uniform dark shade of gray because it is less dense and fairly uniform in density. This contrast allows the veterinarian to see body structures and to determine if there is an injury or change.
Concept: A quality film requires accurate measurement of the body part, correct film exposure settings, accurate patient positioning, and proper developing of the exposed film.
Discussion: With the advent of DR, measurement and proper positioning are still very important, but because the image is digital, the film exposure can be adjusted lighter or darker and, of course, there are no "films" to develop.

Procedure

Location: Any place and with anyone when discussing radiology

PREPARATION

1. Review the vocabulary introduced at the beginning of this chapter.
2. Review the remainder of this section.

PROCEDURE

1. Compare and contrast digital and traditional radiology. Make a chart comparing the characteristics of each.
2. Make flash cards as needed for this section.

FOLLOW-UP

1. Can you define terms?
2. Discuss traditional versus digital radiology.
3. List the different types of indirect visualizations of body parts besides the traditional and digital radiograph.

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TASK 15.2
RADIATION SAFETY

Concept: The radiation produced by a radiation or X-ray machine is considered a hazard, and regulations regarding the use of equipment and personnel safety are governed by the Department of Health at the state level.
Discussion: Radiography machines are registered with a Radiation Safety Board that inspects the equipment to make sure it is operating within parameters.
Concept: Radiation is odorless and colorless; it cannot be felt or seen.
Discussion: Radiation causes damage to rapidly dividing cells, such as those found in the unborn and immature individuals, bone marrow, skin, and blood-forming tissues. Damage occurs when multiple, small doses accumulate over a lifetime or through a single, massive dose. This damage may not manifest for years and/or genetic damage can appear in future generations. Consistently following proper safety measures will prevent harm.
Concept: The National Committee on Radiation Protection and Measurements (NCRP) recommends using "as low as reasonably achievable" (ALARA) exposures when taking radiographs.
Discussion: This means that the personnel taking radiographs need to know what they are doing so the image is right the first time. For every radiograph taken, there is more exposure to radiation, increasing the chance of damage being done to personnel over a lifetime. Some states actually prohibit manual restraint of animals during radiographic procedures. Patients are anesthetized and positioning aids are used to hold them in place. This is a sensible guideline even when not required by law. Another option is to rotate staff conducting radiographic procedures especially in high-volume practices.
Concept: Major safety measures are used to reduce the amount of radiation exposure to personnel.
Discussion: The following guidelines *must* be followed to ensure a safe working environment:

1. Each person involved in the radiograph must wear personal protection equipment (PPE) while exposing radiographs. These include a lead apron or lead skirt and vest that covers the front of the body from the shoulders to midthigh, lead gloves, goggles, and thyroid collar.
2. Your personal dosimeter is *always* worn around radiation. A dosimeter is a personal film badge worn facing out at neck or chest level on the outside of the lead garment(s). The dosimeter measures the level of exposure to radiation to the wearer. The standard acceptable exposure is 0.005 Sievert/year for occupational and background personnel. An annual report is sent to the practice for each individual badge.

Tip Box 15.1: **A dosimeter should never be placed in direct sunlight or left in the heat of a car as it can give a "false" high radiation reading.**

3. Individuals under 18 years of age and pregnant women are never allowed in the room when radiographs are being exposed. *Suggestion*: If you think you might be pregnant, advise your employer immediately. Duties will need to be modified, the first of which is staying out of the radiography area.

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4. Never enter a room denoted by a radiation hazard symbol unless invited or if it is known that a radiograph is not being taken at that time. Close and, if possible, lock the door to the radiation room, or indicate radiographs are being taken by turning on a warning light. This symbol denotes radiation is used in that location.*
5. Reduce personal exposure by
   a) Staying out of the primary beam, which comes from the X-ray tube housing and points down at the table. Never place any human body part within the primary beam; doing so substantially increases exposure to radiation and subsequent damage.
   b) Reducing scatter radiation. The radiograph machine has aluminum filters preplaced between the window of the X-ray tube and the collimator; it absorbs soft X-rays referred to as scatter radiation. Scatter radiation is the interaction of the primary beam with objects in its path. As the beam hits a body part, cassette, and table top, it bounces up and outward. Scatter radiation is further decreased by using the collimator to restrict the primary beam from spreading beyond the body part being radiographed. Use the smallest cassette size to accommodate the anatomy being X-rayed. If restraining a patient, lean as far away as possible from the primary beam.
6. Use only the number of personnel necessary to take the radiograph; everyone else should evacuate the room or area.
7. Exact site measurements with a caliper and the subsequent setting of exposure factors are an absolute must to avoid retakes. Exposure factors are obtained from a technique chart prepared especially for that radiography unit.
8. Position patient correctly and confirm that the correct body part is being X-rayed as per the veterinarian's orders. Tips for accomplishing this are the following:
   a) Keep a copy of a current text on animal positioning in the radiography room. Use as needed when determining how to position a patient.
   b) Anesthetize or sedate patients if possible. This reduces struggling with a patient and avoids movements that may require retakes.
   c) Use positioning aids: sandbags, foam wedges, ropes, and radiopaque "V" troughs to correctly position patients; these will also improve quality by evening out the body. Ropes and adhesive tape can also be used. *Suggestion*: Keep positioning aids in a large lidded bin on the floor adjacent to the radiographic table.
9. Use correct focal–film distance (FFD), usually 36–40 in. from the X-ray generator to the table top or grid located under the table top. Most radiography machines have an indicator to show where to place the generator for both tabletop and grid shots.
10. Use proper film developing techniques if using traditional radiographs.
11. Take care of equipment in the radiograph and darkrooms:
    a) proper care of PPE equipment, keeping them clean and stored properly; semiannual radiography of aprons or other lead garments to look for cracks or damage to the lead shield
    b) monthly cleaning of traditional cassettes and intensifying screens
    c) proper mixing of processor chemicals and maintenance of automatic processors
    d) annual field service by a qualified representative including machine calibration.

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12. Maintain a "radiology Log" of each exposure taken. This can be used to determine if the technique chart is off by comparing settings. It will also help management determine if one person is being exposed to too many X-rays.

Concept: Strict adherence to these recommendations reduces radiation exposure and therefore possible damage.
Discussion: Once the radiation damage occurs, it is not reversible. The best that can be done to treat an overexposed patient or staff member is to provide supportive care. Radiation exposure to mothers before or during pregnancy results in lifelong handicaps to children. The precautions as discussed must be applied during every radiologic procedure to prevent these health issues.

Tip Box 15.2: **Adhere to all radiation safety guidelines as radiation exposure is accumulative over a lifetime and may not be apparent for years.**

Procedure

Location: Radiology Room

PREPARATION

1. Prepare a card for your reference book entitled "Radiographs: Safety Equipment."
2. Mark your card as to the PPE needed in order to participate in taking a radiograph.
3. Locate all PPEs used during radiology.
4. Locate your personal dosimeter.

PROCEDURE

1. Put on an apron or vest and skirt. Warning: They are heavy!
2. Put on a thyroid shield.
3. Put your personal dosimeter on the neckline of your apron or vest.
4. Put on goggles. These are special goggles that shield your eyes from radiation. *Never* substitute ordinary goggles as those used when mixing chemicals.
5. Put on gloves. They feel awkward when restraining a patient. Although tempted, *never* take them off when exposing film.

FOLLOW-UP

1. Did you put all PPE on correctly?
2. Did you check to determine you were using your personal dosimeter?
3. Put all PPE equipment away.

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TASK 15.3 PREPARATION FOR RADIOGRAPHIC PROCEDURE

Concept: Although an intimate knowledge of the technicalities of X-ray image creation is not necessary for the assistant, the ability to provide assistance during these procedures is essential.
Discussion: Taking a radiograph requires a specific sequence followed every time to ensure a quality image and safety for all involved. The following is that process in a checklist format; each action will be discussed further in the information that follows.

Procedure

Location: Radiography room

PREPARATION

1. Use the card in your reference book entitled "Radiographs." Mark the card with the start-up information for the automatic processor.
2. Turn the automatic processor on if using traditional radiographs. This is done at your arrival for work so solutions can warm up. It is now ready to use as soon as needed.
3. Locate then begin entry of the patient information into the X-ray log.
4. Confirm correct patient positioning and needed restraint for requested studies.
5. Set out positioning aids if necessary and ready PPE.
6. Locate then correctly use calipers to measure the thickness of the anatomic site being studied.
7. Set the exposure factors on the X-ray console according to the technique chart and patient measurements.
8. Select the size of the film cassette to accommodate the area of the animal being radiographed.
9. Prepare identification and directional markers. These should also be stored in a small box where they are readily retrieved and stored. The do not need to be kept away from a radiation source. Store with calipers and positioning text.
10. Two views are always taken, so have two cassettes available or divide a large cassette in half with lead to shield it from exposure, then move the lead shield to the exposed half while the second exposure is made.

PROCEDURE

1. Put on PPE: dosimeter, apron, gloves, goggles, and thyroid collar.
2. Assist in positioning the body part over the cassette for the requested views.
3. Measure the thickness of the desired area.

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4. Place identification markers on the cassette.
5. Set exposure parameters on the console.
6. Expose the film.
7. Develop the film if using traditional radiography.
8. Complete the X-ray log entry.

FOLLOW-UP

1. Return the animal to the owner or the kennel.
2. File the film if using traditional radiography.
3. Clean and store the radiography table, cassette, positioning aids, and PPE.
4. Check developing chemicals if using traditional radiography.
5. Cassettes are stored away from possible exposure to radiation, often in a darkroom with the door closed.

TASK 15.3.1 PREPARATION: RADIOGRAPHY LOG

Concept: The radiology log serves three purposes.
Discussion:

1. It is part of the patient's legal record and required by the American Animal Hospital Association (AAHA) to meet the standards for AAHA-accredited hospitals.
2. It facilitates comparison of techniques used on a patient during follow-up studies.
3. It serves as a reference when working toward improved film quality, which should be the goal of every team member.

Concept: The log is maintained in a binder kept within the radiology area. A functional pen is secured to the binder. Entries are made throughout the radiographic process.
Discussion: The format is similar as in all logs, being composed of columns and rows. The number of columns will vary but must provide the legal minimum of information. AAHA-approved hospitals will require recording additional details. The log is used whenever a radiograph is taken. *No exceptions. It is the practice's legal means of confirming radiographs were taken and which personnel were involved.*

The following is a list of information recorded in a radiology log meeting AAHA standards:

1. date
2. X-ray number—may be generated by the practice software
3. patient identification—may be generated by the practice software
4. breed of the animal
5. sex
6. age
7. weight
8. anatomic location of the radiographs
9. thickness in centimeters (cm)

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10. radiographs taken—usually the description and number
11. kilovolts (kV)
12. milliampere (mA)
13. seconds—some radiography machines will set this automatically
14. quality of radiographs
15. diagnosis or radiographic findings as determined by the veterinarian
16. initials of personnel involved in taking the radiographs.

Concept: Maintenance of the log is a job the assistant can take on, thus freeing up other personnel to complete other tasks.
Discussion: The following is the procedure followed when making an entry into the X-ray log.

Procedure

Location: Radiology room

PREPARATION

1. Using your reference book card entitled "Radiography." Mark the procedure for marking properly in the logbook.
2. Locate the radiology log with the attached pen. Start the entry into the log as personnel are preparing to take the radiograph.
3. Confirm patient identification; use patient record for accuracy.

PROCEDURE

1. Start entry with the date, X-ray number, patient/owner identification, breed of animal, sex, age, weight, and anatomic location of the radiographs.
2. Record the body measurements from the use of the calipers and kilovolt, milliampere, and second settings from the technique chart for each radiograph. Sometimes the millamps (mA) and second are combined to form the milliampere.
3. After the film is developed, record the film quality, diagnosis (after the veterinarian determines the diagnosis), and comments such as whether the patient was anesthetized, who took the radiographs (initials will do), and factors impacting film quality (e.g., patient panting during thoracic radiographs).

FOLLOW-UP

1. Did you complete all required entries into the logbook?
2. Make certain there are enough empty rows to meet the needs of the day or week in the radiography log. Keep a master copy of a blank log page in the binder, under a divider so no one uses it, to make copies as needed. When there is half a page left, make several copies and place them in the logbook.
3. If the binder is getting full or to prepare a new binder, label and date the spine of the binder with the date of the first and last entries. This facilitates finding a particular entry as binders accumulate. They must be kept as long as the medical records and any other legal document.

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TASK 15.3.2 PREPARATION: PERSONAL PROTECTIVE EQUIPMENT (PPE)

Concept: PPE must be worn by all personnel involved in taking the radiograph.
Discussion: The assistant can facilitate and "enforce" the wearing of PPE.
Concept: PPE requires proper care.
Discussion: Aprons, vests, and skirts have thin sheets of lead in them and folding the lead will quickly cause a break to occur. This break will expose the wearer to radiation. Gloves should be put on a glove rack to ventilate, as they get quite damp from sweat during procedures. Do not allow animals to chew or bite the gloves as the holes will expose the wearer to radiation.
Concept: All lead-containing equipment should be radiographed at least biannually to examine for cracks in the shielding.
Discussion: Lay equipment across a cassette and expose; if there are dark spots or lines on the film, there are breaks in the lead. Notify the inventory manager so the piece of equipment can be replaced. The assistant can do a great service for team members as well as himself or herself by making sure this task gets done!

Procedure

Location: Radiography room

PREPARATION

1. Anticipate team members' needs:
   a) Locate and lay out all PPEs for personnel including you.
   b) Lay out the dosimeter. *Suggestion*: Keep all staff dosimeters in a small box or container where they can be picked up and returned. The box is then stored in an area away from the X-ray machine.

PROCEDURE

1. Be a watch dog! Do not let the radiographs be taken until all the staff are wearing their PPE and personal dosimeters.

FOLLOW-UP

1. Put away all PPE. All lead-containing safety equipment is hung up and never folded. Aprons and thyroid collars are hung up, not folded. Gloves are placed on pegs with the fingers upward. If such is not available, placing a small can such as an orange juice can with both ends removed into the cuff will help ventilate the gloves.
2. Collect all dosimeters and put these away in an area where they will not be exposed to radiation or sunlight. This is usually a darkroom.
3. Prepare a task card entitled "Radiography PPE Check: 6 Months." Check for damage to PPE.

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TASK 15.3.3
PREPARATION: USING THE CALIPERS

Concept: The ability of the X-ray beam to penetrate tissue is limited, in part, by the thickness of the tissue. So accurate measurements must be taken and the instrument used is a caliper.
Discussion: This instrument is an L-shaped ruler with a movable bar that slides up and down the vertical axis of the L. The bar is slid up so the body part fits between it and the horizontal axis of the L. The vertical axis is marked in both centimeters and inches. Centimeters are used to determine the settings used on the radiography machine.
Concept: Measuring a body part must be done in very specific areas and in specific ways to ensure proper settings on the radiography machine.
Discussion: Calipers are placed "around" the thickest portion of the body part to be radiographed. The movable bar is allowed to settle lightly around the part being measured. For example, the right carpus of a dog is to be radiographed. The two views requested are anterior/posterior (AP) and medial/lateral (ML). Place the patient in sternal recumbency with the right carpus placed between the two bars with the leg in the AP position. The stationary part of the bar is beneath the joint, and the movable bar rests lightly on top of the joint. The lower edge of the movable bar rests on 3 cm. Record that measurement under the "cm" area of the log and the direction AP in the "view" section of the same row. Measure the joint again, but this time the patient is in right lateral recumbency and the stationary bar is on the lateral side of the joint, and the movable bar rests on the medial surface of the joint. The reading is 5 cm because the carpus is usually wider than it is thick. Record this measurement and the direction as ML in the log.

Tip Box 15.3: **Keep the caliper near the log so it is readily located when needed.**

There is a temptation, as expertise develops, to "eyeball" a patient rather than to actually use the caliper. This only results in poor quality films and more frequent retakes. Time is actually saved by taking a few moments to measure.
Concept: When in doubt where to measure, always measure the thickest portion of the area being X-rayed.
Discussion: Begin your measurement with the animal in the position needed to get the correct radiograph. Correct use of the caliper serves as one of the fundamentals leading to quality films and radiation safety.

Procedure

Location: Radiography room

PREPARATION

1. Mark your reference book card entitled "Radiography" with the procedure required for setting up a radiograph.

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2. Review the patient's medical record for view and the areas to be radiographed.
3. Confirm the correct positioning with information in the positioning reference.
4. Have positioning aids, calipers, and directional markers available.
5. Have cassettes available.
6. Confirm the patient identity.

PROCEDURE

1. Place the animal into the position required for the radiograph requested.
2. Move the caliper to the thickest portion of the body structure, with the fixed portion of the caliper touching the site the beam is to exit.
3. Slide the movable bar to settle lightly over the site the beam is to enter.
4. Read the centimeter scale on the edge of the movable bar closest to the patient's body.
5. Record the measurement in "cm" and the "view" in the log on the same row as other data from the patient.

FOLLOW-UP

1. Always return the caliper to the same place after use.

TASK 15.3.4 PREPARATION: SETTING EXPOSURE FACTORS USING TECHNIQUE CHARTS

Concept: Technique charts are formulated exposure settings for a specific X-ray machine.
Discussion: They are based on the thickness of the area to be radiographed, the type of equipment and its limitations, techniques being used, and anatomical differences.
Concept: The constants of the system are predetermined before the technique chart is created; therefore, the assistant should be aware of them and should know how to adjust them if necessary or possible.
Discussion: The constants of setting up a technique chart are the following:

1. Because of FFD, a technique chart will be formulated for both tabletop and grid techniques. The grid is used when radiographs of body parts are greater than10cm.
2. Intensifying screens on the inside front and back of the cassettes convert the X-rays to visible light to expose the film. The screens are rated high speed, par speed, and slow speed. The high-speed screens reduce the exposure time. Slow-speed screens increase film detail, but blurring is more likely because of patient movement. Usually, a practice will have one type of screen and will formulate the technique chart based on the screens.

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3. X-ray film is rated according to speed and matched to the type of screens. Fast film requires less exposure time but lacks definition. Slower films require greater exposure time and produce films with greater detail. The film–screen system is the combination of the values of the screen and film ratings. The film manufacturers provide tables for their film–screen ratings.

Concept: The goal of technique charts is to consistently obtain the greatest detail at the highest speed.
Discussion: Select the chart that corresponds to the body part being radiographed. Charts are set up in rows and columns. The first column lists the thickness in centimeters of the body part to be radiographed. Once the thickness of the study site is located, move across the row to determine the kilovolt peak, milliampere, and exposure time in seconds or milliampere per second (mAs). The mAs is the mA multiplied by the time in seconds.
Concept: More than one technique chart is created for a machine.
Discussion: Based on the constants just discussed and the fact that we have patients that weigh from less than l to over 100 lb, the following are recommended charts for a small animal practice. There should be tabletop technique charts and grid technique charts for each of the following areas:

a) extremities and skull
b) abdomen
c) thorax
d) avian and exotics—usually not grid shots.

While all this may seem confusing, just remember to use the correct chart based on the measurement of the anatomy being radiographed.

Procedure

Location: Radiology room

PREPARATION

1. Locate the technique charts.
2. Determine which chart to use for the anatomy being radiographed.

PROCEDURE

1. Locate the measurements for each view on the correct chart.
2. Record the measurement information and the settings from the technique chart in the logbook in the same row with the patient's name, related data, and the "view" and "cm" information.

FOLLOW-UP

1. Were you able to complete all information correctly?
2. Have a team member critique your entries the first few times you do this. The best person to do so is the team member working with you in the radiology area.

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TASK 15.3.5 PREPARATION: CASSETTE SELECTION AND FILM IDENTIFICATION

Concept: Cassettes come in three sizes and selection is based on the size of the animal and the area that is to be radiographed.
Discussion: The standard sizes of cassettes are: 8 × 10 in., 10 × 12 in., and 14 × 17 in. Selection is based on making sure the requested body part is on the film with at least an inch above and below the body part. For example, if the radius and ulna are to be X-rayed, the joint above (elbow) and the joint below (carpus) should be included on the film; this ensures the entire radius and ulna are visible. Check your reference book for the exact placement of the animal on the cassette.
Concept: Radiographs are part of a patient's medical record.
Discussion: As such, they are legal documents. Because of this, they must be accurately and permanently marked.
Concept: Basic information is required on each radiograph.
Discussion: This includes the following:

1. patient's/owner's names and/or the medical record number
2. hospital name
3. date the radiograph is exposed
4. radiograph number, if used
5. directional information—left or right
6. standing and time—for special studies.

Concept: There are three ways to permanently include the patient information on a radiograph and four other markers that are used to indicate direction and time.
Discussion: One type of marker used to identify an X-ray is label tape. This consists of a strip of paper that has a graphite bar centered across the strip with adhesive on the back. The information is written on the graphite portion. The adhesive backing is peeled off then pressed onto a holder blocker. The holder blockers come in different thicknesses for table top or grid radiographs.

A second type is a holder that allows lead letters and numbers to be slid into a tract. Both holders usually have the clinic's name embossed on them so that information does not have to be written or added each time.

A third type is a flash marker or flash blocker. Cassettes have a lead blocker shield in one corner preventing exposure of that area. Patient data are written on a card in ink and placed on the flasher plate of the labeler in the darkroom. With the lights off, remove the film from the cassette and place the unexposed corner of the film in the labeler; press down to expose the information card onto the film. Then process the film as usual. Make certain there is an adequate supply of blank patient information cards if a flasher block is used.
Concept: Directional labeling is very important for the veterinarian to diagnose an injury or condition.
Discussion: A lead R for right or a lead L for left is placed on the cassette adjacent to the corresponding side of the body part being radiographed. For example, if a right limb is being radiographed, the R marker is placed on the right side of the limb. If radiographing the

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abdomen, indicate which side is right or left, or if the patient is recumbent, indicate which side is closest to the film.

Concept: A special marker, the Mitchell marker, is a gravitational marker used for standing radiographs. A time marker is used to indicate the time since contrast media was administered to a patient. Often multiple films are taken which make the time marker essential.

Tip Box 15.4: **Be certain all markers are placed within the beam but not under any body part or in the lead protected corner. This will obscure the label or the body part being radiographed.**

Preparation

Location: Radiology room

PREPARATION

1. Using the previous card in your reference book entitled "Radiography," mark the procedure for labeling radiographs.
2. Review the order for the radiographs to be taken.
3. Locate the holder, directional marker, and if needed, the special study marker.
4. Confirm the patient identity.
5. Fill in patient data to be entered on identification marker or flash card if that is being used.

PROCEDURE

1. Assist with placing the animal on the table.
2. Place the completed label holder on the cassette so it does not interfere with the image. If using the flash marker, ensure the patient is not placed on top of the corner used to expose the marker as it will obscure that portion of the body.
3. Use a directional marker with either information markers.
4. If you are doing special studies, add appropriate markers as well.

FOLLOW-UP

1. Once the film is developed, examine the film to confirm that all the required information is visible.
2. Put labeling equipment away. If you are using the small lead letters, remove them from the holder and place them back into the proper slots so they can be quickly recovered for the next label. Remove the x-rite tape from the blocker holder, throw the tape away, and store the holder for the next time. Return the directional marker and the study markers to their storage place.

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TASK 15.3.6 PROCEDURE: TAKING A RADIOGRAPH—PATIENT POSITIONING

Concept: A minimum of two radiographs for each body structure is taken usually at right angles to each other.
Discussion: A radiograph is only two dimensional. Patients are three dimensional. To accurately locate a lesion, two radiographs are needed at right angles to each other. Sometimes, a third view called oblique is requested. This is at a 45° angle to the body structures.
Concept: The American Committee of Veterinary Radiologists and Anatomists is the source of anatomic and directional terms and abbreviations used in veterinary radiology. The veterinarian will order radiographs to be taken using these terms and abbreviations.
Discussion: Understanding these abbreviations is important because it is used to indicate what body part to radiograph and how to fill out the identification label and log.
Concept: The first letter in an abbreviation represents where the X-ray beam enters the body. The second letter represents where the beam exits the body. The following are some of the most common directional terms and abbreviations:

- Left (Lt): a patient's left side or limb.
- Right (Rt): a patient's right side or limb
- Dorsal (D): the upper parts of the body; this includes the top of the head, neck, back, and tail
- Ventral (V): the lower parts of the body; this includes the lower part of the head and neck, chest and abdomen, and tail
- Palmar (Pa): the forelimb from the carpal joint distally; used instead of the term caudal
- Plantar (Pl): the hind limb from the tarsal joint distally; used instead of the term caudal
- Medial (M): the inner surface of a limb or toward the center of the body
- Lateral (L): the outer surface of a limb or away from the center of the body
- Cranial (Cr): relative to a given point, any point toward the head, also referred to as anterior
- Caudal (Cd): relative to a given point, any point toward the tail, also referred to as posterior
- Distal (D): relative to a given point, any point on a limb or the tail away from the trunk
- Proximal (P): relative to a given point, any point on a limb or the tail toward the trunk
- Rostral (R): parts of the head located toward the nostrils
- Oblique (O): at a 45° angle, between a horizontal and a perpendicular angle
- Recumbent: lying down either on their side (lateral) or sternum (sternal).

An example of the application of this terminology is as follows:

The veterinarian has requested VD and LL abdominal radiographs. The positioning of the patient for the VD film is on the patient's back with the front and back legs extended

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parallel to each other and beyond the patient's head and rear. The beam is centered directly over the caudal aspect of the thirteenth rib. The second film requires the patient to be lying on its right side to provide better visualization of the kidneys when doing abdominal studies. Again the beam is centered over the caudal aspect of the thirteenth rib.
Concept: Patient positioning is determined by using a reference text or wall chart providing descriptions of various veterinary patient positioning.
Discussion: Such a reference is customarily kept near the radiology log binder in the radiology area. Any of the following references are highly recommended:

- Lavin, L. M. (2006). *Radiology in Veterinary Technology*, 4th ed. Philadelphia, PA: Elsevier.
- Thrall, Donald E. (2012). *Textbook of Veterinary Diagnostic Radiology*. St. Louis, MO: Elsevier.

Concept: The goal is to maintain as normal an anatomic position as possible while preventing superimposition of extraneous tissues over the study site.
Discussion: This often requires the animal to be placed in uncomfortable positions. Knowing what is going be radiographed and how it is to be laid on the cassette is so important not only for the diagnostic quality but for the comfort of the animal as well. Remember to use positioning devices such as sandbags, foam blocks and wedges, ropes, tape, and radiopaque "V" trough if suggested by the reference. Try to keep all positioning devices in a large lidded plastic bin near the X-ray table.
Concept: After determining the proper positioning for the patient, the assistant and the technician must maneuver the patient into position. It is vital to have everything ready to go before positioning the animal, so it will only have to be still for less than a second to get the radiograph.
Discussion: Before bringing a patient into radiology, review the sections relevant to positioning for the requested radiographs. Start data entry in the X-ray log, locate positioning aids, determine cassette sizes, and prepare identification markers and PPEs. The patient is brought into radiology only after preparations are completed. This reduces patient stress and allows the assistant to focus on the tasks at hand.
Concept: Take the radiograph by engaging the exposure button.
Discussion: The exposure button can be on the console panel or a foot pedal connected to the console. Either can be pressed to take the exposure. Some machines will have a two-step process to make the exposure, one to start the rotor and the second to trip the exposure.
Concept: The foot pedal enables someone who is restraining a patient to make the exposure.
Discussion: As the exposure button is pressed, a red light flashes on the panel and a beep sounds to indicate the emission of X-rays.

For patients not requiring manual restraint, the radiologist can simply press the exposure button while standing behind a clear lead shield.

Tip Box 15.5: **Reminder: When taking radiographs, always wear PPE.**

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Procedure

Location: Radiology room

PREPARATION

1. Review the patient's record to determine requested studies.
2. Review the reference text for proper positioning of required studies.
3. Gather needed positioning devices such as sandbags, foam blocks and wedges, ropes, and adhesive tape.
4. Determine the sizes of cassettes needed for two views.
5. Measure the anatomic site, consult technique chart, and select settings.
6. Confirm the patient identity.

PROCEDURE

1. Place the cassette on the tabletop or under the grid.
2. Position the patient so the beam is centered over the anatomic site being studied.
3. Place positioning devices as per reference.
4. Place labels and markers on the cassette.
5. Collimate to just include the body part on the cassette. Ideally, there is a 1-in. unexposed area all around the film.
6. Expose the radiograph by pushing the control button.
7. Switch cassettes, reposition, and repeat to expose the second radiograph.

FOLLOW-UP

1. Develop film then compare the films with the examples in the reference text.
2. Were the requirements for positioning met?
3. How could the positioning be improved?
4. Could alternative methods of restraint be used?

TASK 15.4
DEVELOPING RADIOGRAPHIC FILM

Concept: Radiography film is radiation and light sensitive.
Discussion: It must be handled properly as it can be ruined before, during, or after the radiograph is taken. This requires knowledge about the cassettes that house the film during the radiograph, film handling, and storage and how to use and maintain the processor. We begin with cassette management.
Concept: Cassettes are expensive pieces of equipment for both traditional radiography and DR.
Discussion: Cassettes are often dropped by personnel or kicked off tables by the patient. This can cause the screens inside to loosen, which in turn will cause film defects. Care must be taken when carrying and using them.

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Concept: Traditional film cassettes hold the film flat against the intensifying screens and prevent exposure of daylight to the unexposed film.
Discussion: Cassettes have latches securing the top and bottom sides tightly together so no light can penetrate. Push or slide the latches to release the two sides to access the film inside.
Concept: Cassettes require routine maintenance.
Discussion: Ideally, the exterior is disinfected between patients by spraying with a dilute disinfectant and drying off with paper towels. After each patient, clean the cassette surface. Monthly, the outsides can be wiped off thoroughly using a mild soap and water and then dried thoroughly with towels. Do this when cleaning the intensifying screens.
Concept: The intensifying screens on the interior of the cassette also require monthly maintenance.
Discussion: To clean the screens, open the cassette with the hinge away from you. The white surfaces on both sides of the inside are the screens. Screen cleaning solutions are used by applying a small amount of solution to a 4 × 4-in. gauze sponge and wiping the surface of the screens. A second sponge is used to dry the screen. Leave the cassette open to air-dry thoroughly, overnight if possible. Clean the cassettes at the end of the day so they are not out of commission during business hours. Refill the cassette first thing the next morning.

Tip Box 15.6: **To maintain a record of cleaning, place a small sticker on the back of the cassette with the date cleaned. Replace the sticker after each cleaning. A quick check of the sticker each time the cassette is used will remind personnel it is time to care for the cassette.**

TASK 15.4.1
FILM HANDLING

Concept: Radiograph film is light and pressure sensitive.
Discussion: The darkroom is a specially constructed room that when the door is shut and the overhead light is turned off, it is absolutely pitch-black. The darkroom is equipped with a low wattage safelight that contains a dark red filter that does not affect X-ray film and is enough for us to see to work. The door should have a lock to prevent someone from walking in and inadvertently ruining a radiograph just taken out of the cassette or the boxes of film in an open storage safe.
Discussion: Any work with film must be in the darkroom with the door closed and the red light within the darkroom is on. A red light outside the door is turned on to indicate occupancy of the room. If the correct bulb is installed, it has wavelengths that do not expose film. Take a few moments to allow your eyes to adjust to the darkness.
Concept: Film boxes are stored on edge inside a light proof safe.
Discussion: The safe is only opened with the door to the darkroom closed and the overhead light turned off. To open a new box, carefully remove the lid by pulling the tear strip and then carefully tearing or cutting the inside wrapper straight across at the very top. The reason is so the films slide out without hanging up and the wrapper can be folded over and the lid replaced for added protection of the film inside the safe.

Film is handled at the corners only and should not touch anything other than the inside of the cassette. Scratches, static electricity, and water will cause film defects.
Concept: After the film has been exposed, it is taken to the darkroom for processing.

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Procedure

Location: Darkroom

PREPARATION

1. Prepare a card for your reference book entitled "Darkroom Procedures." Mark the card with the steps required for developing films.
2. Before opening the cassette, check to make sure the countertop in the darkroom and the feeder tray on the automatic processor are clean and dry.
3. Place the cassette face down, with the latch side toward you and the hinge away from you.
4. Close and lock the door, turn off the overhead light, turn the safety lights on, and wait for your eyes to adjust.

PROCEDURE

1. Release the latches and lift the cassette back up and away from you, allowing it to lay open on the counter.
2. Lift the film by one corner and carry it to the feeder tray on the processor.
3. If using a flash marker, place the film with the unexposed corner in the flasher and press down. Once it flashes, you can remove the film.
4. Lay the film in the feeder tray so it slides in straight; most processors will have a raised edge that allows you to square the film by placing the short edge of the film along its side.
5. The film should be caught by the rollers and start to be pulled into the processor. If not, give the film a little nudge until you feel it moving away from you. Wait for the signal beep from the processor indicating it is ready to accept another film and repeat the process for the second film.
6. Replace the film in the cassette by opening the film safe and the film box containing the appropriately sized film. Remove the lid and unfold the inside wrapper. Grasp the film with your fingertips, making sure you are just taking one sheet of film. Pull the sheet up and out of the box.
7. Set the film into the cassette with minimal sliding to avoid creating static electricity. The white screens inside the cassette makes this easy as you can see where the corners are; set the bottom of the film against them and allow it to settle into place. To confirm proper placement of the film, place a fingertip on one corner of the film and move it up and down and then side to side.
8. If the film is properly placed, the sides of the cassette limit film movement.
9. Close the cassette by giving the back a gentle push; you should hear the latches click into place.
10. Refold the inside wrapper on the film box and replace the lid and close the safe.
11. If the processor has signaled it is ready for another film but you have finished, close the cover on the feeder tray. It is now ok to turn on the overhead light and turn off the safety light.

FOLLOW-UP

1. Remove the labeling devices from the outside of the cassette and store them properly.

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2. Disinfect the outside of the cassette and place the replenished cassette into storage. Filled cassettes are often stored in a pass-through box that can be opened from the radiography room as well as on the darkroom side. Often the radiograph machine cabinet has a lead-lined storage container to protect the cassettes from exposure and that is where the cassettes can be stored.
3. The films should be out of the processor by this time and can be taken to the veterinarian for analysis.
4. Turn the light off in the darkroom and leave the door open as you leave.

Tip Box 15.7: **Rule: Never leave a cassette without film!**

If the cassettes need to be cleaned and if it is close to the end of the day, leave them open on the countertop so everyone knows they are not filled.

TASK 15.4.2 DEVELOPING FILM

Concept: There are two methods for developing X-ray film.
Discussion: The older method is manual developing. The only reason it is retained in this edition is the possible use of manual development of dental films where it will be discussed. The most frequently occurring method of film development is automatic film processing. As DR moves to the fore, even film processors will become obsolete as film development will become unnecessary.
Concept: Automatic film processing has several advantages over manual developing. The most obvious is the speed at which a readable film is available. The constant temperature of solutions and constant time in each reduces developing errors and increases film quality. Staff time needed to develop a film is significantly reduced. The disadvantages include the initial cost of the processor and the cost of periodic professional maintenance. Ideally, a backup system of hand processing is available if a breakdown in the processor occurs. This is used until a service representative from the manufacturer makes repairs. Because of lack of darkroom space, many veterinary facilities do not keep a backup system relying on the manufacturer's service representative to provide a loaner during repairs.

Manual developing does not require a backup system, is cheaper to set up, and is easier to maintain. Unfortunately, these advantages are offset by the variables of temperature and time required in developing, and the length of time until the film is dry and readable.
Concept: Film processing involves several steps whether hand or automatic processing is used.
Discussion: When the film is pulled into the processor, it first goes into the developing solution. The roller bars are designed to keep the film in the solutions just long enough to develop, fix, rinse, and dry the film, usually within 90 seconds. These steps include developing, fixing, rinsing, and drying. Processing takes place in a darkroom as the undeveloped film is light sensitive and would be ruined if removed from the cassette in normal light before it is developed.

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Automatic Film Processing

Concept: Among the first tasks the assistant performs each morning is to turn on the film processor. If unfamiliar with a particular processor, the owner's manual will have complete instructions.

Discussion: This allows the chemicals within the machine to reach the desired temperature and it is ready to process at any time during the day. At the same time, the external replenishment tanks are checked for adequate chemical levels. If they need replenishment, it is done at this time.

Concept: The instructions for mixing the chemicals are on the side of the box they come in and are usually mixed to make 5 or 10 gal at a time.

Discussion: PPE includes goggles, an apron, and exam gloves to protect the eyes and skin from accidental exposure to the solutions. Use the premixed replenishers to the fill line as needed.

Concept: Automatic processors do require regular maintenance.

Discussion: Roller racks should be removed on a routine basis and rinsed with warm water. This is done weekly to monthly depending on the level of use of the processor. The manufacturer's recommendations for cleaning and maintenance should be followed. When removing these racks, take care not to drip developer into the fixer and vice versa as that will contaminate these solutions.

Concept: Whenever working around developing chemicals, wear PPE.

Discussion: PPE includes goggles, apron (waterproof, not lead), and gloves. These chemicals are caustic and can cause damage to the eyes and skin.

Concept: Tanks that hold the developer and fixer for the automatic processor need to be maintained routinely.

Discussion: Always wear PPE when working around developing chemicals. Remove the lids from their respective tanks. Each will have a hose that carries the chemicals into the processor. Place these in a sturdy bucket to avoid dripping chemicals on the floor. Dip or siphon any developer and fixer out of their tanks and into containers for hazardous waste. Scrub the tanks out with mild soap and warm water. Rinse thoroughly then refill with the appropriate chemicals mixed according to the directions on the containers. Careful measuring is important so the chemicals are diluted properly. Put the feeder hoses into their respective tanks, making sure they are on the bottom of the tanks, and place the lids back in place.

TASK 15.5
FILM FILING

Concept: Once a film has been read, the diagnosis, film quality, and comments are entered into the radiology log.

Discussion: The assistant can do this from the entry in the patient's record, as the veterinarian will have entered the diagnosis. At this point, the film is ready for filing and storage. It is placed in a large paper envelope specifically designed for radiograph storage. Enter data on the exterior of the envelope including the patient's name, owner name, veterinarian name, and the dates the radiographs were taken. Some veterinarians also like to put the type of study and the diagnosis after each date.

Concept: Special storage systems are used to file films as they are too large to file with a patient's paper medical record.

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Discussion: The radiograph envelopes are placed in open filing cabinets sized to hold the envelopes in an upright position.
Concept: Filed radiographs must be filed in such a way that they are easily retrieved as needed.
Discussion: There are several methods utilized to file radiographs and these usually follow the same method used to file the patient's medical record. One method is to file them alphabetically under the patient's/owner's name. The owner's last name is used first, followed by the first name. This can get a bit confusing with common last names like John Smith. Then a middle initial comes into play. If misfiled, these radiographs are difficult and time consuming to find.

If medical records are filed numerically, the radiograph envelopes are numbered with the patient's file number and filed in numeric order. In either system, all the radiographs for a single patient are filed in one envelope. If the animal is radiographed again, place the new films in front of the old films. The front of the envelope is the side with the writing on it. Hold the envelope so the writing faces you and place the new films in front of the old. Write the information for these new films under the last entry. This will facilitate looking for specific radiographs.

A second system requires filing radiographs using a combination of date and patient name or number. In this circumstance, only the radiographs taken on a specific date for a patient are filed together. The advantage to this system is that location of a specific radiograph is more rapid. The disadvantage is that more envelopes are used, resulting in more cost and more space needed for filing. Likewise, the more items require filing increases the chance for misfiles and more personnel time.

The third system is filing by date. All films taken on each date are filed together. This requires less filing and fewer envelopes but makes locating all the films of a particular patient for comparison purposes difficult because they might have been taken on different dates. If many films are taken on a particular date, locating a specific film becomes time consuming.
Concept: Use an "out-guide" whenever a filed radiograph envelope is removed.
Discussion: This is usually a large card placed in the spot where the radiographs were filed. This makes it easier to return the file or alert personnel that it has been removed.
Concept: Accurate filing and quick retrieval are a must!
Discussion: Accurate filing makes radiographs readily available and increases their usefulness. "Lost" or misplaced files must be found and requires a lot of time to locate the films. Filing radiographs is a daily task for the assistant. Remember these radiographs are legal documents just like the medical record and should be treated with the same care.

Tip Box 15.8: **Never allow filing to accumulate; digging through a pile of radiographs on a busy day just creates frustration.**

TASK 15.6
DARKROOM MAINTENANCE

Concept: The darkroom itself can become a source of poor film quality if it is not properly maintained.

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Discussion: Potential darkroom sources for loss of quality include improper chemical balance, improper safelight, white light in the darkroom, and artifacts due to chemicals or materials on and in cassettes or on hands.
Concept: Check the darkroom for white light leaks.
Discussion: Close the darkroom door, turn off the light, and note the presence of any daylight that might be entering around the door. If there is any light from cracks around the door or any other source, notify the office manager.
Concept: Check the safety light.
Discussion: With the door closed, the overhead light turned off, and the safety light on, place an unexposed film on the counter, then place a metal object such as a paper clip on the film; expose for 2 minutes, then develop the film. If the object appears on the film, the safety light is not working properly or there is some other source of light in the room.
Concept: Check to see if the flasher blocker is working properly.
Discussion: If the light does not work, it can be as simple as changing the bulb. Always follow the manufacturer's directions for product maintenance.
Concept: Ideally, there are two areas to a darkroom: a wet side and a dry side. The processor side is considered the wet side and countertops the dry side.
Discussion: There needs to be sufficient dry counter space for working with cassettes and film boxes. If a flasher block is used for film identification, make sure there is enough room to accommodate the film in the flasher without having to bend the film. Even a slight bend in an unprocessed film can cause an artifact. The cassettes should be able to lay flat on the counter so they do not accidentally fall.
Concept: The tanks and the film processor are on the wet side.
Discussion: Floors and counters can become wet. All spills or wet areas need to be cleaned up and dried immediately. Wet spots will make artifacts on the film. Keep paper towels stocked in the room for wiping up spills and cleaning the counter. Mop the floor whenever it becomes wet or at least weekly.
Concept: Keep a box of examination gloves, an apron, and goggles in the room to be used whenever working with chemicals.
Concept: Maintain an adequate supply of materials and chemicals in inventory.
Discussion: Note the quantity of each whenever using these items. Add needed items to the want list or notify the office manager as supplies become low. Allow for sufficient time for ordering and delivery.
Concept: Develop daily, weekly, and monthly maintenance charts for the darkroom and materials stored in it.
Discussion: Compose a chart of rows and columns to meet the needs and policies of your practice. Table 15.1 is an example of a maintenance chart. Alternatively, task cards can be created for these duties and can be filed in your task box.
Concept: Certain tasks are completed on a daily to weekly basis.
Discussion: These include the following:

1. Counters should be wiped down daily with dilute disinfectant. Paper towels are restocked and the disinfectant is replenished as needed.
2. Developer and fixer chemical levels are checked daily and replenished as needed.
3. Note down items that need to be added to a want list or need repair. Next time you are near the want list, copy the information down or pass the note on to the office manager if more appropriate.
4. File radiographs daily.
5. Mop floors weekly.
6. Film processor rollers are rinsed weekly to monthly. Confirm professional processor maintenance based on manufacturer recommendations. Notify the office manager if there is a lapse in service.

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Table 15.1
Daily Maintenance Chart

Daily Tasks	Date/ Initials	Date/ Initials	Date/ Initials	Date/ Initials
Processor on/off				
Solution level good/low				
Counters clean and dry				
Floors Clean & Dry				
Supplies stocked				
Safelight in good order				
Weekly Tasks				
Mop floor of darkroom				
Clean view boxes				
Clean the exterior of cassettes				
Clean roller bars on the processor				
Monthly Tasks				
Clean cassette screens				
Every 6 Months				
Check the darkroom for light leaks				
Check PPE for cracks				
As Needed				
Replace lights in view box, flasher, and darkroom				
Order supplies				

7. View boxes are cleaned weekly and bulbs replaced as needed. Any glass cleaning liquid will do. Dry thoroughly so no streaks are left. View boxes may be located in the darkroom, each exam room, and even in the surgery and treatment rooms.
8. Clean cassettes monthly inside and out.

Tip Box 15.9: **There is nothing so insignificant in radiology that it can be ignored. Quality comes in paying attention to details.**

TASK 15.7
DIAGNOSTIC ULTRASONOGRAPHY

Concept: Ultrasonography use is increasing as an indirect imaging technique in veterinary medicine.

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Discussion: The advantages over radiography are the lack of radiation and the portability of equipment.
Concept: Ultrasound provides indirect images of organ shape and structure. The principle is based on sound waves. The sound waves are produced by a transducer.
Discussion: The waves hit tissues within a patient and are "echoed" back to the transducer. The higher the intensity of the returning echo, the brighter (whiter) the image is on the screen. It is commonly used for diagnosis of uterine, ovarian, bladder, heart and kidney diseases, pregnancy confirmation, guided cystocentesis, and tissue biopsies.
Concept: The role of the assistant in ultrasonography is in equipment setup, patient preparation, and restraint during the procedure.
Discussion: The quality of the image is affected by patient preparation. Image quality is decreased by anything that traps air. This can be hair, dirt, or skin scales, which makes skin preparation so important.

The study area over which the transducer is placed is clipped with a no. 40 blade to remove the hair; completely vacuum loose hair when finished. Then the area is gently washed with a surgical disinfectant, rinsed with water, and dried thoroughly. To enhance transducer contact with the skin, a liberal amount of acoustic gel is applied to the skin and is allowed to stay in place for 5 minutes before the procedure.
Concept: The ultrasonograph, keyboard, monitor, and acoustic gel are usually kept on a rolling cart, making it portable and accessible anywhere in the clinic. Positioning aids can also be stored on the cart.

Procedure

Location: Ideally an imaging room but most often in the treatment area

PREPARATION

1. Prepare a card for your reference book entitled "Ultrasonography." Mark it with the procedure for setting up the ultrasound.
2. Plug the ultrasound in, turn it on, and place it near the examination table.
3. Placement of the patient is usually to the operator's right with the cart facing the operator. If the operator is left-handed, reverse the arrangement. This allows the operator to hold the transducer in the dominant hand and to operate the controls with the other.
4. Prepare the patient. Consult anatomical charts to learn where to clip a patient for the ultrasound. This will also tell you how to restrain the patient for the procedure.

PROCEDURE

1. Assist with patient restraint during the procedure. In most studies, patients do not need to be anesthetized.

FOLLOW-UP

1. Clean the gel off of the patient with a warm soapy cloth wipe with water, then towel dry.
2. Return the patient to its housing or owner if waiting.

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3. Clean the transducer according to the manufacturer's directions.
4. Straighten the cart, restock the acoustic gel if necessary, and put away.

Tip Box 15.10: **Make certain there is always an adequate supply of gel on hand as it is used "liberally" during each examination.**

5. File printouts of the images in the patient's record or if the images are recorded on disc or videotape, label in a manner similar to the patient's medical record and store with other patient discs or videotapes.

RESOURCES

Han, C., & Hurd, C. (2004). *Practical Diagnostic Imaging for Veterinary Technicians*. St. Louis, MO: Elsevier.

Lavin, L. M. (2006). *Radiology in Veterinary Technology*, 4th ed. Philadelphia, PA: Elsevier.



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

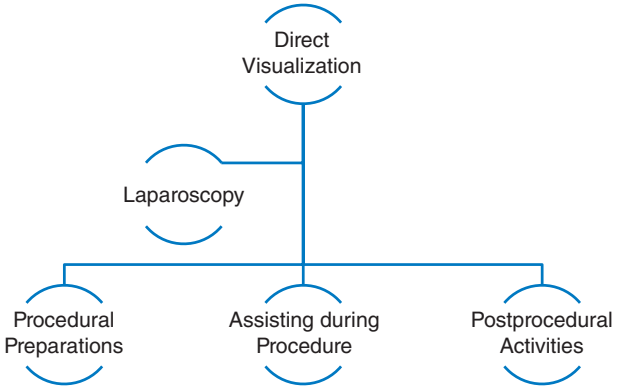
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CHAPTER

16

ENDOSCOPY

ORETA M. SAMPLES



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Identify parts of the endoscopic system.
2. Identify accessory equipment.
3. List the uses of an endoscope.
4. Describe the differences between a rigid, semirigid, and flexible endoscope.
5. Gather the needed auxiliary equipment for various endoscopic procedures.
6. Create a bin filled with materials needed to clean an endoscope.
7. Correctly clean an endoscope.
8. Safely transport and store an endoscope.
9. Restrain and position a patient during the preparation phase of endoscopy.
10. Effectively assist during the preparation and cleanup phases of an endoscopic procedure.

INTRODUCTION

The endoscope is used for diagnostics and surgery. It includes a wide range of procedures and uses highly specialized equipment. It gives the veterinarian a direct view of body structures which aids in diagnosis. It also reduces healing time if used for surgeries because of the ability to do procedures with two to three small incisions. Because patient preparation requires heavy sedation and general anesthesia, the topic of endoscopy is also found under anesthesia and patient monitoring within the surgery chapter.

In instances where entrance to a body cavity is through the skin and musculature, the patient requires a surgical prep (see Chapter 18). These are additional illustrations of the less-than-clear-cut difficulty in classifying such topics in veterinary medicine.

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TASK 16.1
ENDOSCOPE INSTRUMENT

Concept: An endoscope is an instrument that allows the veterinarian to have real-time visualization within structures and organs that would otherwise only be visualized indirectly (Fig. 16.1).
Discussion: As the name *endoscope* implies, the instrument allows the user to see via the end of a complex bundle of glass fibers that allows for the bending of light. These bundles are encased in an insertion tube of varying lengths and diameters based on the intended location of the instrument's use. The viewer can see through a lens to visualize what is at the other end of the insertion tube.
Concept: The handpiece is the large end with valves and knobs.
Discussion: The valves and knobs are manipulated by the operator to guide the deflection of the tip, control the suction and water valves, and are connected to the umbilical cord, which attaches to the air pump, water bottle for irrigation, and the light source. There may be an eyepiece through which the operator can look or it may be directly connected to a video screen where the operator and others can view material directly at the end of the tip.
Concept: The narrowing at the end of the insertion tube contains various tools used in endoscopy; all will have a light guide and image lens.
Discussion: The tips will also contain various channels for irrigation, a suction channel to remove the irrigation fluid, an accessory channel for various instruments inserted from the handpiece to the tip, and an insufflation channel for inflating a hollow organ with air or gas to increase visibility of its surface. The last few inches of the insertion tube are known as the "bending section" as this is the portion that is controlled by deflection knobs to bend up and down as well as right and left with remarkable accuracy.
Concept: Endoscopic findings are documented through video or still pictures.
Discussion: Minimally, this requires a camera, a light source, and a printer. For more sophisticated endoscopic setups, there is a camera control unit, video recorder, monitor, and keyboard for adding text to the pictures (Fig. 16.2).
Concept: The umbilical cord attaches to the handpiece at one end and to various instruments at the distal end.
Discussion: Most important, the light source is attached to the distal end of the umbilical cord. There are connectors for the air pump for inflating hollow organs, a connector for the suction pump, a connector for the water bottle for irrigation of tissues, and a pressure compensation valve.

All of the equipment is best stored together on a wheeled cart that is stored out of the way of usual hospital traffic. It can be rolled to a sink where cleaning functions can be performed immediately after removal of the endoscope from the patient. Ideally, all of this should be in a designated room for endoscopic procedures, as seen in a photograph of the special procedures room at the Colorado State University College of Veterinary Medicine (Fig. 16.3).

Unfortunately, many veterinary facilities were built before the advent of endoscopy and lack the additional space dedicated to endoscopic procedures. A possible option is the surgery prep area where instruments are cleaned immediately after surgery or a grated examination table in the treatment area with running water. The cart should have a power station with several electrical outlets to plug in the various machines stored on the cart. The cart itself plugs into a wall outlet providing power for the power station.

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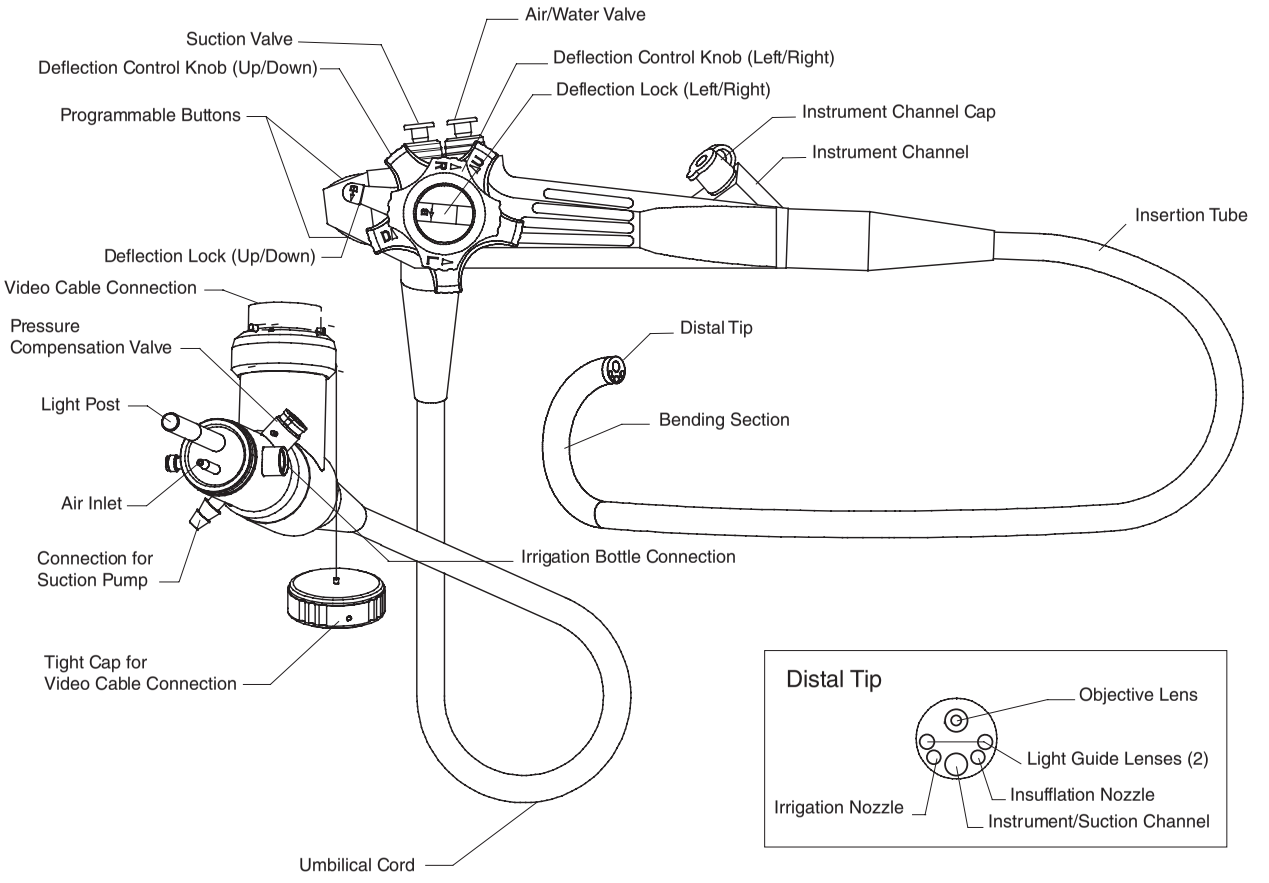


Figure 16.1. Labeled parts of an endoscope. Courtesy of Karl Storz Veterinary Endoscopy-America, Inc., Goleta, CA.

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Figure 16.2. Basic endoscopy video camera system. Note the endoscope hanging from the hook. Courtesy of Karl Storz Veterinary Endoscopy-America, Inc., Goleta, CA.

Concept: Endoscopes are classified as rigid, semirigid, or flexible.
Discussion: The earliest endoscopes were little more than a hollow, rigid tube with a light source. The tube was inserted into a patient and the physician looked through the tube to view tissues. Since the advent of fiber optics, endoscopes have evolved into the highly sophisticated instruments that exist today.
Concept: Rigid endoscopes are used for such procedures as ear canal and rectal examinations.
Discussion: These are adaptations of human pediatric endoscopes, and they allow veterinarians to see into structures too small to have been visualized before. These contain fused silica bundles rather than being composed of bundles of very small glass rods that are found in the true fiber optic systems. Semirigid scopes are used for such procedures as examination of the urethra, urinary bladder, and the nasal passages.

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Figure 16.3. The endoscopy/special procedures room at the Colorado State University Veterinary Teaching Hospital. Note the cabinet for storage of endoscopes and accessory instruments and a videotape deck and television monitor conveniently located in the work area. Courtesy of David C. Twedt. From Tams, *Small Animal Endoscopy*, with permission from Mosby.

Concept: The flexible endoscopes are larger than the semirigid endoscopes, but they have greater flexibility in the bending section, allowing the user to have a wider range of tissue visualization.
Discussion: They are used in a wide range of species and body sites including the gastrointestinal tract.

TASK 16.2
ENDOSCOPY PREPARATION

Concept: Endoscopy encompasses a variety of procedures, which are named after the location in the body where the instrument is used.
Discussion: Use is limited only by the length and diameter of the instrument available and the patient size and site of the body into which the instrument is inserted. Table 16.1 illustrates the more common endoscopic procedures, the location in which the endoscope is placed, and the required patient positioning.

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Table 16.1
Common Endoscopic Procedures and Locations

Name of Procedure	Location	Position
Esophagogastroscopy	Esophagus and stomach	Left lateral recumbency
Duodenojejunoscopy	Duodenum and jejunum	Left lateral recumbency
Proctoscopy	Rectum	Any position the endoscopist prefers
Colonoscopy	Rectum and colon	Left lateral recumbency if using a flexible endoscope; right lateral recumbency if using a rigid scope
Thoracoscopy	Thoracic cavity	Dorsal, left or right lateral recumbency; depends on procedure
Laparoscopy	Abdominal cavity	Dorsal recumbency
Rhinoscopy	Nasal passages	Sternal recumbency with head propped up on a large rolled towel
Bronchoscopy	Larynx and bronchi	Same as above
Cytoscopy	Urethra and urinary bladder	Female: hind legs over the examination table and hips elevated with a large rolled towel; male: lateral recumbency
Arthroscopy[a]	Joints	Depends on the location of the joint; the joint must be uppermost

[a]Requires surgical prep.

Concept: The assistant can facilitate endoscopy during both the preparation phase and the postprocedural phase of the endoscopic procedure.
Discussion: During the preparation phase, the assistant helps by aiding in the instrument setup and patient preparation and restraint.
Concept: Patients are usually heavily sedated or anesthetized.
Discussion: This requires either injectable drugs or a gas anesthetic machine. Check the patient's medical record for drugs prescribed, then place them on a counter with appropriately labeled syringes. The gas anesthetic machine should be checked to make sure that all parts are in working order (see Chapter 18).
Concept: To prevent infection, it is important that a surgical scrub be completed whenever the skin and musculature are penetrated to access a body cavity.
Discussion: A surgical clip and prep are needed for *thoracoscopic* and *laparoscopic* procedures (see Chapter 18).
Concept: Each endoscopic procedure requires special instrument packs.
Discussion: The most basic pack will be the standard surgical pack, which includes a towel pack and a surgical drape. There are special instrument packs designated for a single type of endoscope procedure. As an alternative, instruments such as a trocar can be sterilized in individual pouches. A list of instruments needed for each type of procedure can be kept on a card in your reference book; then all individually packaged instruments are gathered as needed for specific procedures. Or a laminated copy of the card attached to the endoscopy cart may serve as a helpful reminder. In anticipation of procedure cleanup, cleaning supplies must also be laid out.

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Procedure

Location: Endoscopy room or surgical prep area

PREPARATION

1. Prepare a card for your reference book entitled "Endoscopy."
2. Mark out the different procedures your facility does and the supplies and equipment required for each on your card.
3. Lay out anticipated equipment, which may include the following:
   a) Attaching equipment associated with the umbilical cord
      i. light source (If multiple scopes are available, be certain to inquire which diameter of cable is to be used as the cable must be matched to the right scope to prevent overheating.)
      ii. air pump for insufflation
      iii. bottle filled with sterile normal saline for irrigation
      iv. suction pump and fluid receptacle.
   b) Endoscope suitable for the procedure and the patient. Confirm the following:
      i. Type:
         1. rigid
         2. semirigid
         3. flexile.
      ii. Length
      iii. Diameter.
   c) Accessory equipment. This depends on the procedure. Learn which instruments are desired for various types of procedures, such as
      i. brush, cytology
      ii. coagulating electrode
         1. unipolar
         2. bipolar
      iii. dislodger
      iv. forceps
         1. biopsy, assorted
         2. grasping, assorted
      v. needle, injection/aspiration
      vi. scissors
      vii. snares, various sizes and configurations. (All of these are very small, fragile instruments attached to the end of a long flexible wire that can be passed through the accessory channel of the endoscope located just in front of the insertion tube at the end of the handpiece.) (Fig. 16.4)
   d) Oral speculum suitable for the patient's size if doing any procedure requiring the endoscope to pass through the patient's mouth
   e) Drugs as required for sedation or preanesthesia
   f) Anesthetic machine: Ensure working order of all parts if the patient is to receive gas anesthetic (see Chapter 18)
   g) If tissue specimens are to be collected during the procedure, collect appropriate materials (e.g., slides, coverslips, formalin jars, and culture media), labels and laboratory forms, Sharpie marker, and ballpoint pen. Label with the patient's/client's name and date.

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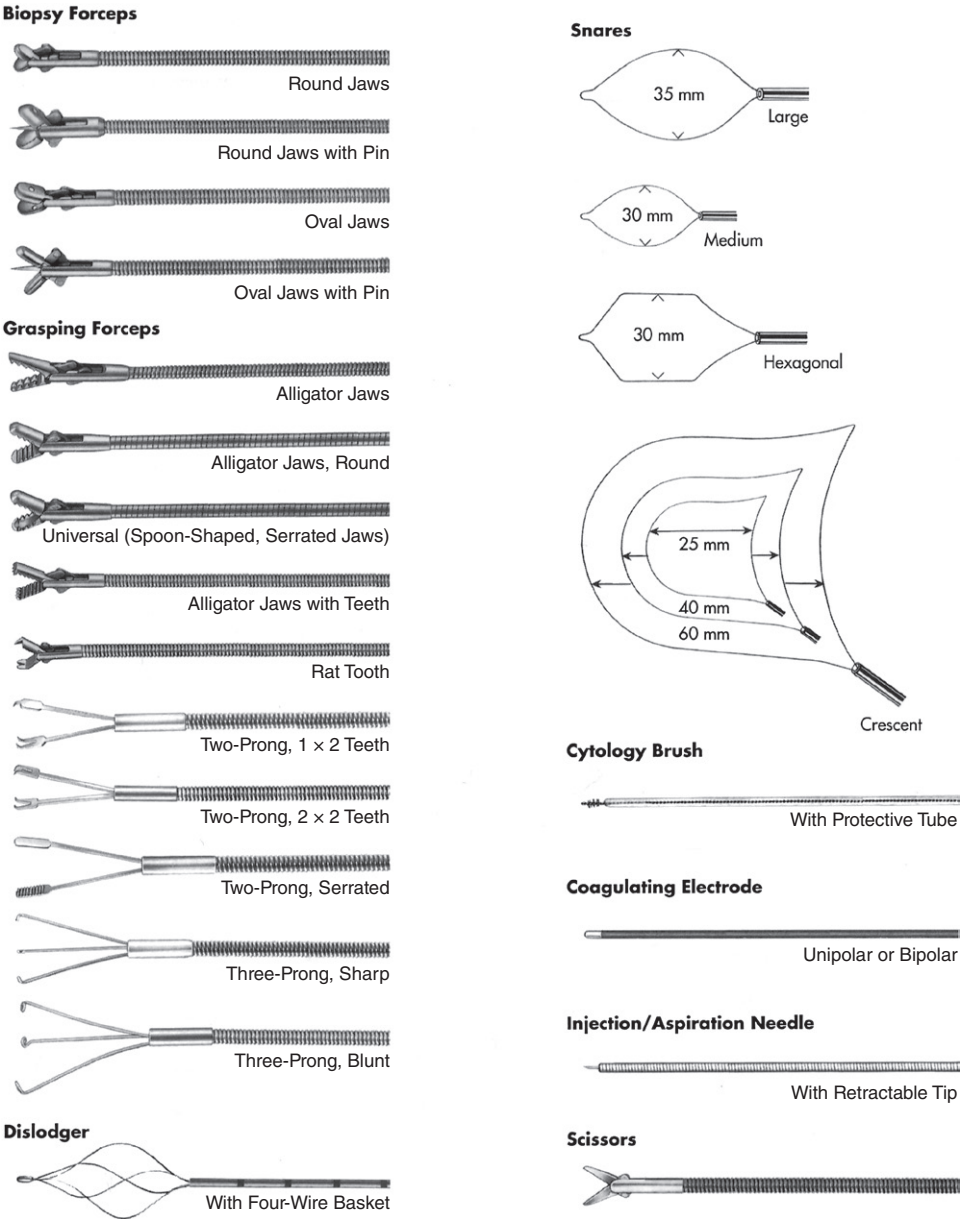


Figure 16.4. Flexible instruments for use with endoscopes that have an accessory channel. Courtesy of Karl Storz Veterinary Endoscopy-America, Inc., Goleta, CA.

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4. Patient preparation
   a) Confirm the patient's weight and identification.
   b) Have medical records with the patient at all times during the procedure for reference and medical documentation by the veterinarian or the technician.
   c) Restrain the patient during administration of preanesthetic and anesthetic drugs.
   d) Restrain during IV catheter placement and intubation (see Chapter 10).
   e) Attach various anesthetic monitors (see Chapter 19).
   f) Position the patient.
5. Wear examination gloves whenever handling bodily fluids or animals during the procedures.

PROCEDURE

1. During the actual procedure, the technician will assist the veterinarian through patient monitoring, helping with instruments and collecting tissue samples, and providing documentation (working the photographic/video equipment). If a licensed or specially trained assistant is not available, the assistant might monitor the patient and assist with sample collection and preparation. During gastroscopy, the technician or assistant observes the animal for excessive distention of the stomach with gas/air, which in turn impairs respiratory function.
2. The most important function of anyone assisting an endoscopist is patient monitoring.

FOLLOW-UP

1. Were all supplies laid out and readily available?
2. Were all steps in the preparation phase anticipated?
3. Were patient preparation and positioning correct?
4. Was adequate staffing available throughout the procedure to facilitate the safe and smooth flow of the procedure?
5. Was staff training sufficient to anticipate the needs of the endoscopist and the patient?
6. Were distractions to the endoscopist kept to a minimum?

If any of the last three steps were answered "no," discuss the issues with the veterinarian and the technician to resolve the problem to avoid future reoccurrence. If possible, attempt a "dry run" before attempting another endoscopic procedure.

TASK 16.3
ENDOSCOPY: POSTPROCEDURE

Concept: During the postprocedural phase, the technician is busy caring for the patient and the assistant begins immediate equipment cleanup.
Discussion: Immediacy of equipment cleanup cannot be overemphasized. The endoscope will have mucus and fluids on and around it, which will dry and harden very quickly if not removed, making any delay in cleanup more difficult.

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Concept: The hollow tubes and valves are so small that foreign materials quickly dry in and on them, making them inoperable.
Discussion: Do not risk damaging the endoscope by forcibly trying to clear the channel with a small brush or applying too much pressure to work stuck valves. Careful attention to detail in cleaning the accessory instruments is important as the hinges must remain freely movable. The thin wire must never be kinked or bent in any way.
Concept: Actual handling requires that the endoscope is never bumped or hit against a hard object or dropped (unthinkable!) as the internal glass fibers are easily shattered.
Discussion: This results in black areas in the field of vision when next the endoscope is utilized. All of the parts are (1) fragile and (2) very expensive. No distractions should occur during endoscope cleaning; focus on what you are doing. Know and anticipate what you and the other members of the team are about to do.

Tip Box 16.1: **Never force a stuck part of the endoscope; if it does not move freely, *stop*. If anything is inoperable, continue to soak until it is no longer stuck. Then remember to clean it next time *immediately* after use.**

Concept: Before a procedure ever begins, gather all materials that will be needed for cleaning after the procedure is completed. This will allow quicker attention to the fragile equipment.
Discussion: Most clinics have only one endoscope; therefore, it is imperative that it be kept clean and functional. The cleaning of the instrument immediately after a procedure is especially important if multiple endoscopies are scheduled on the same day.

Procedure

Location: Endoscopy room or presurgical prep area

PREPARATION

1. Prepare a card for your reference book entitled "Postprocedure Instrument Cleanup."
2. Mark your card with the materials needed:
   a) labeled squirt bottles containing the following: disinfectant soap solution or enzymatic cleanser as recommended by the endoscope manufacturer
   b) disinfectant solution as recommended by endoscope manufacturer
   c) 70% alcohol
   d) hydrogen peroxide (Either cover the secondary container with light and waterproof tape or screw a squirt tip from another bottle onto the original peroxide container as hydrogen peroxide deteriorates in the presence of light.)
   e) two stainless steel bowls, large dog water dish size
   f) nonsterile cotton-tipped applicator swabs in large ziplock bag
   g) 4" × 4" gauze sponges in a small ziplock bag
   h) large plastic syringe, 20–35 mL, no needle attached
   i) small bristle brush for cleaning accessory channel and accessory instruments (available from the manufacturer of the endoscope)

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j) roll each of (1) a plastic sterilization sleeve and (2) a sterilization indicator tape that are cut to length for enclosing instruments and the endoscope if sterilization is used; indicator tape must be compatible with types of sterilization procedure used, *or*
k) glutaraldehyde solution or product of manufacturer's recommendation for cold sterilization *if* the endoscope is submersible.

3. Dissemble each piece of equipment according to the manufacturer's directions.
4. Consult the manufacturer's instructions for cleaning/sanitizing. Failure to follow instructions can cause any existing warranty to be null and void.

PROCEDURE

1. To clean an endoscope:
   a) First, review the manufacturer's instructions. Their recommendations take precedence over any other suggestions.
   b) Put 100–200 mL of cleaning solution (enzymatic cleaner or diluted surgical soap) into one pan. Put diluted disinfectant solution in the second pan. Have tap water available either at a sink or in a third large bowl.
      i. Clean the working channel first.
         a. Using the syringe, draw the cleaning solution through the working channel until the solution exiting the channel is clear.
         b. The cleaning brush is passed up and down through the channel.
         c. Pass the disinfectant solution through the channel until it runs clear.
         d. Flush with tap water.
         e. Flush with alcohol to aid drying *or*
         f. Use dry air under pressure (large clean, dry syringe).
      ii. Clean the air/water valve.
         a. Disconnect the water bottle from the umbilical cord.
         b. Place one finger on the air/water inlet and one finger on the air/water valve.
         c. The light source pump will blow the residual water out of the channel.
      iii. Clean the exterior of the insertion tube.
         a. Wash using a gauze sponge soaked in soapy solution or enzymatic cleaner.
         b. Wipe soap off using a gauze sponge soaked in plain water.
         c. Wipe the surface with a gauze sponge soaked in 70% alcohol.
      iv. Clean the handpiece.
         a. Use cotton-tipped swabs soaked in alcohol to clean around the valves and knobs thoroughly.
      v. Clean the accessory instruments.
         a. Soak working end of accessory instruments in soapy water or enzymatic cleanser.
         b. Use a soft brush to clean serrations and hinges.
         c. Soak wires attached to working end of accessory instruments, being careful not to bend or kink the wire.
      vi. Clean the suction bottle.
         a. Dump contents down drain, flushing with copious amounts of water.
         b. Fill the bottle with soapy water. Swirl contents to loosen debris. Pour out.
         c. Rinse with tap water until water runs clear.
         d. Fill with disinfectant solution for designated contact time per manufacturer instructions.
         e. Rinse with tap water.
         f. Turn upside down on rack to drain until dry.

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2. To sterilize an endoscope system, either of the following procedures may be used depending on manufacturer's recommendation:
   a) Gas sterilization
      i. Place the endoscope and accessory instruments in individual plastic pouches.
         a. Insert a sterilization indicator strip into each pouch.
         b. Next, seal and label.
            (i) Heat sealer *or*
            (ii) Indicator tape
         c. Place pouches in a gas sterilizer.
      ii. Use ethylene oxide gas sterilizer only.
         a. Follow the manufacturer's directions for the use of the gas sterilizer.
         b. Never exceed the endoscope manufacturer's temperature and humidity limits.
         c. Allow adequate time after gas sterilization for the gas to dissipate:
            (i) 7 days in a quarantined area at room conditions *or*
            (ii) 12–18 hours in an aerator (failure to do so results in tissue damage when next used).
      iii. *Never* use hydrogen peroxide plasma gas sterilization.
   b) Cold (liquid) sterilization
      i. Glutaraldehyde (2% Cidex)
         a. Causes tissue irritation, so all channels/surfaces must be rinsed thoroughly with sterile water after sterilization.
      ii. Follow the product's guidelines for contact time and dilution.
   c) *Never* use a steam autoclave or hydrogen peroxide plasma gas on endoscopes.
3. Reassemble parts.
4. To store an endoscope and accessory equipment, use
   a) Designated storage cabinet
      i. Hang vertically on rack, handpiece up and locked onto the rack. This allows for continued drying of the endoscope and its parts *or*
      ii. The cases in which they arrived from the manufacturer; however, be advised that continued drying is inhibited when stored in this fashion, which may lead to microbial growth.
5. Collected samples:
   a) Complete tissue labeling as to patient, source, and collection method.
   b) Complete laboratory requisition forms.
   c) Arrange for pickup or delivery of samples.
6. Photographs and video footage:
   a) Label
      i. patient and client names
      ii. date and time
      iii. endoscopist
      iv. locations
      v. samples collected and procedures performed.
   b) File
      i. with medical records *or*
      ii. in separate storage designated for endoscopic documentation. (Use numeric or alphabetical system as designated at the worksite; see Chapter 21.)
7. Medical record:
   a) Enter procedure information as appropriate.
   b) Document all samples collected and date/time sent out to the lab.

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Tip Box 16.2: **The veterinarian will probably list findings and the technician will prepare and insert the anesthetic log.**

FOLLOW-UP

1. Replenish supplies in the cleaning bin.
2. Clean and disinfect the surgery table and counters.
3. Use a disinfectant or an appropriate cleaner to wipe down any equipment such a pumps, printers, keyboards, and monitors that were handled during the procedure.
4. Reflect upon your work.
   a) Were all materials needed for cleaning the endoscope present and of adequate quantity?
   b) Were all manufacturers' instructions followed scrupulously?
   c) Was the endoscope handled in such a way that it could not drop or be accidentally hit by a hard surface such as a counter edge or a surgery table?
   d) Was the endoscope stored in a proper manner after cleaning? Were all tasks related to patient handling and care accomplished correctly?

RESOURCES

Olympus America. Retrieved from: http://www.olympusamerica.com/msg_section/cds/index.asp.

University of Georgia. Retrieved from: http://www.uga.edu.

VetVu: How to Clean an Endoscope. Retrieved from: http://www.vetvu.com/index/cleaning.htm.



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

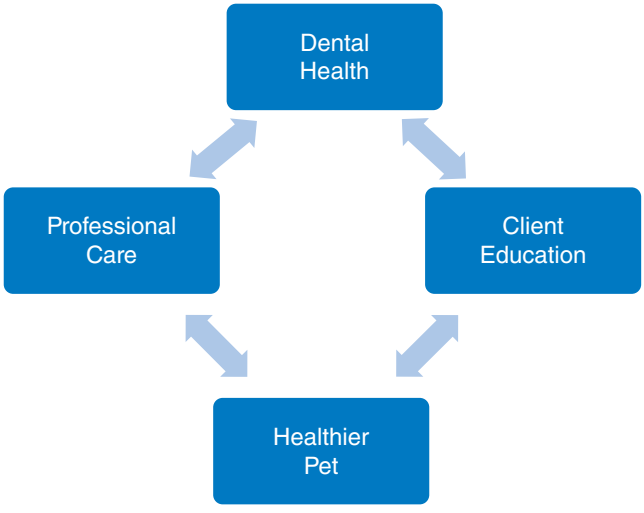
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CHAPTER

17

DENTAL SKILLS FOR THE VETERINARY ASSISTANT

MARY L. BERG



Tasks for the Veterinary Assistant, Third Edition. Paula Pattengale and Teresa Sonsthagen.
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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Provide proper and essential dental education to clients.
2. Properly use PPE during the dental cleaning procedure.
3. Properly identify and maintain all dental instruments and equipment.
4. Differentiate between the types of power scalers.
5. Prepare appropriate equipment and materials needed for polishing teeth after scaling.
6. Record the results of the oral examination on the patient's dental chart.
7. Identify each tooth using the triadan numbering system or the anatomical system.
8. Identify the head types of dogs and cats.
9. Interpret common dental terminology.
10. Evaluate dentition of juvenile dogs and cats to approximate age.
11. List the dental formulae for juvenile and adult dogs and cats.
12. Apply dental terminology to locate basic dental anatomy.
13. Prepare instruments needed for pocket pet dentistry.
14. Recite dental formulas for common pocket pets.
15. Develop dental films.
16. Prepare a dental report card for clients prior to discharge.
17. Conduct a thorough dental discharge appointment.

INTRODUCTION

Oral disease is one of the most prevalent diseases in dogs and cats. Eighty percent of adult dogs and 70% of adult cats have some form of oral disease. Dental problems are one of the top three pet concerns among owners, with calculus and gingivitis the most common conditions diagnosed by veterinarians regardless of the age of the animal. Dental cleaning, charting, instrument care, and client education fall on the shoulders of the veterinary technician and assistant. Dental care is an important part of patient care.

The process of professional dental care requires anesthesia. This is the first thing done. Once the patient is anesthetized and intubated, a mouth speculum is placed between the jaws to open the mouth and to expose the teeth. Dental charting, taking radiographs, then cleaning and polishing of teeth take place.

Dental procedures are usually conducted over a wet table with the patient in lateral recumbency on a metal rack below it, allowing fluids to drain away from the patient. All necessary dental equipment, such as the X-ray and dental machines, are stored nearby. All dental instruments and materials should also be kept near the equipment.

The patient is cared for as any patient to receive and recover from anesthesia (see Chapters 18–20).

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TASK 17.1
THE ASSISTANT'S ROLE IN VETERINARY DENTISTRY

Concept: Client education is the most important part of providing patients with dental care.
Discussion: Companion animals have become an important part of our lives. Many people consider the pet a part of their family. All members of the veterinary team must be excited and motivated about dental care and, in return, project that enthusiasm to the client. As veterinary health professionals, it is our job not only to promote dentistry but also to educate our clients about the importance of proper oral health. It is necessary to communicate that the importance of dental treatment and oral care should become routine. Start this education process with your clients at the first puppy or kitten visit. Talk with them about the importance of oral care by expressing the fact that the mouth is a mirror to the body. Give handouts explaining the relationship between oral disease and systemic health. Use pictures to give the client an impression of what can happen if oral home care is not given to their pet.

TASK 17.2
DENTAL INSTRUMENTS, EQUIPMENT, AND MAINTENANCE

Concept: A veterinary assistant should be able to identify and maintain dental instruments and equipment.
Discussion: Commonly used hand instruments include a periodontal probe, explorer, scaler, curette, and mirror (Fig. 17.1).

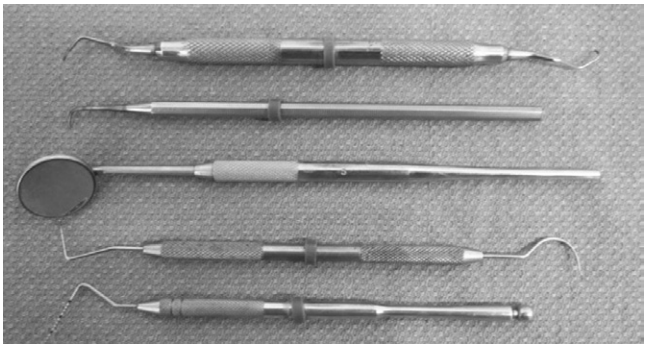


Figure 17.1. Dental hand instruments. Top to bottom: curette, scaler, mirror, periodontal probe/explorer, periodontal probe.

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Figure 17.2. Left: scaler; right: curette.

1. *Periodontal Probe:* used during the oral examination to identify and measure pathology of the periodontal tissues surrounding each tooth.
2. *Dental Explorer:* usually in the shape of a shepherd hook and is used to determine problems on the tooth surface. The explorer is very sharp and should never be used below the gumline.
3. *Scaler:* has two sharp sides and a sharp pointed tip. The scaler is used to remove calculus (tartar) from the tooth surface. Due to the sharp tip, the scaler cannot be used below the gumline as it can cause lacerations. The scaler should always be held with a modified pen grasp and used in a rocking motion from the gumline to the crown of the tooth (Fig. 17.2).
4. *Curette:* has two sharp sides and a blunted tip. The curette is designed to be used to remove calculus and debris from the periodontal pockets. The blunted tip protects the gingival tissues from laceration.
5. *Mirror:* helps visualize the surfaces of the hard-to-reach teeth.
6. *Luxators and Elevators:* cut or weaken the periodontal ligament that holds the tooth in the alveolar bone. Luxators and elevators vary in sizes.
   a) Luxators have a thinner working end and are used to cut the ligament; they should not be used for leverage as they may break (Fig. 17.3).
   b) Elevators have a thicker working end and are used to break down the ligament. A periosteal elevator is required to assist in retracting the gingival tissue during oral surgeries (Fig. 17.4).
7. *Extraction Forceps:* removes the tooth from the socket after it is completely elevated.
8. *Needle Holder:* A small needle holder is essential to suture all extraction sites closed.

Concept: Determine if hand instruments are in need of sharpening.
Discussion: Instruments are sharpened frequently to maintain their efficacy. A hard plastic test stick is used to determine the sharpness of an instrument. A sharp instrument will grab or bite into the test stick, while a dull instrument will slide along the test stick. Sharpness can also be determined by visually inspecting the instrument. Hold the instrument under a

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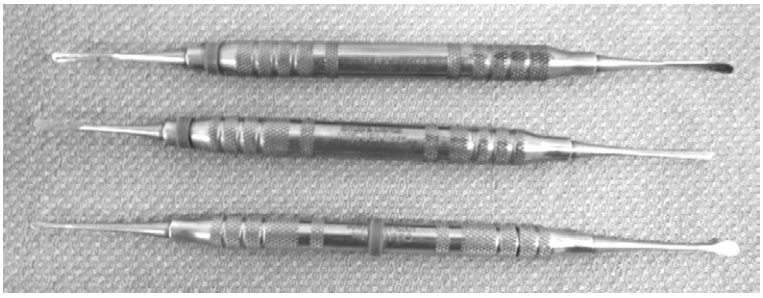


Figure 17.3. Top: luxator; bottom: elevator.



Figure 17.4. Periosteal elevators.

light and rotate the instrument until the edge is facing the light. A dull cutting edge will reflect light when it has been rounded from use.

Concept: Keep equipment needed to properly sharpen instruments together.

Discussion: The equipment necessary to sharpen instruments includes an Arkansas stone, both flat and conical; sharpening oil and cotton-tipped applicators to spread the oil; gauze; plastic test stick; and a diagram of a clock. Other helpful equipment includes a magnifying glass.

Concept: There is a proper technique for instrument sharpening.

Discussion: Place a drop of oil on the surface of the stone and gently spread the oil with a cotton-tipped applicator in a small circular shape.

Concept: Your grasp on the instrument is important to complete the sharpening process properly.

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Discussion: Hold the instrument in your nondominant hand. Brace your index finger or thumb near the top of the instrument to counterbalance the pressure caused by the sharpening of the lower blade. As a guide, use the diagram of a clock to hold the instrument vertically with the blade to be sharpened at the 6 o'clock position. Hold the stone in your dominant hand. Begin by holding the stone at 12 o'clock with your thumb on the edge toward you and your fingers on the edge away from you. This grasp will stabilize the stone. The stone is then angled to meet the angle cutting edge of the instrument to be sharpened. Move your entire arm in an up-and-down motion when sharpening. It is helpful to use the numbers on a clock diagram to correctly position the instrument and the stone for sharpening. One can move either the stone or the instrument to sharpen the edge of the instrument. When the edge has been sharpened, you can take the conical stone and gently remove any metal shards from the cutting surface.

Suggestion: There are many helpful dental instrument sharpening videos available. View http://www.youtube.com/watch?v=yUwG0EzyqDY.

Concepts: Power scalers use vibration to remove tartar from the tooth surfaces. There are three main types of power scalers.

Discussion: The ultrasonic scaler can have either a magnetostrictive insert handpiece that contains tightly stacked metal sheets or a ferrite rod insert. The ultrasonic scalers convert high-frequency electrical current into mechanical vibrations. Water must be in the handpiece prior to insertion of the metal stack insert. This prolongs the life of the insert. Occasionally hold the handpiece up to the light; if light is visible between the stacks, it is time to replace the handpiece.

Tip Box 17.1: **Be sure to read the equipment manual for the scaler to ensure proper use and to maximize the equipment life and effectiveness.**

Use the ferrite rod with care. If it is dropped, it can fracture the rod and render the handpiece unusable.

The piezo scalers use crystal technology in the handpiece to provide mechanical vibration. The same care in use should be applied with piezo scalers to prevent tooth damage. (Fig. 17.5).

Sonic scalers use compressed air to operate producing less heat, reducing the chance of thermal damage. Sonic scalers are an excellent choice for the removal of *supragingival* calculus; however, their inability to effectively scale *subgingival* is due to the large elliptical motion.

All of the scalers require water during use to prevent thermal damage to the tooth. A properly adjusted water flow will create a fine halo of mist to ensure that the scaling tip is properly cooled. The water source should be from a pressurized container filled with distilled water. Tap water will clog your scaler with the minerals found in almost all sources of city water. The container can be pumped to create pressure or a CO_2 charge is used to create pressure. Low pressure = low water = a hot tooth = a damaged tooth.

Rotary scalers are not as common and are not recommended. The rotary scaler can cause extreme etching of the enamel as the six-sided burr rotates at 30,000 rpm. If contact is made with the enamel, traumatic injury will occur.

Concept: The use of the correct handpiece tip is vital to performing effective dental cleaning.

Discussion: There are three main types of scaler tips available for power scalers.

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Figure 17.5. Dental scaler. Photo courtesy of Teresa Sonsthagen.

1. The tip used to remove gross accumulations of dental calculus or tartar from the crown of the tooth is most commonly called the beaver tail. This tip is broad and effective in rapidly removing debris from the crown. This tip requires a higher power on most units and thus should never be used below the gumline.
2. Another tip that is essential to complete a proper dental cleaning is the periodontal tip. This tip has a slender end and is designed to be used below the gumline and requires less energy and water to be effective. Using the periodontal tip helps to remove disease-causing dental calculus and plaque found below the gumline. The water flushes out the debris, while the vibrations will burst the cell walls of bacteria. It is recommended that each clinic have both the wide or beaver tip and the periodontal tip to perform the most effective dental cleanings.
3. The universal tip can be used both above and below the gumline; however, they are not as effective for cleaning.

Note: All tips must be checked regularly using manufacturing guides to ensure that they are still effective. Handpieces and tips will need to be replaced on occasion for the safety of the patients and the effectiveness of your procedures.

Concepts: Polishing follows scaling as a part of dental cleaning.

Discussion: Polishing with a prophy cup and paste applied with an electrical or air-powered polisher is an important step. Polishing removes any missed plaque and smooths the tiny scratches on the tooth surface created during dental scaling. If left unpolished, the etching gives the plaque bacteria more surface area to attach to the tooth.

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Concept: The prophy cup is used on a low-speed handpiece that moves at approximately 3000–8000 rpm.
Discussion: Disposable prophy cups decrease contamination and are inexpensive. Many commercially available prophy pastes are convenient to use, but it can be made inexpensively by mixing flour pumice with glycerin. Prophy pastes range in grit and hardness from fine to extra course. The fine grit is preferred as the larger grit can create etching. Care must be taken not to overheat the tooth while polishing. No more than a second or two on each surface and you must have the polish to reduce the friction.
Concepts: Dental units are basically compressed gas-driven units.
Discussion: There are two types of dental units. One uses compressed gas, usually nitrogen, from a cylinder. The second uses an air compressor.
Concept: The pressure in the compressor tank must be released at the end of each day to reduce condensation in the tank.
Discussion: Condensation can lead to ineffectiveness and damage to the tank.
Concept: Most air-driven compressor systems use oil for lubrication.
Discussion: The oil level must be monitored and changed based on the manufacturer's recommendations.
Concept: Different types of handpieces can be used on the compressed air systems.
Discussion: Sonic scalers are one of the handpieces often attached to air compressor units. Low-speed handpieces use speeds of 5000–20,000 rpm and are used for polishing with prophy angles. High-speed handpieces with speeds of 300,000–500,000 rpm are used for cutting teeth during extractions and can also be used for creating access holes in the teeth for root canal therapy.

The handpieces may need to be lubricated depending on manufacturer recommendations.
Concept: The dental units also come equipped with a three-way syringe.
Discussion: This syringe has two buttons. One button creates a water spray, while the other creates an airstream. The water spray can be used to rinse the mouth to clear debris and excess prophy paste and to irrigate the tissues. The airstream is used to dry tissues. If both buttons are pressed, a mist will be formed.

Procedure

Location: Dental area, may be a part of the treatment room

PREPARATION

1. Prepare a card for your reference book entitled "Dental Equipment."
2. Locate the manufacturer's instruction/maintenance manual.

PROCEDURE

1. Using the manual, identify the various parts of the dental machine used at your worksite.
2. Follow the procedures for correctly preparing the machine for use.
3. Follow the step-by-step procedures for closing down the machine.
4. Identify the maintenance procedures and materials needed to do so.
5. Locate cleaning instructions. Prepare materials to do so.
6. Mark all of the above on your reference card.

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FOLLOW-UP

1. Practice each of the procedures, timing yourself until you can do so quickly and without error.

TASK 17.3
DAILY DENTAL CARE

As with many diseases in pets, prevention is the key to good oral health; this is discussed thoroughly in Chapter 12, Task 12.11.

TASK 17.4
CHARTING THE ORAL EXAMINATION

The most effect dental practices implement four-handed dentistry. Four-handed dentistry allows for the veterinarian or the veterinary technician to perform the oral examination while the veterinary assistant records the information onto the dental chart.

Concept: Dental charting is done on a dental chart specific for each species.

Discussion: A dental chart is a diagrammatic representation of the dentition where information can be entered in a pictorial or notation format. It allows you to keep a record of the patient's oral health, track changes in oral health, and record treatment. A dental chart is also a legal document. The dental chart should include vital information about the patient, history, findings, medications, and, most importantly, a key to interpret the notations used on the format.

The charting technique will depend on the what the facility uses. Review their chart to become familiar with it before you have to assist during a dental prophylaxis.

Concept: Learning the dental formulas or dental arcades of cats and dogs is information used to ensure charting accuracy.

Discussion: Dogs and cats differ in the total number of teeth as juveniles and adults. A 2x refers to the left and right side of the mouth. I indicates incisor (front teeth), C indicates canines (fangs), P indicates premolars, and M indicates molars (chewing teeth). Capital letters represent adult teeth and small letters represent deciduous teeth. The first number represents the maxillary teeth and the one afterward represents the mandibular teeth:

Adult dog: 2x(3/3I, 1/1C, 4/4P, 2/3M) = 42
Puppies: 2x(3/3i, 1/1c, 3/3p) = 28
Adult cats: 2x(3/3I, 1/1C, 3/2P, 1/1M) = 30
Kittens: 2x(3/3i, 1/1c, 3/2p) = 26.

Concept: The triadan system is most commonly used tooth identification system (Fig. 17.6).

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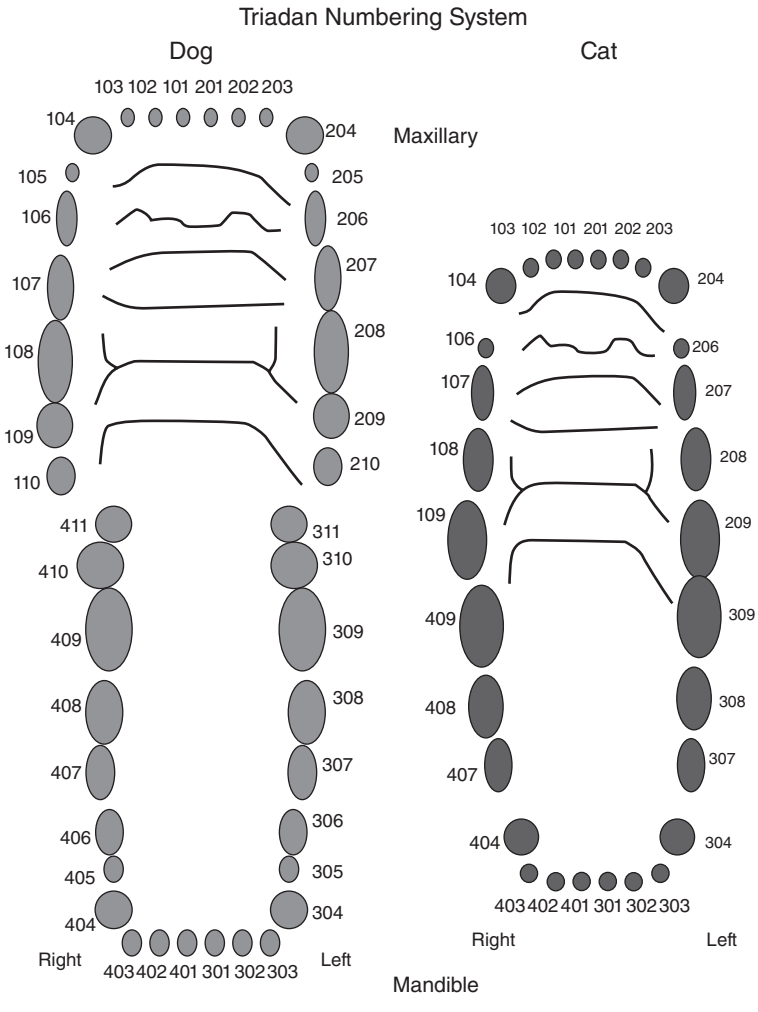


Figure 17.6. Triadan numbering identification system. Diagram courtesy of Teresa Sonsthagen.

Discussion: The triadan numbering system gives each tooth a three digit number. The first digit represents the quadrant of the mouth. Starting on the right maxilla as 10_, left maxilla as 20_, left mandible as 30_, and right mandible as 40_. The other two numbers represent the individual teeth on each quadrant. The advantages of the triadan system is that it is quicker and easier to say and can be used with most computers. The disadvantages are that it is based on the canine mouth with 42 teeth. This is a problem when we look at the feline mouth with 30 teeth!

Concept: The Triadan system works if you remember the "Rule of 4 and 9" for numbering.

Discussion: The canine tooth is always referred as the 04 and the *first molar* is always 09. For instance, the upper left canine is 204 and the first lower right molar 409 in the dog. If a species has fewer teeth, the canine and first molar will still be 04 and 09. You will have to remember that cats only have one molar on the top and bottom jaw, then count down as you move to the canine tooth. You will notice that there are two teeth "missing" on the bottom jaw and one on the top.

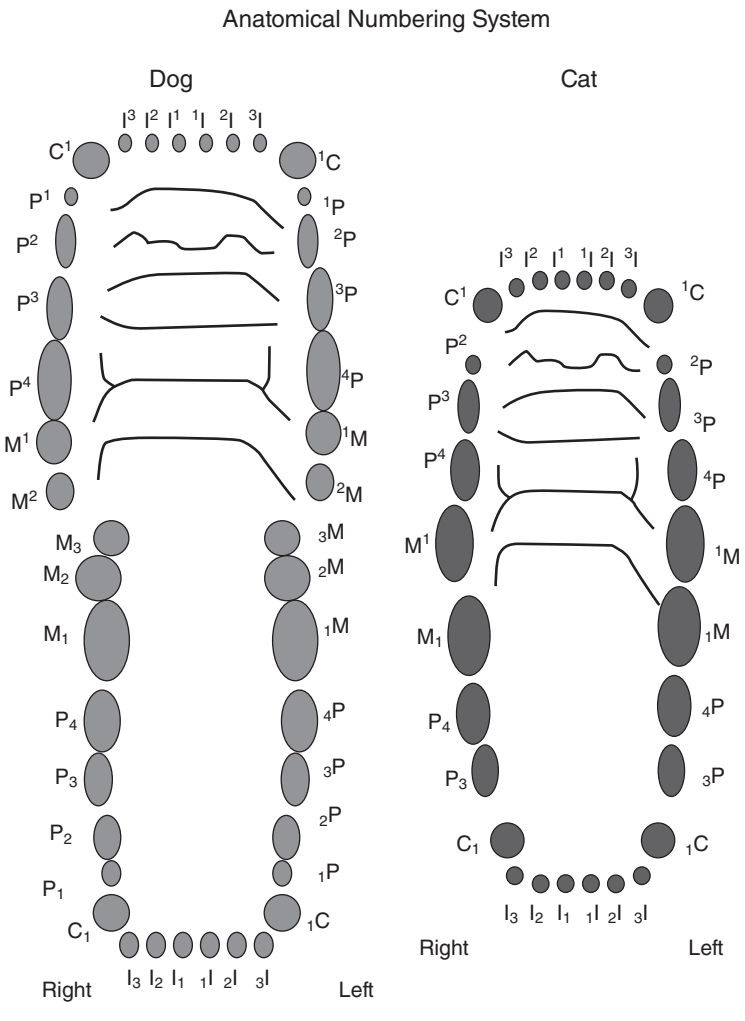


Figure 17.7. Anatomical identification system. Diagram courtesy of Teresa Sonsthagen.

Concept: Anatomical identification is another commonly used system.
Discussion: The anatomical system uses the first letter of each tooth type along with a number to identify each tooth: I = incisors, C = canine, P = premolars, M = molars. Capital letters are used for the adult teeth, while lowercase letters are used for the *deciduous* (primary) teeth. The advantage of the anatomical system is that it is easy to remember and many teeth can be identified at one time. The disadvantages are that it can be more time consuming to identify individual teeth and some computer systems may not be alphanumeric friendly (Fig. 17.7).
Concept: Animal head type should be recorded on the chart.
Discussion: The head type of each patient should be recorded. The head type can be indicative of dental problems.

1. *Brachycephalic:* animals with a shortened maxilla and longer mandible (bulldogs and Persians)

2. *Mesiocephalic:* animals with medium-length muzzles; both maxilla and mandible are of the same length (labradors, domestic shorthairs)
3. *Dociocephalic:* animals with long muzzles (dachshunds, Siamese)

Concept: It is important to understand common dental terminology.
Discussion: The following terms are commonly used in veterinary dentistry. A complete list is available at the American Veterinary Dental College website: www.avdc.org (Fig. 17.8).

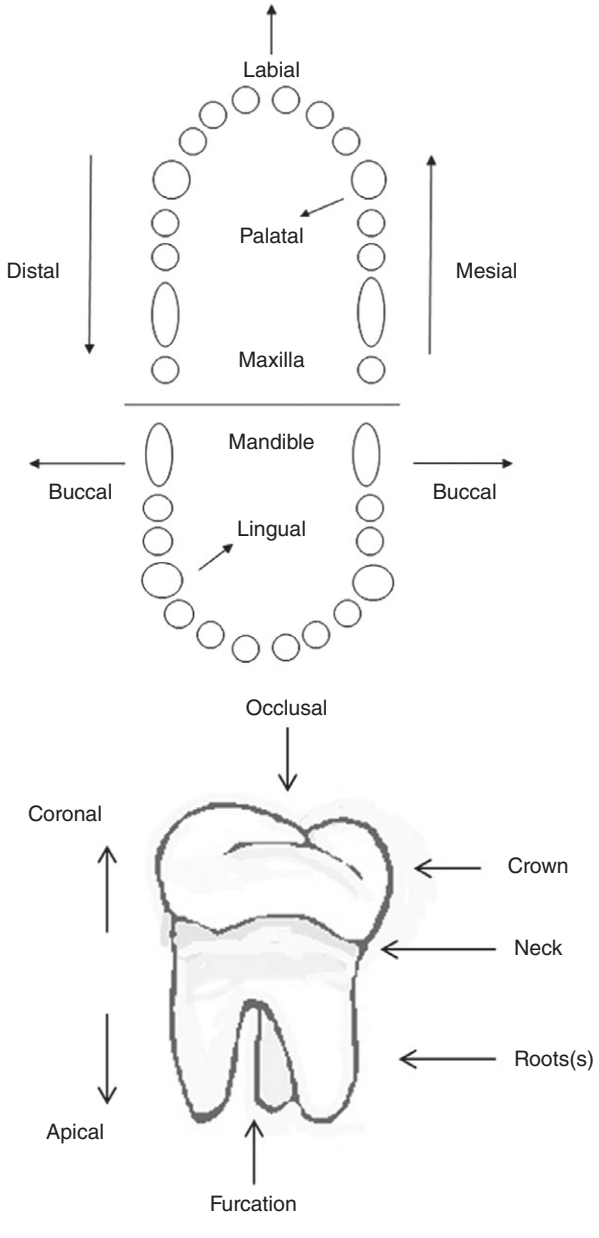


Figure 17.8. Directional terms for dental charting.

At a minimum, know the following terms:

Maxilla—upper jaw
Mandible—lower Jaw
Gingiva—gum tissue
CEJ—cementoenamel junction
Sulcus—area between free gingiva and tooth
Subgingival—below the gingiva
Supragingival—above the gingiva
Coronal—crown
Interproximal—between teeth
Occlusion—the way teeth fit together
Furcation—where roots join
Recession—loss of gingival tissue
Inflammation—swelling, redness, infection

Concept: Each surface of the tooth has a name.
Discussion:

Buccal—toward the cheek
Labial—toward the lips
Lingual—toward the tongue on the mandible
Palatal—toward the tongue on the maxilla
Mesial—the surface is facing the medial incisor, toward the midline
Distal—the surface away from the midline
Apical—toward the apex of the root
Occlusal—chewing surface
Gingival—toward the gingiva

Procedure

Location: Dental table during a prophylaxis

PREPARATION

1. Prepare a card for your reference book entitled "Dental Formulae, Numbering Systems, and Directional Terms"
2. Mark the card with the terms described earlier.

PROCEDURE

1. As you go through the dental prophylaxis with the veterinary technician, practice using the directional terms.
2. Identify the teeth using either the anatomical or triadan numbering systems.
3. Assist by charting the teeth as the veterinary technician checks for sulcus depth, lesions, or fractures.

FOLLOW-UP

1. Have the veterinary technician check over the chart with you before placing it in the patient's file; remember these are legal documents.

TASK 17.5
DENTAL ANATOMY

Concept: A basic understanding of dental anatomy.
Discussion: The bulk of the mature tooth is composed of dentin. The portion of the tooth above the gumline is covered by enamel. Below the gumline, the dentin is covered by a layer of cementum. In the center of the tooth is the pulp. The pulp contains the blood supply and nerve system for the tooth. The tooth is held in the jaw by the periodontium. The periodontium consists of the gingiva, the periodontal ligament, and the alveolar bone.
Concept: Canine and feline teeth have different numbers of roots (Table 17.1).
Discussion: It is important to know the number of roots on each tooth. In dogs, the incisors, canine, first premolar, and the mandibular third molar have one root. The maxillary second and third premolars and the mandibular second, third, fourth premolars, and the first and second molars have two roots. The maxillary fourth premolar and the first and second molars have three roots (see Fig. 17.5).

The cat has one root on the incisors, canine, maxillary second premolar, and maxillary first molar. The maxillary third premolar and the mandibular third and fourth premolars and first molar have two roots. The maxillary fourth premolar is the only three rooted tooth in the cat.

Table 17.1
Number of Roots per Tooth

	Canine		Feline	
Tooth	**Maxilla**	**Mandible**	**Maxilla**	**Mandible**
Incisors (all)	1	1	1	1
Canines (all)	1	1	1	1
First premolar	1	1	Absent	Absent
Second premolar	2	2	1	Absent
Third premolar	2	2	2	2
Fourth premolar	3	2	3	2
First molar	3	2	1	2
Second molar	3	2	Absent	Absent
Third molar	Absent	1	Absent	Absent

Table 17.2
Estimation of Age Based on Tooth Eruption

	Primary (Week of Eruption)		Permanent (Month of Eruption)	
Tooth Type	**Canine**	**Feline**	**Canine**	**Feline**
Incisors	3–4	2–3	3–5	3–4
Canines	3	3–4	4–6	4–5
Premolars	4–12	3–6	4–6	4–6
Molars	None	None	5–7	4–5

TASK 17.6
ESTIMATION OF AGE BASED ON TOOTH ERUPTION

Concept: Age can be estimated by the dental eruption.
Discussion: In dogs, the deciduous (primary) canine teeth begin to erupt at 3–4 weeks of age. By 4–6 weeks, the deciduous incisors and premolars begin to erupt. By 8 weeks, all deciduous teeth are erupted. At 4–5 months, the permanent incisors, some premolars, and molars begin erupting. Permanent canines begin to appear at approximately 5 months. All permanent teeth should be in place by 6 months of age (Table 17.2).

In cats, the deciduous incisors begin to come in at 2–4 weeks followed by the deciduous canines at 3–4 weeks. Deciduous premolars begin to erupt in the lower jaw at 4–6 weeks of age. All deciduous teeth are in place by 8 weeks. At 3–4 months, the permanent incisors begin coming in. The permanent canines, premolars, and molars begin to erupt at 4–5 months. All permanent teeth should be in by 6 months of age.

Procedure

Location: Dental table during a prophylaxis

PREPARATION

1. Prepare a card for your reference book entitled "Dental Anatomy and Aging Animals."
2. Mark your card with the information provided earlier.

PROCEDURE

1. During a dental prophylaxis, quiz yourself on which teeth have multiple roots.
2. Determine which teeth have two roots and which have three in both dogs and cats.
3. Look into all mouths every chance you get! This will give you a chance to compare ages and to see what deciduous teeth look like as compared with adult teeth.

FOLLOW-UP

1. As you determine what teeth have roots, confirm this with the veterinarian or technician.
2. Confirm your age estimation with the veterinarian or technician until you feel confident that your judgment is correct.

TASK 17.7
A DENTAL PROPHYLAXIS CAN BE HAZARDOUS TO YOUR HEALTH!

Concept: Teeth that have been neglected will have major tartar build up. Tartar is calcified plaque, which is a combination of debris, saliva proteins, and bacteria.
Discussion: The dental scaler and dental unit both will aerosolize the bacteria in the mouth during a dental cleaning procedure. It is important to protect yourself from these bacteria. Gloves, eye protection, and a mask or a facial shield must be worn to protect you from the bacteria. It is also recommended to have a special smock or gown to wear during dental procedures to prevent bacteria from getting on your clothing.

TASK 17.8
HOW TO CLEAN TEETH

Concept: Cleaning a patient's teeth requires a general anesthetic.
Discussion: The dental prophylaxis is usually done with the patient lying in lateral recumbency. Monitors are attached as soon as the patient is on the gas anesthetic machine. The first step is to chart the dental arcades, probing for sulcus depth and noting any obvious pathology. A mouth speculum is placed on the canine teeth that are closest to the table. The buccal and lingual surfaces of the teeth that are facing up are cleaned and polished, then the animal is carefully turned over and that side is done. The mouth is rinsed of polish with warm water, then a disinfectant rinse and fluoride are applied.

TASK 17.9
BASICS OF POCKET PET DENTISTRY

Concept: Pocket pet dentistry requires special equipment.
Discussion: Specially designed dental instruments exist for pocket pets to allow access to the small, long, narrow mouths; assist in retracting cheek pouches and to cut, file, and extract continuously erupting teeth. A useful set of instruments would include

- rodent incisor luxator
- rodent molar/premolar luxator
- Crossley rabbit luxator
- rodent molar/premolar extraction forceps
- rodent mouth gag
- pouch dilators
- molar/premolar rasp
- rodent tongue depressor (or use regular wooden tongue depressor split in half-lengthwise)
- low-speed burs to use for crown height reduction
- high-speed burs for use in incisor trimming and extraction
- rodent molar/premolar cutters if no drill is available
- cotton-tipped applicators to staunch blood flow from extraction sites or to absorb fluid from the mouth.

Concept: Oral examination is difficult on a conscious patient.
Discussion: The small, long and narrow oral cavities on pocket pets make it very difficult to perform an oral examination on a conscious patient. It may only be possible to examine the anterior portion of the mouth or front teeth. An otoscope may be useful to access the cheek teeth of conscious rabbits, chinchillas, and guinea pigs.
Concept: Rabbits and rodents have similar dentition but with some differences.
Discussion: The main dental difference between lagomorphs (rabbits) and rodents (guinea pigs, chinchillas, rats, mice, hamsters) is that lagomorphs have four maxillary incisors—two anterior and two posterior. These posterior incisors are commonly referred to as "peg teeth." The extra incisors of lagomorphs are important in chewing. Rabbits chew in a side-to-side, scissors-like fashion, with the two lower incisors cutting back and forth between the peg teeth and larger, anterior upper incisors.

Rodents have only two maxillary incisors. Another important different between lagomorphs and most rodents (the exceptions being guinea pigs and chinchillas) is that all the teeth grow continuously and must be worn down—by chewing or by professional dental treatments. In rodents, other than guinea pigs and chinchillas, only the incisors continue to erupt. Also, the incisor teeth of most rodents are normally a yellow-orange in color.

Lagomorphs (rabbits): 2(I2/1:C0/0:PM3/2:M3/3)
Guinea pigs and chinchillas: 2(I1/1:C0/0: PM1/1:M3/3)
Rat/mouse/hamster: 2(I1/1:C0/0:PM0/0:M3/3)

Concept: Ferrets have similar dentition to felines.
Discussion: Because ferrets are carnivores, their dentition appears like the anatomy we commonly see in cats. Their dental formula is 2(I3/3:C1/1:PM3/3:M1/2).
Concepts: Hedgehogs are very different from other pocket pets.

Discussion: As a member of the order Insectivora, the oral anatomy of hedgehogs is very different than those of other pocket pets. The anatomical characteristics of insectivores include small, long, narrow snouts, and a primitive tooth structure. The incisors are used as forceps for picking up small prey, and the canines often resemble incisors or first premolars. Hedgehogs can have between 30 and 46 teeth. A complete oral examination of hedgehogs requires anesthesia or chemical restraint because of their self-protective behavior of rolling into a tight ball when stressed.

TASK 17.10
INTRAORAL RADIOGRAPHY

Concept: Dental X-rays are an essential part of each and every oral examination.
Discussion: The crown is just the tip of the iceberg. Approximately 42% of dental pathology is found subgingivally. Radiographs will help diagnose pathology that is not visible from the surface, confirm suspect pathology, as well as help demonstrate the pathology to the client. Survey radiographs can also increase your clinic's revenue.
Concepts: Dental X-ray films are available in different sizes.
Discussion: Dental films are available in four different sizes.

1. Size 0—smallest
   a) cats or small single tooth
2. Size 2—small animal
   a) most common size used
3. Size 3—cats and dogs
   a) longer and narrower
4. Size—large dogs
   a) multiple teeth
   b) second most common size used

Concept: Dental films are very easy to develop.
Discussion: Dental film consists of four layers. The outer layer consists of white plastic. This layer protects the film from moisture. The second layer is the lead layer, which is silver. The third layer is the paper layer; this layer is the black layer. All of these layers surround the film layer that is gray.
Concept: Dental films can be developed in a chair side darkroom.
Discussion: The chair side darkroom contains four cups for rapid film developer, water, rapid fixer, and water, respectively. The cover for the darkroom is a dark red tinted plastic that allows the person developing the film to see what they are doing without light exposing the film. The darkroom allows veterinary assistants to insert their hands inside the unit. Special clips should be used to hold the film while developing to protect the film from finger prints.

The steps involved in developing dental films after exposures are as follows:

1. Ensure that the developer and the fixer are fresh.
2. Slowly open the film packet, remove the film, and attach the film clip.
3. Place in the developer for 30 seconds.
4. Wash in water for 30 seconds.
5. Place in the fixer for 10–15 seconds.

6. Review the film in 10 seconds.
7. If the positioning and exposure are correct, place back in the fixer for 10 minutes or until the procedure is completed. Follow with a thorough rinse for 30–60 minutes.
8. Remove and hang on a film rack to dry.

Concept: Digital dental radiography is becoming more commonplace.
Discussion: More and more veterinary clinics are appreciating the value of dental X-rays and, in an effort to reduce anesthesia time, are turning to digital dental X-ray sensors. These sensors allow the X-ray image to appear on a computer monitor within seconds of shooting the X-ray.

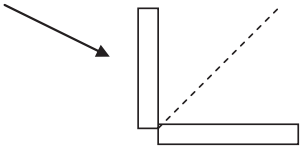
The advantages of digital X-rays include the following:

1. Less storage space
2. *Less anesthesia time*
3. No expense for film, chemicals, mounts, envelopes, storage cabinets
4. Images can be enhanced to change contrast and magnify.
5. Images can easily be sent to specialists.

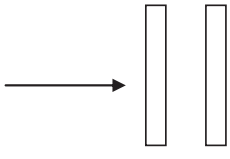
TASK 17.10.1 PATIENT POSITIONING DURING DENTAL RADIOGRAPHY

Concept: There are two intraoral radiograph techniques commonly utilized in veterinary dentistry.
Discussion: The simplest is the parallel technique, and as luck would have it, it can be used for the fewest views. The parallel technique is used for the posterior mandible. This view will include the molars and caudal premolars. The film beam is placed at a 90° angle to the film, which has been placed on the lingual surface of the teeth.

The other technique is the bisecting angle. The bisecting angle is used to minimize distorting the teeth. The bisecting angle is used for the anterior teeth, maxilla and mandible, and the posterior maxillary teeth. In this technique, the beam is aimed at the imaginary line bisecting the plane of the tooth and the plane of the film.



Bisecting Angle



Parallel Technique

If the beam is not perpendicular to the bisecting angle, the tooth will be distorted. If the angle is too low, it will cause elongation, and if too high, it will cause foreshortening.

Procedure

Location: Radiography room

PREPARATION

1. Prepare a card for your reference book entitled "Dental Radiography."
2. Mark your card with the equipment necessary to set out for dental radiographs.
3. Draw the examples provided for a bisecting angle and the parallel technique.

PROCEDURE

1. Assist the technician in setting up the dental radiographs needed for the patient.
2. Carefully watch the endotracheal tube as the patient is being maneuvered.
3. Help with developing the dental films.

FOLLOW-UP

1. Assist with recovering the patient or moving it back to the dental table.
2. Help clean up the dental table and put the equipment away.
3. Mark the patient off the treatment board and write in the patient's file if directed to do so.

TASK 17.11
DENTAL PATIENT DISCHARGE INSTRUCTIONS

Concept: Clients need detailed discharge instructions.
Discussion: The use of a dental report card is a great way to help clients understand the treatment that was given to their pet. Include before and after photos and a simplified dental chart on which problem areas can be marked or highlighted. A section for diagnosis, treatment, home care, prescriptions, and follow-up visits should be included on this report card. Keep it simple and use bright, cheerful colors with clipart on the take-home sheet. Keep blanks in a manila folder. After each dentistry add a blank to the patient's medical record, complete, and present to the owner before patient discharge.

Procedure

Location: Any place with computer access

PREPARATION

1. Decide to whom and what you want to say on your client education page.
2. Include lines for the client's and patient's names and the date.
3. Hospital logo, name, address, e-mail address, website. Locate prominently at the top of the page.
4. Locate cute clipart of animals, teeth, and dental procedures.
5. Decide what information should be included on the dental report card.

PROCEDURE

1. Try formatting as a one-page fill-in-the-blank document.
2. Include areas for listing diagnoses.
3. Provide an area for what was done.
4. If photos are taken before and after dental care, then provide an area in which these can be pasted.
5. If teeth have been removed or fell out, have small plain white envelopes to put them into. Label and date then staple to the dental report card.
6. Provide an area for home care.
7. Provide space for listing future dental appointments.

RESOURCES

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

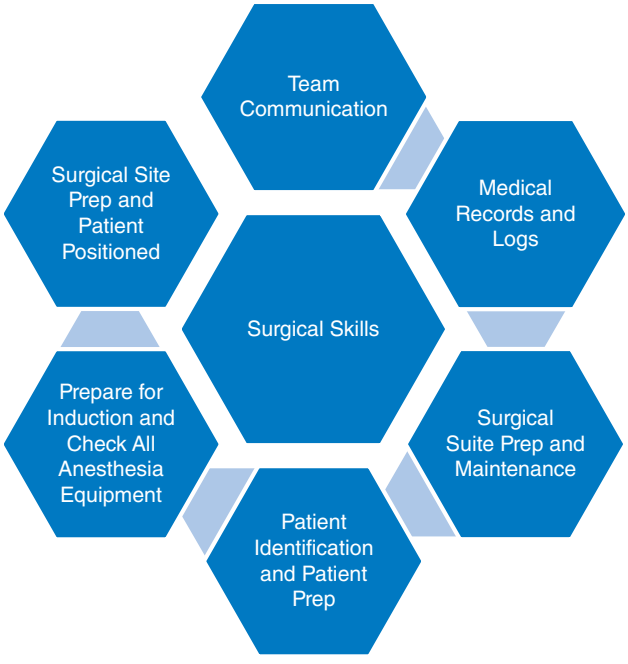
- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

CHAPTER

18

PRE- AND PERISURGICAL SKILLS

ELIZABETH BROTHERTON, PAULA PATTENGALE, AND TERESA SONSTHAGEN



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Effectively communicate with the veterinary health-care team members.
2. Correctly enter patient information in medical records.
3. Apply knowledge to accurately complete surgery logs, anesthetic logs, and controlled drug logs.
4. Follow and maintain aseptic technique.
5. Correctly prepare and maintain surgical suite for surgical procedures.
6. Properly identify and prepare surgical patients.
7. Prepare supplies for induction of surgical patients.
8. Identify monitors commonly used in a surgical suite.
9. Prepare supplies and assist with anesthetic equipment checks.
10. Maintain checklists and report deficiencies for all surgical and anesthetic equipment.
11. Properly identify the surgical prep site.
12. Apply aseptic techniques in preparing patients for surgery.
13. Properly place animals in the correct position needed for surgery.
14. Maintain sterility of surgical packs prior to surgical procedures.
15. Applying sterile techniques, and properly gown surgeon and surgical assistants.
16. Identify suture materials and suture needle types.
17. Safely remove a scalpel blade from a handle.
18. Describe common surgical procedures and compare advantages/disadvantages to each.

INTRODUCTION

Surgical procedures have three phases: presurgical, perisurgical, and postsurgical. This chapter covers the presurgical stage. It is the first stage of a surgical procedure and is a critical element in providing efficient flow of procedures from stage to stage.

Presurgical procedures consist of properly preparing the surgical suite and the patients. To be an effective and efficient veterinary assistant, it is imperative to understand the role one plays on the veterinary health-care team (see Chapter 3). Understanding each member's roles and responsibilities can only be obtained by developing good communication with team members. If individuals do not carry out what is expected of them or communication breakdowns occur among the team, errors in patient care may occur. Communication is the key to a good team and will allow the team to function more efficiently.

Tip Box 18.1: **Communication among the veterinary medical team is essential to be efficient and effective.**

As the objectives state, the assistant should understand what information is required to be included in medical records as well as how to properly and accurately fill out monitoring charts and logs such as surgery, anesthesia, and controlled substances. Proper identification of the surgical patient is critical in choosing the correct patient to prep for surgery. In the presurgical stage, the assistant will prepare the surgical suite and ensure that sterility of instrumentation, equipment, supplies, and personnel are maintained at all times. Veterinary assistants will prepare supplies and equipment for the premedication and inductions of patients as well as perform routine checks on surgical and anesthetic equipment. The assistant will be on alert for breaks in aseptic technique and, lastly, will help to properly prep and position patients for surgical procedures.

TASK 18.1
ASEPTIC TECHNIQUE

Concept: The principle behind the aseptic technique is to prevent pathologic organisms from entering into a patient.
Discussion: Organisms enter when the skin integrity is altered from an incision or wound. Aseptic techniques are required when preparing instruments, equipment, patient, and personnel for the surgical procedure to reduce the number of organisms that have the potential for entering the patient. All surgeries carry a risk of infection, but an increased risk for infection is higher in surgeries of long duration, in exposure of body cavities, bone, contaminated wounds, and in *immunocompromised* patients. The higher the risk, the higher level of asepsis is required.
Concept: Introduction of infection in a patient is a complex cycle of relationships between the infecting organism and the host.
Discussion: The first barriers to entry of pathogens are the skin, hair, and secretions of the mucous membranes (mucus) of an animal. The way in which an infectious agent enters the host (patient) is variable, but once it has invaded the patient, a cascade of responses occurs to rid the infection.

Evaluate the patient. What is the condition of the patient? Is it immunocompromised in any way? Has the primary barrier to infection already been breached? Is there a wound? Is it infected? What can be done to reduce the number of organisms to prepare the surgical site? How long is the procedure?
Concept: Establish and maintain *asepsis*, being free from disease-causing agents.
Discussion: Aseptic technique is the application of the following:

1. *Autoclaving* surgical packs, a sterilization procedure that kills all organisms that can cause harm to the surgical patient.
2. Clipping and then scrubbing the incision site on the patient with disinfectants. Note that skin cannot be sterilized. A surgical scrub reduces the number of organism on the skin so that the patient's immune system does not get overwhelmed.
3. The personnel performing the surgery put on a cap and mask, scrub their hands and forearms with disinfectant, then don sterile gowns and gloves.
4. Maintaining the surgery suite is discussed a little later in this chapter.

Concept: Any break in aseptic technique leads to possible patient infection, delayed healing, and potentially, patient death.
Discussion: In the surgical environment, sterile objects must remain sterile or "clean," whereas objects that are not sterile are considered contaminated or "dirty." Breaks in aseptic technique, no matter how minor, contaminate making whatever it is unsafe. The goal is to maintain sterility of every object that comes into contact with the sterile fields and zones.

Sterile fields are individual areas of sterility and include the surgically prepared site on the patient, the scrubbed hands of the surgeon, and the open surgical packs. A sterile zone is the capped, masked, gowned, and gloved surgeon, the open surgical pack, and the draped patient.

Nothing unsterilized should enter or cross over sterile fields or zones. To help prevent contamination of sterile surgical packs, they are opened in a specific manner. Surgical packs are wrapped with either one or two layers of material. Commonly, packs with instruments are double wrapped and all others are single wrapped (see Chapter 20 for wrapping

instructions). Touching only the corner of the wrap, pull the first corner away from the pack; repeat until the interior or the second layer of wrapping is exposed. Care must be taken not to reach across the pack while opening it as debris from your sleeve or skin cells from your arm may fall onto the interior and contaminate the contents. This also applies to the scrubbed area on the patient. Move your body or lean around the sterile fields to prevent contamination.

TASK 18.2
SURGICAL SUITE MAINTENANCE

Concept: The surgical suite is composed of a number of areas or rooms.
Discussion: These areas serve to function as the following:

1. *Patient Preparation Area:* This may also double as the treatment area. The patient is put under anesthesia, shaved, and scrubbed before being moved into the surgery room. Dentals may be performed here as well as lavaging wounds and suturing skin lacerations.
2. *Surgical Staff Scrub Area:* This may be a separate room, shared with the patient preparation area. The only sterile packs opened here are surgical scrub brushes if used.
3. *Surgery Room:* This is a closed room used for sterile surgeries only. Keep the doors closed; no unnecessary staff or patient traffic is allowed in this room.
4. *Patient Recovery Area:* This is often the treatment area or an adjacent room to the surgery room.
5. *Pack Preparation Area:* This is a separate room or an area shared with the patient preparation or treatment area.

Whether the rooms are separate or shared, they need to have a higher level of sanitation than other areas of the hospital.
Concept: Every aspect of the environment, including the air, must be considered.
Discussion: The surgical suite usually consists of a preparation/recovery area and a surgery room separated by doors. The surgical room doors must be kept closed at all times. No through traffic as well as in and out traffic is permitted in the surgery room. Dirty procedures, such as opening an abscess or performing a dental cleaning, should never take place in the surgery room. Sanitation of all surfaces in the surgery suite is paramount.
Concept: As soon as the surgical procedure ends, the surgical suite must be cleaned and returned to a level of cleanliness and orderliness suitable for its next use.
Discussion: During the day, there are generally several surgeries scheduled. At times, there are emergency surgeries that take place. It is important to properly prepare and maintain the surgical suite at all times. Veterinary assistants must communicate with the veterinary technician or the veterinarian to ensure that everything is placed in its proper place.
Concept: The surgery room itself requires the most diligent maintenance.
Discussion: The variability of the surface types requires adaptation to their special needs. Frequent repetition of procedures is the key to increased sanitation. The surgery room will require its own set of cleaning materials that are *only used in the surgery suite*:

1. Designate mops and buckets for "surgery room use only." Never use regular hospital mops and buckets in surgery; the level of contamination of these mops and buckets

are too high for the surgery suite. Use a separate mop for ceilings and walls and one for the floor. These items should be stored in the patient preparation or treatment area. So they are not accidently used in other parts of the facility.

2. Use a dual-bucket method. One bucket contains the disinfectant solution used for mopping. The other bucket contains fresh water for rinsing mops only. The mop is dipped in the disinfectant and wrung dry. A section of the ceiling, wall, or floor is mopped. The mop is then rinsed well in the water bucket and wrung dry. The mop is placed back into the disinfectant and wrung out again for the next section.
3. Disinfectant for cleaning the surgical "furniture" is kept in spray bottles along with paper towels. If new to the practice, make sure there isn't a special disinfectant used on stainless steel as some can cause pitting and erosion.

Ceiling

Spot clean daily. Wipe down weekly using the dual-bucket method. Because some ceilings are not of a washable material and may have an irregular surface, vacuuming becomes the choice for cleaning. Use a clean vacuum with a clean filter and bag each time. Change the filter and bag weekly even if they are not full. The high-efficiency particulate air (HEPA) filters used to trap allergens are ideal. If the bag is not disposable, wash then rinse the receptacle with a disinfectant after emptying. Remove light fixtures and clean the lens before putting them back up. Change the filters in the ventilation system as per the facilities' policies.

Tip Box 18.2: **When cleaning the surgery suite, work from the highest to the lowest surface to ensure the room is disinfected properly.**

Walls

Spot clean the walls at the end of each day and after cleaning the ceiling. Use a disinfectant spray and paper towels for spot cleaning. Mop the walls once weekly using the dual-bucket method.

Counters, Cupboards, Open Shelves, and Equipment

Spray daily with a disinfectant and wipe with paper towels. Start with the surgical lights, work down to shelving, then tables and counters, cleaning the edges and catch trays, working to the floor, catching the sides of the sink or pedestals on the tables. Spot clean between surgical procedures. Clean the tops of cupboards weekly.

As with all equipment, retain the manufacturer's materials in a binder with all other hospital equipment; review them for maintenance and cleaning. Permanent fixtures, such as surgical lights, are disinfected weekly and spot cleaned daily with a disinfectant spray and wiped dry with paper towels. The surgery table is cleaned after each use. Do not forget the edges or the catch tray centered under the table. Clean the base and adjustment handles daily. The same applies to the Mayo stand, IV pole, monitor cart, and anesthesia machines. Ropes are washed weekly and other restraining devices such as the thoracic positioner are disinfected after each use. Always review instructions for cleaning items in contact with a patient. There should never be any residual chemicals that might cause tissue irritation or damage.

Sinks and Waste Containers

Empty, clean, disinfect, and dry at the end of each surgery day. Waste containers are dumped into biohazard containers if they contain medical wastes then cleaned and disinfected. If the

sharps containers have reached their fill to lines, they are set aside for the hazardous waste management company to pick up. Refer back to Chapter 3.

Flooring

Sweep or vacuum the floor, move all movable equipment including the surgery table to sweep and mop underneath them. Return the equipment to their original locations.

Use the dual-bucket method and start from the most distant corner of the room working toward the door. When finished, rinse the mop in the water bucket, then dip it into the disinfectant bucket and wring dry. Empty both buckets immediately after use and rinse. Refill them just before the next use. This will discourage anyone from using the surgery only set "just this once" to clean up a mess in the facility.

The mop head is washed in a washing machine with hot water and bleach once weekly. A cleaning service can supply clean mop heads on a regular basis as well. The floor is swept and mopped in its entirety at the end of each day.

Each morning, before the first surgery, enter the surgery room and wipe down all surfaces with disinfectant spray and paper towels. Dust particles might have settled during the night. In addition, clean counters and sinks just in case an emergency was treated during the night. At the end of the day, after all surgeries are completed, do the heavy cleaning and mopping.

Emergency Lights

Concept: Some form of emergency lighting is kept in the surgery room at all times.
Discussion: Check the functionality of the emergency lighting daily as part of the end of the day procedures. Consider the implications of power loss during surgery if there is inadequate backup lighting. It is only used in extremely rare circumstances, but when it is needed, it is essential.
Concept: Proper dress and conduct in the surgical room also decrease the risk of contamination.
Discussion: Members of the veterinary health-care team must wear clean scrubs that are free from animal hair and other debris. A mask, cap, and booties are also worn by all individuals entering the surgery room.

Procedure

Location: Surgery suite

PREPARATION

1. Prepare a card for your task box entitled "Surgery Suite Maintenance."
2. Make a checklist of duties required to establish aseptic conditions in the surgery room.
   Separate them into daily, weekly, and periodical things that need to be done.
3. Wear heavy-duty gloves, a clean lab coat, and clean disposable booties on your shoes while cleaning. Wash the lab coat at least weekly. Keep separate from regular hospital laundry. Do not wear during a surgical procedure.

PROCEDURE

1. Spot clean ceiling, counters, walls, and floor as needed throughout the day with an appropriate disinfectant.

2. Remove used surgery packs from the surgery room and clean these items in the preparation or pack areas (see Chapter 20).
3. Clean surgical furniture (tables, Mayo stand, IV pole, prep table, and lights) after each patient.
4. Sweep or vacuum floors daily then mop using the dual-bucket method.
5. At the end of the day, clean counters, shelves, and cupboard doors with disinfectant; check the emergency lighting and empty the waste container and replace the liner.
6. Review maintenance checklists. Complete all tasks and initial upon completion.
7. Designate 1 day a week, preferably one in which there are no elective surgeries scheduled, for weekly cleaning tasks.

FOLLOW-UP

1. Restock supplies daily.
2. Weekly clean the entire room from the ceiling to the floors.
3. Change filter on the air vents and vacuum cleaner as per the facilities' polices.
4. Dump mop buckets, rinse, and store in their proper location so no one uses them for any other areas in the facility.
5. Wash or switch out mops on a weekly basis.

Tip Box 18.3: **When preparing patients and supplies for surgery, it is important to remember that maintaining a sterile environment is the number one goal for the veterinary assistant.**

TASK 18.3 COMMUNICATION WITH HEALTH-CARE TEAM MEMBERS

Concept: Team operations are very important in the delivery of animal health care.
Discussion: A veterinarian is much like a quarterback in making "calls" about what and how things are to be accomplished in regard to patient care and procedures. The veterinary technicians are the linemen taking care of the quarterback by taking on the nursing tasks, completing diagnostic tests, and preparing patients for treatments and surgery. The assistant is like the running back; tasks are "thrown at them" and when caught and carried out (over the finish line), everyone—including the patient—wins.

It is very important that every team member understands and performs her/his specific roles and responsibilities to ensure the most efficient and effective delivery of patient care. Number one way to accomplish this is *communication*!
Concept: Part of the team includes the owner!
Discussion: Presurgical instructions are given to the owner either verbally or in writing. Ideally, a presurgical care form is mailed to the owner at least 7–10 days before an elective procedure, with a follow-up reminder call occurring 24 hours before patient admission.

TASK 18.3.1
MEDICAL RECORDS

Concept: Medical records are the number one means of communicating with all staff members.
Discussion: Record keeping is important to comply with regulation and documentation of veterinary operations. Records and logs convey information about procedures performed and medications used on patients. Each member of the health-care team is responsible for adding items to the records and in the logs as procedures are completed on patients.

The medical record contains the patient's name, owner's name, procedure being performed, breed, sex, color, and other identification items. It will indicate where the patient is housed, what diagnostic tests are required, surgery to be performed and any other special information.

As you write in a medical record, use proper spelling and grammar as these are legal documents. Remember to use blue or black ink if the facility uses paper files. Other documentations such as consent forms, surgical report forms, estimates, and other types of forms may be found in a medical record.
Concept: Presurgical documentation is not required but is strongly recommended for legal protection.
Discussion: The owner must sign the estimate fee form and the consent form for anesthesia and surgery before the surgery is performed. A surgical estimate fee form is prepared so the owner is aware of the costs associated with the surgery. The consent to anesthetize and perform surgery includes the risks these procedure have and the measure the clinic will take to prevent anything from happening to their pet. The owners' signature on the form indicates that they agree to pay the fee for the surgery and that they understand the risks involved. These forms must be signed at the time before the presurgical examination occurs.

The assistant confirms that the fee and consent forms are completed, signed, and placed in the patient's medical record. Blank anesthetic and recovery forms are also inserted into the patient's record to be completed during the pre-, peri-, and postoperative periods.

TASK 18.3.2
PATIENT ANESTHETIC RECORD

Concept: Surgery is not without serious risks, least of all the anesthesia required.
Discussion: Anesthesia allows a patient to be unaware of what is going on or being done to them during a surgical procedure. Anesthesia, if not performed correctly, can result in death

of the patient. In order to prevent anesthetic deaths, it is important to properly monitor the patient throughout the procedure.

Concept: The patient's vital signs are monitored continuously to decrease any risk of compromise from the anesthetic to the surgical patient.

Discussion: Monitoring patients conveys how the patient is responding to the anesthesia as well as to the surgical procedure. The use of a monitoring record is a tool the surgical staff uses to identify changes in the patient status. Modifications can be made to increase patient safety. Proper monitoring is done continuously and is charted at 5-minute increments for healthy patients, more often for critical patients.

Concept: Charting starts before the patient is administered the first preanesthetic.

Discussion: Resting heart and respiration rates, temperature, capillary refill time, and mucous membrane color are recorded. Some charts will ask for a percentage of the heart rate to act as a "no lower than" guideline. The resting heart rate is multiplied by 30%; that value is then subtracted from the resting hear rate. *Example*: A dog has a resting heart rate of 95 bpm $\times$ .30 = 28.5. The "no lower than" rate is 95 bpm $-$ 28 = 67 bpm. If the patient is getting close to this number, the veterinarian is alerted so that steps can be taken to reverse this downward trend.

Concept: After the preanesthetic is given, the time is noted on the chart.

Discussion: Manual heart and respirator rates are charted every 5 minutes. If there is monitoring equipment that also measures oxygen saturation, blood pressure, carbon dioxide, and temperature readings, these are also marked on the chart. Each parameter will have a different symbol, and as the surgery progresses, it is important to connect your marks with a line to create a graph. This allows the veterinarian or the technician to glance at the record to see how the patient is doing and to make periodic adjustments of anesthetic levels based upon the direction of the graph (see Fig. 18.1 for an example).

Discussion: The anesthetic record also provides other information: patient status, type and total amount of fluids administered, medications, anesthetics (premedications, induction agents, oxygen and nitrous oxide flow, vaporizer settings). Time is marked when anesthetics have been given, when the patient was intubated and placed on the gas machine, when surgery started and ended, and when the patient was removed from the gas machine, extubated, and pain medications given. Any complications are noted on the record as they occur. Recordings are made until the time of *extubation* or removal of the endotracheal tube.

Concept: Some practices will then use a recovery form to record postoperative procedures until the patient is discharged.

Discussion: The format is similar to the anesthetic record but is modified to meet the needs of the time period. Some anesthetic records incorporate the postanesthetic information, making it a complete record of the preanesthetic, anesthetic, and postanesthetic periods.

Vital signs are recorded every 15–30 minutes (doctor dependent) until the temperature is at or above 100°F. Any analgesic administered with the drug name, amount administered, route administered, and time given is recorded. Postsurgical complications are noted with time and detailed description included. Postoperative instructions for the nursing staff are provided by the veterinarian and recorded on the patient's recovery form for ready reference.

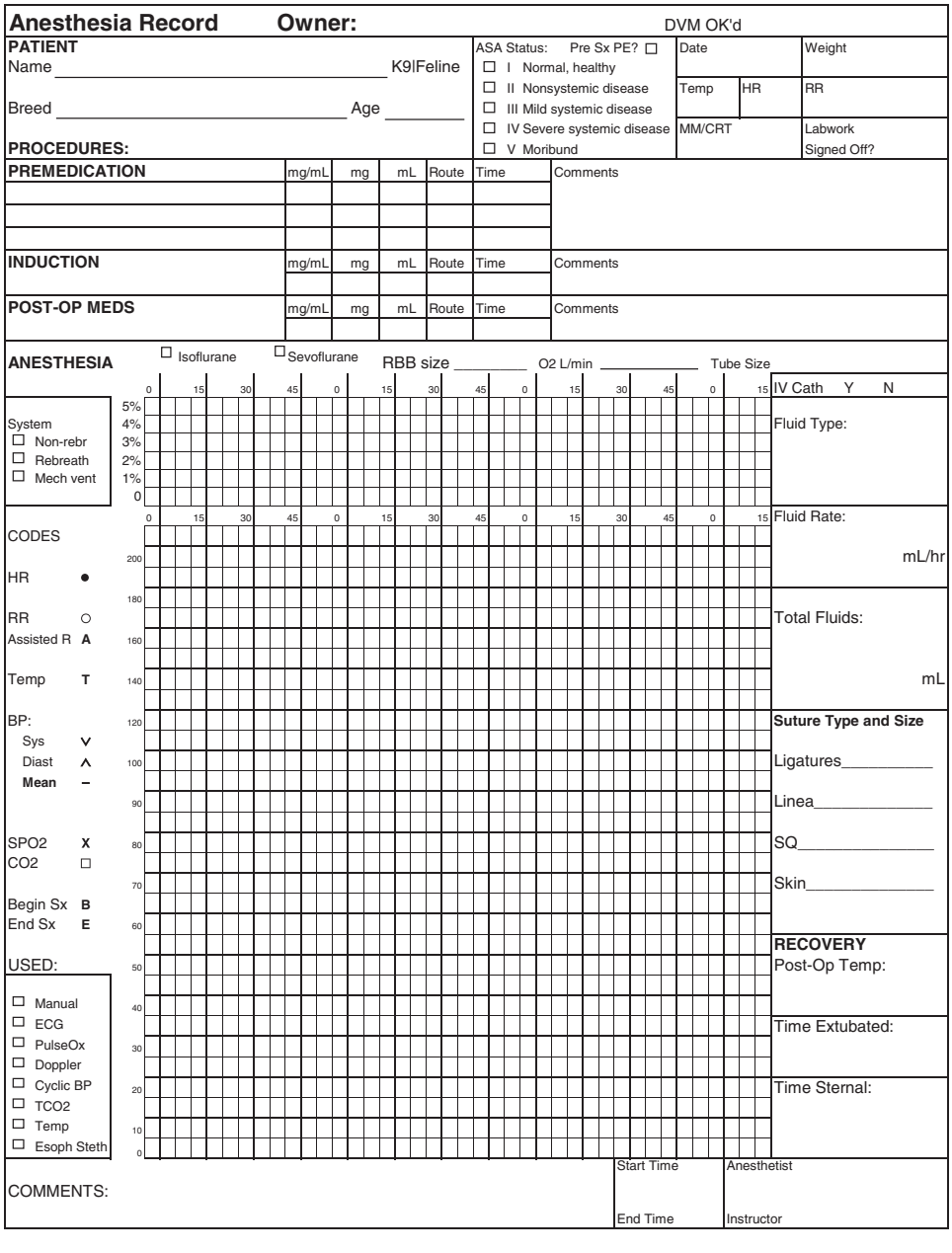


Figure 18.1. A sample anesthetic record that allows for sequential recording of the heart rate, respiratory rate, and arterial blood pressure. Also included is a summary of the preanesthetic findings as well as the dose, route, and time of administration of drugs. Courtesy of Teresa Sonsthagen.

TASK 18.3.3
SURGERY LOGBOOK

Concept: The surgery log differs from a medical record in that the surgical log is an accumulative log recording all surgeries performed on site.
Discussion: Although both the anesthesia record and the surgery log are not legally required, they are highly recommended. Like the radiology log, the surgery log is used to meet both legal and American Animal Hospital Association (AAHA) requirements. The information is formatted much as in prior descriptions of various hospital logs. The information included in the surgery log is as follows:

1. Date of surgery
2. Medical record number if used
3. Owner and patient identification
4. Breed
5. Sex
6. Weight
7. Procedure: List all procedures performed, major first, minor following (e.g., canine castration and dewclaw removal, left hind leg)
8. Preanesthetic and induction agents: dose, concentration, and route administered
9. Anesthetic administered and route: dose, concentration, and route administered
10. Presurgical assessment score provided to the assistant by the veterinary technician or veterinarian. Ratings are defined as
    I. Minimal risk—normal, healthy patient
    II. Slight risk—systemic disease but no clinical signs of disease. These are usually the very young, geriatric, or obese patients.
    III. Moderate risk—systemic disease with slight clinical signs of disease
    IV. High risk—systemic disease with severe clinical signs of disease, may be a threat to life
    V. Grave risk—moribund patient may die with or without surgery within 24 hours.*
11. Time: total length of surgery from beginning of incision to completion of closure
12. Histology: Record any tissues or samples collected, locations, and testing to be performed.
13. Comments: This is where any complications or special observations are noted.
14. Technician/assistant's initials
15. Veterinarian's initials
16. Fee (optional).

The log is kept in the patient preparation area; entries are made before and at the end of the procedure.

Patient documentation does seem time consuming, but the information good documentation provides saves time in the long term.

*Based on the American Society of Anesthesiologists (ASA) Score.

TASK 18.3.4
CONTROLLED SUBSTANCE LOG

Concept: The Drug Enforcement Administration (DEA) requires all controlled substances used to be recorded in a controlled substance logbook.
Discussion: Controlled substances are routinely used in anesthesia protocols. Controlled substances are under the lock and key of the veterinarian and should only be handled by those given authority to do so. Any anesthetic that has a CII, must be recorded as it is used. Some practices will also require records kept on CIII and CIV drugs as well. Veterinary technicians and assistants record information into the controlled drug log. Information must be kept current at all times in case a DEA inspector visits the facility and requests inventory documentation. Controlled substance logs include the following information:

1. Name, volume, and concentration of drug
2. Balance currently in inventory
3. Date of each entry
4. Patient identification
5. Amount of drug withdrawn (deducted) from inventory
6. Reason for the drug use (spay, neuter, laparotomy, etc.)
7. Initials of the one removing the controlled substance from inventory
8. As new inventory is added, it is recorded in the control log as well.

Procedure

Communications During Surgical Procedures
Location: Throughout the veterinary facility

PREPARATION

1. Review the organizational chart of the facility.
   a) Identify the veterinary team members who are working and know what roles they play.
   b) Review the surgical schedule for the day. Find out how the team arranges surgeries; many clinics will go from most intense to least intense (bone fractures to spays to neuters).
2. Prepare a card for your reference book entitled "Surgical Record Keeping."
3. Collect medical record, anesthetic and recovery records, and surgery and controlled substance logs for future use.

Presurgical Communication

PROCEDURE

1. Before performing any presurgical duties, the veterinary assistant should confirm with the team members about the following: *Mark this information for routine surgeries on your card.
   a) Type of surgical procedures to be performed in the facility
   b) Special instructions in regard to medications, positioning, and preparation of the patient for each procedure
   c) Type of surgical instruments and equipment that may be needed for the surgical procedure
   d) Time frame and preferred order of surgical patients
   e) Check that all consent forms have been signed and anesthesia and recovery records are attached to the medical record.
   f) Confirm the medical record contains contact information for the owner in case of an emergency, any known allergies or medical conditions of patient, history, and other pertinent information as it pertains to the patient.

FOLLOW-UP

1. After the surgeries have been completed, review the procedures with the team members to see if the team worked efficiently and effectively.
2. Ask if there are any adjustments that need to be made prior to the next surgical procedure.

Anesthetic Record

PROCEDURE

1. Presurgical information required:
   a) Weight—pounds and kilograms
   b) Temperature (note in Fahrenheit or Celsius)
   c) Resting heart rate—record as ____bpm and figure "the 30%." *Example*: A cat has a resting heart rate of 140 bpm × .30 = 42. The "no lower than" rate is 140 bpm − 42 = 98 bpm. Alert the veterinarian if the rate is dropping toward this number.
   d) Respiratory rate—record as _____rpm.
   e) Patient status—I–V
   f) Procedure to be performed
   g) Anesthetics to be used—doses will be written in later.
   h) IV fluids—type and amount to be given—vein used for catheter.
2. Perisurgical the chart is marked:
   a) With all vital signs recorded using a specific symbol for each
   b) Every 5 minutes for ASA patients ranked as I–III and continuously for patients of IV–V ranking
   c) Start and end of the procedure is indicated.
   d) Adjustments in oxygen flow and vaporizer levels are marked.
3. Postsurgical the chart is marked:
   a) With the time the animal was taken off the gas machine
   b) Time the patient was extubated.

4. If a recovery record is used, mark this as follows:
   a) Record heart rate and respiratory rate every 15–30 minutes
   b) Record temperature at the same time until it reaches 100°F
   c) Include any issues experienced during the procedure or recovery.
   d) Mark the analgesics given, the route, and how much.
   e) Mark the time when the patient became sternal or got to its feet.

Surgery Logbook

PROCEDURE

1. Before patient preparation, use the patient's medical and anesthetic records to enter information into the logbook:
   a) date
   b) medical record number (optional)
   c) patient and owner identification
   d) breed
   e) sex
   f) weight
   g) procedure to which the owner has consented. (Confirm the presence of a signed consent form and fee estimate sheet.)
2. From the anesthetic form, record the following:
   a) Presurgical assessment—ASA rating I–V. Rating will be assigned by veterinarian or the veterinary technician.
   b) Any preanesthetics, induction agents, and anesthetic agents used. Give name, dose, and route administered.
3. Postoperative entries include the following:
   a) Procedure: List all procedures performed, major first, then minor.
   b) Time: total length of surgery from the beginning of incision to the completion of closure
   c) Anesthetic administered and route: dose, concentration, and route administered
   d) Histology: Record any tissues or samples collected, locations, and testing to be performed.
   e) Comments: This is where any complications or special observations are noted.
   f) Technician/assistant's and veterinarian's initials
   g) Fee (optional).

Controlled Substance Log

PROCEDURE

1. Make sure the controlled substance log is up to date, balance carried forward.
2. Compare the doctor's drug order with what is being withdrawn and written into the logbook.
3. Make entries of controlled drugs used using caution to make sure the correct drug and concentration have been identified in the log.
4. Make sure the drug amount is recorded in the appropriate document in the medical record.
5. Fill out the log as columns indicated.
6. If an error is made, make one mark or line through the information and initial it. Next, write the correct information.

FOLLOW-UP

1. Attach anesthetic and recovery records to the patient's medical record.
2. Return the logbooks to the same place at all times.
3. Check your math on the controlled drug log to make sure it is correct.
4. Add new drugs when shipments are received.

TASK 18.4 PREANESTHETIC PATIENT IDENTIFICATION AND PREPARATION

Patient Identification

Concept: It is important to properly identify the patient that is to be anesthetized for a surgical procedure.

Discussion: Unfortunately, errors and accidents can occur in a clinical setting. Someone's error can result in injury or even death of a patient, which in turn will provide a reason for a client to seek legal advice in suing the veterinarian. As a veterinary technician, it is imperative to always properly identify the patient that is to receive anesthetic drugs or have a surgical procedure. The veterinary assistant assists in acting as a gatekeeper as the first level of safety of the patient.

Preanesthetic Patient Preparation

Concept: Ideally, the patient undergoing elective surgery is brought to the hospital the day beforehand.

Discussion: Paperwork is completed before admission and includes the consent forms and fee estimate. By admitting the patient well before surgery, there is time for a full history, physical examination, vaccinations if needed, and completion of all presurgical blood work. The exceptionally dirty patient is also bathed with a mild shampoo the day before to ensure a cleaner surgical site. Patient admission beforehand ensures that the patient is on the premises and surgery can begin whenever the surgeon wishes. Nonelective surgeries, fractured limbs, urethral obstructions, abscesses, caesarian sections, and other emergencies are worked into the schedule as needed.

Concept: Some hospitals do permit admission early in the morning of the same day surgery is performed.

Discussion: These patients need to undergo the presurgical workup before undergoing the operative procedure. The physical examination includes determination of the vital signs, which generally include the temperature, pulse (heart rate), and respiration, also referred to as TPR.

Vital signs can be taken and recorded on the monitoring chart by the veterinary assistant. The assistant should also review the consent forms and fee estimates to ensure that they are complete and correct prior to administration of the preanesthetic drugs.

Concept: By admitting the patient the day beforehand, the 12-hour presurgical fast is ensured.

Discussion: Fasting needs to be defined as food only or food and water, which is referred to as *NPO*, or nothing per os or by mouth. Water is provided until just before administration of the preanesthetic drugs. This is particularly important for the dehydrated patient or one

with compromised renal function. If the owner forgets to withhold food before surgery or it has raided the garbage can, it creates a potentially dangerous situation while going under anesthesia. The medications used often cause the animal to vomit, and if their swallowing reflex is diminished, they may aspirate the vomitus. For very young patients or patients weighing less than 5 lb, a shorter presurgical fast is safer as they have less *glycogen* (energy source) reserves than adults or heavier patients. The veterinary assistant is responsible for communicating with the veterinarian or veterinary technician about the fasting requirements for specific patients.

Concept: Presurgical blood work is more frequently performed.

Discussion: The information derived from the laboratory results aids in the preanesthetic classification of the patient. Preanesthetic blood work helps the veterinarian evaluate the body's current liver and kidney function as well as other organs.

Concept: Conversely, the age and physical examination of the patient serve as a guideline for the laboratory tests chosen.

Discussion: The older or sicker the patient and the higher the ASA rating, the more extensive the laboratory testing. The range of tests run and the accessibility of lab results determine the veterinarian's choice of tests. The veterinary assistant is responsible for communicating with the team to know what the ASA rating is for a particular patient.

Concept: The ASA ratings also serve as a guideline for the selection of preanesthetic preparation of the patient.

Discussion: A patient rated as III–V is stabilized with drugs and fluids before surgery. The choice of preanesthetic drugs, anesthetics, and the extent of surgical monitoring will vary according to the ASA classification. Each hospital has its own *protocol* for preanesthetic drugs. The veterinary assistant helps with the veterinarian and veterinary technician by ensuring that all procedures and tests ordered have been completed and results are reported to the veterinarian for further direction.

Concept: The dose, route, and other information will be ordered by the attending veterinarian.

Discussion: Species and breed, age, ASA rating, the surgical procedure, and the anticipated length of the procedure, as well as the veterinarian's preferences, influence the choice of preanesthetic drugs. Once a patient and all diagnostic test results have been assessed, the doctor will order a specific drug protocol for the patient. Sometimes, there are calculations of drug doses that may need to be determined. In this case, consult with the veterinary technician or the veterinarian. Calculations should be performed by the technician or the veterinarian.

Concept: The dose is based on a kilogram per body weight (kg/BW) basis.

Discussion: The formula weight (W) $\times$ dose (D) divided by concentration (C) equals the amount needed. This is the standard means of determining drug doses for veterinary patients with the exception of those used in cancer treatment. Preanesthetic drugs are usually injectable; they may be administered intravenously (IV) for more rapid onset and intramuscularly (IM), or subcutaneously (SC) for longer effects. The purpose of these drugs is to calm patients, reduce pain, and reduce potential side effects of anesthetic drugs by reducing the total amount of each drug needed.

Concept: Some preanesthetic drugs are controlled substances.

Discussion: Remember to enter the amount withdrawn from inventory into the controlled substances log whenever a controlled substance is used.

Tip Box 18.4: **Careful documentation is essential for excellent patient care and is a legal safeguard.**

Concept: Proper preparation of the patient and coordinated preoperative procedures add time-saving measures.
Discussion: Each facility has a format to follow in regard to patient prep. Regardless, the veterinary assistant needs to be familiar with the case so that proper preparation can be made to save time for the entire team as the procedures get underway.

Procedure

PREPARATION

1. Prepare a card for your reference book entitled "Presurgical Routines."
2. Prepare a card for your reference book entitled "Anesthetic Protocols."
3. Prepare a card for your reference book entitled "ASA Patient Status."
4. Mark the clients' instructions for preparing their pet for surgery.
   a) Who, when, and how is the owner instructed about the preanesthetic fast?
   b) Review hospital policy regarding presurgical scheduling.
      i. When is elective surgeries conducted? Types and number of each usually scheduled?
   c) When is the patient admitted before elective surgery?
      i. If hospitalized overnight:
         1. Assist with obtaining and setting up for presurgical blood work and the physical exam.
         2. Remove food but not water before leaving for the day.
         3. Bathe and dry the patient if very dirty.
   d) If patient is admitted on the day of surgery, confirm the 12-hour fast with the owner.
      i. Make a notation of compliance or lack thereof in the patient's record.
      ii. Assist with obtaining and setting up for presurgical blood work.
      iii. Record all lab results in the patient's record; check it off on the treatment board.
5. Add the routine anesthetic protocols used in your facility:
   a) Know where all preanesthetic drugs are stored.
   b) Prepare the syringes and needles required for injection of the preanesthetics.
   c) Know which preanesthetic drugs are controlled substances.
   d) Know the location of the controlled substances log and how to enter patient information and subtract the drug amounts from inventory in the log.
6. List the description for ASA patients on your card with indications for anesthesia.
   a) Which tests are routine for ASA I–II patients?

PROCEDURE

1. Retrieve the medical record.
   a) Confirm patient identification.
   b) Confirm the presence and completeness of required paperwork in the patient's file (consent form and fee estimate).
   c) Confirm vaccination status, note drug allergies, and review concurrent health problems that might affect ASA rating of the surgical procedure.

2. Locate the patient for anesthesia and procedure by going to the holding area and reading the name on the cage card and checking the ID band around its neck.
3. Start the anesthesia record as per the instructions previously described.
4. Start the surgical log entry, filling in as much information as you can from the patient's record.
5. Restrain the patient for the premedication injection.

Tip Box 18.5: **Take care to note the time of the actual delivery of the premedications. The next agent given to the patient is with induction and that generally occurs 15–30 minutes after the premedications have been administered.**

FOLLOW-UP

1. Have an experienced team member critique your work.

TASK 18.5
INDUCTION OF ANESTHESIA

Induction Supplies and Equipment

Concept: After the preanesthetic medications are given, the next phase of anesthesia is preparing for induction.

Discussion: Induction is when the patient is *intubated* and placed on the inhalant gas machine. The veterinary assistant identifies the needs and supplies and begins to prepare a tray with supplies that will be used for delivery of preanesthetic medications, IV catheter placement, and induction. This is when the patient receives medication to provide enough sedation to cause an absence of the cough or gag reflex to allow the endotracheal tube to be placed in the trachea. The *endotracheal tube* is a flexible tube placed in the trachea to assist in the delivery of the inhalant anesthesia and oxygen during the surgical procedure.

Concept: An *IV catheter* is placed preanesthetically in order to give induction agents. The catheter acts like a port to assist with delivery of anesthetics as well as to provide fluids during a patient's surgery. The catheter also provides venous access in case emergency drugs are needed to be administered at any time while the animal is sedated or anesthetized.

Discussion: An IV catheter is placed after the hair is clipped and using aseptic techniques to prep the area for catheter insertion. The size of the catheter is determined by the veterinary technician. A guideline is 24 ga for cats and very small dogs, 22 ga for up to medium sized dogs, and 20 ga for large breed dogs. The assistant's role is to hold off the vessel while the veterinarian or the veterinary technician places the catheter and administers the induction agent, and later, administers the fluids. Catheters are usually taped in place and each person has his or her own technique. The assistant can help by putting out of the correct size of the catheter and preparing the tape.

Concept: All medications should be labeled so that syringes do not get misplaced or given to the wrong patient.

Discussion: Use a piece of adhesive tape to mark the name of the patient, contents, and route. The tape is place below the level of the contents once the syringe is filled. Before any

medication is given to a patient, remember the "five patient rights"! Note the time medication was given on the anesthetic record.

Concept: Premedications help patients to relax as well as provide pain control for the patient.

Discussion: There are varying degrees of pain that patients feel, but most levels are determined by the procedure being performed. A veterinary assistant needs to anticipate that patients should be monitored for pain postoperatively. Having pain medication given to the patient prior to the surgical procedure can assist in alleviating post-op pain and discomfort.

Concept: Prior to providing induction agents, all equipment must be inspected to ensure proper functioning.

Discussion: The veterinary assistant can be very instrumental in assisting the veterinarian or the veterinary technician in ensuring that all equipment used in the anesthesia process, such as making sure the laryngoscope light is working, the cuffs on the endotracheal tubes don't leak and setting up the anesthetic machine. The veterinarian or the veterinary technician will lead the veterinary assistant in the area he/she will be responsible for.

Concept: Checking the endotracheal tube cuffs before each use is required to determine that it does not leak.

Discussion: This is accomplished with a syringe attached to the insertion port on the tube and injecting air until the balloon inflates. Apply slight fingertip pressure to the cuff, and if it remains inflated, there are no leaks.

Concept: Between administration of anesthetic premedications and actual surgical anesthesia is the brief anesthetic induction period.

Discussion: This is the time when a patient passes from wakefulness to being sufficiently anesthetized to place an endotracheal tube.

Discussion: Intubation consists of placing a tube, referred to as an endotracheal tube, through a patient's mouth and pharynx into the trachea to about the level of the thoracic inlet. The primary purpose is to provide a patent airway by preventing the tongue and epiglottis from slipping into the tip of the larynx and blocking the airway. The second purpose is to prevent the aspiration of saliva and gastric contents down the trachea and into the lungs, as some patients will vomit while under anesthesia. Animals are fasted to prevent vomiting or regurgitation that could result in aspiration.

Concept: Endotracheal tubes come in various diameters and lengths.

Discussion: The size chosen should approximate the diameter of the patient's trachea. The tube itself is of a plastic material and the length is slightly curved. One end is slightly tapered. This is the part entering the trachea first. The other end protruding, from the patient's mouth, has an adapter on it. This allows the tube to be attached to the anesthetic-delivering hose of the anesthetic machine. The lubricated tube is inserted through the mouth into the trachea to about the level of the thoracic inlet. Cats may require other medications to be placed topically to ease the muscle spasms for easy intubation.

An inflatable cuff surrounding the endotracheal tube is just before the tapered end. Attached to the tube is a small tube running parallel to the endotracheal tube that ends with a small balloon called a cuff and a fill aperture through which air is injected. Inflating the cuff prevents the patient from breathing around the tube and prevents aspiration of fluids.

Induction Procedure

Concept: The induction period is a complex and individualized process.

Discussion: The astute assistant begins by careful observation while providing patient restraint. As familiarity with the procedures increases, responsibilities throughout the process increase.

Concept: Time frame is of the utmost importance in the induction period.

Discussion: Being prepared and staying on task while working quickly but efficiently is required during the induction period. The drugs used to induce anesthesia can be short acting, which means that if procedures and tasks are not carried out in a timely fashion, a smooth induction will not be realized. Most are administered IV, but some are given IM and some by inhalation. If an intravenous catheter is placed for administration of fluids throughout surgery, or if a catheter is already in place, intravenous drugs can be administered through the catheter.

Concept: In the case of intravenous drugs, customarily, the dosage is given "to effect."

Discussion: This is done by giving the first half of the drug is rapidly called a bolus dose and then the remainder of the dose is given slowly until the desired effect on the patient is reached. An additional amount or portion of the induction drug is administered as needed throughout the intubation process. Once the patient is sufficiently relaxed, the patient is placed in sternal recumbency and the process of intubation begins.

Concept: The depth of anesthesia is evaluated by monitoring involuntary reflexes.

Discussion: Most assistants do not monitor the level of anesthesia, but it is helpful to understand what others are doing.

1. *The Palpebral Reflex:* This is evaluated by tapping the fingertip lightly on the surface of the *medial canthus* of the eye. If there is a strong blink response, the patient is in a light level of anesthesia. The palpebral reflex lessens and finally disappears as the level of anesthesia becomes deeper.
2. *Pedal Reflex:* Pinching the skin between the toes tests the pedal reflex. In the normal, conscious patient, the limb is withdrawn. As the level of anesthesia deepens, the reflex weakens and then disappears.
3. *Muscle/Limb Relaxation:* Muscle tone is marked in light levels of anesthesia but lessens as the level of anesthesia deepens. For this reason, some orthopedic surgery requires being done during deeper levels of anesthesia. Check the tone of muscles by pulling on the lower jaw. How relaxed is it?

Concept: The placement of the endotracheal tube begins when the swallowing reflex is suppressed.

Discussion: The patient exhibits muscle relaxation; eye reflex and jaw tone are checked after the bolus and, if still present, more induction agent is given until it is not present.

The mouth is opened wide to facilitate the placement of the tube.

Concept: Actual placement of the endotracheal tube requires lubricating the exterior of the tube.

Discussion: Some prefer a topical anesthetic-containing lubricant such as lidocaine gel especially in cats, a plain water-soluble gel, or tap water.

Concept: To intubate, the patient is placed in sternal recumbency with the head and neck extended.

Discussion: The mouth is held open by the assistant, who may also be required to pull the tongue forward and down over the patient's incisors (Fig. 18.2).

A *laryngoscope* may be used. The device has a light and a blade that depresses the epiglottis, which aids in visualization of the larynx. As the patient breathes, the cartilages of the larynx open and close; in cats, the larynx tend to spasm. The use of a small amount of local anesthetic on the margins of the larynx helps to make intubation possible.

Concept: During the opening phase of the larynx, the tip of the endotracheal tube is inserted between the laryngeal cartilages and slid down the trachea to the level just above the first bifurcation of the bronchi. It is imperative to place the tube before the trachea bifurcation to avoid the tube from being placed into one of the bronchi.

Discussion: The tube is secured in place with a strip of gauze that has been tied around the tube below the cuff inflation tube, brought up behind the canine teeth, and tied over the



Figure 18.2. Intubation process: endotracheal tube placement with a laryngoscope. Courtesy of Regina Brotherton.

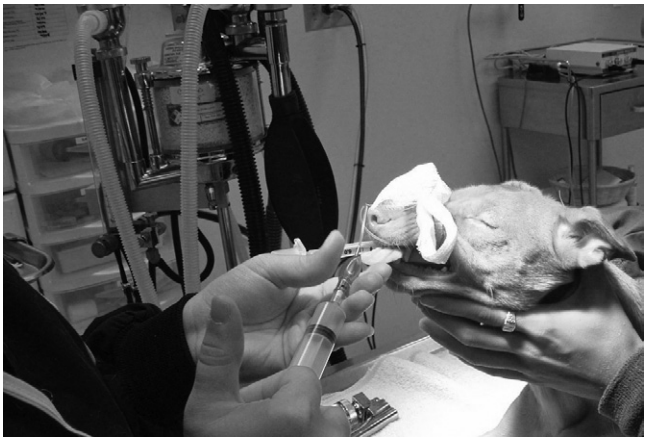


Figure 18.3. Secure endotracheal tube and an inflated cuff. Courtesy of Regina Brotherton.

patient's nose or behind the patient's ears with a bow. This prevents the tube from accidentally being dislodged from the trachea (Fig. 18.3).

Concept: Once the endotracheal tube is secured, the patient is rotated into lateral recumbency.

Discussion: The cuff is inflated; a syringe is filled with air and attached to the opening on the insertion port leading to the cuff that surrounds the tube. As the air is forced from the syringe, the cuff inflates. The goal is to inflate the cuff enough to form a tight seal between the tube and the interior margins of the trachea but not create so much pressure that the lining of the

trachea is irritated or damaged. The anesthetic flowmeter is turned on to deliver oxygen, the cuff is inflated, then the vaporizer is set. The adapter on the tube is connected to the breathing tubes on the inhalation gas anesthesia machine. Patients are maintained on an anesthetic gas throughout the surgical procedures.

Concept: Once the patient is intubated, care should be taken to make sure it is placed in proper position to facilitate breathing.

Discussion: Observe the patient closely throughout the induction/intubation process for *apnea* and *cyanosis*. If patient is still apneic after intubation, *notify the veterinarian immediately*.

Once anesthetized, it is imperative to understand that the patient has no control over movement and will rely on the veterinary assistant to ensure his/her safety by making sure it is in proper position at all times. Make sure the neck is not kinked or the tube is kinked as it protrudes from the mouth. If this occurs, the animal may suffocate or brain damage occurs because of a lack of oxygen. Proper placement of the patient keeps the animal safe while under anesthesia.

Concept: The levels of anesthesia are divided into stages and planes.

Discussion:

1. *Stage 1:* The patient will be disoriented for a brief period of time. The patient quickly passes into stage II.
2. *Stage II:* The excitement stage is where the patient can show involuntary movements, such as paddling, and can even vocalize. The patient passes through this period quickly during most anesthetic protocols. It might only be briefly visible during the recovery phase and not at all during induction. If it is seen, place the patient in a quiet, dark place and alert the veterinarian. Often, a tiny dose of a tranquilizer will be ordered.
3. *Stage III, Plane I:* Light anesthesia. The patient can be positioned and may twitch but may not be able to fully control or move its muscles. The preparation of the surgical site usually takes place during this time.
4. *Stage III, Plane II:* Most surgery is conducted at this level. Respiration should be of normal depth and above 8–10 bpm. Pupils should be of normal size and the eyes rotated slightly medially. The pedal and corneal reflex is slightly present. There is an anal "wink" reflex as seen when the end of applicator stick is passed over the anal surface. There is moderate muscle relaxation.
5. *Stage III, Plane III:* This is a very deep level of anesthesia and is reserved for times when the most muscle relaxation is needed. Orthopedic surgeries will sometimes require this level of anesthesia.
6. *Stage III, Plane IV:* The patient is severely overdosed. There are no reflexes and the pupils are centrally fixed and moderately dilated. Blood pressure falls, pulse is weak, and respiration is abdominal.
7. *Stage IV:* The patient is dying. As this stage progresses, the respiration ceases and the heart arrests. There is no muscle tone. The pupils are dilated and centrally fixed.

Just as a patient goes through the stages and planes during induction until achieving a suitable plane of anesthesia, so it will go through these in the reverse order as it regains consciousness.

Concept: The blink reflex is suppressed during anesthesia.

Discussion: Administer an eye ointment such as artificial tears at this time to protect the corneas throughout the anesthetic period.

Concept: Monitoring devices are attached to the patient at this time.
Discussion: The measurement of vital signs may be through the use of multiple machines with screens and alarms when parameters do not fall within a given range. Multiple monitors are stored on a wheeled cart containing several shelves. The multifunction machine has a single screen with multiple tracings on it and multiple connections to the patient for each of the functions. Either before or after the surgical site prep, various monitors are placed on the patient according to preference and availability. These can include

a) *Temperature Probe*: lubricated and placed in the rectum. If using a monitor, the readout will appear on the screen. If using a mercury thermometer, it will be difficult to get a reading while the patient is in surgery because of the sterile drapes and instrument trays. As soon as the patient is undraped, the temperature must be taken. If lower than 100°F, the temperature is taken every 15–30 minutes until it has risen to that level. Hypothermia is often seen in smaller animals. Hyperthermia is seen only rarely. Both are considered emergency situations.
b) *Respiratory Monitor with Capnograph:* This shows the respiration rate and the end title carbon dioxide level—a sensor is placed between the endotracheal tube and breathing tube to the gas machine. Carbon dioxide is needed to stimulate respiration. Excess CO_2 means the patient is not getting enough oxygen. Too little CO_2 means the oxygen level may need to be reduced, there are cardiac problems, and so on, depending on the wave pattern.
    a. *Blood Pressure Monitors:* There are two types of monitors commonly used in veterinary medicine.
        i. Oscillometric monitors automatically cycle every 2–3 minutes, require cuffs no wider than 40% of limb circumference, and are placed on the mid-forelimb or the base of the tail for the most consistent results on dogs and cats. They can be used on large animals around the metacarpus and metatarsus and distal tibia. They tends to be less labor intensive than Doppler monitors but, in turn, deliver less consistent blood pressures for smaller patients.
        ii. The Doppler monitors require clipping the hair between the footpad and the stop pad on the limb to which it is applied. Vacuum the hair. No other skin prep is needed. Fill the concave area on the probe with *ultrasound* gel then place it on the clipped area between the stop and paw pads. Tape is placed over the probe and around the limb. After one or two wrappings, form a "U" in the wire extending from the probe. Extend the wire distally over the paw then up and over the dorsum of the foot to the level of the probe. Incorporate the probe wire into the last wrap on the leg. This prevents the probe from being loosened from the site of attachment. Remember your courtesy tab. Choose a cuff appropriate for dogs at 40–50% and for cats at 30–33% of the diameter of the clipped area. Place the cuff over the limb. Turn on the machine. To record a blood pressure, squeeze the inflation bulb until sounds are no longer heard. Read the pressure at this time. This is the peak systolic blood pressure. Normal pressure is about 90 mmHg (mercury). The minimum is about 80 mmHg. At the end of surgery, the probe and cuff are gently removed from the patient. Avoid kinking the wires. The probe end is soaked in *tepid* water, never hot water nor alcohol. If the gel has dried on the probe, let it soak longer. *Never* scrape the surface of the probe.
    b. *Electrocardiogram (ECG):* shows the cardiac rhythm and pattern to look for cardiac arrhythmias. During surgery, only the red lead (positive electrode) is attached to the left hind stifle and the white lead (negative electrode) is placed

Table 18.1
Placement of Bipolar Limb Leads

Lead	Positive Electrode: Color	Negative Electrode: Color
I	Left front leg: black	Right front leg: white
II	Left hind leg: red	Right front leg: white
III	Left hind leg: red	Left front leg: black

on the right front leg behind the humerus about the level of the fourth intercostal space (Table 18.1).
ECGs are used with a ground, meaning there is a rubber pad beneath the patient and a clip attached to the patient. Use ECG gel to increase skin contact and to reduce possible development of tracing artifacts.

c. *Pulse Oximeter:* measures oxygen saturation and the heart rate—the sensor is placed with the lighted side on top of the tongue or anywhere there is not a lot of hair and is thin enough for the light to shine through. Normal values are around 100-98%. If the level is below 95%, there is an increased risk for imminent *cyanosis*. *This is an emergency situation requiring immediate contact with the veterinarian*.
d. *Palpation of a Peripheral Pulse:* This is usually the femoral pulse and doesn't require any equipment other than your fingers!

Concept: It is very important to deflate the cuff before the removal of the endotracheal tube, a process referred to as *extubation* (removal of the endotracheal tube).
Discussion: Extubation does not occur until the patient demonstrates the swallowing reflex. If the tube is removed too early, aspiration may occur if vomiting or regurgitation takes place. Also, if the tube is removed too early, the airway is not easily accessible in case of an emergency.

Procedure

Location: Patient preparation area

PREPARATION

1. Mark your reference book card entitled "Anesthetic Protocols" with the following items:
   a. syringes of appropriate size to accommodate dosages
   b. needles of appropriate size
   c. fluids as per veterinarian's order
      i. IV catheter of appropriate size
      ii. drip set and IV pump
      iii. adhesive tape, strips precut and adhered to the edge of the treatment table
      iv. bandaging materials
   d. clipper with No. 40 blade
   e. surgical solution

   f. endotracheal tube of appropriate size—the veterinary technician will select a size
      i. laryngoscope with appropriate sized blade
      ii. length of gauze to secure endotracheal tube (Tightly tie a 24- to 30-in. length of gauze bandaging around the endotracheal tube at the point where the cuff inflation tube exits the endotracheal tube.)
      iii. desired lubricant for the endotracheal tube
      iv. inflate the cuffs to check for leaks
   g. drug(s) of choice
   h. artificial tears ophthalmic ointment
   i. examination gloves.
2. Read the manufacturer's directions for all equipment and patient monitoring devices at the worksite.
3. Prepare a card for your reference book entitled "Monitoring Device Attachments."
4. Prepare a card for your reference book entitled "Monitoring Device Maintenance."

PROCEDURE

1. Confirm patient identity.
2. Confirm preanesthetic drugs, remembering the five patient rights.
3. Restrain the patient for induction of anesthesia in sternal recumbency with access to the cephalic vein for the IV catheter.
4. Confer with the veterinary technician or the veterinarian during this procedure to ensure ultimate safety of the patient and to work smoothly together.
5. Position the patient for placement of the endotracheal tube in sternal recumbency with the mouth held open.
6. Tie the tube in place after you position the patient in lateral recumbency and as the technician starts the oxygen flow on the gas machine.
7. Inflate the cuff immediately after the technician attaches the endotracheal tube to the breathing tubes on the gas machine.

Tip Box 18.6: **Keep a 6- to 12-mL syringe casing taped to the anesthetic machine to store a syringe for inflating and deflating the cuff on the endotracheal tube, making it available as needed.**

8. Apply bland ophthalmic ointment to both eyes.
9. Attach monitors to the patient as previously described.
10. Carefully move the patient into position for the clipping and scrubbing.

FOLLOW-UP

1. If it is your responsibility, make the appropriate marks on the anesthesia record and start the charting process.
2. The probes and patient attachments need to be cleaned according to manufacturer's recommendations prior to use on the next patient. Read the manufacture's maintenance requirements and then mark your card for your reference book entitled "Monitoring Device Maintenance." Include daily or intermittent or long-term care.

3. Ensure all controlled substances have been properly recorded in the drug log and put away.
4. Area cleaning begins after patient responsibilities are complete.

TASK 18.6
ANESTHETIC EQUIPMENT AND ANESTHETIC MACHINE SETUP

Concept: Anesthesia machines must be inspected for optimal safety.
Discussion: Although the veterinarian and the veterinary technician will oversee the safety check and the operation of the gas machine, the assistant can help by making sure the products used on the machine are filled or replaced as needed. In order to do that, the assistant must learn a few key parts of the gas anesthesia machine (Fig. 18.4).

1. *Breathing, Scavenger, and Carrier Hoses:* There are three types of breathing tubes. Regular rebreathing split corrugated tubes that come in three diameters. The coaxial Bain rebreathing system or "tube within a tube" warms the inhaled air that is inside the tube and also comes in three diameters. The Bain (tube within a tube) or Ayers non-rebreathing system is often selected for smaller patients weighing 15 lb or less. This allows fresh oxygen and gas to be inhaled, but the exhaled gas goes straight to the scavenger system.
   a. These hoses will be black, clear, or opaque and must be routinely checked visually for holes or breaks. After each use, hoses are rinsed with a mild disinfectant, allowed to sit for 10 minutes, thoroughly rinsed with warm water, and hung up to dry.
   b. The rebreathing hoses, bags, and oxygen carrier hoses on the machine or hanging from the ceiling will need to be checked periodically. A visual inspection and a leak test should be performed daily. To check a system for leaks, place a thumb over the end of the rebreathing hose that connects to the patient. Close the pop-off valve and press the oxygen flush valve until the manometer reads 40 cmH_2O. If pressure is maintained, the system is free from leaks.
2. Rebreathing bags are usually black and are attached to the anesthetic gas machine. It breaks down very quickly from the oxygen and anesthetics that run through it every day. Care must be taken when taking the bags off the machine. Do not just grab it and pull. Wrap your fingers around the top of the bag on the thickest part and work it back and forth until it comes off.
   a. To determine the correct bag size, take five times the *tidal volume*, which is 10 mL/kg of a patient. Multiply the tidal volume by 5 and round up to determine the appropriate size of rebreathing bag to use. For example, a 22-lb dog weighs 10 kg; 10 kg × 10 mL/kg = 100 mL; 100 mL × 5 = 500 mL. The bag size needed is 500 mL or 0.5 L. Bags range in size from 0.25 to 30 L. The bag inflates and deflates as the patient breathes. Clean the bag after each use by removing it from the machine. Spray the inside with a disinfectant; let it sit in the bag for 10 minutes and then rinse thoroughly with warm water. Hang it upside down to dry.

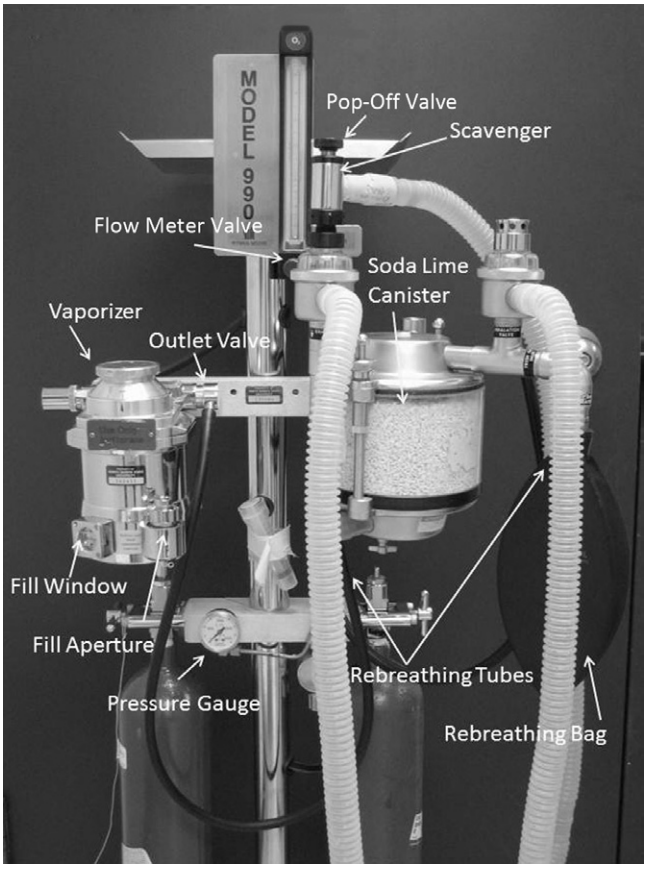


Figure 18.4. Gas machine with labeled parts. Courtesy of Teresa Sonsthagen.

3. *Soda Lime Canister:* This canister contains soda lime crystals that are white and crumbly when fresh. They are used to take the carbon dioxide out of the exhaled gases from the patient. A canister will last for about 10–12 hours after which it is removed, dumped, and refilled with fresh crystals. A piece of adhesive tape is often placed on the canister and the total time of operation for each day is marked on the tape. This will tell you when the 10–12 hours are up and the canister needs to be changed.
4. *Vaporizer:* The vaporizer mixes liquid anesthetic agents with oxygen, which, when breathed in, will anesthetize a patient. On the side of the vaporizer, there is a fill window that indicates how much liquid gas anesthesia is presently in the vaporizer. Next to it is a fill aperture that can be screwed open. Before filling a vaporizer, read the top dial; it should indicate what type of fluid anesthetic agent is required. Never mix the agents up! If you do, alert the veterinary technician so that steps can be taken to fix the mistake. There is a fill line on the fill window that should not be gone over as the liquid will pour out the bottom of the vaporizer. Also take care as you fill the vaporizer not to spill it on the floor; both events create a major hazardous spill! Anesthetic gases are toxic. Incidence of miscarriages is increased

in pregnant surgical staff members who are continually exposed to low levels of anesthetic gases. Halogenated anesthetic gases cause hepatic and even renal damage when inhaled over time. Short-term exposure can cause dizziness. If a spill should happen, put on gloves and a mask, pour kitty litter over the spill to soak up the liquid, then sweep it up and get it outside as soon as possible. Also, never try to fill the vaporizer when there is oxygen in the system. As you open the fill aperture, the liquid gas will bubble out of the vaporizer creating a spill. Do not do this maintenance if you are pregnant. No one under 18 years of age can be in a room with anesthetic gases.

5. Oxygen tanks and any hoses delivering oxygen are color coded green. Oxygen comes in either small Puritan E sized tanks that hold 2 L and attach directly to the gas machine. Large H sized tanks hold 6900 L and are housed in a closet usually fairly close to the surgery suite. The oxygen is delivered to the surgery suite through hoses descending from the ceiling. Both tanks should be checked daily for the amount of oxygen as per the gauge on the machine or attached to the tank. Paper tags are used to indicate whether a tank is "full," "in use," or "empty." Always use the tank with the in-use tag before using the full tank.
   a. The oxygen is regulated by the flowmeter on the anesthetic machine. It is calibrated in liters per minute. The rate of oxygen flow is determined by patient size, the method of administration (chamber, mask, or endotracheal tube), and whether a rebreathing system or non-rebreathing system of administration of anesthetic gases is used. Small animals use a semiclosed circle breathing system that has an oxygen flow of 30 mL/kg/min. For example, a 10-kg dog will have a flowmeter setting of 300 mL.
   b. In some instances, nitrous oxide is used to supplement the primary anesthetic gas. The nitrous tanks, hoses, and flowmeter are blue. The flow of nitrous oxide should never exceed the level of oxygen being administered. Nitrous oxide is always turned off and the oxygen is doubled at least 5 minutes before the patient begins to breathe room air. This will flush the nitrous oxide out of the patient's system.
6. The pop-off valve and scavenger system sits atop the soda lime canister and is used for two different functions. The pop-off valve releases excess pressure if the flowmeter is too high. It is usually left open but is closed to check for leaks, breath or "bag" a patient, and to check for proper inflation of endotracheal tube cuffs. If left closed, the breathing bag will fill up to almost bursting and can cause lung damage to the patient. The scavenger system is used to shuttle excess waste gases from the patient to the outdoors or into an F/air canister. A scavenger hose is attached at the scavenger system on the machine and then attached to an active ventilation system or a passive system. Waste gas is hazardous to human health over the long term. If using the F/air canisters, they must be weighed daily, and when they have increased in size to 50 g, it is time for a new canister.

Concept: Gas machines are set up based on the size of the patient being anesthetized.
Discussion: There are two systems used:

1. *Non-Rebreathing System:* does not use the soda lime canister or the rebreathing bag. The carrier hose from the outlet valve coming off the vaporizer is attached to a non-rebreathing system that allows fresh gas and oxygen to be inhaled. Exhaled gases follow the least path of resistance and are "piped" out to the scavenger system. This is used for patients under 7 kg, such as cats, small dogs, pocket pets, and birds.
2. *Rebreathing System:* uses either Y-rebreathing tubes or the coaxial Bain system. The patient rebreathes the anesthetic gas from a reservoir bag after it has been passed

through the soda lime canister. A great anesthetic machine video can be found at http://www.youtube.com/watch?v=1LY0eAzrIrE.

Procedure

Location: Patient preparation area and surgery room

PREPARATION

1. Prepare a card for your reference book entitled "Routine Maintenance of the Gas Anesthetic Machine."
2. Using Figure 18.4 (anesthesia machine), locate all the parts on the machine in your facility; mark what they do and what your responsibilities are with each:
   a. Hoses and bags
      i. Visually check for cracks and holes.
      ii. Select the appropriate breathing system based on the patient's size.
   b. Anesthetic vaporizer
      i. Fill window and aperture—fill with the appropriate gas.
   c. Soda lime canister
      i. Check the number of hours it has been used; change when it reaches 10–12.
   d. Pop-off valve and scavenger system
      i. Make sure the pop-off valve is open and the scavenger system is operational.
   e. Oxygen tanks
      i. Check levels by turning the tank valve on.
   f. Nitrous oxide.
3. Mark the breathing system required as per patient size.
4. Mark the formula for determining the size of the rebreathing bag based on tidal volume.
5. Make sure the cuff inflation syringe is available and attached to the machine for easy access.

PROCEDURE

1. Attach the proper breathing hoses and proper sized bag to the machine.
2. Ensure the pop-off valve is open and the oxygen (nitrous if using) tanks are turned on.
3. Assist with the intubation procedure.
4. Tie the tube into place and inflate the cuff.
5. Check that the veterinary technician has set the flowmeter and vaporizer.
6. Attach the monitoring devices and continue filling in the anesthesia record.

FOLLOW-UP

1. Have a, experienced staff member check your anesthetic machine over for accurate setup.
2. Learn from your mistakes and make notes in your reference book to avoid future mistakes.

TASK 18.7
SURGICAL SITE PREPARATION

Concept: Once the induction period is complete, the patient is no longer able to move and the veterinary team will need to position it for the procedure being done. There are three commonly used positions.
Discussion: Generally, for abdominal surgeries and dog castrations, the patient is positioned in dorsal recumbency; this is the most frequently used as it gives access to the abdomen of all species and the scrotal area of the canine. Positioning aids help to keep the animal from tilting to either side. The urinary bladder is usually expressed by the veterinarian or the veterinary technician. The VA will restrain the patient by placing it in lateral or sternal recumbency to facilitate the palpation of the caudal abdomen. Once they feel the bladder just cranial to the pelvic floor, they will begin a slow application of firm, consistent pressure to the bladder. This usually results in urine flow as the bladder is reduced and no urine flows and the pressure is stopped. This procedure can be done on a grated prep table. This is often unnecessary for dogs if they were taken for a walk prior to presurgical procedures. Occasionally, the front limbs may need to be tied with them extended out to facilitate the flow of the IV fluids.

Patients requiring thoracic procedures may require either dorsal or lateral recumbency, which most orthopedic (bone) surgeries will require with the injured limb facing up, allowing the veterinarian to maneuver the limb. Because of this, when preparing for an orthopedic procedure, the entire circumference of the limb is clipped usually up to the spinal column. Some surgeons prefer lateral recumbency for the tom during castration.

Back, neck, tail, and perianal surgeries such as cat castration or anal fistulas need to be positioned in sternal recumbency. For perianal surgeries, a rolled up towel is often placed under the abdomen as close to the back legs as possible.
Concept: The preparation of the patient's surgical site begins in the treatment or preparation area, not in the surgery room. Only the final application of the surgical solution/disinfectant occurs in the surgery room.
Discussion: Preparation of the skin follows the prescribed steps to ensure as clean a surface as possible.
Discussion: It is not possible to truly sterilize the skin because of the presence of hair follicles and the ducts of small glands extending below the surface of the skin. Likewise, the preparation of the skin should not be so traumatic as to damage the skin and decrease its ability to serve as a barrier to infection.
Concept: The area clipped is depending on the anticipated location of the incision.
Discussion: The area clipped and prepared should extend on all sides well beyond the anticipated incision borders. Some authors recommend two to three clipper widths beyond all borders of the incision. Long-coated patients should have any hair that might fall into the incision site shortened by tipping the clipper on edge and setting it gently down over the hair. This gives you a straight cut across the border and should be made as neatly as possible. Keep the borders of the clipped area smooth, creating a neat appearance (Fig. 18.5).
Concept: All of the hair must be removed, which a no. 40 blade is designed to do.
Discussion: The blade is held flat against the skin to avoid producing a clipper burn that abrades the skin.

The clipper is moved against the growth pattern of the hair to obtain as short a clip as possible. Once the hair is completely clipped and the borders are shortened, a vacuum

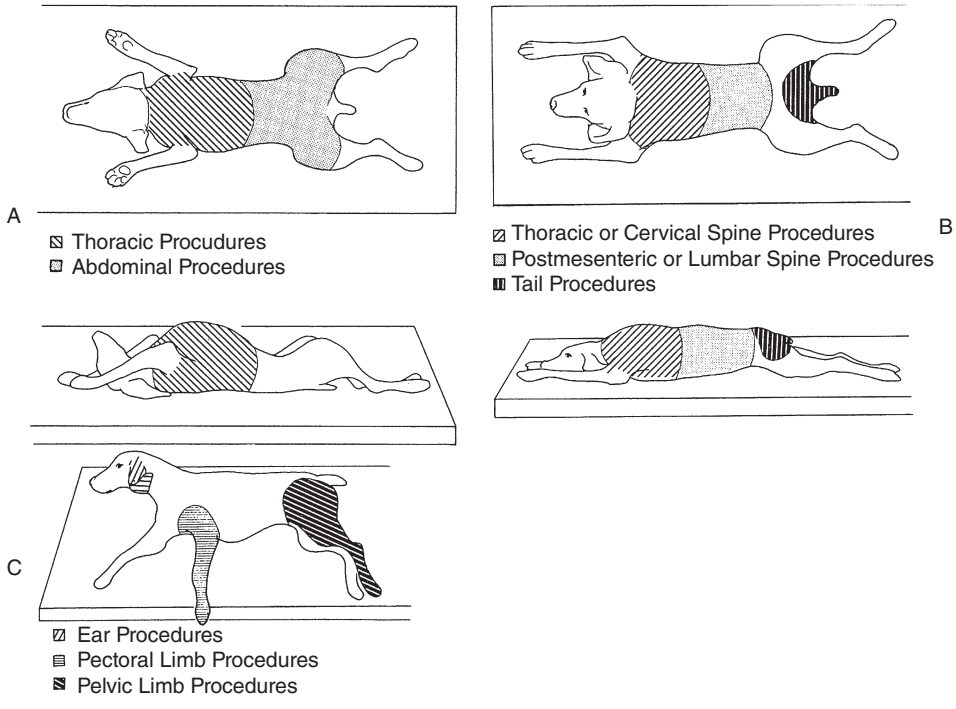


Figure 18.5. Diagrams of various surgical preparations. A. Dorsal recumbency. B. Sternal recumbency. C. Lateral recumbency. *Source*: Tracy, D. L., & Warren, R. G. (1983). *Small Animal Surgical Nursing*. St. Louis, MO: Mosby. Reproduced with permission from Elsevier.

cleaner hose, without any attachments on it, is passed over and around the clipped area to pick up all loose hairs. Care should also be taken to vacuum hair that has fallen onto the preparation table and the floor around it. Also vacuum hair from the front and sleeves of your scrub top.

The scrotal hairs of the tom, in preparation for castration, are often plucked instead of being clipped. Clipping is usually not performed before docking puppy tails and dewclaw removal. Similarly, before declawing, a cat's front feet are not always clipped.

Concept: After vacuuming the patient, begin the scrub process.

Discussion: Povidone-iodine or chlorhexidine formulas are the two most frequently used preparations for the skin, although there are other patented products on the market. Surgical antiseptic scrubs contain a soapy component that helps to break down oils on the skin. The antiseptic solution is used after the scrub and does not contain the soapy component.

The scrub pattern starts over the incision line and is either done in an ever-widening concentric circle or in a rectangular pattern. Both patterns are done with a 4×4 gauze sponge that is picked up and held with the thumb and index finger by one corner. The other three corners are brought up to be grasped by the thumb and the index finger (Fig.18.6).

The sponge is set down over the intended incision site and the pattern is made with overlapping strokes. The scrubbing material is wiped off with 4×4 gauze sponges soaked in sterile water. Grasp them in the same manner, but in this case, don't "scrub," just wipe the scrubbing material off. Be careful not to go over areas twice with the same gauze nor go into areas that have not been scrubbed. This entire process is repeated two more times. After the



Figure 18.6. Proper way to hold a gauze sponge to start the scrubbing process. Photo courtesy of Teresa Sonsthagen.

last scrub, alcohol is sprayed over the entire site in a liberal fashion. Take care not to reach across or allow anything to touch the scrubbed area from this point on as it has now become a sterile field. The patient is now moved into the surgery room.

Concept: The way a patient is positioned is determined by the surgical procedure.

Discussion: The ideal position provides optimal access to the scrubbed surgical site. Whatever position is chosen, it is maintained using various "V"-shaped positioners, sandbags, foam wedges, rolled towels, body-conforming vacuum-activated bags, and soft cotton ropes. For patients with deep, narrow chests such as collies and salukis, use a thoracic positioner. This is a V-shaped devise of stainless steel or plastic that keeps the animal's chest from wobbling back and forth. The positioner is placed on the table then the towel placed over it.

Concept: There are two types of surgery tables available.

Discussion: Both will have handles underneath that can be loosened to allow the table to tilt. The table is usually kept horizontal. However, it may be tilted toward the bucket end slightly to gather any fluids. It is often tilted slightly in cases where increased visibility of an area is needed. For example, a fat dog may need to have its hind quarters lowered during a spay to increase access to the ovaries. This is a slight tilt. Some will have a pedestal that can be raised and lowered to adjust for the height of the surgeon. Usually, there is a handle to loosen the pedestal and then a step lever to pump it up or a release lever to let it down. Take care when you loosen this handle as it will also allow the table to be spun around!

Both will have a means to capture body fluids. A small hole located at the bottom of the table allows fluids to run into a bucket attached to a hook. Other tables will have a tray running down the middle of it again with a hook underneath from which a stainless steel bucket hangs. The bucket will catch fluids that might be released during surgery. This may occur with a caesarian section or possibly peritoneal fluid or urine. The bucket should be lined with a plastic liner so it can be removed if anything is in it. Just keep a few extra bags on the bottom as you do with all waste containers. This speeds setup for the next surgery. The solid tables are not entirely flat but have a shallow trough around its perimeter. This feature allows fluids to drain from the table surface into the bucket below.

Concept: The stainless steel surgery table must be prepared before the patient enters the room.

Discussion: The top and edges are sanitized using a disinfectant spray. Patients, especially young and small patients, those 15 lb or less, tend to loose body heat during surgery. A heated water circulating pad, a thick folded towel, a warm air-filled bag, a heater built into the table, or some other heat-retaining device is placed on the tabletop. These items are used to help maintain normal body temperature while the patient is on the surgery table. A clean towel covers the water circulating pad and the patient is placed on top of the clean towel. The others are designed to be used without a towel covering them. These devices are expensive and must be treated with respect.

Tip Box 18.7: **Never use a regular human heating pad. They cause horrible thermal burns!**

Concept: Once the patient is positioned, each limb is secured with a rope. Some tables are equipped with movable cleats along fixed bars for this purpose (Fig. 18.7).
Discussion: Limbs are secured using the four soft cotton ropes, which should be hung from the surgery table when not in use. Each rope has a small loop on one end which is used to form a larger loop that is placed around the limb. Pass the end of the rope through the small loop at the other end to form a larger loop. This larger loop is placed around the proximal portion of the limb either above the elbow or above the hock as appropriate. The free end of the rope is then made into another loop with the free end passing underneath the second loop to form a half-hitch. The loop is placed around the distal portion of the limb near either the carpus or the tarsus. The free end is pulled over the nearest end of the table and secured to the adjacent cleat with a figure eight and one or two half-hitches. The ropes should be tight enough to help maintain the patient's position but not so tight as to impede circulation. If the surgical procedure involves the distal portions of a limb, do not secure that limb with a rope. Large dogs in dorsal recumbency should have their front legs crossed with opposite cleats being used to secure the legs. This prevents shoulder injuries.
Concept: Once the patient is positioned and secured into place, the surgery lights are positioned to cast the brightest light over the incision site.
Discussion: Positioning is done before the final skin preparation and may need adjustment once the patient is fully draped. The light is then adjusted to shine directly over the *fenestration* (opening) in the drape. The surgeon, using a sterilized handle, makes the final adjustment with a handle that attaches to the bottom of the light. If a handle is not available, the nonsterile personnel makes the final adjustment before the drape is placed. Care must be taken not to pass any part of his or her body over the prepared incision site.
Concept: Once the patient is positioned and the lights are adjusted, the final skin preparation begins.
Discussion: A 4 × 4 gauze sponge is removed from a container of povidone-iodine surgical solution with a sterile sponge forceps. Three additional wipes of the skin are made in a similar scrub pattern. Or the solution is in a spray bottle and is simply sprayed onto the prepped area. The final solution is allowed to dry on the skin before draping the patient. The container of surgical solution with the gauze sponges is kept in the surgery room and is used exclusively in the surgery room. The sponge forceps is sterilized in a single-use package and one is opened for each surgery.

At this point, the surgeon steps in and begins draping the patient. The assistant must remember to stay out of the way of the surgeon; never move into the light or field of vision, and never touch sterile areas with bare hands. *Do not break the aseptic technique.*

As with any veterinary procedure, there are variations based on personal preferences. Review the veterinarian's preferred scrub procedure with the veterinarian or technician before proceeding.



Figure 18.7. Using knot tying skills to secure a cat to the surgical table. Photo courtesy of Teresa Sonsthagen.

Procedure

Location: Patient preparation area and surgery room

PREPARATION

1. Prepare a card for your reference book entitled "Surgical Patient Prep."
2. Mark the card with the veterinarian's preferred positions for various surgeries.
3. Mark you card with the preferred steps for scrubbing a patient for surgery.
4. Place the water circulating pad or a warm air circulating pad on the surgery table and turn it on!
5. Decide if you need a thoracic positioner or secure an adjustable table into a "V" position so it is ready for the patient.
6. Position the table up or down as the surgeon prefers.
7. Hang a sanitized bucket with clean liner underneath the drain hole at the table's end.
8. Put on examination gloves.

PROCEDURE

1. While in the patient preparation area, assist with positioning the patient for aseptic preparation of the surgical site.
2. Check the position of the neck and endotracheal tube to make sure it is not occluded.
3. Check the monitoring devices to make sure they are still in place.
4. Continue to monitor the patient if not involved with clipping or scrubbing.
5. If assisting with the clipping and scrubbing, follow the instructions as per your clinic's policy.
   a) Clip the patient; the area should extend beyond the incision site by two to three clipper widths. Neat borders on the hair and the incision itself are the only means for a client to judge how well the surgery went! Long hairs are neatly clipped to form a smooth edge along the border of the already clipped area.
   b) Vacuum loose hairs from the patient.

   c) Using gauze sponges soaked in surgical scrub, start at the incision site then work in an ever-widening circular motion until the entire clipped area is covered. Repeat with a sterile water-soaked sponge removing the scrub. Repeat two more times, then spray with alcohol and allow to air-dry.
6. Assist with moving the patient into the surgery room. Taking care not to contaminate the surgical site by reaching across it or actually touching it.
7. Reattach the patient to the gas machine and monitoring device.
8. Position and secure the patient to the table.
9. Turn the surgical lights on.
10. Apply the surgical solution if permitted.
    a) Use antiseptic solution-soaked gauze sponges grasped with a sterile sponge forceps. Apply down the length of the incision in ever-widening circles until the periphery of the clipped area is reached. Repeat twice more and allow the last application to dry on the patient's skin.

FOLLOW-UP

1. If you are responsible for monitoring the patient, continue until it is in recovery.
2. If this is the last surgery for the day, refill:
   a) the scrub container in surgery with gauze and the skin antiseptic as needed
   b) empty the vacuum and clean the hose end with disinfectant.
3. Clean and lubricate the clipper blade before putting it away. Follow the manufacturer's directions.

TASK 18.8 SURGICAL PACKS IN PRESURGICAL PERIOD

Concept: There are many types of surgical packs with varying contents based on their intended uses.
Discussion: All packs are labeled with the contents, date, and the initials of the person that put them together.
Concept: All packs are closed with a piece of autoclave tape.
Discussion: This tape has indicator stripes that turn dark during the sterilization process. These are the only packs that should be opened for use during surgeries. A tab on the end of the autoclave tape facilitates removal of the tape when opening the pack.
Concept: Opening a sterile pack requires thought and observation!
Discussion: Before opening packs, check the area for any wet spots. If found, dry these thoroughly with paper towels. Water or body fluids will wick through the wraps and contaminate the interior, rendering it useless for surgery. Also, make certain the tape stripes have turned black during the autoclaving process (Fig. 18.8).

To open the wrapped packs, face the pack with the extending dog ear toward you. Grasp the tape tab and remove it completely from the pack. Either toss it in the garbage or stick it to your leg low enough that it can't fall into the open pack. Grasp the protruding tip of the outer wrap, first pulling it toward you to release the tuck, then lifting and pulling the corner



Figure 18.8. Using only the corners of the wrap to aseptically open a surgical pack. Photo courtesy of Teresa Sonsthagen.

back away from you. Never pass your arm over the pack but to the side of it. Release the fabric. Grasp the next dog ear with your fingertips, pull to unfold, and lay flat. Repeat on the other side. Grasp the tip of the remaining dog ear then pull it toward you to unfold it. Release the extended fabric. Handle only the tips of the wrap. Your arm must *never* pass over the sterile surfaces, nor should the inner surface of the wrap be touched with a bare hand at any time.

Concept: Set the packs out in the appropriate places for easy access by scrubbed or to be scrubbed personnel.

Discussion: *Brush packs* are placed on a counter near the sink where the surgeon scrubs, but not so near that splashing will contaminate the contents of the pack. This contains a sterile bristle brush and a linen hand towel. The surgeon uses the items to scrub then dry hands prior to gloving. The outer wrap is opened in a manner such that the contents or the inner wrap is never touched. A cap or bonnet, mask, and shoe covers that are clean but not sterile are also laid out.

The surgeon first puts on the cap, mask, and shoe covers. The surgeon next removes the sterile scrub brush from the opened scrub pack. The hand scrub follows. This, too, is done in a standard pattern.

Concept: Upon completion of the scrubbing and drying of the hands using the sterile towel remaining in the scrub pack, the surgeon proceeds to gown.

Sterile Gown Pack: is often placed inside the surgery room if there is a table available. The veterinarian will don the gown after the scrubbing hands and before gloving. The assistant will need to assist the surgeon in tying the gown. The gown is picked up by the dog ear at the neckline and the gown is held up to allow it to unfold. The surgeon places his or her hands through the armholes. If the surgeon uses a closed gloving technique, the final steps of gowning are completed after the surgeon is

gloved. If the surgeon uses an open gloving technique, gowning is completed before the gloves are donned. The assistant steps behind the partially gowned surgeon. The assistant uses each hand. Reaching under the surgeon's arms where the armhole seam meets the back panel seam, the fabric is firmly grasped. The sleeves are pulled upward until the cuff of each sleeve is around the wrists of the surgeon. Next, reach over the shoulders and just touching the ties at the neck, pull the gown the rest of the way on. The gown is tied in a bow at the neck and at the waist. *Note*: make sure to glance around to the front of the gown; it often gets hung up on the chest and needs to be pulled down. This is done by grasping the hemline and giving it a pull. Step away from the surgeon. At no time is the gown to be touched by anyone or anything that is not sterile.

Sterile Surgical Gloves: are prepackaged, disposable gloves. They may be prepowdered, not powdered, or latex free. The glove sizes and the types of glove preference vary by each surgeon. The gloves come packaged with an outside paper or plastic wrap and the inside package with the gloves folded inside of it. One end of the outside package will have tabs; grasp the corners one at a time and open them just a bit. Then move to the middle of the pack and place thumbs on both tabs with index fingers on the other side. With a rolling motion, pull the tabs apart to expose the inside package. Hold still and let the surgeon grasp the inside pack or, if given permission, pull the package all the way open, giving it a little flip onto the wrap the gown was or is laying upon. Upon completion of gloving and gowning processes, the surgeon enters the surgery room (Fig. 18.9).

Instrument Pack: is placed on the Mayo stand, which is pulled to sit close to or over the surgery table. The first layer is opened, taking care not to lay the side that opens toward the scrubbed patient on the scrubbed area. Do *not* open the second layer; only a scrubbed, gowned, and gloved personnel can open this layer.



Figure 18.9. Lay thumbs on each flap to aseptically open ancillary supplies for surgery. Photo courtesy of Teresa Sonsthagen.

Drape Pack: Some clinics will have a cloth drape wrapped or they will include it with the instrument pack. If in its own pack, open it up as soon as the surgeon steps up to the table the patient is laying upon.

Ancillary Packs: Suture packs and scalpel blades will also need to be opened. These come in single-use sterile packs. They usually have two tabs on one end that will accommodate thumbs laid across them with index fingers pressed on the other side. Open the pack with a rolling motion so that your thumbs are covered by the inside of the pack. Hold it steady and allow the surgeon to grasp the interior package. Or if given permission, open the outside package completely and give it a little flip onto the Mayo stand. Do *not* reach across the Mayo stand as that will contaminate the instruments.

TASK 18.8.1
SUTURE MATERIALS, NEEDLES, AND SCALPELS

Concept: Suture materials are available in many different materials and sizes.
Discussion: Suture materials range from stainless steel, natural materials such as silk, to a multitude of synthetic sutures. Some are single strand, known as monofilament, some multiple braided strands. Some are absorbable, some are nonabsorbable. Some have memory, meaning they retain the form they were in in their original packaging. Some are softer, some have greater tensile strength, and others have greater knot retention. What is chosen depends on patient size, procedure, and surgeon.
Concept: Sutures come in sizes ranging from 10-0, pronounced ten "Ott," to #7, which is used in very large animals.
Discussion: 10-0 is very, very thin, while the 7 has the greatest diameter. Diameter and tensile strength are related. Tensile strength is the amount of pressure that can be applied without breakage.
Concept: Suture needles come in a variety of sizes and shapes.
Discussion: A swedged-on needle is one that has been attached to the suture material in the factory. Some surgeons prefer this style as it reduces time in threading a suture needle and there is less drag as the suture is pulled through the tissue as the thickness of the suture and needle are less than with an eyed needle.

Eyed needles must be threaded and come in two different eye forms. The regular eye is a single eye much like a hand sewing needle. The French eye has a regular eye with an eye below it which the suture material can be snapped into through a flexible side hole. This reduces the likelihood of the suture material slipping out of the first eye.

The needle shapes can range from a straight needle to one that is "J" shaped, referred to as a ½ curved to those that are some part of a circle. They are called ½ circle needles. Each shape facilitates the passage of suture material through tissue and the use of various suture patterns. All have specific purposes.
Concept: The tip of the suture needle opposite the eye can be taper point or cutting edge.
Discussion: The characteristic of the preferred needle's end is determined by the tissue through which it must pass. A taper point is used for organs and other "interior" tissues. A cutting edge is used to suture skin, it is flat and so slides through tough animal skin easier than the rounded taper points.

Concept: Surgeons may use several types of suture needle during one surgery.
Discussion: A variety of needles can be placed in a needle holding rack and autoclaved with the rest of the instruments in a pack.
Concept: Surgical blades come in various sizes and shapes.
Discussion: The number on the blade's packaging tells you the size and shape of the blade. Always ask the surgeon the choice of blade size. Chapter 19 will explain more about scalpel blades and handles.

Procedure

Location: Surgery room

PREPARATION

1. Prepare a card for your reference book entitled "Surgeon's Preferences for Surgical Packs."
2. Mark the card with the type and size of gloves each veterinarian and veterinary technician likes or needs to use. Ask the surgeon which suture materials and needles are preferred and mark that on your card as well.
3. Remove packs from storage and lay out the various packs for the surgeries.

PROCEDURE

1. Lay out the following packs.
   a) scrub pack
   b) gown pack in the correct size
   c) glove pack in the correct size
   d) scalpel blade in the size requested.
2. Suture type and size as requested by surgeon
3. Open the packs according to the technique described.
4. Assist the surgeon with gowning and gloving.
5. Open the drape pack.

FOLLOW-UP

1. Pick up all wraps and other items to be taken to the laundry.
2. Assist with the next patient or start the cleanup process if it is the last surgery of the day.

TASK 18.9
GLOVING AND GLOVE PACKS

Although the assistant is rarely in the surgery room during surgery, under extreme circumstances, this can happen.

Tip Box 18.8: **"Just in time" learning is not appropriate where surgery-related tasks are concerned.**

Under normal conditions, the technician is in the surgery room with the surgeon.

Concept: Gloving actually begins with the hand scrub.

Discussion: Like the surgeon, put on cap, mask, and shoe covers first. Lay out the scrub brush, gown, and glove packs. If you do not know your glove size, you will be able to learn it later when practicing how.

Before you begin a scrub, remove all objects from your hands and arms. Make sure nails do not extend beyond your fingertips and are without polish. Aseptically open the scrub brush pack.

Concept: A scrub may be done in two ways: the timed method or the counting method.

Discussion: Move to the scrub sink. The soap dispenser and the water valve are controlled by knee, elbow, or foot pedals. With the hands held above the elbows, moisten the brush and hands. Dispense soap onto hands and brush.

The timed method requires a 5-minute scrub of all surfaces of the fingers, each side, and the tips; move to the back and palms and, finally, the sides of the hands; repeat with the wrists. Then move up the arms to nearly the elbows. Drop the scrub brush without dropping your hands and rinse liberally.

With the counted scrub, count 10 scrubs on each finger surface and the four sides of the hands. This is followed with a counted scrub of each side of the wrist and forearm. Drop the scrub brush without dropping your hands and rinse liberally.

Remember to keep hands above the elbows. When rinsing, move from fingertips to elbows. Move your arm out of the stream of water then go back in from fingertips to elbows again. If you just move your arm back from the elbow to the fingertips, you may wash contaminants from your unscrubbed elbows toward your fingertips.

Concept: To dry your hands, use the sterile towel in the scrub pack.

Discussion: Pull the towel open and use it to first dry your hands thoroughly. Then wad the towel up and blot dry your wrist—as you pass the towel to your other hand, grasp it in the same spot you held it for the first wrist—blot dry the opposite wrist then your forearm—switch the towel again and dry the other forearm. Drop the towel to the floor without dropping your hands below your waist. At this point, move to the gown pack. Follow the same instructions given for assisting the surgeon with the gown, only now, someone else will be tying you into the gown!

Concept: Begin the gloving process. Gloving can be either closed or open. Closed is the preferred technique.

Discussion: With your hands remaining in the cuffs of the gown, lay one glove over your gowned wrist with the fingers placed outward. Pull the edge of the glove over your fist and into the palm of the glove. The cuff of the glove should extend beyond the top of the glove. Uncurl your fingers and put into fingers of the glove. Repeat this process with the remaining glove. Grasp your hands together and push the fingers toward the tips of the glove. For a demonstration of gowning and gloving, access http://www.youtube.com/watch?v=ZBsKr3PMp4E.

Procedure

Location: Surgery prep counter and scrub sink

PREPARATION

1. Gather needed packs:
   a) scrub pack
   b) gown pack
   c) glove pack.
2. Put on mask, cap, and shoe covers.
3. Decide which scrub technique to use.
4. Remove all objects from hands and arms.

PROCEDURE

1. Open the scrub pack and the gown pack.
2. Conduct either a 5-minute scrub or a counted scrub.
3. Rinse well then dry hands first then work toward the elbow.
4. Once dry, put arms into the gown and have someone help to tie the gown at the neck and waist.
5. *Reminder: Do not fully extend hands through cuffs but the inside of the cuff into your fist in preparation for a closed gloving.*
6. Glove using a closed gloving with both hands. Hold hands together until inside the surgery room.

FOLLOW-UP

1. Do you have enough scrub packs on hand?
2. Do you have enough gown packs on hand?
3. Be sure to launder caps and masks if they are cloth.
4. Do all surgery laundry separately.

TASK 18.10
FREQUENTLY PERFORMED SURGICAL PROCEDURES

The Ovariectomy (OH) or Ovariohysterectomy (OH or OVH)
Concept: Either procedure keeps an animal from reproducing.
Discussion: The difference is the OH removes only the ovaries but not the uterus, which is a "Y"-shaped structure in mammals giving birth to multiple young at a time. This includes dogs, cats, rabbits, and rodents. There have been arguments pro and con for years. The important thing to know is which procedure is done at your worksite.

How the surgery is accomplished is also variable. The classical method involves making an incision into the abdomen through the *linea alba*, just below the *umbilicus*. Both ovaries and uterine horns, the body of the uterus, and adjacent vessels are ligated and removed. The stump of the uterus is returned to the abdominal cavity. The abdominal wall and skin are sutured. Nonabsorbable sutures are placed in the skin and are removed in 7–10 days. If absorbable sutures are used with a subcuticular suture pattern, they are not removed. An alternative method uses a laparoscope in which three small incisions are made into the abdominal wall to allow for passage of the equipment through various "ports." Patient recovery is less painful as there is less tissue manipulation, but the cost is increased due to the cost of equipment and additional surgeon training. Lasers to cut tissue can be used in either method. Again cost and training are a consideration. If any such equipment is present, be certain how to clean and sanitize/sterilize parts, maintain ancillary equipment, and how to maintain it before tackling the job. It is easy to damage these instruments of handled incorrectly.

The advantages to spaying are reduction in the incidence of breast cancer, no chance for development of *pyometra* because the uterus has been removed, no lusting males about, less wandering off by females seeking satisfaction, and no unwanted litters or messy vulvar discharge from dogs in heat.

Castration, More Properly Called Orchidectomy

Castration is the removal of the testes from the scrotal sac. There are several ways to do this and depends more on species and current practice. For cats, castration is accomplished through a small incision in the scrotum over each testicle. The scrotal hair may be clipped or the hairs plucked. Either way, there needs to be a minor surgery prep. The incisions are left open as the scrotum collapses on itself.

For dogs, a prescrotal incision is made in the midline skin just cranial to the scrotum. Each testicle is pushed through the opening, ligated, and then removed. The incision is sutured closed.

The advantages of castration for both cats and dogs is a pet that is less likely to wander where it can become exposed to infectious diseases or testicular cancer, be hit by cars, be involved in fights, or become lost. The life expectancy for a castrated animal is longer than one that is not.

Caesarian Section

Dystocia is a common problem seen in certain breeds of dogs, especially brachycephalic and those with arrow hips. Dystocia rarely occurs in cats; however, it can be seen in those hit by a car and having a fracture of the pelvis that resulted in a narrowing of the pelvic canal. The cesarean section calls all hands on board. Once the incision into the uterus is made, the individual offspring are handed to individual staff members. The staff member should receive the new born in a clean towel. The pup or kitten requires the membranes to be removed from its face, nostrils, and mouth. It is then vigorously rubbed. Hold its head downward for several seconds to help drain the fluid from the mouth and nose. If need be, use a needleless syringe or an ear bulb syringe as a suction device to suck the fluids from the mouth and nostrils. Try to get the individual to breath. A small cry is indicative of success. Once the individual is breathing, place it with its siblings in a box. To prepare the box, fill several surgical gloves with hot water then tie a knot in the cuff to seal the glove. Place in the bottom of the box and cover with a towel. Allow each of the newborns to snuggle between the fingers of the glove. The moment the mother is awake from surgery and standing, place the pups on a towel next to her so they can begin nursing. Ideally, the new family should return home to familiar surroundings as soon as the mother is stable and accepting her new young.

When the pups are about 3–5 days old, they are returned with their dam. The mother is checked for possible uterine, mammary, and incision infections. The pups are checked for hernias, *atresia ani*, and cleft palate. This is when tail docking and dewclaw removal take place in puppies. This is done to meet breed standards.

Tail Docking and Dewclaw Removal

This is not a sterile but clean procedure. The pups are removed from the mother as their cries will upset her. The skin of the tail and feet are wiped well with a cotton ball or a gauze sponge saturated with a suitable skin disinfectant. The instruments are usually in a cold tray filled with glutaraldehyde solution. Since this is toxic to the skin, triple rinse the instruments in sterile saline or sterile water. Place on a clean towel where the veterinarian will work. If the surgeon prefers to suture the excision sites, have the required sutures and needles on hand. Stand opposite the veterinarian holding the puppy with its hind legs pressed toward its chest wall and facing you. Hold the pup at the veterinarian's desired height. This is often eye level. You will need to extend your elbows as you restrain the patient. After the tail dock, turn the puppy on its back. Extend each foot in turn so it can be examined. If extra dewclaws are present, extend the limb and restrain it as the dewclaw is removed. Once completed, return the puppies to their mother.

Declawing or Onychectomy in Cats

This is a controversial subject and, at the most, it is done to the front feet only. The American Association of Feline Practitioners (AAFP), a large and very active group within the American Veterinary Medical Association (AVMA) and AAHA, is *opposed* to declawing. It is a painful procedure and denies the use of a cat's first line of defense. This leads to an individual that must use its teeth, placing the eyes vulnerable to severe injury, even blindness. The AAFP position is to clip nails frequently or to use nail caps. Nail caps are sold under the trade name of Soft Paws. They are sold in sets that require nail glue to secure them over the existing nails. The best thing one can do for the cat and its owner is to teach the owner how to clip their pet's nails (see Chapter 12).

RESOURCES

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Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

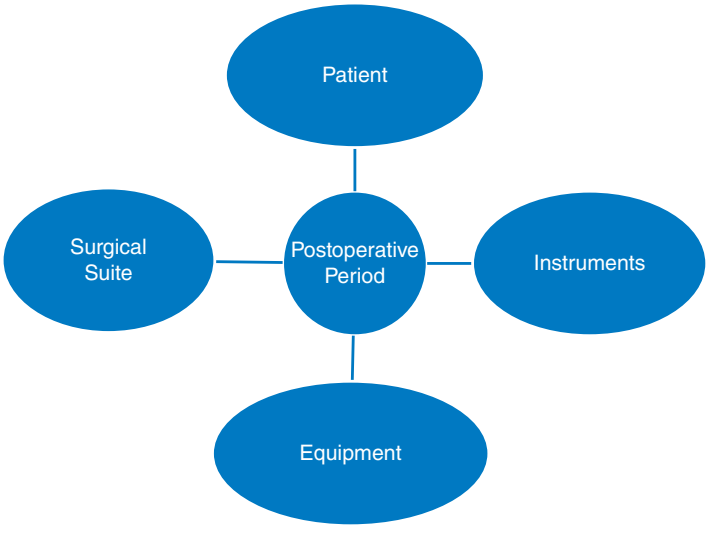
- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

CHAPTER

19

POSTOPERATIVE TECHNIQUES

TERESA SONSTHAGEN



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Companion website: www.wiley.com/go/pattengale/tasks

CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Provide postanesthetic patient care.
2. Provide postoperative patient care.
3. Extubate a patient.
4. Recognize and respond to emergencies in the postoperative and postanesthetic patient.
5. Review postoperative patient care with clients.
6. Remove sutures.
7. Identify, clean, and prepare surgical instruments and supplies.
8. Wrap packs.
9. Operate and maintain common sterilizers.
10. Clean and maintain the surgical suite using facility-specific protocols.

INTRODUCTION

The postoperative period begins when the patient is taken off the anesthesia machine, moved to a recovery room, extubated, and given postanalgesics. The veterinary assistant is utilized to help monitor and evaluate patients as they wake up from surgery. This chapter will cover those tasks as well as cleaning and repacking the surgical packs and a brief review of the cleaning and care the surgical suite requires.

TASK 19.1
POSTANESTHETIC PATIENT CARE

Concept: The postanesthetic period begins when administration of anesthetic agents ends.
Discussion: When the anesthetic machine vaporizer is turned off, patients may remain connected to the anesthetic machine for a few minutes in order to breathe in 100% oxygen and exhale anesthetic gas into the scavenger system. Patients will begin to recover as they "blow off" anesthetic gas. Depending on the depth of anesthesia, the administration of, and the metabolism of other perianesthetic drugs, this may take just a minute or two or may be much longer. Careful observation of the patient for signs of recovery is essential.
Concept: The patient requires constant and careful monitoring of vital signs and reflexes in the early stages of anesthetic recovery. Do not get distracted or attempt to multitask at this time. Anesthetic complications are most likely to occur during the induction and recovery periods.
Discussion: Just as the patient progressed through stages and planes of anesthesia from disorientation to excitement, to surgical anesthesia at the time of induction, the animal will progress back through those stages in reverse order until ultimately recovered. The exact timing cannot be predicted, so assessment and reassessment are essential. Early indicators include increases in heart rate and respiratory rate, and return of reflex activity and muscle tone. Watch particularly for palpebral reflex (blink), tongue movement, jaw tone, and swallowing movements. These are signs that the patient will be ready to extubate soon, so prepare by loosening the endotracheal tube, tie around the head or muzzle, and remove the air from the cuff indicator balloon with an empty syringe. Extubate as soon as a strong swallow or cough is observed.
Concept: Patient recovery once disconnected from the anesthetic machine may be done in a designated area or in the patient's cage, as long as the patient is closely monitored and is not left alone.
Discussion: The recovery area should be close to a source of oxygen and within visual and auditory range of the veterinarian in case of emergency. The recovery area should be warm and quiet and large enough for the patient's neck to remain extended. A bent neck may result in airway obstruction in the early recovery period. Take the patient's temperature at the time the patient is removed from the surgery table and provide heat support as needed (for any temperature below 100°F).
Concept: Patients may require external heat support to facilitate anesthetic recovery.
Discussion: If the patient is hypothermic, then anesthetic recovery will be prolonged and, if shivering, oxygen and glucose metabolism will be increased. Though the goal is to prevent hypothermia during the anesthetic procedure, body temperature commonly decreases as a result of multiple anesthetic and surgical factors. Warm bedding under and on top of the patient, forced air warming blankets, circulating warm water pads, warmed rice bags or heating disks, and administration of warm IV fluids are all effective ways of supporting body temperature. Avoid using electric heating pads or lamps if possible; the patient is unable to move, and the "hot spots" these units can create will actually cause thermal burns.
Concept: Patients may require IV fluid administration during the recovery period.
Discussion: IV fluids should be continued as prescribed by the veterinarian using an infusion pump or other rate-limiting devices. Continue monitoring hydration and perfusion parameters (mucous membrane color, capillary refill time, blood pressure, pulse quality, respiratory rate, and effort) during anesthetic recovery to ensure that the patient is receiving the correct

amount of fluids. If fluids are not required during recovery, then disconnect the fluid line and cap the IV catheter. The catheter should not be removed until the patient is substantially recovered (sternal or standing) in case of emergency.

Concept: Patients may require blood sugar support during the recovery period.

Discussion: Very young and small patients are likely to have become hypoglycemic during the preanesthetic and anesthetic periods. You may be instructed to either check blood sugar with a glucometer or to routinely apply honey or corn syrup to the gums of these patients in the recovery period. Additionally, IV fluids with dextrose may be administered.

Concept: Rough recoveries can occur when patients wake up painful, disoriented, or from lingering drug side effects.

Discussion: Excessive vocalizing, paddling or thrashing, attempts to bite or escape, and self-trauma can indicate the need for administration of additional sedatives or analgesics in the recovery period. Though this may occur solely as the result of anesthetic drug effects and side effects, rough recovery is not normal and should be addressed for patient safety and comfort.

If you have any questions or concerns about your patient's anesthetic recovery, immediately consult with the technician or the veterinarian so that the patient can be evaluated and appropriate measures taken to ensure patient safety.

Procedure

Location: Patient recovery area

PREPARATION

1. Collect the anesthetic monitoring form for the patient or start a recovery record to have on hand during the recovery period.
2. Prepare a card for your reference book entitled "Patient Recovery." Mark the card with the following equipment and procedure.
3. Prepare the patient recovery area with all of the tools and supplies that will be needed so that you will not need to leave the patient's side during anesthetic recovery:
   a) padding and bedding
   b) rectal thermometer
   c) warming devices
   d) IV fluids and infusion pump
   e) corn syrup or honey
   f) syringe for deflating the endotracheal tube cuff
   g) all medications prescribed for the patient

PROCEDURE

1. Place the patient on a warm, padded area. Provide heat support as needed.
2. Extend the neck.
3. Loosen the tie or band securing the endotracheal tube.
4. Continue monitoring vital signs, reflexes, and muscle tone recording results on the recovery record.
5. Observe for return of swallowing reflex.

6. Deflate the endotracheal tube cuff when the patient begins exhibiting swallowing movements.
7. Extubate when a strong swallow or cough is observed.
8. Administer medications as prescribed by the veterinarian.
9. Continue to observe the patient and monitor vital signs.
10. Continue to administer IV fluids as prescribed.
11. Apply honey or corn syrup to the gums as instructed by the veterinarian.
12. Report any concerns or patient abnormalities immediately to the technician and the veterinarian.

FOLLOW-UP

1. Complete all forms and medical record notes.
2. Notify the technician and veterinarian when the patient is extubated and sternal.
3. Patient-side monitoring may be discontinued at this time, but the patient should still be frequently observed.

TASK 19.1.1 EXTUBATION

Concept: Anesthetized patients are intubated in order to deliver anesthetic gases, collect exhaled waste gases, and protect the patient's airway.
Discussion: Patients who are unable to protect their own airways by coughing, gagging, and swallowing should have an endotracheal tube in place with the cuff correctly inflated. This helps to ensure that material in the mouth and oropharynx (such as vomitus, saliva, and water generated during dental procedures) cannot be aspirated into the lungs. Aspiration can cause both immediate and delayed respiratory complications, up to and including death. Remember: if the patient can't protect their own airway, then we must do so for them!
Concept: The endotracheal tube can save a patient's life but can also endanger it if the tube is left in place too long. Anesthetized patients require constant monitoring while they are intubated.
Discussion: Careful observation is vital to know when the time is right for extubation. The patient should be able to cough and gag but should not be awake enough to bite down on the tube. Endotracheal tubes and tube fragments can be inhaled or coughed up and swallowed, necessitating additional anesthetic and surgical procedures to retrieve them.

Note: If the patient begins chewing while the endotracheal tube is in place, *do not* reach into the mouth to grab the tube. Immediately yell for assistance and try to keep the animal from closing its jaws on the tube. Pull on the portion of the tube that is outside of the mouth to remove the tube.
Concept: The cuff must be inflated in order to protect the airway but must be deflated prior to removal.
Discussion: Extubating a patient with the cuff inflated can cause tracheal irritation, laryngeal irritation (especially cats), and tracheal tears with resulting subcutaneous emphysema formation. The cuff should remain inflated until just before the endotracheal tube is removed. Having an empty syringe attached to the indicator balloon can facilitate smooth deflation and extubation once the patient begins swallowing.

Concept: Careful monitoring immediately after extubation is essential to ensure that the patient is able to breathe adequately. Maintain the body in a position with the head and neck extended after extubation.

Discussion: Patients can develop laryngospasm or other airway complications (especially brachycephalic breeds) after the tube is removed. If this happens, the patient will likely require reinduction of anesthesia and reintubation. Notify the veterinarian immediately if the patient's respiratory rate, pattern, or effort changes after extubation; if the patient's gums become pale or cyanotic; or if breathing is loud. If the patient starts to vomit, make sure to lower the head so fluid runs out.

Procedure

Location: Patient recovery area

PREPARATION

1. Have an empty syringe ready for endotracheal tube cuff deflation.
2. Monitor the patient closely and carefully to determine the right time for extubation.
3. Keep the patient close to a source of oxygen in case of emergency.

PROCEDURE

1. Loosen the tie or band securing the endotracheal tube in place.
2. Deflate the cuff indicator balloon just prior to extubation.
3. Remove the tube with a smooth motion during patient exhalation.
4. Keep the animal positioned with the head and neck extended after the tube is removed.
5. Notify the veterinarian immediately if there are any signs of respiratory distress or if there is blood on or inside the endotracheal tube.
6. Place the endotracheal tube with the cuff deflated in a tub of soapy water to prevent secretions from drying prior to the tube being cleaned.

FOLLOW-UP

1. Continue to monitor the patient closely and carefully until the patient regains sternal recumbency or stands.
2. Use your hand to scrub the outside of the endotracheal tube with the cuff inflated; scrub the inside of the tube with a bottlebrush and disinfectant solution. If disinfectant solution is used, follow with plain water to remove all chemical residues. Hang or position upright in a tube rack to dry.

TASK 19.1.2 EMERGENCIES IN THE POSTANESTHETIC PERIOD

Concept: Anesthetic complications are more likely to occur in the recovery phase than at any other time during anesthetic procedures.
Discussion: While complications and adverse effects of anesthesia can occur at any time when a patient is anesthetized, the recovery period can be considered to be the riskiest due to a number of compounding factors: Anesthetic agents continue to exert their effects on patients; discontinuing oxygen and airway support can cause problems in patients transitioning from anesthesia to consciousness; and patient monitoring may be less diligent at this time than during the induction and maintenance phases of anesthesia.
Concept: Patients may be unable to oxygenate adequately and may develop *hypoxemia* (low blood oxygen) when oxygen is discontinued.
Discussion: General anesthesia always causes some degree of respiratory depression. Patients who are taking fewer breaths or shallow breaths due to this depression will likely still be able to oxygenate well when they are breathing in nearly 100% oxygen. However, once they are back on room air, with about 21% oxygen, they may be unable to do so. Continuing oxygen support until the patient has recovered normal respiratory function may be necessary to prevent hypoxemia in these patients. A pulse oximeter should be used during anesthetic recovery to ensure adequate saturation of peripheral hemoglobin and should only be removed when the patient is extubated and breathing normally.
Concept: Respiratory arrest may occur due to hypoxemia and respiratory depression, upper airway obstruction, and lower airway disease or collapse (atelectasis).
Discussion: Respiratory arrest is most likely to occur soon after discontinuing oxygen administration or endotracheal extubation. If the patient stops breathing, then immediate intubation and initiation of positive pressure ventilation ("bagging") using the anesthetic machine or a resuscitator (Ambu-bag™ or similar) are required. Yell for help, as full cardiopulmonary resuscitation (CPR) may be required.
Concept: Hypotension can develop or persist beyond the maintenance phase of anesthesia and can compromise oxygen delivery to the tissues.
Discussion: Blood pressure is not commonly monitored during the recovery phase of anesthesia, but if a patient is hypotensive during the maintenance phase, then treatment should be initiated at that time and continued into the recovery period. IV fluid support plays an important role in maintaining adequate blood pressure both during and after anesthetic administration. It should not be discontinued when the anesthetic is turned off. Hypotension can also develop when patient position is changed, so careful monitoring for this complication using either blood pressure monitors or evaluation of pulse quality and other perfusion parameters (mucous membrane color, capillary refill time) is essential. Early intervention is vital.
Concept: Cardiac arrhythmia or cardiac arrest may occur and may go unnoticed during anesthetic recovery if auscultation, pulse evaluation, and electrocardiogram (ECG) monitoring have been discontinued. Organ damage secondary to hypotension does occur.
Discussion: During anesthetic recovery, patients should be frequently auscultated for the presence of heart sounds and should have the pulse rate and quality assessed during auscultation. ECG monitoring often ends when the patient leaves the surgical suite, so manual monitoring is essential. If the patient develops a very slow or very fast heart rate, irregular pulses,

or loss of pulses, immediate intervention is required. Yell for help, as full CPR may be required.

Procedure

Location: Recovery room

PREPARATION

1. Have an oxygen supply, resuscitator, and crash kit nearby in case of emergency.
2. Have a system in place for reporting emergencies so that additional personnel come immediately to the patient's side when needed (such as calling out "code" or "code blue" very loudly).
3. Be sure all staff working in the surgery area knows how to respond to various emergencies.
4. Do all anesthetic recoveries within visual and auditory range of the veterinarian and other support staff.

PROCEDURE

1. Monitor all anesthetic recovery patients closely and carefully until they are extubated and maintaining sternal recumbency on their own.
2. Do not walk away from your patient or attempt to multitask while sitting at the patient's side.
3. Report all concerns to the surgery technician immediately; yell "code" or "code blue" in the event of respiratory or cardiac arrest.
4. Immediately reintubate a patient who has been extubated and stops breathing. Administer positive pressure ventilations using a resuscitator or anesthetic machine.
5. Start chest compressions if the patient is in cardiac arrest. Be prepared to provide additional interventions, such as administration of emergency drugs or fluids, as directed by the veterinarian.

FOLLOW-UP

1. Reflect back to the incident and determine if there was anything you could have done differently.
2. Ask your supervisor for input and instructions to clarify the incident and learn from it for future use.

TASK 19.2
POSTOPERATIVE PATIENT CARE

Postoperative care usually begins at the same time as postanesthetic care and continues after the patient is returned to its normal cage or kennel.

Concept: Once the surgical incision has been closed and the surgeon has stepped away from the patient, postsurgical care can begin.
Discussion: Remove the drape from the patient and carefully wipe the area with a gauze sponge soaked in hydrogen peroxide to remove blood. Do not touch the actual incision or apply hydrogen peroxide to it. Monitor the incision for continued bleeding and, if it occurs, apply pressure with dry gauze and notify the veterinarian immediately. Monitor the patient for signs of internal hemorrhage (pale gums, prolonged capillary refill time, swelling) and notify the veterinarian immediately with any concerns. Internal bleeding can cause the patient to go into shock, which must be evaluated and addressed quickly. Continue monitoring for bleeding throughout the recovery period.
Concept: Keep the patient positioned with the neck extended and the head angled slightly downward, if possible, with the cuff of the endotracheal tube inflated until just prior to extubation.
Discussion: Vomiting or regurgitation may occur while the patient is still intubated. If this happens, report to the technician or the veterinarian and tilt the patient so that the head is lower than the rest of the body. You may be instructed to extubate this patient with the cuff partially inflated. If the patient vomits or regurgitates after extubation, then tilt the patient so that gravity assists the expulsion of this material and prevents aspiration or choking.
Concept: The veterinarian may order postoperative antibiotics, analgesics, or other medications to be given in the recovery period.
Discussion: Take careful note of all medication orders and give the correct drugs and doses, by the correct routes, at the correct times. Record all of these medications in the patient's medical record, on the treatment sheet or board, or on the anesthetic monitoring form per your hospital's policy.
Concept: The recovery period, between the time of extubation and return to normal housing, is be a good time to provide basic health and hygiene procedures such as ear cleaning, toenail clipping, brushing, and mat removal.
Discussion: Follow your hospital protocol and guidelines for these additional procedures. These may be performed routinely for all patients or only at the client's request and may be associated with additional fees to the client. Record all procedures performed in the patient's medical record, on the treatment sheet or board, or elsewhere per your hospital's policy. Do not allow these nonessential procedures to interfere with your careful monitoring of the patient's anesthetic and surgical recovery.
Concept: The patient may be returned to its normal cage or kennel when able to stand.
Discussion: Standing does not indicate complete recovery from anesthesia and surgery, so regular monitoring must be continued throughout the day. Provide adequate padding and bedding, as these patients are often wobbly and disoriented.
Concept: Food and water can be offered when the patient is fully awake and standing.
Discussion: Patients may be nauseated after anesthesia and surgery, so only small amounts of food and water are initially offered. If consumed and no vomiting occurs, more can be offered later. Feed and water patients as directed by the veterinarian. Small animals and exotics will be fed soon after anesthetic recovery; others may not be fed prior to discharge from the hospital if going home on the same day.
Concept: Analgesic administration often continues for several days after surgery, and a single dose may last from a few to several or more hours.
Discussion: Continue to monitor the patient for signs of pain or discomfort, such as depression, aggression, vocalizations, guarding the painful area, panting, increased heart rate, licking the painful area, self-trauma, frequently shifting position or reluctance to move, and other physical or behavioral changes. If patient discomfort is suspected, ask the veterinarian to check the patient and give additional analgesics as the veterinarian orders. Most

postoperative patients will also be discharged from the hospital with a prescription for pain medications and instructions for their continued use.

Concept: Patients recovering from routine surgeries may be discharged from the hospital on the day of surgery or on the following day, while nonroutine or difficult surgeries may require extended hospital stays.

Discussion: Patients remaining in the hospital require basic treatment plans for feeding, exercise, and medication administration; some may also need wound or bandage care, IV fluid administration, or other procedures during their recovery in the veterinary hospital. All treatments, from feeding and walking to dressing changes, must be provided as ordered by the veterinarian and recorded in the patient's medical record.

Procedure

PREPARATION

1. Know hospital policies and procedures for postoperative patient care.
2. Have hydrogen peroxide, gauze, and bandaging material on hand.
3. Prepare the initial recovery area and the patient's normal kennel or cage with adequate padding and bedding material.

PROCEDURE

1. Clean the incision area with hydrogen peroxide. Note bleeding from incision and notify the veterinarian if it occurs. Apply pressure with clean gauze and bandage if ordered by the veterinarian.
2. Transfer the patient to the anesthetic recovery area and monitor anesthetic recovery as described in Chapter 10.
3. Monitor the patient for signs of internal hemorrhage and shock. Notify the veterinarian immediately with any concerns.
4. Administer any additional treatments ordered by the veterinarian and procedures requested by the client. Record all procedures performed and medications administered in the appropriate area.
5. Return the patient to its normal cage or kennel once recovered from anesthesia and standing. Continue to monitor regularly; at least hourly postoperative patient rounds are recommended, as anesthetic and surgical complications are most likely to occur within the first 3–6 hours after the procedure.

FOLLOW-UP

1. Complete all paperwork or medical record entries for the patient's care and create a postoperative care sheet or plan per your hospital's policy for patients staying overnight in the hospital.
2. If any orders are unclear or missing or you have any concerns regarding the patient's continuing safety and comfort, consult the veterinarian for clarification and additional orders.

TASK 19.2.1
CLIENT COMMUNICATION

The veterinary assistant may be responsible for any or all of the following: calling the client after surgery with a progress report and to schedule a discharge appointment, discharging the patient to the client at pickup time, and calling the client the day following discharge to get a progress report and schedule any necessary follow-up visits.

Concept: For routine surgeries without complication, the veterinary assistant may be assigned to call clients with a progress report once the patient has initially recovered and has been returned to its normal kennel or cage.

Discussion: Generally, this phone call is to inform the client that the surgery has been completed and to reassure them that their pet did well. Clients may be very nervous about leaving their pet for surgery and won't relax until receiving this report, so make it a priority—a brief, reassuring phone message is often adequate. Be ready to answer the question, "when can I pick up my pet?" If there were any complications or if the surgery was not routine, the veterinarian should make this phone call.

Concept: At the time of discharge, provide clients with both written and verbal instructions for home care of the pet.

Discussion: Most hospitals have a standard form providing postoperative care instructions; this form should be personalized for each patient and should include medication instructions, feeding and watering instructions, exercise restrictions or allowances, instructions for monitoring the incision and preventing licking/chewing (such as use of an Elizabethan collar), and signs of complications or an emergency. Clients should be encouraged to call with any questions and given after-hours contact information for the on-call veterinarian or emergency service.

Concept: The patient should be clean and the IV catheter removed at the time of discharge. Patients should be standing and walking before they leave the hospital.

Discussion: Clients have no way of judging the quality of a surgical procedure other than by the appearance of their pet after it is over. Be sure that blood has been cleaned away from the incision area and venipuncture sites, there is no soap or antiseptic residue on the skin or in the fur, the patient's eyes are clear of residual ointment, and the coat is well brushed. The patient should be ambulatory though may still be slightly wobbly or seem slightly "out of it" to the owner. Explain to clients that this is expected and that their pet should return to normal attitude within 24 hours. If the client remains concerned, consult the veterinarian.

Concept: Clients should be called the day after their pet has been discharged from the hospital to get a progress report, answer any questions or concerns, and make or confirm the follow-up appointment if one is required.

Discussion: This phone call is an opportunity to determine whether the patient has continued to recover normally at home and address any questions or concerns that the client has regarding their pet. If the client reports any problems, consult a veterinary technician or veterinarian to determine what measures should be taken. The patient may need to be seen for reevaluation. If no problems are reported, then the regularly scheduled follow-up appointment can be made or confirmed, if one is needed. Not all patients need to be seen after routine surgeries; the most common reason for follow-up appointment after elective surgery is suture removal.

Procedure

Location: Phone station or a private area away from the public areas of the clinic

PREPARATION

1. Have the patient medical record on hand before calling the client so that accurate information can be given and notes made regarding the phone call.
2. Before discharging the patient, have home care instruction sheets ready and prescriptions for medications filled.
3. Confirm that the patient is clean, catheters removed, and ambulatory prior to discharge.

PROCEDURE

1. Call the client after surgery is completed per hospital policy and procedure. *Note*: This conversation is written into the patient's record. Always date and initial your entry.
2. Prior to discharge, clean the incision area of blood and remaining soap or antiseptic residue. Remove the IV catheter and clean the venipuncture sites. Clean the eyes and brush the coat as necessary.
3. Provide written discharge instructions to the client but verbally discuss all aspects of postoperative care with the client. Show the client the incision and explain how to monitor it. Show the client all the medications prescribed and, if needed, review medication administration techniques. Explain normals and abnormals of recovery. Be sure that the client knows to call with any questions and has contact information for after-hours emergency care, should it be needed.

FOLLOW-UP

1. Call the client the day after discharge for a progress report on the patient and answer any questions that have arisen. If the client reports any problems, consult a veterinary technician or veterinarian to determine whether the patient should return to the hospital for reevaluation.
2. Make or confirm follow-up appointments, as for suture removal, if needed.

TASK 19.2.2
SUTURE AND STAPLE REMOVAL

Concept: Not all patients require suture removal after surgery.
Discussion: This depends on the location and type of sutures placed. If skin sutures or staples are present, they are generally removed 7–14 days after surgery, although timing can range from 1–3 weeks and occasionally longer.
Concept: Patients with skin sutures should be scheduled for a suture removal appointment at the time of discharge.

Discussion: Suture removal appointments should be made in advance according to hospital policy and procedure. Patients with subcuticular closures do not need to come in for suture removal, but the veterinarian may wish to see the patient for postsurgical follow-up anyway. Schedule these appointments based on hospital policy and veterinarian preference.
Concept: Suture removal appointments may be handled by veterinary technicians, or patients may be presented for suture removal without an appointment.
Discussion: No matter how these procedures are handled, the veterinarian should evaluate every incision and confirm that the incision has healed properly and closures can be removed. The veterinarian may or may not need to speak to the client at this time.

Note: Don't assume that it is okay to remove closures just because the appropriate amount of time has passed since sutures or staples were placed. Several factors may lead to delayed wound healing, so the veterinarian should look at all incisions and approve all suture or staple removals.
Concept: Sutures are removed with scissors designed for this task. Staples should only be removed with a surgical staple remover.
Discussion: Use the correct tool for the job. Suture removal (Littauer or Spencer "stitch") scissors have a scooped blade, which slides under the suture to be removed on one side, and a blunt-tipped blade on the other side, minimizing the chances that the patient will be inadvertently cut by the scissors. Surgical staple removers have a blunt tip that slides under the staple and jaws to unbend the staple ends so that the staple can be lifted gently from the skin. Using the wrong tools can make removal very difficult or traumatic to the patient.

Procedure

Location: Examination room

PREPARATION

1. Gather the instruments needed for suture or staple removal: stitch scissors and thumb forceps or hemostats for sutures and a surgical staple remover for staples. You may also need saline-moistened gauze to remove exudate from the incision so that you can see all of the sutures and staples clearly.
2. Show the incision to the veterinarian before removing sutures or staples. The closures are not necessarily ready to come out just because the right amount of time has passed.

PROCEDURE

1. To remove a suture, first grasp one of the free ends of the knot and pull on it gently. Slip the scooped blade of the stitch scissors under the suture, away from the knot, and cut the suture. Pull the cut suture by the knot through the skin until the entire suture is free.
2. To remove a staple, insert the blunt end of the staple remover under the flat part of the staple. Squeeze the jaws of the remover until the staple loosens, then remove it by pulling straight up. If the staple has rotated or is buried, consult the veterinarian before trying to remove it.

FOLLOW-UP

1. Note the date of suture removal in the patient's medical record, with general appearance of incision; initial entry.

TASK 19.3
STERILIZATION AND STERILIZERS

Concept: There are several different ways to sterilize tools and equipment. The method used will depend upon the material to be sterilized and available equipment.
Discussion: Sterilization is the process of removing or destroying all microbial life from a surface. This generally requires the use of harsh environmental conditions or chemicals, which may be harmful to humans or ineffective if used improperly. The three most common in-hospital sterilization methods are autoclave, ethylene oxide (ETO) gas, or using chemicals (glutaraldehyde).
Concept: The autoclave is used for items that will not be damaged by heat and moisture.
Discussion: Most surgical instruments, drapes, and gown packs can be autoclaved. An autoclave is a closed stainless steel chamber in which distilled water is heated beyond the boiling point. The steam displaces air and generates pressure, forcing the steam into the packs, where it touches every surface and kills bacteria, viruses, fungi, and spores.
Concept: Sterilization in the autoclave requires a combination of heat, pressure, and time.
Discussion: Always follow the manufacturer's specific instructions for the proper use of the autoclave. Generally speaking, the minimum exposure is: 250°F, 15 psi,* 15 minutes (conventional autoclave) to 270°F, 30 psi, 3 minutes ("flash" sterilization). The thicker the pack, the longer it takes for the steam to reach the center of the pack for the minimum of 15 minutes. For example, a gown pack is fairly thick; in order to be sterilized, it usually needs to be in an autoclave for 30–40 minutes.
Concept: ETO gas can be used for heat and moisture-sensitive items, for example, those containing plastic, rubber, or electrical equipment.
Discussion: ETO is a toxic chemical gas that requires careful use in a sealed chamber with venting to the outside. The Occupational Safety and Health Administration (OSHA) requires operators of ETO sterilizers to wear dosimeter-monitoring badges to ensure that working environments are not contaminated with hazardous levels of this gas. The most common type of ETO sterilizer in veterinary hospitals is the Anpro™ unit. Always follow the manufacturer's specific instructions for the use of an ETO sterilizer. Generally speaking, items are packed and wrapped with ETO appropriate packaging and chemical indicators. Items are placed in a heavy plastic bag with an ETO ampule. A vacuum tube is inserted into the bag and the bag is sealed around the tube. The vacuum is activated to remove air from the bag; the ETO ampule is broken, the bag is sealed and locked within a stainless steel chamber for 12–24 hours. At the end of the sterilization cycle, the ETO gas is purged from the bag to the outside. After the purging cycle, items are removed

*Pounds per square inch.

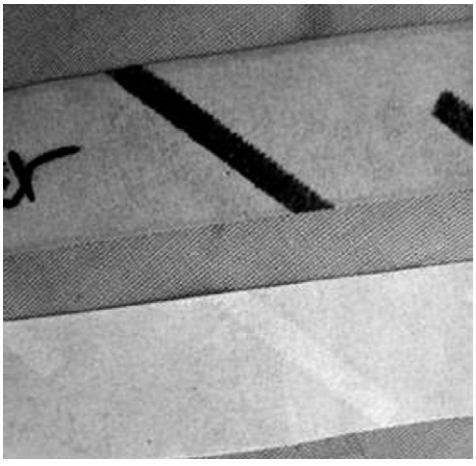


Figure 19.1. Sterilization indicators. Used to confirm that a surgical pack is sterile. The chemical strip turns black when it has been exposed to the right temperature and pressure for the correct amount of time. Photo courtesy of Teresa Sonsthagen.

from the chamber and plastic bag. Items must be allowed to "outgas" for an additional 24 hours in a well-ventilated room prior to use.

Concept: There are other methods of sterilizing equipment, such as hydrogen peroxide plasma gas and cold (liquid) sterilization for endoscopic equipment.

Concept: Resterilization may be required for items that have been previously sterilized but unused within a certain time frame.

Discussion: There are many variables that affect the duration of sterility including wrapping or packing material and storage conditions. No. 1 rule: If in doubt, consider it unsterile. There are few absolute rules, so follow the policies and procedures established for your hospital. When items are to be resterilized, remove the old indicators and replace them before reprocessing.

Concept: Sterilization indicators are used to confirm that correct sterilization parameters have been achieved (Fig 19.1).

Discussion: Since it is impossible to determine by looking whether an item is sterile or nonsterile, we rely on indicators to tell us when items should be sterile. There are several types of indicators and they provide different types of information. Chemical or sterilization indicators are used outside of packaged items to indicate that they have been processed through the autoclave. They do *not* guarantee the sterility of the items; these indicators typically develop color when exposed to certain temperatures—this does not assure that the correct temperature and pressure were maintained within the autoclave for adequate time for sterilization. Steam indicators used on the inside of the pack generally develop only when exposed to steam (heat) for a certain amount of time and can more reliably indicate the sterility of the items in the pack. The most effective indicator is biological. Biological indicators contain heat-resistant bacterial spores that will be killed only under proper autoclave conditions. No growth in a biological indicator system provides the best assurance that sterilization has been achieved.

Procedure

Location: Pack preparation area

PREPARATION

1. Choose the appropriate method of sterilization for each item. Package appropriately with the correct indicator types on the inside and outside of the pack.
2. Follow all manufacturers' instructions for correct and safe use of the sterilizer.
3. Check indicator strips and package integrity before storing or using packs. When in doubt, resterilize!

PROCEDURE

Autoclave

1. Fit items loosely into the chamber. A good rule of thumb is to leave an inch of space on all sides of the pack. Do not stack packs on top of each other as this prevents adequate steam penetration.
2. Fill the water reservoir to the appropriate level with distilled water. Do not use tap water as it leaves mineral residues that compromise the function of the unit.
3. Fill the bottom of the autoclave chamber using the "fill" function of manual autoclaves. This is not required for automated units.
4. Close the door and, if necessary, hand-tighten the latch so that steam does not escape through the door, but avoid overtightening as this puts undue stress on the unit.
5. Activate the sterilization cycle and set the temperature and timer (for manual units).
6. At the end of the sterilization cycle, activate the venting cycle. Once pressure has returned to zero, open the door slightly and activate the drying cycle or simply allow cooling and drying naturally before removing items for storage or use.
7. Never put damp or wet items away—place on a rack to dry thoroughly before storing.

ETO Sterilizer

1. Place all packed and wrapped items into the plastic bag supplied for your unit.
2. Put on dosimeter badge or turn on permanent environment monitor.
3. Place the ETO ampule (which often comes wrapped in its own pack and bag) in the bag, but do not break it. *Handle with care*.
4. Insert the purge (vacuum) tube into the bag and seal the bag around this tube.
5. Put the closed bag in the chamber and, while the chamber is still open, activate the purge cycle.
6. Break the ETO ampule through the plastic bags. Be careful not to tear the plastic.
7. Close and lock the chamber and start the timer.
8. After the sterilization and purge cycles are complete, remove the items from the bag and store in a well-ventilated room for an additional 24 hours prior to use.

TASK 19.4
CLEANING AND PREPARING INSTRUMENTS AND SUPPLIES

Concept: Instruments must be cleaned after use in preparation for sterilization.
Discussion: Used and contaminated instruments should be soaked in distilled water (cold tap water may be used, but impurities in the water can discolor and pit the instruments, shortening their working life) immediately after use to prevent drying and hardening of blood, fluid, and tissue on the surfaces. Instrument cleaning solutions or disinfectant solutions may be is added at this time.
Concept: Instruments are cleaned mechanically or manually.
Discussion: Manual cleaning with a designated stiff-bristled brush can be used. Particular attention to crevices and hinges is required, as debris tends to accumulate there. Mechanical cleaning with an ultrasonic cleaner may also be used. Carefully follow the manufacturer's instructions regarding appropriate water level, cleaning solution dilution, timing, number of instruments, and metal types per load.
Concept: After cleaning, instruments are rinsed, lubricated, dried, and tested prior to packing and wrapping.
Discussion: Rinse instruments with distilled water and then spray with a water-based instrument lubricant (*not* general-use lubricants, which contain oil) or dip for 30 seconds in a fresh lubricant solution (often called "instrument milk" because of its appearance). Instrument lubricant stored in tubs becomes contaminated quickly, supports microbial growth, and should be discarded daily. After applying lubricant, allow to air-dry or carefully blot. Cutting and locking instruments should be tested before packed, as edges will become dull over time and hinges will weaken. To test scissor tips, cut through two gauze sponges. The scissors should cut cleanly and easily through the gauze. To test locking instruments, engage the first box lock and lightly tap on the palm of your hand. The instrument should remain locked and should not spring open. Needle holders are tested by clamping a suture needle with the second lock and then trying to twist the needle in the jaws. If the needle moves or can be turned, the jaws are sprung and the needle holder should be disposed of. If instruments do not pass this test, consult the veterinarian or office manager about sharpening, repair, or replacement.

Procedure

Location: Pack preparation area

PREPARATION

1. Collect all necessary materials: neutral pH instrument cleaner, disinfectant solution, distilled water, and instrument lubricant.
2. Prepare and test the ultrasonic cleaner according to the manufacturer's instructions, if used.

PROCEDURE

1. Upon completion of each surgical procedure, collect and place all instruments in distilled water and precleaning solution. Be sure to safely remove the scalpel blade from the handle and discard if the surgeon has not already done so before adding the rest.
2. Clean instruments manually then place them in the ultrasonic cleaner using appropriate tools and solutions.
3. Rinse instruments again in distilled water, dry, then apply instrument lubricant.
4. Carefully blot or allow to air-dry.
5. Test instruments prior to repacking and notify the veterinarian or the office manager if any instruments fail.

FOLLOW-UP

1. Keep instruments together from the packs if they are not identified with colored tape, bands, or engraving. This makes repacking faster and easier.

TASK 19.5 IDENTIFYING SURGICAL INSTRUMENTS

Concept: Pack contents vary with the preference of the surgeon and use of the pack.
Discussion: Most practices have general surgery packs and specialty packs of instruments, with specific contents described by name and number in the pack on a list in the surgical prep area. Additionally, instrument sets are often labeled with colored instrument identification tape, colored rings, or engraved codes.
Concept: There are hundreds of different surgical instruments available but a few common types of instruments found in veterinary general surgery packs. You should be familiar with common instruments by name and appearance.
Discussion: Common instruments include grasping, cutting, and special-use instruments (Fig. 19.2).

Grasping instruments are called forceps, and there are two basic types. Thumb forceps resemble tweezers and they have variable tips, with serrations or teeth, depending on their use. (See Fig. 19.2 G & H) Locking forceps have rings and a ratchet (lock) and hinge (box). (See Fig. 19.2 A, B & C) Needle holders, (See Fig. 19.2 K) hemostats, intestinal clamps, sponge forceps, and towel clamps (See Fig. 19.2 L) are all locking forceps. These instruments vary by size, body type, curve, jaw type, presence of serrations or teeth, as well as by use.

Cutting instruments are further divided into scissors and scalpels. Scissors vary by size, body type (long and slender or thick and stout), curve (straight or curved), and tips (sharp/sharp, blunt/blunt, and sharp/blunt) (See Fig. 19.2 I & J).

Special-use instruments include spay hooks, (See Fig. 19.2 F), groove director (See Fig. 19.2 E), retractors, and various orthopedic and ophthalmic instruments.

Scalpel blades will not be included in the instrument pack but will be opened separately onto the sterile field by a nonsterile surgical assistant. Scalpel handles are designed to fit specific sizes of blade; both can be identified by number. For example, a number 3 scalpel



Figure 19.2. Surgical instrument pack. A. Rochester carmalt. B. Crile or Kelly forceps. C. Halstad mosquito forceps. D. Scalpel handle. E. Groove director. F. Snook hook. G. Dressing thumb forceps. H. Adson–Brown or Adson thumb forceps. I. Metzenbaum scissor. J. Operating scissor (sharp/sharp). K. Mayo–Hegar needle holder. L. Backhaus towel clamps. Photo courtesy of Teresa Sonsthagen.

blade handle is used for number 10, 11, and 15 scalpel blades. (See Fig. 19.2 D) A number 4 or 8 handle will accommodate a 20, 21, or 22 blade, which are considered large animal scalpels and blades. Surgical blades come in various sizes and shapes. The number on the blade's packaging tells you the size and shape of the blade. Always ask the surgeon the choice of blade size (Fig. 19.3).

Concept: The sterile blade is never handled until the blade is discarded.

Discussion: One end of the scalpel handle, there is a narrow tip with a groove. The tip is grooved to fit the corresponding hole in the scalpel blade. To remove a scalpel blade from its handle, use a needle holder or larger forceps to grasp the corner of the blade. Lift the corner upward and push the blade forward over the tip with the forceps. Once it is free from the handle, discard into a sharps container. *Caution: Blades are sharp. Handle carefully*.

Concept: Suture needles come in a variety of sizes and shapes.

Discussion: A swaged-on needle is one that has been attached to the suture material in the factory. Some surgeons prefer this style as it reduces time in threading a suture needle and there is less drag as the suture is pulled through the tissue as the thickness of the suture and needle are less than with an eyed needle.

Eyed needles must be threaded and come in two different eye forms. The regular eye is a single eye much like a hand sewing needle. The French eye has a regular eye with an eye below it, which the suture material can be snapped into through a flexible side hole. This reduces the likelihood of the suture material slipping out of the first eye (Fig. 19.4).

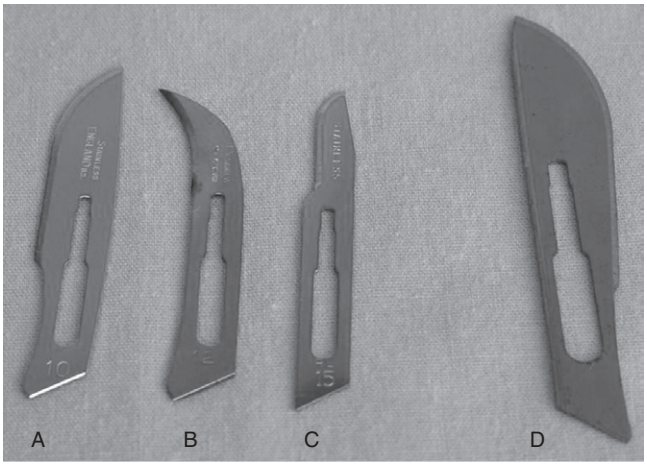


Figure 19.3. Scalpel blades. A. 10. B. 11. C. 15. D. 20. Photo courtesy of Teresa Sonsthagen.

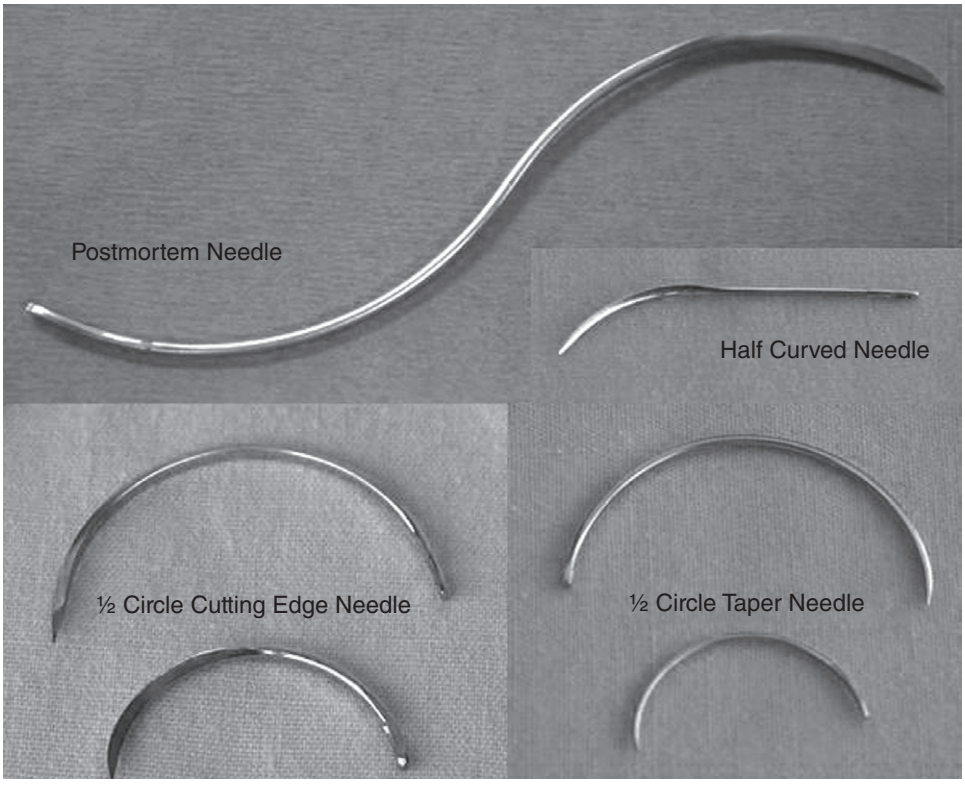


Figure 19.4. Postmortem needle, ½ curved cutting, ½ circle taper, ½ circle cutting suture needles. Photo courtesy of Teresa Sonsthagen.

The needle shapes can range from a straight needle to one that is "J" shaped, referred to as a ½ curved to those that are some part of a circle. They are called ½ circle needles. Each shape facilitates the passage of suture material through tissue and the use of various suture patterns. All have specific purposes.

Concept: The tip of the suture needle opposite the eye can be taper point or cutting edge.

Discussion: The characteristic of the preferred needle's end is determined by the tissue through which it must pass. A taper point is used for organs and other "interior" tissues. A cutting edge is used to suture skin; it is flat and so slides through tough animal skin easier than the rounded taper points.

Concept: Surgeons may use several types of suture needles during one surgery.

Discussion: A variety of needles can be placed in a needle holding rack and autoclaved with the rest of the instruments in a pack.

Concept: Needle holders come in a variety of shapes.

Discussion: Sometimes called needle drivers, these instruments are used to push a suture needle through tissue and then tie the suture into a knot. Some come with scissors behind the jaws.

TASK 19.6
SURGICAL PACK ASSEMBLY

Concept: Instrument packs are wrapped in cloth or specialty paper that is infused with a plastic to maintain sterility.

Discussion: Instrument packs are always double wrapped; everything else is single cloth wrapped. No matter how you wrap the pack, the idea is that anyone in the hospital can open the pack without worry of contaminating what is inside the pack.

All packs should be labeled as to what is inside of them, dated, and initialed. This helps in identifying the contents of the pack, how long it has been sterilized, and who put the pack together, so if there is a question or problem with the pack, personnel will know who to go ask.

Concept: Packs should be created so that the surgeon has easy access to its contents.

Discussion: Like instruments are grouped together in the pack and are organized neatly from shortest to longest, and the loose instrument is positioned at the top or bottom of the stack. Instruments with locks are left unlocked. An instrument ring, towel clamp, or spay hook can be put through the rings of the other instruments to keep them neatly stacked.

Concept: Clinics will usually have a major or spay pack that is used for opening the abdomen and a minor or neuter pack used for opening the skin and muscles only.

Discussion: These packs are used or must be available every day, and so it is important to clean, put them back together, and sterilize them as soon as possible.

Some clinics will also have a suture pack that is used to remove skin tumors or to close lacerations. Each clinic or doctor will have his or her own idea of what should be in a surgical pack. It is our job to make sure they get the combination of instruments they prefer.

Instrument packs are wrapped in two layers. The sterile technician or surgeon *only* opens the inner layer. The outer layer protects the sterility of the inner layer and pack contents. Pack wraps may be cloth or paper but must be specifically designed for surgical use; both materials have advantages and disadvantages. Be sure that the material is compatible with your sterilization techniques and equipment.

Assembling Instrument Packs

Concept: There are many ways to assemble surgical instrument packs.

Discussion: There are two basic techniques for wrapping packs, square and diagonal or "envelope" technique. Either is acceptable; the method should be consistently used in the veterinary hospital so that the packs are always put up and opened for use in the same way. Follow the clinic's procedure for the number of instruments, gauze, and other items they want inside their instrument pack. The following is a suggestion for organizing the instruments inside the pack:

1. Spread out two large wraps, on the diagonal, one on top of the other on a table top.
2. Place a blue linen towel folded in half in the center of the top wrap.
3. Gather the required instruments for the specific pack. Organize the hemostats/needle holder/towel clamps together from longest to shortest. Thread the longest of all the instruments into one ring of each handle. Make sure the instruments are *not* locked.
4. Lay the instruments onto the center of the top wrap. Place the loose instruments against the side of the instrument holding the ringed instruments together.
5. Put a sterilization indicator on top of the instruments.
6. Set the *correct size and amount of gauze sponges* on top of the instruments and indicator.
7. To wrap the pack, pull the corner closest to you over the instruments and fold it back so it covers the edge of the instruments away from you with the corner pointing at you but not over the edge. If the corner is over the edge, make another fold so it stays on top of the pack. Fold one side over the pack then fold the corner back so it doesn't stick out over the edge. Fold the last corner over the top of the pack, grasp the material at the edge of the pack, then fold the material under, creating a flap with the last corner under the flap (Fig. 19.5).
8. Repeat with another layer of wrapping.
9. Secure the outside with a strip of autoclave tape. Tape the packs closed with autoclave tape and mark it with what's inside the pack, date, and initials. The tape does *not* have to be extra long, about 2–3 in.; tab one end of the tape and place that end "on the top" of the pack. This allows you to open the pack easier as the autoclave makes the tape extremely sticky. This tape has a chemical stripe that turns black when it has been through the autoclave sterilization process (Fig. 19.6).
10. Gowns and drape packs are single wrapped using the technique described earlier.

Concept: Gauze, bowl, drape, towels, or other supplies may be included in the pack.

Discussion: If gauze sponges are included, they *must* be counted and the number of gauze sponges in the pack indicated on the pack label. *The number of sponges that go into a pack must come out after surgery. This includes both used and unused sponges*. If the numbers don't match, a hunt for the missing gauze is undertaken and it is hoped they are in the garbage can and not the patient!

Tip Box 19.1: **Gauze sponge formula: what goes in = what goes out. *Always!***

Paper drapes are cut to a specific size and both cloth and paper drapes are fan folded for placement in the pack. Huck towels should also be fan folded. Bowls should be placed upside down to prevent condensation in the bowl.

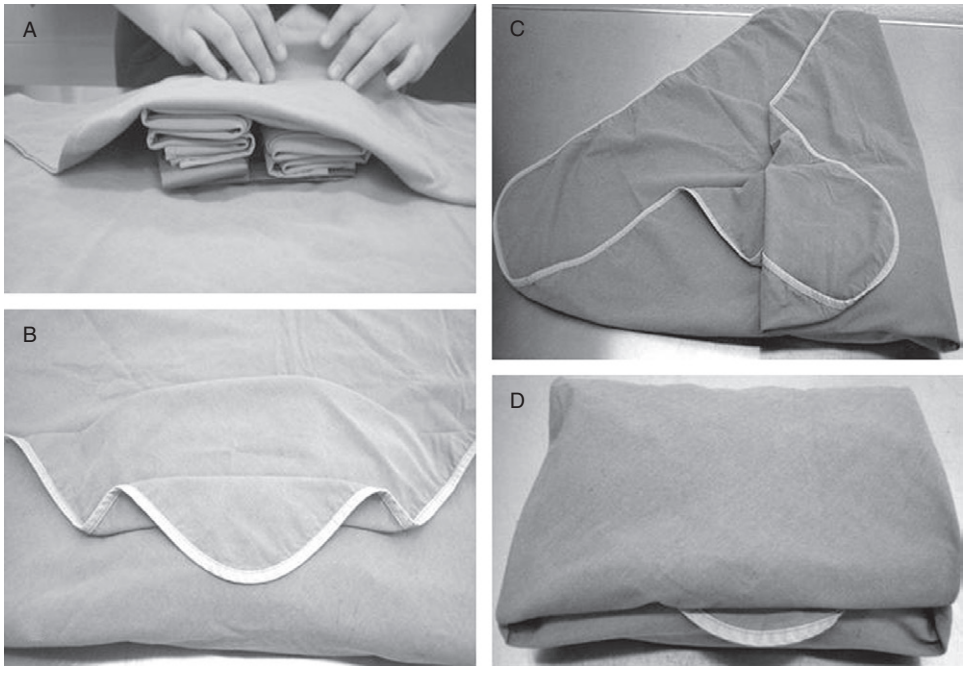


Figure 19.5. Folding a surgical pack. A. First fold the corner closest to you so it just covers the contents, then edge it even with the contents. B. The point must be situated toward you or away from the contents of the pack. C. Second and third folds bring the sides across the pack. D. The final fold can be tucked or just folded over and taped. Photos courtesy of Teresa Sonsthagen.



Figure 19.6. Autoclave Tape. This tape is used to indicate that a surgery pack has gone through the autoclave. The chemical stripes turn black. Photo courtesy of Teresa Sonsthagen.

Assembling Gown Packs

Concept: Gowns are worn to give the surgeon a sterile field that extends from the shoulders to the waist and down to the wrists (Fig. 19.7).

Discussion: The gowns are folded inside out so surgical personnel only touches the inside of the gown with their arms and body. One or two paper towels or one linen cloth towel is placed on top of the gown to allow the surgical personnel to dry their hands and arms before

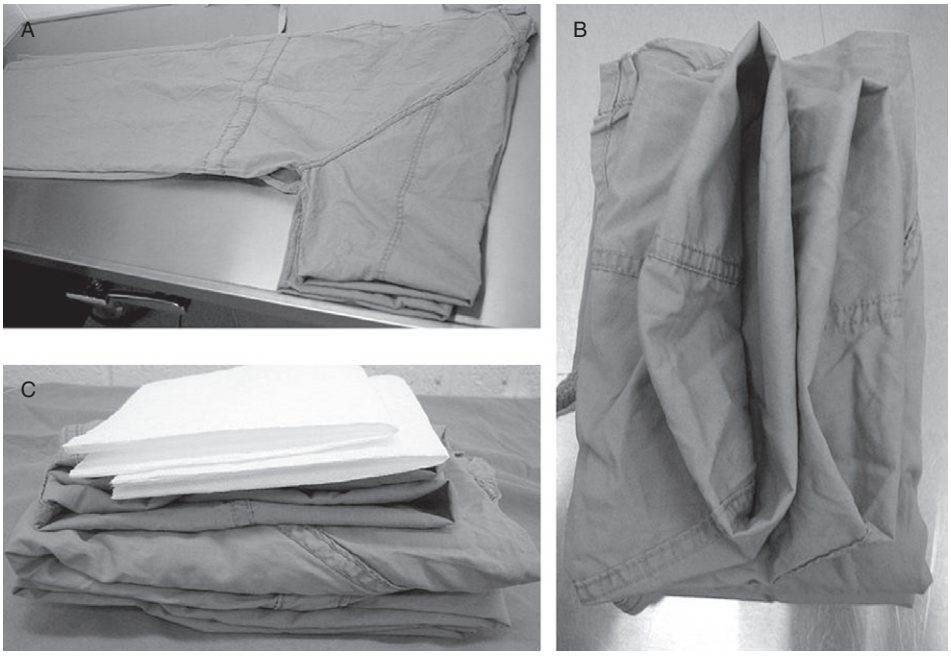


Figure 19.7. Folding a gown. A. Pull the sleeves inside out and bring them together, then fold the gown in half once and then in half again. B. Accordion fold gown ending up so that the sleeves are on top. C. Fold a towel and place it on top of the gown. Then wrap as per Figure 19.4. Photos courtesy of Teresa Sonsthagen.

putting on the gown. Some surgeons prefer to have their towels included in their scrub brush pack if using reusable scrub brushes. The sterilization indicator goes into the center of the gown so that you can be sure that it has been sterilized through all of the layers.
Concept: There are a number of ways to fold a surgical gown.
Discussion: This is one suggestion: Open the gown up so it is turned right side out and put your arms about halfway into the sleeves like you would if you are going to put it on. Grasp the inside of the sleeves with your hands and pull the sleeve inside out about 8–10 in.

Assembling Drapes

Concept: Drapes are used to create a sterile field over the incision site on the patient.
Discussion: The drapes can be made of cloth or a special plastic-infused paper. The cloth drapes can have either a rectangular, square, or circular *fenestration*. The paper drapes can be cut to any size and the fenestration to any shape, making them very versatile.
Concept: Drapes are folded in an accordion pattern so that they are easy to open without a lot of flopping around.
Discussion: Drapes must cover the patient from at least the axillary area down to the rear toes for abdominal surgery or to cover most of the body if being used for limb surgery. The cloth drapes come in a variety of sizes and the paper drapes are cut long enough to meet that requirement.

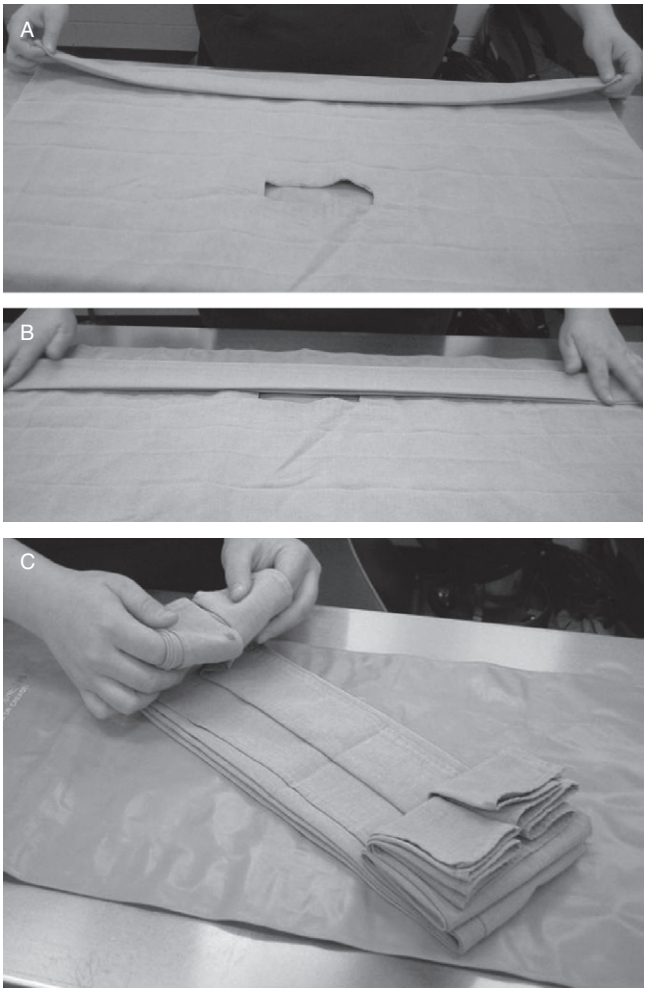


Figure 19.8. Folding a cloth drape. A. Accordion fold one side of the drape to the middle of the fenestration. B. Repeat on the other side. Make sure the corners are pointing out. C. Accordion fold ends to meet at fenestration. D. The fenestration should be somewhat centered when finished. E. Accordion fold four paper drapes first lengthwise and then widthwise. F. Each will end up as a small square and is placed on top of the cloth drape. (This technique is used if only paper drapes go into the packs.) Photos courtesy of Teresa Sonsthagen.

Some clinics will double drape. This means that paper drapes are included in with the cloth drape. The paper drapes are secured with towel clamps around the incision site first, and then the cloth drape goes over that. It is a good technique to use for catching blood or other fluids before they get to your cloth drape, and they are an excellent means of protecting the incision site from contamination.

Drapes with fenestrations are folded so the fenestration is centered on the bottom (Fig. 19.8A–D).

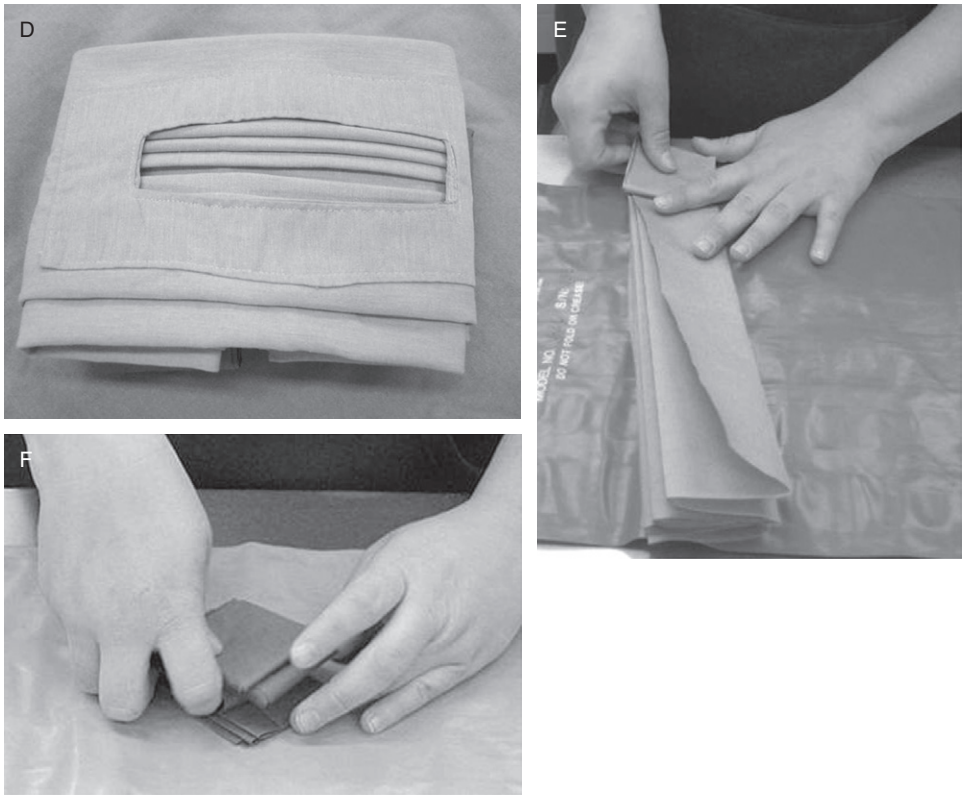


Figure 19.8. (*Continued*)

The corners are pointing out so the surgical personnel do not touch each other while grasping them to pull the drape flat. The accordion fold allows the drape to "fall" open and not catch. A sterilization indicator is placed at the center of the drape again to make sure it has been sterilized through and through. The paper drapes are accordion folded first widthways then lengthways (Fig. 19.8E,F).

The drape is wrapped in a small cloth wrap as previous explained.

Ancillary Instruments

Concept: Individual instrument pouches are specialized envelopes with a clear window on one side and a special steam-resistant paper on the other side (Fig. 19.9).

Discussion: These envelopes can be sterilized in either an autoclave or ETO chamber. It is important to include the sterilization indicator for whichever technique you are using. Cover sharp points with either manufactured tip covers or gauze sponges. Label the envelope with the contents, the date, and initials. Place the instrument in the pouch with the handle toward the end that will be opened for the surgeon or sterile technician to make it easier to grasp.



Figure 19.9. Ancillary instruments pouches. Photo courtesy of Teresa Sonsthagen.

Procedure

Location: Pack preparation area

PREPARATION

1. Prepare a card for your reference book entitled "Surgical Pack Contents."
2. Review the instrument and content list for the packs to be assembled. Mark your card with the appropriate list of contents for each pack.
3. Clean, dry, lubricate, and test all instruments in a pack.
4. If surgical needles are included in the pack, inspect them for burs (tips are bent over) and replace them as needed. These are placed in a separate envelope or stuck into a rolled piece of gauze or on a needle holding rack so that they are contained and remain organized during pack processing.
5. Gather materials: sterilization pouches, paper or cloth wraps, chemical or steam indicators, and autoclave tape. For disposable drapes, ask the length of the fenestration desired or even if the fenestration is to be omitted.
6. Pen.

PROCEDURE

1. Fold packs as described earlier or as per your facility's policies.
2. Label, date, and initial packs to identify the contents and length of time inside a pack.

3. Autoclave packs.
4. Put packs away after they have dried thoroughly. Rotate your packs so the oldest are used first.

FOLLOW-UP

1. After use, fabric drapes are cleaned in the following manner:
   a) Pretreat blood spots with hydrogen peroxide.
   b) Soak in cold water at least 30 minutes.
   c) Surgical laundry is washed as a separate load from the rest of the hospital laundry. This includes surgical gowns, wraps, drapes, scrubs, fabric caps, and masks. Linen hand towels may be included but *not* regular bath towels. These produce a lot of lint which can drop into the patient if on the drapes and wraps.
2. Use hot water and regular detergent to wash.
3. Dry with or without a static cling sheet as per your clinic's policies.
4. Fold until use or repack the items needed for surgery and sterilize.
5. Paper gowns, drapes, and disposable gloves are discarded in the hazardous waste container.

TASK 19.7 POSTOPERATIVE SURGERY ROOM CLEANING

Routine surgical suite maintenance is addressed in Chapter 18, "Pre- and Perisurgical Skills."
Concept: The surgery room must be cleaned after each procedure is completed and set up for the next surgery or for the next day.
Discussion: Steps include the following:

1. Take used packs to the prep area and immediately rinse or soak used instruments.
2. Separate and dispose of used sharps from the sterile field.
3. Dispose of all single-use, soiled materials and tissues appropriately. This may vary according to state laws for biohazard materials.
4. Put used cloth materials in a surgery laundry hamper to be washed separately from regular laundry. Presoak any drape or wrap that has blood on it in cold water.
5. In the surgery room, sanitize and disinfect the surgery table, instrument stand, and counter surfaces, sides, and bases.
6. Set up packs, equipment, and supplies for the next procedure.
7. If surgeries are finished for the day:
   a) Recharge monitors and equipment as needed.
   b) Mop the floor using a dedicated surgery room mop and a bucket.
   c) Remove all trash and place a new liner in the bucket.

Concept: Depending on hospital flow and staff assignment, instrument cleaning, pack wrapping and sterilization, surgical laundry, and other procedures may be delayed until surgeries are completed.

Procedure

Location: Pack preparation area, surgery room

PREPARATION

1. At the beginning of the day, review the surgery schedule and ensure that all required packs, supplies, and equipment are prepared and ready to use.
2. Have all supplies at hand for cleaning between procedures so that the room can be turned around quickly between surgeries.

PROCEDURE

1. Patient care is the first priority. After the surgery is completed, ensure that the patient receives proper attention and care in the immediate postanesthetic and postsurgical recovery periods.
2. Take used packs to the prep area: Sort, rinse, and soak used instruments. As time allows, clean, rinse, lubricate, dry, and test the instruments.
3. Sort linens: Pretreat bloody areas with hydrogen peroxide or soak in cold water. Place in surgery laundry hamper. As time allows, wash linens separately and use an extra rinse cycle to ensure that no detergent residue remains in the cloth material.
4. Clean and disinfect table and counter surfaces in the surgery room and surgical monitors. Sweep and mop the floor using the dual-bucket method described in Chapter 18.
5. At the end of the day, do a thorough surgical suite cleaning, clean any remaining instruments, wash or retrieve washed linens from the laundry area, wrap packs, and sterilize supplies for the next surgery day.
6. Remove trash, clean the container, and replace the bucket liner. Set up supplies for the next procedure.

FOLLOW-UP

1. Were you able to keep the surgery room clean between patients?
2. Were instruments soaked prior to cleaning?
3. How were instruments kept together?
4. Were packs cleaned, sterilized, and returned to the proper storage cabinets?

RESOURCES

Sirois, Margi (2011). *Principles and Practice of Veterinary Technology*, 3rd ed. St. Louis, MO: Elsevier.

Tear, Marianne (2012). *Small Animal Surgical Nursing, Skills and Concepts*, 2nd ed. St. Louis, MO: Elsevier.



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

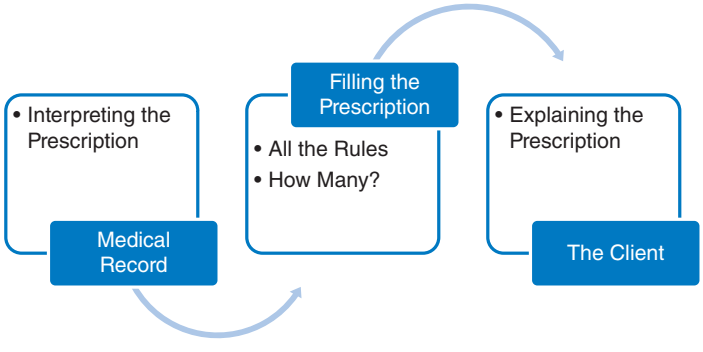
- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

CHAPTER

20

PHARMACY SKILLS

JENNIFER SERLING



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Know the five "rights" of a patient.
2. Read primary drug labels correctly.
3. Interpret a prescription.
4. Label a dispensing container.
5. Use a pill counting tray to count pills and capsules.
6. Calculate correctly the quantity of a drug to dispense.
7. Demonstrate and explain to a client how to administer patient medication.

INTRODUCTION

Medications are prescribed by veterinarians. The assistant may be asked to fill the prescription and to label the secondary container.

TASK 20.1
"FIVE PATIENT RIGHTS"

Concept: Accuracy and safety are vital factors when filling a prescription or administering medications. The patient and client has the "right" to know that veterinary professionals are following certain standards of practice by ensuring they are getting the correct prescription. Clients can also be reassured that the facility is practicing the best standard of care.
Discussion: The five rights are

1. the right patient
2. the right drug
3. the right strength
4. the right quantity/amount
5. the right time/frequency.

When filling a prescription, *always* double check these five items at least three times

1. when taking the medication from inventory
2. when counting out the medications
3. when preparing the label.

Make sure the label is filled out with the correct information in regard to these five things.
Concept: Filling a prescription presents some major challenges in regard to accuracy.
Discussion:

1. The first is correctly reading the veterinarian's handwriting. Legibility with handwriting can range from good to indecipherable with anybody, not just veterinary professionals. Learning the scrawl of each veterinarian in a practice takes time. In the beginning, ask an experienced team member to help you. If there is any doubt, it is wiser to ask the veterinarian for clarification than to risk filling a prescription incorrectly. Don't ever assume.
2. The second challenge arises from the use of abbreviations in a prescription. These abbreviations are a combination of Latin and English. It is necessary to translate the abbreviations on the prescription to standardized English. Most laypersons don't know what "bid" means, for example. The client needs to know how, where, and when to administer their pet's medication. There are standard abbreviations recognized within the profession. Some abbreviations have several meanings depending on the context in which they are used. To add further confusion, some veterinarians or practices have *their own* abbreviations. You need to memorize both the standard abbreviations and the ones used within your practice. Refer to your reference book card entitled "Abbreviations" (Appendix F). When encountering nonstandard abbreviations, make a notation of these on your card.
3. Another challenge encountered is drug identification. Labels look similar. Bottles look similar. Drugs can be packaged the same way but in different concentrations per bottle. Other times, a drug may be packaged differently when purchased from a different manufacturer. Drug names can also look similar, such as amoxicillin and ampicillin.

Concept: Careful reading of every drug label is essential.

Discussion: If the name of the drug is abbreviated in the prescription, comparison of the label to the drug order is not possible. Know the abbreviations used. Take the time to identify a drug correctly before filling the prescription.
Concept: Always read a drug label five times before dispensing it to a client or administering to a patient.
Discussion: When to read the drug label:

- ✓ First time you remove the primary container from inventory/pharmacy
- ✓ Second time you compare the label to what is written in the patient orders
- ✓ Third time you fill the prescription and write/type in the label information for the secondary container
- ✓ Fourth time the medication is returned to inventory/pharmacy
- ✓ Fifth time when the medication is dispensed or administered

Errors in filling a prescription or administering medications compromise patient health or, worse, risk death. Accuracy and hypervigilance is of the upmost importance. This is no time to cut corners, get sloppy, or complacent.

TASK 20.2
READING A PRESCRIPTION AND DETERMINING HOW MUCH TO DISPENSE

Concept: Prescriptions are written in a combination of English and Latin.
Discussion: Some drug names are completely written out, while some very frequently used drugs are often written in an abbreviated format; for example, amoxicillin can be abbreviated as amoxi. Instructions for how often they are administered are customarily written in Latin abbreviations. Remember some veterinarians use a combination of the standard abbreviations as well as their own versions when writing instructions for administration.
Concept: A prescription begins with the letters Rx, meaning "take thou of."
Discussion: The parts of a prescription follow with the name of the drug, either immediately proceeded by or after the drug strength. Drug strength is most often listed in the metric system. For example, "mg/mL" or "mg/tablet" is the most commonly seen.

After the drug and its strength, the method and frequency of administration are listed. Refer to Appendix F for a list of abbreviations for prescriptions and Appendix D for metric system abbreviations. An "×" means times, followed by a number, which indicates the duration of treatment. This can be days, weeks, or months. For example, "×5d" means for 5 days.
Concept: The amount to be dispensed may be listed.
Discussion: If it is not already given in the prescription, the following are the steps needed to determine the amount of medication to be dispensed.

Rx: Cephalexin 250 mg bid × 10 Days

Step 1: Determine how often the medication is given by translating the abbreviation "bid" from Latin to English. In our exam, bid means twice daily.
Step 2: Determine how long the medication is given. Prescription says 10 days.

Step 3: Determine what strength of medication is needed. In this case, it is 250 mg.
Step 4: How many total doses will this patient need to be given? Multiply the number of doses per day by the number of days treated:
2× a day (bid) for 10 days = 20 total doses of 250 mg tablets.
Step 5: Locate the designated drug in the pharmacy then match the strength as nearly as possible to that on the prescription.
a) For example, there might be 100, 250, and 500 mg cephalexin tablets on the shelf. The 250-mg strength matches the prescription.
Step 6: Determine how many units per dose you need. Because the prescription asked for 250 mg and we have 250 mg tablets, this equals one tablet per dose. Multiply the number of tablets per dose by the number of doses needed: 1 tablet × 20 doses = 20 capsules. This is the number of tablets dispensed.
Step 7: *Double* check your math. Does it look realistic?

Many medications come in more than one strength and so you may need to determine the amount per dose needed because the milligram per tablet in the pharmacy is not equal to the dose prescribed. This is determined by dividing the units per dose (milligram per tablet) requested by the strength/concentration of the tablet (units per tablet). For example, if only 500 mg cephalexin tablets are available, the dose is divided by the concentration available. The dose prescribed in our example is 250 mg. This is divided by the concentration or strength on hand, that is, 250 mg/tablet/500 mg/tablet = 0.5 tablet or ½ tablet per dose. If only 100 mg tablets are available, the patient would need 2½ tablets per dose to receive 250 mg per dose: 250 mg/100 mg = 2.5.

1. To determine the number of tablets needed, we would still use step 5. For the 500 mg tablets = ½ tablet × 20 doses requires dispensing 10 tablets. For the 100 mg tablets = 2.5 tablets × 20 doses requires dispensing 50 tablets.
Occasionally, a prescription is written with the dose already figured out. For example, 0.025 mL/lb of ketamine and diazapam each are to be given IV to a 45-lb dog for induction. Because the dose is already in milliliters, we simply multiply the number of milliliters per pound: 0.025 mL × 45 lb = 1.125 mL of each drug will be given.

At the end of the prescription, the number of times the drug can be refilled is listed. Again, this is optional. If it is not listed, the rule is to always consult with the prescribing veterinarian should an owner request a refill. Under such a circumstance, *never* tell an owner a refill is possible until consulting with the veterinarian. It is against the law to refill a prescription that is not ordered by the veterinarian. Refills 6 months after initial prescription customarily require reexamining the patient.

TASK 20.3
INFORMATION CONTAINED ON THE PRIMARY CONTAINER OR PACKING

Concept: Medications often come in various strengths or in different combinations and may have different names. The primary container contains information you will need.
Discussion: Knowing where to look for this information is vital to select and dispense the correct medications as per the prescription. An animal's condition may worsen or it could

die if some very basic rules are not scrupulously followed. Malpractice such as this is detrimental to the patient and the clinic.

Cautions:

1. Many drugs have similar spellings.
2. A medication can have different names:
   a) Based upon the chemical-complex makeup of the medication
   b) Official (brand, proprietary, or copyrighted ®) or the generic-compendium name. The generic name may be most familiar; for example, amoxicillin is the generic name and Amoxi-Tabs® is the proprietary/brand name. Many times in a facility, the generic and proprietary names are used interchangeably.
   c) Always compare the spelling on the prescription with that on the drug label. Make sure they match and if there is a doubt, ask!
3. Drugs are marked with an expiration date. *Never* use expired drugs. This is usually printed on the side of the label or on the crimped end of a tube.

Tip Box 20.1: **Rule: Always read a drug label five times while filling a prescription.**

Concept: Some drugs are hazardous to the people dispensing them and administering them.
Discussion: Steroids and chemotherapeutics are two of the types of drugs that can harm personnel. When handling these drugs, the person *must* wear gloves, goggles, and a mask. Gloves and goggles are the minimum for all of the other types of drugs dispensed or administered in the veterinary facility.

Procedure

Location: Pharmacy

PREPARATION

1. Use the reference book card entitled "Abbreviations."
2. Prepare a card for your reference book entitled "Prescription Math."
3. Mark the following steps on your math card:
   Step 1: Determine the number of doses needed per day from the prescription: sid, bid, tid, and so on.
   Step 2: Determine the number of days the medication is given from the prescription.
   Step 3: Determine the number of doses required for the entire number of days: Number of doses/day × number of days of treatment = total number of doses.
   Step 4: Match or determine the units per dose based on the strength or concentration of the medication available = dose in mg/concentration mg/tablet (capsule/mL) = number of tablets/capsules/mL for each dose.
   Step 5: Determine the quantity to dispense = number of tablets × total number of doses (step 3) = quantity to dispense.
   Step 6: Check your work!
   Also mark the steps for calculating the dose if it is given in milliliter per pound or milliliter per kilogram.

Step 1: Multiply the number of milliliters times the pounds or kilograms = ___mL as the dose.

4. Patient's record.
5. Prescription usually listed last in the day's entry for a patient. Look for the "Rx" followed by the prescription.
6. Calculator or scratch paper to do the math in long hand.

PROCEDURE

1. Identify the name of the drug.
2. Locate the strength of the drug on the bottle or box.
3. Determine how frequently it is to be used.
4. Determine how it is to be administered.
5. Locate how long the drug is to be given.
6. Determine how much medication to dispense.
   a) Exercise: The veterinarian has prescribed 0.2 mL of Pyrantel per kilogram of body weight. How much Pyrantel will you dispense for a 15-lb dachshund? *(Hint: convert pound to kilogram and multiply by milliliter.)* Answer at the end of the chapter.
   b) Locate the number of times it can be refilled, if any.

FOLLOW-UP

1. Recheck your interpretation of the abbreviations.
2. Recheck your math if you determined how much medication to dispense.

Again if there is *any* doubt about the prescription or your accuracy, ask someone to review your work. Supervisors would rather you ask questions then have to deal with an erroneous prescription with possible grievous consequences.

TASK 20.4
PRESCRIPTION LABELING

Concept: The purpose of the label is to tell the owner who it is for, what is in the container, and the directions for its use.

Discussion: Most veterinary hospitals have preprinted labels with some of the required information already on it. In that instance, you only need to fill in the blanks whether it be handwritten or on computer.

Additional cautionary labels should be put on the prescription container with warnings on drug use or storage. Some examples are labels stating "Keep Refrigerated," "Do Not Give with Dairy Products," or "For Veterinary Use Only." These are usually preprinted and come in rolls of peel-off labels. These are important as well since many medications need to be stored properly or given a particular way.

Laws list information required on a prescription label. Typically included are the following:

1. Name, address, and telephone number of the facility where the prescription is filled
2. Name of the prescribing veterinarian
3. Client name (and address if the drug is a controlled substance [CS])
4. Patient's name or identification number
5. Drug name
6. Drug strength
7. Quantity dispensed
8. Expiration date of the drug
9. Number of refills
10. Directions for use in plain English including
    a. dose per treatment
    b. frequency of treatments
    c. duration of treatments
11. *Withholding Time:* If the drug is administered to an animal meant for consumption (i.e., food animals such as cattle) or if any of its products are consumed, the withholding time required before processing the animal must be listed. This is the time from the last dose of medication until the time of slaughter or use of products for human consumption.

This information is included on the bottle or on the package insert that comes with every medication. If it is missing, veterinarians usually keep a compendium of drugs book that will contain the same information as what is found on the package insert.

Procedure

Location: Pharmacy

PREPARATION

1. Prepare a card for your reference book entitled "Prescription Labeling Instructions."
2. Learn how to insert a label into a typewriter or a printer; if using a veterinary management software, learn how to fill in the information for dispensing a medication.
3. Using the patient's record, locate the prescription to be filled.
4. Determine the size and type of secondary container to use based on the type of medication (liquid, pills, ointment) and the quantity to be dispensed.

PROCEDURE

1. Prepare the label for the typewriter or check the printer to be sure there is a label ready.
2. Fill in all blanks with the required information using English, not the abbreviations as written in the patient's record.
3. Be certain the correct information is on the intended blank.
4. Apply label to the container in a straight and centered fashion.
5. Apply any additional labels as required, again in a straight and centered manner.

FOLLOW-UP

1. Reread the label for accuracy, completeness, and spelling. Match all label information with Rx information in the patient's record and on the primary drug's label.
2. If the container is smaller than the label, place the primary container in a larger secondary container and label the secondary container. For example, on an ophthalmic ointment tube, place the label on the box enclosing the tube rather than on the tube itself.

Tip Box 20.2: **Get into the habit of rechecking *every* time you dispense any medication.**

TASK 20.5
PRESCRIPTION PACKAGING

Concept: The secondary container must always be childproof.
Discussion: The only exception is at the request of the owner. Even then, it is best to recommend safety containers to prevent children and pets from possibly opening the container. Persons with disabilities and the elderly may lack the strength and coordination in their hands to open a childproof container and are the most likely candidates for containers that are not childproof.
Concept: An owner request for a container that is not childproof is documented in the patient's record.
Discussion: Ideally, owners sign a request form documenting their request for dispensing of medication in a nonchildproof container. The form is then included in the medical record. If no such form exists in the facility, document the request in the record itself and have the client initial or sign. A medical record is a legal document.
Concept: Plastic vials with caps, either twist-off or snap-off, are available in various sizes.
Discussion: The size is measured in *drams*. Use one that is large enough to hold the entire prescription with a small amount of space left at the top of the vial. It is financially wasteful to fill a prescription in a vial that is only one-fourth filled. Vials are usually amber (brown) colored to protect the medication from deterioration due to exposure to sunlight. Vials are suitable for dry medications such as tablets and capsules. They can also be used to dispense smaller items that cannot be fitted with a label such as a tube of eye ointment.

Liquids are dispensed in bottles with twist-off caps or dropper tops. The bottles are often marked on the outside as to the quantity (in ounce or milliliter typically) on the inside. This is helpful in filling the bottles. A funnel or a large syringe aids in bottle filling. Be certain that the funnel or syringe is clean and dry before using.

Some medications begin as a powder and must be *reconstituted* with a specified amount of water to form a liquid; use a syringe for accurate measurement. There may be a dropper attached to the lid that is marked in milliliter to indicate the amount the dropper holds. Read the label carefully before reconstituting a drug.

Ointments are placed in amber vials, metal tins, or similar containers. To transfer medication from the primary container to the secondary container, use a clean tongue depressor to fill the ointment tin. Once filled, be certain there are no air pockets within the medication.

TASK 20.6
HOW TO USE A PILL COUNTING TRAY

1. Face the channel to your left with the opening immediately in front of you (Fig. 20.1).
2. Pour medication onto tray.
3. Lift the cover over the channel.
4. Using the spatula or a tongue depressor, push groups of five pills or capsules into the channel.
5. When you have counted the desired number of tablets or capsules, close the channel cover.
6. Lift the tray and place the spout on the back right side of the tray into the original medication container.
7. As you tilt the tray, the pills remaining on the tray will slide back into the original container.
8. Put the secondary container on the counter.
9. Place the opening to the covered channel over the vial with the cover still closed.
10. Tilt the tray and the counted medication will slip into the vial.

Tip Box 20.3: **If a pill counting tray is unavailable, pour the pills into the palm of your gloved hand. With the other gloved hand, grasp three to five pills at a time and place these in a prescription vial. This is more efficient than counting one or two pills at a time. Just remember the three, four, or five's multiplication table for the number of times you will drop pills into the vial.**



Figure 20.1. Photo of a pill counting tray. Photo courtesy of Teresa Sonsthagen.

Procedure

Location: Pharmacy

PREPARATION

1. Determine the type of container needed.
2. Determine the size of container to be used.
3. Locate the appropriate container and childproof lid.
4. Put on gloves before handling medications and goggles if working with liquids.
5. If dispensing pills, tablets, or capsules, place a pill counting tray on the pharmacy counter.
6. Retrieve the correct medication from the pharmacy.

PROCEDURE

1. Open the patient's record to the prescription that needs to be filled. *Reread the prescription in the patient's record*.
2. Count or measure out the appropriate medication. *Reread the label on the medication container*:
   a) Use a pill counting tray for tablets and capsules.
   b) Use a funnel for liquids.
   c) Use a clean spatula or a tongue depressor for ointments and pastes.
   d) Secure the cap tightly.
3. Prepare and place the completed label on the secondary container. *Reread the label on the dispensing container*.
4. Attach any other labels as appropriate—"give with food," "may cause vomiting," and so on.
5. Return the primary bottle to the pharmacy or inventory. *Reread the label on the medication container*. If it is a controlled drug, make sure to mark it in the controlled drug log.
6. Close the container securely.
7. Either give the record and medication to the designated recipient (receptionist, veterinarian, and technician) or take to the designated location (front desk, examination room).
8. If it is your task to explain to the client how to administer the medication to the patient, it is best to do so in the examination room before accompanying the client and the patient to the reception area.

FOLLOW-UP

1. Clean and put equipment away.
2. Place the filled prescription with the patient's record. *Reread the label and prescription to make sure they match*!
3. When giving the owner the medication vial, demonstrate how to open it.

TASK 20.7
HANDLING MEDICATIONS AND CONTROLLED SUBSTANCES

Concept: Drugs are divided into three groups:

1. *Over-the-Counter (OTC) Drugs:* These are nonprescription drugs that anyone can buy.
2. *Prescription Drugs (Rx):* The patient cannot receive these medications unless there is a prescription ordered by a licensed veterinarian.
3. *Controlled Drugs:* These are prescription drugs that have the potential for addiction. These are referred to as CSs. The Drug Enforcement Agency (DEA) has specific rules for ordering, storing, and dispensing these medications. Strict adherence to these rules is absolutely required. Controlled or scheduled drugs are designated with a capital C and a Roman numeral. Any drug that has a CII on the label must be recorded as it is used. Some practices will also require records kept on CIII and CIV drugs as well.
   Examples include the following:
   a. *Schedule V:* low addictive potential
      Example: Lomotil, Robitussin AC. *No limits on refills*.
   b. *Schedule IV:* low addictive potential with limited dependence
      Example: diazepam (Valium), phenobarbital. *Limited to five refills in 6 months*.
   c. *Schedule III:* moderately addictive potential. Example: Hycodan, Tylenol with codeine, anabolic steroids. *Limited to five refills in 6 months*.
   d. *Schedule II:* potential for severe dependence. Example: oxymorphone, pentobarbital injectable. *No refills.*
   e. *Schedule I:* no medical use. These are not found in a veterinary facility. Their use is limited to research facilities only.

Discussion: Rules for handling CSs in the veterinary facility:

1. The only person who can order or prescribe CSs is a licensed veterinarian who also has a DEA license. These are issued by the DEA and are renewable every 3 years. A person with such a permit is to post the license in a "visible place" within the facility.
2. CSs are required to be stored behind two locks. This means they must be stored in a locked box in a safe or other locked, permanently affixed place.
3. Access to CSs should be limited to one or two persons within a facility.
4. Dispensing of any CS requires written entry, in ink, into a permanently bound logbook maintained for at least 2 years, but requirements may vary by state.
5. A running account of all CSs entering and leaving the facility is entered into the logbook. This is usually set up in a chart format.
6. Information entered into the logbook when dispensing a CS includes the following:
   a) name of drug
   b) drug form (liquid, tablet, capsule, ointment, paste)
   c) strength

d) quantity dispensed
e) quantity remaining in the original container
f) date dispensed
g) time dispensed (optional)
h) full name and address of the animal's owner
i) species of animal
j) signature of the person dispensing.

Concept: The DEA limitations on access to CSs list four categories of individuals who cannot access these items.
Discussion: They are

1. anyone convicted of a felony related to CSs
2. anyone denied DEA registration
3. anyone whose license has been revoked by the DEA
4. anyone who has surrendered DEA licensure.

Among the processes for new employee orientation is the signing of a statement that the individual is not among the groups denied access to CSs. There may be a background check into drug use. It is not required by the DEA, but it is permitted.

While some may consider this overly cautious, the veterinarian's access to anesthetics and pain killers will be withdrawn by the DEA if strict control of these drugs is not provided and accurate records for use of drugs is not maintained. Inventory on hand and DEA logbook records must always be the same!

Clients may not receive more than a 30-day supply of a CS. Refills depend on drug classification. Also beware of clients, particularly those that seem to frequent multiple veterinary clinics, requesting medications for their pets or seeking constant refills. It is not uncommon to find unscrupulous owners who are taking their pets medication for their own personal use.

Procedure

Location: Pharmacy or surgical preparation area

PREPARATION

1. Determine if the prescription is for a CS.

PROCEDURE

1. Obtain access to the drugs required.
2. After determining the quantity needed, remove that quantity of drug from its primary container.
3. Record all required information into the DEA logbook.
4. Return the logbook and the primary drug container to their original locked location.
5. Be certain both locks are locked.
6. Fill the prescription with the medications removed from the primary container as you would any other prescription.

FOLLOW-UP

1. Return any keys to their place or person of origin.
2. Did you fill in the DEA log book correctly?
3. Have a knowledgeable staff member check your work the first few times you access CSs and enter patient information into the log book.

TASK 20.8 EXPLAINING PRESCRIPTIONS TO THE OWNER

Concept: The veterinarian may have explained to the owner that medication is being dispensed, but it is up to the staff to make certain the client really understands what to do and how to do it.
Discussion: There are possibilities that the veterinarian used terminology with which the client is unfamiliar; the presence of the pet can distract the owner; the owner might be overwhelmed with information; or the procedure can be unfamiliar to the client. Also, time is important and the veterinarian can utilize support staff by having them provide information to clients.
Concept: There is always the possibility that the owner's understanding is incomplete or inaccurate, which serves as a basis for failure to comply with the veterinarian's recommendations for at-home care.
Discussion: The end result is delay or failure in patient recovery. Review of instructions for ongoing care is usually done in the examination room, preferably before bringing the patient to its owner. Both pets and owners tend to lose focus upon being reunited after a hospital stay. The information is found in the patient's record in the SOAP notes under P (Plan).

Outpatients

Instructions should be explained to owners at the very end of the office visit, after the veterinarian has completed the examination procedures but before the client leaves the examination room with the patient. This occurs when the prescription is given to the client. Review any discharge handout with the client.

Inpatients

Instructions should be explained to owners at the end of the hospital stay, after the veterinarian has completed discussing continuing patient care and before the patient is discharged to the owner.
Concept: It is more effective to provide a written copy of the instructions to the client. Do not just hand it to the client; review it with the person.
Discussion: What to review:

1. Medication
   a) Why it is being dispensed
   b) How it is to be administered
   c) When it is to be administered
   d) Finish all of the medication unless specified

2. Follow-up care
   a) Future appointments
   b) How to care for the patient at home
   c) What to anticipate during recovery
3. Environmental care
   a) Diet: food, quantity, and frequency
   b) Water: volume and frequency
   c) Exercise: quality, duration, and frequency.

Check with the office manager, the head technician, or the veterinarian regarding the extent of their expectations of the veterinary assistant to review patient care at the time of discharge. Never overstep your boundaries.

Procedure

Location: Examination Room

PREPARATION

1. Have the patient's record in hand.
2. Have the medication ready.
3. Have a completed client instruction form prepared.

PROCEDURE

As you enter the room:

1. Greet the owner and the patient—smile!
2. Face the owner, speaking slowly and clearly and using layman's terms, not veterinary terminology.
3. Explain to the owner what the medication is and its purpose.
4. Showing the drug label to the owner; explain the instructions.
5. Demonstrate how to open and close the container.
6. Demonstrate how to administer the medication to the patient. If possible, administer first dose.
7. Review the instruction form with the client.
8. Give the medication and the instruction form to the owner.

FOLLOW-UP

1. Ask the owner if there are any questions.
2. For more complicated procedures, you may ask the owner to repeat the procedure after you demonstrate it.
3. Assure the owner that you and the staff are readily available by telephone if any questions about the patient's continuing care arise.
4. The facility's telephone number is usually on the prescription label. Show it to the owner.
5. Ask the owner if there is anything else needed at this time. If not, walk the owner and the patient to the reception desk. *It can be helpful, particularly if the patient is a large or rambunctious dog, to handle payment arrangements in the examination*

room. This allows the client to leave directly from the room to the parking lot and not try to control their pet while writing a check or signing paperwork. If there is, see that you or an appropriate staff member fills the request. Return to the examination room.

6. Begin cleaning and setting up the room for the next patient.

Answer to Exercise on Page 549

1.36 mL of Pyrantel dispensed to a 15-lb dachshund.

RESOURCES

Bill, Pete (1997). *Pharmacology for Veterinary Technicians*, 2nd ed. St. Louis, MO: Mosby.

Bill, Pete (2000). *Medical Mathematics and Dosage Calculations*. Ames: Iowa State University Press.

Sirois, Margi (2011). *Principles and Practices of Veterinary Technology*. St. Louis, MO: Elsevier.



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

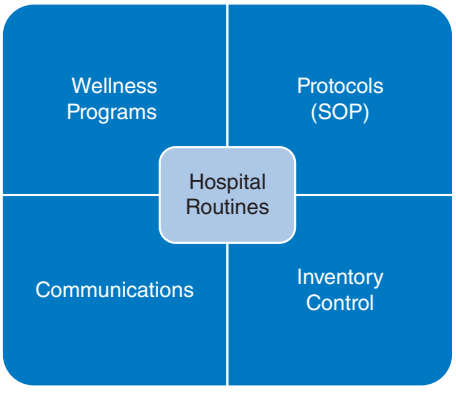
- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

CHAPTER

21

VETERINARY PRACTICE ROUTINES

PAULA PATTENGALE



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CHAPTER OBJECTIVES

After completion of this chapter, the student will be able to:

1. Compare the components of the wellness programs for a dog, cat, and horse.
2. Explain why there are differences in each wellness program.
3. Explain the advantages to the patient, client, and veterinarian in participation in wellness programs.
4. Evaluate a patient's current situation and explain why the chosen wellness program is the most appropriate for that specific patient.
5. Reconcile an invoice with the contents of a shipped order.
6. Correctly store products from an incoming order.
7. Explain why protocols, also referred to as standard operating procedures (SOPs), are used in a veterinary practice.
8. Generate in-house communications that meet professional standards.
9. Create professional letters.

TASK 21.1
WELLNESS PROGRAMS

Concept: "An ounce of prevention is worth a pound of cure" underlies most aspects of veterinary practice.
Discussion: This old adage is the central principle of wellness programs. Treating a disease is much more expensive than preventing disease. The same applies to injuries.
Concept: An individualized wellness program is multiple faceted and is based on a *holistic* approach.
Discussion: The customized wellness program considers the species and where the animal lives in the country:

1. Vaccinations for diseases that commonly occur:
   a) Dogs:
      i. *Core Vaccines:* canine distemper virus (CDV), adenovirus (CAV-1 and CAV-2), parvovirus (CPV-2), influenza (CIV), *Bordetella* (Bb), parainfluenza (CPiV), rabies
      ii. *Noncore Vaccines:* leptospirosis, *Borrelia* (Lyme disease) no earlier than 12 weeks of age, two doses 2–4 weeks apart.
      iii. *Vaccination Protocols:* Puppy vaccines are given as a series of vaccines at 6, 10, 14 or 8, 12, 16 weeks of age. If the puppy had the complete vaccination series, a booster is given 1 year after the last vaccination in the series. After that, it can be up to every 3 years after that. If the puppy is 16 weeks of age, then the core vaccines are given once with boosters given up to every 3 years after that. Rabies revaccination is determined by state law.
   b) Cats:
      i. *Core Vaccine:* feline panleukopenia virus (FPV), feline herpesvirus 1 (FHV-1), feline calicivirus (FCV), rabies
      ii. *Noncore Vaccines*: *Giardia lamblia* (*Giardia*), feline leukemia virus (FeLV), feline infectious peritonitis (FIP), feline immunodeficiency virus (FIV), feline coronavirus (FCoV), *Bordetella bronchiseptica* (a feline upper respiratory disease), *Chlamydia dophilia felis* (*Chlamydia*); multiple recommendations
      iii. *Vaccination Protocols:* Kittens are given a series of vaccines at 6–8 weeks, 3–4 weeks apart, until 16 weeks of age. If over 16 weeks, two doses 3–4 weeks apart are given. A single dose is given 1 year after the series then revaccinated every 3 years after that. Rabies vaccination is according to state law.

Tip Box 21.1: **Remember the locations recommended by the AAFP for each vaccinations.**

   c) Horses:
      i. *Core Vaccines:* Eastern and Western equine encephalomyelitis, tetanus toxoid, West Nile virus, rabies
      ii. *Noncore Vaccine:* equine herpesvirus, viral arteritis, influenza, anthrax, botulism, Potomac horse fever, rotaviral diarrhea, strangles, snake bite

2. Parasite control is designed to prevent endoparasites and ectoparasites:
   a) Dogs/cats—recommendations based on the Companion Animal Parasite Council (CAPC) and endorsed by the American Animal Hospital Association (AAHA)
      i. *Endoparasites*: gastrointestinal—treatment based on results of fecal examination two to four times during first year of life one to two times as adults. Deworm youngsters at 2, 4, 6, and 8 weeks of age, then monthly until 6 months old. Include the mother if offspring is still nursing. Fecal examination two to four times during the first year of life. Fecal examinations one to two times yearly in adult animals.
      ii. *Ectoparasites:* Test for other vector-transmitted organisms in high endemic regions. Lyme disease, heartworms, *Ehrlichia*, mycoplasmas. Vaccinate for *Borrelia* (Lyme disease) and give monthly heartworm preventive. Other diseases are treated as found. Administer year-round flea and tick products.
   b) Horses—flies, mosquitoes, ticks—strongyles, roundworms, pinworms
      i. *Endoparasites:* Recommendation is monthly starting at 30–60 days of age until 18 months. Fecal egg counts to determine if adults need to be dewormed.
      ii. *Ectoparasites:* Flies cause irritation and, in some instances, are vectors for parasites. There are a number of products available to control flies. A few of them are sprays, fly predators (flies that eat the larva of stable flies), feed that kills the fly larva as it eats the feces, masks, boots, and blankets to prevent the flies from landing.
3. Physical examination:
   a) Age dependent for all species:
      i. *Dogs/Cats:* Each vaccination appointment until 16 weeks of age, then every 6 months until they reach full maturity; annually until middle age; semiannually from middle age to elderly; once elderly may even be every 3 months depending on health status
4. Reproductive care:
   a) Spay and neutering in small animals
   b) Castration in farm animals
   c) Breeding practices in both small and large animals.
5. Disease testing:
   a) Dogs: parasites, Lyme, heartworm, brucellosis, *Ehrlichia*, *Mycoplasma*, organ function
   b) Cats: parasites, feline luekemia, feline infectious anemia, heartworm, organ function
   c) Horses: parasites, equine infectious anemia (Coggins), pregnancy, organ function.
6. Integument (skin) care:
   a) Foot, claw or hoof care
   b) Dental, otic, ophthalmic, anal glands, skin and coat.

Concept: For farm animals, a total record of performance (TRP) is kept.
Discussion: Meeting association and industry standards is often kept to improve livestock quality. To implement such a program requires individual animal identification (ear tag, tattoo, or microchip), a scale, a good software program and excellent management. This system is used by commercial producers, end producers such as feed lots and seed stock producers with breeding animals, the front end producers, to increase productivity/quality of their operations. This includes

i. birth weight
ii. viability

iii. weaning weight
iv. pregnancies or breeding efficiency
v. numbers of live births/unassisted births
vi. conformation to ideal breed standards
vii. feed efficiency/rate of gain.
viii. production—milk or calves per season
ix. carcass quality
x. wool or fiber quality/quantity
xi. milk production quality/quantity
xii. successful work (competition, racing, field trials, etc.)
xiii. genetic diseases (phenotype, genotype).

Concept: A wellness program is a win-win-win situation for the client, patient, and veterinarian.
Discussion: In veterinary medicine, the first consideration is the patient. A wellness program provides the components to maintain optimal patient health.

For the client, a wellness program usually provides a slightly discounted fee for services and planned expenses for budgetary control. It also serves as a reminder as to when and what is due, allowing a client to schedule time accordingly.

For the veterinarian, a wellness program is also a business tool helping the veterinarian to manage time and expenses and to target services to patient needs. The individual veterinarian and veterinary practice are more efficient.
Concept: A wellness program in livestock differs from one in companion animals.
Discussion: The goal with livestock is overall herd health management. The focus is not on the individual but primarily on the group. The companion animal program focuses on the individual animal even in the multipet household.
Concept: Wellness programs cover only the costs for the prevention of disease.
Discussion: Actual treatment costs for a diagnosed disease are treatment dependent. Medication costs are usually not included in the wellness programs.

Procedure

Location: Examination room or treatment area

PREPARATION

1. Prepare a card for your reference book entitled "Wellness Program Components."
2. Mark the information needed for wellness plans as per your hospital's policies.
3. The following are areas to ask about.

PROCEDURE

1. *Vaccinations:* core vaccinations and noncore vaccines as determined by risk-based factors; revaccination requirements
2. *Parasite Control:* endoparasites and ectoparasites
3. *Physical Examination Is Age-Dependent:* every vaccination visit until 16 weeks of age, then every 6 months until mature, yearly until elderly, up to every 3 months after that depending on health status

4. *Client Education Topics:* dental health, nutritional and reproductive counseling, parasite management, socialization/behavioral and permanent identification recommendations, environmental management and disease screening, age dependent.

FOLLOW-UP

1. Were you able to give a client a broad overview of the wellness program offered at your worksite?
2. Did you avoid being too specific? *Reminder: The specifics of a wellness program depend on the veterinarian's evaluation of the patient and its circumstances*.
3. Could you inform a client of the advantages of a wellness program to the patient and to the client?

TASK 21.2
USING PRACTICE PROTOCOLS

Concept: Standard operating procedures (SOPs) are used for almost all procedures done throughout a veterinary facility.
Discussion: They are not limited to patient care but also disease state management and strategies. Protocols are used to ensure that all the steps associated within a procedure are accomplished in a similar way. Since there are many employees within a facility, those conducting the same task should accomplish it similarly. Protocols affect every staff member from the veterinarian to the kennel staff.
Concept: Protocols are a management tool.
Discussion: Protocols are also used in the management of the business, resource management such as inventory control and cost containment. Performance protocols involve improvements for the whole practice including plan, procedure, and policy development for practice improvement. There can be hiring protocols, which include advertising steps, job descriptions, application reviews, and interviewing techniques.
Concept: Protocols may be found in a "Policy and Procedure Manual" or as stand-alone sheet in various places within the clinic.
Discussion: When first hired, review the "Policy and Procedure Manual" thoroughly. Inquire as to the existence of other protocol sheets that affect you in any way. Get to know these SOP sheets well and where you fit into them.
Concept: The primary idea behind a protocol is to conduct the many steps of a procedure in the same way. Protocols serve as a guideline for practice improvement and efficiency.
Discussion: This prevents overlooking a step during a procedure by providing information on the sequence of a procedure.
Concept: Protocols do not inhibit creativity or adaptation of the steps within an SOP to new or varied situations.
Discussion: For example, a protocol sheet for euthanasia may include a step to acknowledge an owner's grief. It does not say every client is to receive flowers or a donation is made to the American Veterinary Medical Association (AVMA) Foundation in the patient's name. As an important part of the multiple step procedure, it is important to acknowledge the owner's grief and the SOP acts as a reminder. It can be a phone call, a card, or a donation to research relevant to the patient's disease. Once the step is completed, check it off and go to the next step. When all the steps are completed, add the sheet to the patient's record.

Procedure

Location: Practice manager's office

PREPARATION

1. When first hired, ask for the "Policy and Procedure Manual" and ask for time to review the contents of the manual.
   a) Use Post-it notes to indicate the relevant parts of the material.
2. Ask if there any protocol sheets that interface with your new responsibilities and ask for a copy of each.

PROCEDURE

After reviewing the "Policy and Procedure Manual" and the protocol sheets, make reference book cards or tasks cards for all policies and procedures that affect your new position.

1. Make task cards for each of the steps that affect your job.
   a. File them according to when they are to be performed.
2. Make a task card with general notations of practice policies.
   a) File these cards behind the "Daily, Weekly, Monthly" task cards.
3. Make a reference book card for the "SOPs."
   a) Review practice policies periodically.
4. Make notations of how you interface with your teammates on both sets of cards.
   a) What do you do or can do to facilitate their work?
   b) Always consider ways to increase the quality and rate of patient care.

FOLLOW-UP

1. Do you know the general policies of the workplace?
2. Do you adhere to the steps within the protocol sheets affecting your work?
3. Do you complete each step?

Tip Box 21.2: **Always be a 100 percenter. Never be an 85 percenter. These are the employees who get almost all of their work done, but not quite all.**

TASK 21.3
INVENTORY CONTROL

Concept: Inventory control is a fine balance between having enough supplies on hand to meet hospital needs and having too much on hand that products become outdated. This also ties up cash flow and missed opportunities that come along with that.
Discussion: Unused products sitting on a shelf cost the clinic money because they are not generating income. Conversely, if a product is out of stock, a service or sale is not made. Patient care is compromised and there is a risk of losing a client or a patient!

Concept: Managing inventory properly requires an awareness of what is used, how rapidly it is used, and how quickly it can be replaced.
Discussion: There is the interaction between who takes a product off the shelf, who orders a product, who unpacks the shipment when a product arrives, and who pays the bill for it. Usually, there is one person in charge of inventory management with one backup person that steps in for vacations or illnesses. However, the entire veterinary team plays a key role at several points in the inventory control cycle.
Discussion: Everyone must know how and when to place a request on the "want list," how to unpack an order and reconcile the invoice with the shipment, where and how a product is stored, and how to maintain the cleanliness and orderliness of the product storage areas and the products.

To put a product on the want list because there is only a third or a fourth of the original supply remaining is oversimplification.
Concept: To decide when to put an item on the want list depends upon multiple factors.
Discussion: These factors include the following:

1. How rapidly a product is being used. Some products have a seasonal use as in the case of flea and tick control products. Other products are more consistently consumed.
2. How a product is packaged. Packaging can vary greatly. A case, box, or bottle may contain one unit to a thousand units.
3. The ordering–shipment–arrival cycle. How long does it take for a product to get to the hospital after being placed on the want list?

Let's follow the flow of a flea product, KILLZ-UM, through a veterinary hospital. There is a display in the reception area for KILLZ-UM. Clients purchase the product from the receptionist. This is a nonprescription item recommended by staff members and the veterinarian. The manufacturer sells this flea product exclusively through licensed veterinarians. Extra cases of the product are stored in a room adjacent to the kennel area. The business manager orders all hospital supplies once weekly and pays bills once monthly. There is a want list for needed products in the pharmacy.

Mrs. Smith needs more KILLZ-UM for her three cats. Rene, the receptionist, sells three units to her. Terry, the technician, recommends KILLZ-UM to Mrs. Jones for flea control for her dog, Poo. Mrs. Jones buys one unit after Poo's examination. By late afternoon, Rene notices supplies in the reception area are getting low. She asks Valerie, the veterinary assistant, to bring up a case. Each case contains 12 units of KILLZ-UM. Valerie arranges the display in the reception area, placing new units behind the "old" units on the shelf. Valerie notices there is only one case of KILLZ-UM left in the storage area and sees the inventory reorder tag on the last case of KILLZ-UM. She reads the tag and it says minimum #18. This alerts Valerie that more KILLZ-UM needs to be ordered. She sets the half case on top of the full case in the storage area. She returns to the pharmacy, enters the name of the product, KILLZ-UM, on the want list, the date of her entry, the number on hand, and her initials.

Each Wednesday, Meredith, the business manager, removes the existing want list and replaces it with a new one. She then takes the want list to her office where she phones the suppliers of the various products needed. The wholesalers fill the orders on Thursday and ship them Friday. Monday the shipments arrive.

Valerie unpacks the shipments. The box containing KILLZ-UM contains several other products Meredith ordered from the same wholesaler. As Valerie unpacks each item, she compares the invoice included in the shipment with the actual quantity shipped. She notices the box contains three cases of KILLZ-UM, and the invoice indicates four cases were shipped. Valerie makes a notation of the difference, initialing and dating her entry on the invoice. On the invoice, she notices another product was ordered but was not shipped. The

invoice indicates it is back-ordered (BO). She highlights or circles the item. Valerie signs and dates the invoice. She then places it on Meredith's desk. Meredith calls the drug company to inform them of the discrepancy between the invoice and the shipment. She also inquires about the possible date for the BO product.

Valerie puts the shipment away. Valerie knows where each item is to be placed. Some are refrigerated; others require a cool, dark place; some are stored on open shelving; and others are placed on pallets on the floor of the storeroom.

Concept: At each location, she uses a system called "first in, first out (FIFO)."

Discussion: This means products already on the shelf are brought to the front of the self and newly shipped items are placed behind it. This ensures older products are used first. As she does this, at the same time, she will move the inventory marker to the newest shipment using the minimum number on the marker to determine which bottle or case it should be attached to. She checks all products for expiration dates. The products nearest their expiration date are placed at the very front of the shelf. If any products are expired, they are removed from the shelf. Meredith is given the expired products.

As Valerie handles products, she dusts the products being moved on the shelf and the sections of the shelf on which they were located. This keeps the products and shelves clean in a continuous manner. In the storage room, she must move the remaining case of KILLZ-UM. By now, the open half case has been sold. The floor is swept under the pallet where the remaining case is stored. The inventory marker is moved to the new product and stacked appropriately under the older case.

The manager receives a bill monthly from each wholesaler for all the products ordered. Meredith compares the bills with the invoices of shipments Valerie checked when unpacking boxes. If the invoices and the billing match, Meredith pays the bill. The skilled veterinary assistant is a strategic member of the inventory process.

Procedure

Location: Usually the pharmacy area

PREPARATION

1. Prepare a card for your reference book entitled "Inventory Management."
2. Gather supplies:
   a) pen to check off and indicate expiration dates on the packing slip
   b) box cutter or knife and a pair of scissors to open boxes and bags
   c) waste paper basket to collect packing materials
   d) dust cloth to clean items and the shelves where inventory is stored
   e) cart to carry the items from the area of unpacking to the area of storage. This saves steps!

PROCEDURE

1. Open the box with the box cutter.
2. Locate the packing slip/invoice. It may be on top of the packing materials or in a plastic pocket adhered to the outer surface of the box.
3. Open the packing slip/invoice and place it nearby.

4. Check off each item listed on the packing slip/invoice as it is removed from the box. Make certain what is listed is what is received and is in the correct amount.
5. If there are any discrepancies, recheck the packing materials and the box. If the item cannot be found, make a notation on the packing slip/invoice. Circle or highlight BO items. Date and initial the invoice.
6. As the packing materials are removed to access the shipped items, place them in the wastebasket.
7. Place the items to be put away on the cart.
8. Once the box is empty, flatten it. Place it in the recycling bin.
9. Place the invoice on the business manager's desk.
10. Determine what type of storage is appropriate for each item: refrigerated, cool dark area, open shelving, or storeroom. This information will be on the labels.
11. Determine where in the hospital an item is stored: pharmacy, treatment room, storage room, or other areas.
12. Locate similar items already in inventory; take note if items are arranged alphabetically or in categories; for example, antibiotics are together and dewormers are together.
13. Remove similar items from their existing space; check expiration dates. If short-dated, notify the practice manager.
14. Clean the area then place the newly arrived items to the back of the cleaned area.
15. Dust the old items as they are replaced in front of the new items.
16. Remove expired products from storage and place these on the business manager's desk.

FOLLOW-UP

1. Empty the wastebasket. Recycle contents if appropriate and return to their normal location.
2. Keep shelves and storage areas orderly and clean.
3. Clean the storage area before placing items in proper locations.
4. Add to the want list whenever products reach a low level as indicated by inventory markers.
5. Store the cart with the duster and the box cutter in a convenient place. (The storage room is often an easily remembered place.)

Tip Box 21.3: **When working, always think "efficiency." Use time and personal energy effectively. Learn to concentrate on task components so several task components are accomplished at the same time.**

TASK 21.4
IN-HOUSE COMMUNICATIONS

Concept: Written communication between individuals within an organization need not be formal; however, it should be clear and concise to convey the idea correctly.

Discussion:

Clarity

Pay particular attention to your spelling. Veterinary terminology demands correct spelling. The difference of a single letter can change a word, resulting in potentially life-threatening errors. Punctuation incorrectly used results in changes of meaning. If a note is handwritten, write it legibly.

Conciseness

Keep sentences short and to the point. Avoid unnecessary phrases and adjectives. Present written communications in a memo format. The headings include "To, From, Date, and Regarding" followed by the message.

Format

Formal communications are word processed. Word processing programs such as Microsoft Word include memo templates. Use them to produce your communication quickly and professionally. *Remember to personally sign a memo after the printed "from" name*. For handwritten notes, print out blank copies of one of the templates. The copies are stored where they are accessible to all staff members.

Helpful Hints:

1. The Merriam-Webster's Dictionary can be accessed online at http://www.merriam-webster.com and the Medical Dictionary at http://www.medilexicon.com/medicaldictionary.php.

Tip Box 21.4: **Just as people are judged by their manner of speech and physical appearance, so they are judged by their writing. Make a positive impression.**

Procedure

Location: Office or reception desk

PREPARATION

1. Determine what you need to say.
2. Have references at hand: dictionary, guide to punctuation, and guide to English usage.
3. If a memo is handwritten:
   a) Use dark ink only and *write legibly*.
   b) A blank memo form.
4. It is preferable to use a computer if available. Using a word processing program provides the additional opportunity of spell-checking; however, spell-checkers do not have the ability to check the full range of medical terminology. Moreover, spell-checkers overlook misspellings that result in another word, such as "form" when "from" or "there" and "their."

PROCEDURE

1. Complete the heading identifying the recipient, writer, date, and topic.
2. Complete the message in simple, short sentences.
3. If using a word processing program, use the spell-check then proofread the document for accuracy before printing.

FOLLOW-UP

1. Put references away.
2. Sign the memo or letter.
3. Deliver the memo to the recipient(s).

TASK 21.5
CLIENT COMMUNICATION

Concept: There are many ways and just as many reasons for communicating with a client.
Discussion: Clients are informed by newsletters, individualized postcards, websites, e-mails, and, of course, in person. Any computer-based communication must go out with perfect spelling and grammar. *Always* use the spell-checker before sending. Review and apply the rules of punctuation. Never use acronyms such as LOL. It is simply not professional.
Concept: In-person communication requires clear speech and correct pronunciation.
Discussion: Potentially unfamiliar words require a definition given after the word. Don't just say "Your pet had an ovariohysterectomy." Say "The surgery she had was an ovariohysterectomy, which is referred to as a spay. The procedure removes both ovaries and the uterus." Certainly, do not use the term OHE.

Make certain all contact information is current and correct. Carefully enter the information correctly whether telephone or e-mail address.

If your writing skills and computer proficiency are such that you can create a professional-looking newsletter, let your practice manager know. There are many ways to be helpful when dealing with client communications. Be creative but remember to be professional.

Procedure

Location: Everywhere

PREPARATION

1. Learn how, why, and what you are to communicate.
2. Gather materials to make a telephone call, to send an e-mail, or to create a newsletter.

PROCEDURE

1. If making contact by telephone, have the patient's record with you. Enter the conversation with the date and time and your initials using dark ink in the telephone log section. Even if there is no answer, leave a message and write that message into the patient record. For e-mail, be certain to use the facility's standard letterhead (often a macro) so the recipient knows where the message came from. Sign your name and position at the end of the message. Use the same format as a standard letter.

2. All messages start by using a brief introductory statement to let the person know why they are being contacted. Tell the person your name.
3. Fill in the purpose of your contact using proper sentence structure, grammar, and spelling.
4. For face-to-face communication, pronounce words correctly and avoid using "ums," "you know," and "whatever."
5. Let them know that if they have any further questions, give the recipient the means to contact you for further information.

FOLLOW-UP

1. Review your written communications. Did you use a spell-checker?
2. Were you concise and did you define possibly unfamiliar terms?
3. During your verbal conversation, did you dominate the conversation or were you a good listener?
4. Were you professional at all times?

TASK 21.6
LETTER WRITING

Concept: The veterinary assistant is not often called on to write formal business letters.
Discussion: However, when the occasion does arise, knowing how to do so properly is important. The business letter indicates to the recipient the knowledge and skill of the writer. In many instances, it is the *only* impression the reader will have of the writer and its organization. Therefore, it is essential that the letter is perfect.

Format

Concept: A business letter is written on letterhead paper.
Discussion: The stationary should have a cover sheet or first page with the letterhead. The subsequent pages are always on blank stationery of the same kind as the letterhead paper.
Concept: There are several acceptable formats for formal letters, the easiest being the block style.
Discussion:

1. All margins are 1 in.
2. The lines are single-spaced.
3. The date is typed just below the heading and at the left margin.
4. Four spaces below the date, the name and address of the recipient are entered.
5. Another double space and the *salutation* and the recipient's name follow.
6. The body of the letter begins after a double space following the salutation.
7. Paragraphs are separated by a double space without an indentation for the first line.
8. A double space follows the body, then the closure.
9. Another four spaces and the name of the author is typed.
10. Between the closure and the typed name, the author signs the letter in dark ink.
11. The envelope is addressed on letterhead envelopes.

Word processing programs have templates for formal letters. These can be used to speed the process of letter preparation. A template for envelope preparation is also available, unless the envelopes are preprinted with the return address.

Concept: Be certain the text does not overlap the preprinted information.

Discussion: The following is a little trick to eliminate the problem. A preliminary draft is printed on plain paper. A sheet of letterhead paper is placed over the plain sheet of printed text. Hold the two sheets up to a strong light. The text is evaluated for its placement on the letterhead paper. If there is any overlap between the text and the preprinted material, modifications are made as needed.

Concept: The top and bottom margins of a letter are equal, giving the letter a centered appearance.

Discussion: Use the preview function on the word processing program to help you decide how to adjust the text on the page so that it is centered.

Text

Concept: Remember to use the spell-check if word processed or a dictionary if not. Double-check the spelling of names and addresses. Review punctuation.

Procedure

Location: Office or reception desk

PREPARATION

1. Locate letterhead paper and envelopes.
2. Know the name and address of the recipient.
3. Know the purpose of the letter.
4. Word process if possible.
5. When printing, be certain the cartridge is fresh and the copy is clean and dark.

PROCEDURE

1. Components of a formal letter:
   a) Date
   b) Name and address of the recipient
   c) Salutation
   d) Body of the letter
   e) Purpose of the letter in the first paragraph
      i. Supporting information follows.
   f) Conclude with a statement of expected actions on the recipient's part or the writer's part.
   g) Provide any additional contact information such as a telephone number and e-mail address.
   h) Thank the reader in the last paragraph.
   i) Closure is "Sincerely" or "Sincerely Yours."
   j) Allow for space for the handwritten signature, written in black or very dark blue ink.
   k) Sender's name.

FOLLOW-UP

1. Review the letter for spelling, punctuation, paragraphing, and format.
2. Review the letter for content. Does it make sense to someone who does not know what you are writing about?
3. Is the letter neat and free from smudges and erasures?
4. Fold the letter into thirds and place into the typed, stamped envelope.
5. Seal and mail within 1 day of the date on the letter.

RESOURCES

Deworming Recommendations for Horses. (2010). Retrieved from: http://www.vet.k-state.edu/depts/vhc/equine/pdf/deworming_recommendations.pdf

Vaccination Canine Guideline—AAHA. Retrieved from: https://www.aahanet.org/PublicDocuments/CanineVaccineGuidelines.pdf

Vaccination Feline Guideline—AAFP. (2006). Retrieved from: http://www.catvets.com/uploads/PDF/FINALVaccineTable12.15.pdf

Vaccination Horse Guidelines—AAEP. (2012). Retrieved from: http://www.aaep.org/vaccination_guidelines.htm

Wellness Program for Sheep. Retrieved from: www.aces.edu/pubs/docs/U/UNP-0068/

Wellness Program for Stocker Cattle. Retrieved from: www.uaex.edu/other_Areas/publications/PDF/FSA-3065.pdf



Go to www.wiley.com/go/pattengale/tasks to find additional learning materials for this chapter:

- Competency checklist
- Downloadable flash cards
- Review questions
- Concept maps
- The figures from the chapter in PowerPoint
- Instructor lesson plans

APPENDIX

A

SCANS COMPETENCIES AND FOUNDATION SKILLS

"Skills and Tasks for Jobs: A SCANS Report for America 2000" lists competencies and foundation skills needed to meet the demands of the workplace. The Secretary's Commission on Achieving Necessary Skills (SCANS), U.S. Department of Labor, published this report. The competencies are necessary for success in any job. The foundation skills are needed to fulfill the competencies. The following is from this report.

SCANS Competencies

- Resources
  - Allocates
    - time
    - money
    - material and facility resources
    - human resources
- Information
  - Acquires and evaluates information
  - Organizes and maintains information
  - Interprets and communicates information
  - Uses computers to process information
- Interpersonal
  - Participates as a member of a team
  - Teaches others
  - Serves clients/customers
  - Exercises leadership
  - Negotiates to arrive at a decision
  - Works with cultural diversity

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- Systems
  - Understands systems
  - Monitors and corrects performance
  - Improves and designs systems
- Technology
  - Selects technology
  - Applies technology to tasks
  - Maintains and troubleshoots technology

SCANS Foundation Skills

- Basic skills
  - Reading
  - Writing
  - Arithmetic
  - Mathematics
  - Listening
  - Speaking
- Thinking skills
  - Creative thinking
  - Decision making
  - Problem solving
  - Seeing things in the mind's eye
  - Knowing how to learn
  - Reasoning
- Personal qualities
  - Responsibility
  - Self-esteem
  - Social
  - Self-management
  - Integrity/honesty

APPENDIX

B

SUFFIXES, PREFIXES, AND ANATOMICAL TERMS (ROOTS)

Suffixes

Characteristic of

English Form	Meaning	Example
-al	Relating to, characterized by, of	Mental
-ar	Relating to, being, resembling	Dolar
-able, -ible	Able or capable of	Visible
-oid	Form or like	Hemorrhoid
-plasm	Mold or shape	Cytoplasm
-elle	Small	Organelle

Singular and Plural Forms

English Form	Meaning	Example
-a, -ae	-a means one; -ae means many	Alumna, alumnae
-us, -i	-us means one; -i means many	Radius, radii Alumnus, alumni
-um, -a	-um means one; -a means many	Stratum, strata
-is, -es	-is is singular; -es is plural	Diagnosis, diagnoses

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Medical Condition

English Form	Meaning	Example
-osis	Condition	Prognosis
-ia, -emia	Condition	Anemia
-y	Condition of, state of	Enteropathy
-ic	Condition of	Hydrophobic
-ism	Condition of	Alcoholism

Adjectives (Modifiers of the Root)

English Form	Meaning	Example
-al	Relating to, characterized by	Mental
-ar	Resembling, characterized by	Irregular
-ac, -ic, -tic	Pertaining to, relating to	Cardiac, apneic, acoustic
-us, -ous (vs. u*r*- meaning urine)	Pertaining to	Various

Characteristics

English Form	Meaning	Example
-bryo	Swollen	Embryo
-itis	Inflammation of	Dermatitis
-phlic	Like or love	Hydrophilic
-phob, phobia	Dislike, fear	Hydrophobia
-oma	Mass, bulk	Fibroma
-path, path(y), path(o)	Disease	Enteropathy
-plasm	Related to plasma or the substance of the cell	Cytoplasma
-parous	Bearing	Multiparous
-odyn	Pain, distress	Gastrodynia
-pellent	To drive away	Repellent
-iglia (also: glutin-)	Glue	Neuroglia, agglutination
-stringent	Draw tight, compress	Astringent
-oid	Like	Humanoid

Person

English Form	Meaning	Example
-ist	Person specializing in a disease	Oncologist
-ician	Specialist/practitioner	Physician

Medical Operations

English Form	Meaning	Example
-ectomy	Excision, removal by cutting	Gastrectomy
-otomy	Incision	Laparotomy
-plasty	Repair, reconstruction	Rhinoplasty
-stomy	Making of an artificial opening	Colostomy
-opsy	Examine	Biopsy
-tome	To cut	Microtome
-cente (vs. prefix cent- meaning 100)	To puncture	Cystocentesis

Communication

English Form	Meaning	Example
-gram	Recorded data	Electrocardiogram
-graph	Instrument used to record data	Electrocardiograph

Miscellaneous

English Form	Meaning	Example
-ology	The study of	Biology
-rrhea	To flow, discharge	Dysmenorrhea
-zyme	Ferment	Enzyme
-coele, -cele (vs. coel- prefix meaning same is the suffix)	Denotes relationship to a cavity	*Coelenterata* sp.

Prefixes

Characteristics

English Form	Meaning	Example
Gnos-	Know	Prognostic
Mal-, cac-, dys- (vs. dis- meaning to separate)	Bad	Malady, cacotrophy, dysphagia
Eu-	Good, normal	Eukaryocyte
Pseud-	False	Pseudocyesis
Noci-	Harmful, deleterious	Nociceptor
Amic-	To love, agreeable	Amicable
Mit-	Thread, small	Mitochondria
Lith-, calc- (vs. calc- meaning heel)	Stone, bone, rock	Urolithiasis, calcium
Nom-	Name	Nomenclature

Characteristics (*continued*)

English Form	Meaning	Example
Staphyl-	Cluster	*Staphylococcus*
Strepto-	Chain	*Streptococcus*
Malac-	Soft	Osteomalacia
Scler-	Hard	Sclerosis
Dura-	Hard	Durable
Ton-	Tension	Tonometer
Leva-	Raise	Elevate
Alg-	Pain	Neuralgia
Esthes-	Sensation, perception, feeling	Hyperesthesia
Cata-	Down, negative	Catabolism

Time/space

English Form	Meaning	Example
Chron-	Time	Chronology
Templo, tempo (vs. tempo- meaning temple)	Time	Template, temporary
Brady-	Slow	Bradycardia
Tachy-	Fast, rapid	Tachycardia
Neo-	New	Neonate
Poie-	To make, produce	Hematopoiesis
Gene-	Origin, beginning	Genome
Telo-	End	Telophase

Miscellaneous

English Form	Meaning	Example
Col(l) (glutin-)	Glue	Collagen, glutinous
Therap-	Treatment	Therapy
Laparo-	Flank, abdomen	Laparoscopy
Febr-	Fever	Afebrile
Ly-	Break down, loose	Lysis

Color

English Form	Meaning	Example
Chrom-, chromat-	Colored	Chromatography
Rubri-	Red	Rubrospinal
Erythr-	Red	Erythrocyte
Lute-, lut-	Yellow	Corpus luteum
Xanth-, flav-	Yellow	Xanthophyll, riboflavin

Color (*continued*)

English Form	Meaning	Example
Chlor-	Green	Chlorophyll
Cyan-	Blue	Cyanosis
Leuk-	White	Leukocyte
Alb-	White	Albino
Glauc-	Gray	Glaucoma
Melan-, melano-	Black, dark	Melanoma
Luci-	Clear	Radiolucent
Hyal-	Clear	Hyaline

Relationships/Directions

English Form	Meaning	Example
A-, an-	Negative, without, absence	Ametria, atrophy
A-, a*d*- (can become af-, vs. ef meaning away from), abs-	Away from	Abnormal, abduct, afferent
A*d*-	Toward	Adduct, addiction
Ant-, ant*i*-	Oppose, prevent, inhibit	Antibiotic
Ante-	before	Antemortum
Ob- (b can change to c)	Against, toward	Obturator, occlude
Im-	Not, negative	Impossible
Co*n*tra-	Against	Contrary
Co*m*-, con- (changes to co- before vowels)	With, together	Contraction, cooperate
Pan-	All, universal	Panleukopenia
Omni-	All, universal	Omniverous
Trans-	Through	Transparent
A*m*phi- (i can change to a), ambi- (ph changed to b)	Both, doubly	Amphibious, ambidextrous
Sym-, syn-	Together, with	Symphysis, synthesis
Juxta-	Near, close	Juxtaposition
Para-	Apart, beside, beyond	Paranormal
Homo-, hom-	Same, alike	Homogenized
Iso-	Same	Isomer
Hetero-	Different, other	Heterogeneous
Ultra-	High, beyond	Ultraviolet
Meta-	After, beyond, accompanying	Metastasis
Epi-	Above, on top	Epidermis
Super-, supra-	Above, beyond, extreme	Supernatant
Hyper-	Above, beyond, extreme	Hypermotility

Relationships/Directions (*continued*)

English Form	Meaning	Example
Sub- (b can change to f or p)	Beneath, below	Sublingual, suppository
Hypo-	Below, underneath	Hypothermia
In- (n can change to l, m, r)	Negative, beneath	Invalid
Infra-	Beneath	Infraorbital
Inter-	Between, among	Interstitial
Peri-	Around	Perinatal
Circum-	Around	Circumcise
Ec-, ect-, ex- (c can change to x)	Out, outside, away from	Ectoderm, excrete
Extra-	Outside, beyond	Extracellular
Epi-	Upon, addition to, after	Epiglottis, epistaxis
En-, endo- (n can change to m, b, p, or ph)	In, on	Endoscopy, endocarditis
Eso-	Inside	Esophagus
Re-, retro- (o can change to a)	Behind, backward	Retrodeviation, retract

Direction (Also See Appendix C, "Directional Terms")

English Form	Meaning	Example
Cept-	Receive, take	Intercept
Late*r*- (vs. lat- meaning carry or bear)	Side	Lateral
Medi-	Middle	Mediolateral
Dorso-	Back	Dorsum
Ve*n*tro-	Below	Ventral
Post-	After, behind	Postoperative
Ver*t*-	Turn	Diverticulum
Trop-	Turn	Tropism
Levo-	To the left	Levotorsion
Sinistr-	Left	Sinistrad
Dextr-	To the right, two	Dextrocardia, ambidextrous

Size, Number

English Form	Meaning	Example
Arith-	Number	Logarithm
Nan-	Dwarf	Nanotechnology
Micr-	Small	Microcyte
Mega-, megal- (can also be a suffix)	Large, great, attached to	Megalothymus, splenomegaly

Size, Number (*continued*)

English Form	Meaning	Example
Semi-	Half	Semiconscious
Hol-	Whole	Hologram
Brachy-	Short	Brachycephalic
Doli-	Long	Doliocephalic
Olig-	Few, small	Oligouria
Poly-	Many	Polydactyl
Multi-	Many. much	Multitude
Uni-	One	Uniform
Mon-	Only, sole	Monochromatic
Di- (vs. dia- meaning through, apart), bi-	Two, twice	Dimorphic, bisexual
Tri-	Three	Triplets
Quad-, quadra, tetra-	Four	Quadrangle, tetradactyly
P*ent*- (vs. p*en*- meaning lack or need, p*et*- meaning seek, toward, and p*ex*- meaning fix or make fast), quin-, qui-	Five	Pentapeptide, quintuplets
S*ex*- (vs. meaning differentiation of gametes produced), hex-	Six	Sexigravida, hexameter
S*ept*- (vs. s*ept*- meaning wall of, s*ep*- meaning rot, decay, s*er*- meaning serum)	Seven	Septipara
Octo-	Eight	Octave, octane
N*ov*- (vs. n*od* meaning knot, n*om*- meaning deal out, distribute, n*os*- meaning disease)	Nine	Novobiocin
Deci-	Ten (metric measure)	Decimal
Cen*ti*- (vs. c*en*- meaning common, cen*te*- meaning puncture, cen*tr*- meaning point or center)	Hundred (metric measure)	Centimeter
Kilo-	Thousand (metric measure)	Kilogram

Miscellaneous

English Form	Meaning	Example
Commis-	United	Commissure
Tens-	Stretched	Tension
Tetan-	Rigid, tense	Tetanus
Decide-	Falling of	Deciduous

Miscellaneous (*continued*)

English Form	Meaning	Example
Ortho-	Straight	Orthopedics
Ankyl-	Crooked	Ankyloglossia
Arc*h*- (vs. ara*chn* meaning spider, archo- old term meaning rectum/anus)	Beginning, origin, first	Archiblast
Cusp-	Pointed, a tapering projection	Tricuspid
Delta-	Triangular	Deltoid
Laten- (vs. lat- meaning to the side)	Hidden	Latent
Crypt-	Hidden	Cryptorchid
Actin-	Ray shaped	Actinomycosis
Strat-	Layer, layers	Stratified
Stria-	Furrow, groove	Striation
Fasci- (vs. tear. faci- meaning face, -facient a suffix meaning make)	Band	Fascia
Squam-	Flat	Squamous
Sten-	Narrow, constricted	Stenosis
V*i*sc- (vs. vesic- meaning bladder)	Sticky	Viscous
Append-	To hang, appendage	Appendectomy
Desm-	Band, ligament	Desmosis
Duct-	Lead or draw	Ductile
Bio-	Life	Biology
Vitro-	In a test tube or artificial environment	In vitro
Vivo-	The living body	In vivo

Anatomical Terms: Roots

English Form	Meaning	Example
Abdomi	Abdomen	Abdominal
Acr	Extremities	Acromegaly
Aden	Gland	Adenosarcoma
Adip	Fat	Adiposis
Adren	Adrenal glands	Adrenalism
Angi	Vessel	Angiogram
Aort	Aorta	Aortorrhaphy
Arteri	Artery	Arterial
Arthr	Joint	Arthritis
Bronchi, bronch	Bronchus	Bronchiectasis

Anatomical Terms: Roots (*continued*)

English Form	Meaning	Example
Cardi	Heart	Electrocardiogram
Cephal	Head	Cephalocaudal
Cerebr	Brain	Cerebrum
Chondro	Cartilage	Osterochondritis
Col, colon	Colon	Colonoscopy
Cost	Ribs	Costochondral
Crai	Skull	Craniotomy
Cutane	Skin	Cutaneous
Cyst	Bladder	Cystitis
Cyt	Cell	Cytoplasm
Dent	Teeth	Dentist
Derm	Skin	Dermatology
Encephal	Brain	Encephalomalacia
Enter	Intestine	Enteritis
Esophag	Esophagus	Esophagodynia
Gastro	Stomach	Esophagogastric
Gingiv	Gum	Gingivitis
Gloss	Tongue	Glossectomy
Hepat	Liver	Hepatitis
Hist	Tissue	Histology
Lapar	Abdominal	Laparotomy
Laryng	Larynx	Laryngitis
Lingu	Tongue	Lingual
Lip	Fat	Lipid
Lumb	Lower back	Lumbosacral
Myel	Spinal cord, bone marrow	Myeloma
My	Muscle	Myositis
Nas	Nose	Nasopharynx
Nephr	Kidneys	Nephron
Neur	Nerve	Neuropathy
Odon	Teeth	Orthodontia
Ophthal, ocul, opt	Eye	Ophthalmic, oculomotor, optic
Or, Stomat	Mouth	Stomatitis, oral
Oste	Bone	Osteomyelitis
Ot	Ear	Otic
Pelv	Pelvis	Hemipelvectomy
Phalang	Bones of toes	Phalanx, phalanges

Anatomical Terms: Roots (*continued*)

English Form	Meaning	Example
Pharyng	Pharynx	Pharyngitis
Phleb	Vein	Phlebitis
Pleur	Pleura	Pleuritis
Pneum	Lung	Pneumonia
Rhin	Nose	Rhinitis
Scler	White of eye, also means hardening	Sclerotomy Sclerosis
Tend	Tendon	Tendolysis
Thorac	Chest	Thoracotomy
Trache	Trachea	Tracheitis
Vascul	Blood vessel	Vasculitis

Answers to Terms from Table 1.1, Chapter 1

Abdominal: abdomin/al. abdomin root meaning abdomen, *-al suffix* meaning pertaining to. Abdominal refers to the abdomen.

Antibiotic: anti/biot/ic. -ic pertaining to, *anti- a prefix* meaning against, bio means life. Antibiotic is something that works against life or something living.

Antrum: antr/um. *-um* is singular *antr/* meaning entrance, or opening to a chamber. The early part of the stomach.

Cytology: cyt/ology. cyt root meaning cell, *-ology* suffix meaning study of. Cytology is the study of cells.

Dorsal: dors/al. -al means pertaining to, *dors* meaning back. Dorsal refers to the back.

Frontal: front/al. -al meaning pertaining to, *front* meaning the front of the body. Frontal means toward the front of the body.

Hemiparesis: hemi/pare/sis. -sis condition of hemi- meaning half *-paresis* meaning paralyzed. Paralysis of half the body.

Nephrology: nephr/ology. -ology means study of, *nephr-* refers to the kidney. Nephrology is the study of the kidneys.

Ventral: ventr/al. -al means pertaining to, *ventr-* meaning down. Ventral means downward, bottom.

Virucide: viru/cide. -cide is a suffix meaning to kill, *viru* means virus. A virucide kills a virus.

Xanthoma: xanth/oma. -oma means mass or tumor, *xan-* means yellow. A xanthoma is a yellowish tumor.

Zygote: zyg/ote. zyg- meaning union or yoke, *ote* means one. The zygote is the structure formed after the union of the sperm and egg.

APPENDIX

C

DIRECTIONAL TERMS

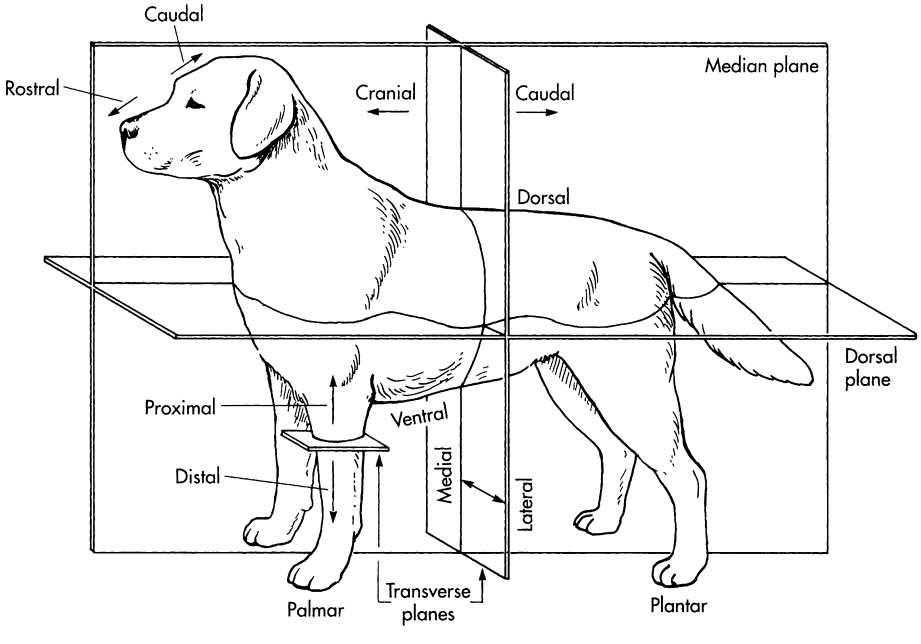


Figure C-1. Anatomic directions and planes. *Source*: McBride, D. F. *Learning Veterinary Terminology*, 2nd ed. St. Louis, MO: Mosby.

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Term	Direction
Left	The animal's left
Right	The animal's right
Cranial	Toward the head
Rostral	Toward tip of nose (head only)
Caudal	Toward the tail
Dorsal	Toward the back
Ventral	Toward the belly
Medial	Toward the median plane
Lateral	Away from the median plane
Deep (internal)	Toward the center (whole body or part)
Superficial (external)	Toward the surface (whole body or part)
Proximal	Toward the body (extremity)
Distal	Away from the body (extremity)

From Colville, T., & Bassert, J. M. (2002). *Clinical Anatomy and Physiology for Veterinary Technicians*. St. Louis, MO: Mosby, with permission from Elsevier.

APPENDIX

D

METRIC SYSTEM AND TABLE OF EQUIVALENTS

Metric System

Basic Units

Gram:	g, gm, G, Gm. Unit for weight.
Liter:	l, L. Unit for volume.
Meter:	m, M. Unit for linear measurement or length.

Prefixes for Basic Units

Kilo-	1,000 (one thousand)
Hecto-	100 (one hundred)
Deca-	10 (ten)
Deci-	0.1 (one-tenth)
Centi-	0.01 (one-hundredth)
Milli-	0.001 (one-thousandth)
Micro-	0.000001 (one-millionth)
Nano-	0.000000001 (one-billionth)

Units and Abbreviations

Weight	
Kilogram:	kg, Kg
Gram:	g, gm, G, Gm
Milligram:	mg, m
Microgram:	mcg
Volume	
Kiloliter:	kl, kL
Liter:	l, L
Deciliter:	dl, dL
Milliliter:	ml, mL

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Length

Kilometer:	km, Km
Meter:	m, M
Centimeter:	cm
Millimeter:	mm

Equivalents

Metric
5 cc (mL) = 1 teaspoon
15 cc (mL) = 1 tablespoon
30 cc (mL) = 1 oz

English
3 teaspoons (15 mL) = 1 tablespoon
2 tablespoons = 1 oz
8 ounces = 1 cup = 16 tablespoons
2 cups = 1 pint
4 cups (2 pints) = 1 quart
4 quarts = 1 gal

Answer to Math Problem in Chapter 1

What I Want to Know	Concentrate (mL)	Water (mL, metric)
	33.34 mL concentrate mixed in 966.66 mL of water.	(Step 2) Division and subtraction: 1000 mL of diluted solution ÷ 30 parts concentrate = 33.34 mL of concentrated solution 1000 mL total volume − 33.34 mL concentration = 966.66 water, which is the 1:30 ratio
What I Know	Dilute 1 part of concentrate to 30 parts of water (1:30)	(Step 1) Multiplication: 4 × 250 mL = 1000 mL or 1 L of diluted disinfectant is needed

APPENDIX

E

COMMON NAME, GENUS NAME, SCIENTIFIC NAME, AND GENDER TERM FOR COMMON SPECIES

Common Name	Genus Name	Scientific Name	Male	Female	Offspring
Domestic duck	*Avian*	*Anas platyrhyncha*	Drake	Hen	Ducklings
Turkey	*Avian*	*Melleagris gallopavo*	Tom	Hen	Poult
Domestic chicken	*Avian*	*Gallus domestica*	Cock Rooster	Hen	Chicks
Domestic goose	*Avian*	*Anser cygnoides*	Gander	Goose	Gosling
Parrots	*Avian*	*Psittacine*	Cock	Hen	Chicks
Finch/canary	*Avian*	*Passerine*	Cock	Hen	Chicks
Horse	*Equine*	*Equus caballus*	Stallion Gelding	Mare Filly	Foal Colt/filly
Donkey	*Equine*	*Equus aninus*	Jack	Jenny	Foal
Cattle European	*Bovine*	*Bos taurus*	Bull Steer	Cow Heifer	Calf
Cattle Tropical	*Bovine*	*Bos indicus*			
American bison	*Bovine*	*Bison bison*			

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Common Name	Genus Name	Scientific Name	Male	Female	Offspring
		Camelid—Group Term			
Llama	*Camelid*	*Llama glama*	Sire	Dam	Cria
Alpaca	*Camelid*	*Vicugna pacos*			
Sheep	*Ovine*	*Ovis aries*	Ram Buck	Ewe	Lamb
Goat	*Caprine*	*Capra hircus*	Billy Ram	Doe Nanny	Kid
Swine	*Porcine*	*Sus scrofa*	Boar Barrow	Sow Gilt	Piglet
Dog	*Canine*	*Canis familiaris*	Dog	Bitch	Pup
Cat	*Feline*	*Felis catus*	Tom	Queen	Kitten
Ferret	*Mustela*	*Mustela putorius furo*	Hob	Jill	Pup
Rabbit	*Lagomorph*	*Oryctolagus cuniculus*	Buck	Doe	Kit Kitten Bunny
Mouse, house	*Rodent*	*Mus musculus*	Buck	Doe	Pinkie
Rat, black	*Rodent*	*Rattus rattus*	Buck	Doe	Pinkie
Mongolian gerbil	*Rodent*	*Meriones unguiculatus*	Buck	Doe	Pup
Hamster	*Rodent*	*Mesocricetus auratus*	Buck	Doe	Pup
Guinea pig	*Rodent*	*Cavia porcellus*	Boar	Sow	Pup

APPENDIX

F

ABBREVIATIONS USED IN VETERINARY PRACTICE

aa	Of each
ac	Before meals
AD	Right ear
ad lib	Freely as wanted
ADR	Adverse drug reaction; also "ain't doing right"
AL	Left ear
Amp	Ampule
ARF	Acute renal failure
AU	Each ear
BAR	Bright, alert, responsive
BCS	Body condition score
BE	Barium enema
BER	Basic energy requirements
bid, BID	Twice daily
BLD	blood
BM	Bowel movement
BOL	Bolus
BP	Blood pressure
BSA	Body surface area
BW	Body weight
C, w/	With
c̄, w/o	Without
caps	Capsules
CBC	Complete blood count
cc	Cubic centimeter
CD	Canine distemper
CHF	Congestive heart failure
Cob	Care of body
CRF	Chronic renal failure
CRT	Capillary refill time
C-S	Coughing, sneezing
cwt	Hundred weight
CXR	Chest X-ray
d	Right, day
D5W	5% Dextrose in water
DIC	Disseminated intravascular coagulation
DJD	Degenerative joint disease
DLH	Domestic Long Hair
DM	Diabetes mellitus
DOA	Dead on arrival
DOB	Date of birth
DS	Dose
DSH	Domestic Short Hair
Dx	Diagnosis
ECG, EKG	Electrocardiogram
ECHO	Echocardiogram
EENT	Eyes, ears, nose, throat
F-A	Fecal Analysis
FB	Foreign body
FD	Feline distemper
FeLV	Feline leukemia virus
FeSV	Feline sarcoma virus
FIP	Feline infectious peritonitis

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FPV	Feline panleukopenia virus (see FD)
FUO	Fever of unknown origin
FUS	Feline urologic syndrome
FVR	Feline viral rhinotracheitis
Fx	Fracture
g, gm	Gram
gal	Gallon
GDV	Gastric dilatation volvulus
GI	Gastrointestinal
gtt(s)	Drop(s)
GU	Genitourinary
h	Hour
HBC	Hit by car
HBS	Harsh bronchial sounds
HC	Health certificate
HCT	Hematocrit
HR	Heart rate
hs	At bedtime
Hx	History
ICH	Infectious canine hepatitis
ID	Intradermal
IM	Intramuscular
IN	Intranasal
IP	Intraperitoneal
IT	Intratracheal
IV	Intravenous
IVD	Intervertebral disk disease
IVP	Intravenous pyelogram
KCS	Keratoconjunctivitis sicca
kg	Kilogram
L, LT, S	Left
LN	Lymph node
LRS	Lactated Ringer solution
MAP	Mean arterial pressure
mEq	Milliequivalents
mg, mcg	Microgram
MI	Mitral insufficiency
mL	Microliter; milliliter
MLV	Modified live virus
MM	Mucous membrane
NC	No change, no charge
Non Rep	Do not repeat
NPL	No palpable lesions
NPO	Nothing per os (nothing by mouth)
NR	Nothing remarkable
NS	Normal saline
NSF	No significant findings
NVL	No visible lesions
OCD	Osteochondritis desiccans
OD	Right eye
OFA	Orthopedic Foundation for Animals
OHE	Ovariohysterectomy (spay)
OL, OS	left eye
OTC	Over the counter
OU	Both eyes
pc	After meals
PCV	Pack cell volume
PDQ	"Pretty darn quick"
per os, PO	By mouth or postoperative
PI3	Parainfluenza-3
PM	Postmortem
PPH	Pertinent past history
ppm	Parts per million
PPN	Partial parenteral nutrition
prn	As necessary
PTA	Prior to admission
PTS	Put to sleep (euthanasia)
PWD	Powder
q	Every
qd	Every day
qh	Every hour
q __ h	Every __ hours
qid	Four times a day
qod	Every other day
qs	Quantity Sufficient
R, RT	Right
RACL	Ruptured anterior cruciate ligament
RADs	Radiographs
R/O	Rule out
RV	Rabies vaccination
Rx	Prescription
s	Without
SC, SQ	Subcutaneous
Sig	Prescription label
SOB	Shortness of breath
sp.	Species
SR	Suture removal
ss	½
Sx	Signs, symptoms, or surgery
tab	Tablet
TDx	Tentative diagnosis
TLC	Tender loving care
tid	Three times daily
TPR	Temperature, pulse, respiration
Tx	Treatment
U	Unit
UA	Urinalysis
Ung	Ointment
UO	Urinary obstruction
URI	Upper respiratory infection
UTI	Urinary tract infection
V-D	Vomiting and diarrhea
VS	Vital signs
V_T	Tidal volume
WNL	Within normal limits

APPENDIX

G

NORMAL VITAL SIGNS

Species	Temperature ±2.0°F)	Temperature (±1.0°C)	Average Heart Rate (Pulse/ min or bpm)	Average Respiratory Rate (Breaths/min or rpm)
Cat	100.5	38.1	120–140	16–40
Cow	100.5	38.5	48–84	26–50
Dog	100.0	37.9	70–120	19–34
Goat	101.3	38.5	70–80	16–34
Horse	99.5	37.0	28–40	12
Pig	101.6	38.7	70–120	32–58
Sheep	101.0	38.3	70–80	16–34
Rabbit	103.0	38.6	180–350	39

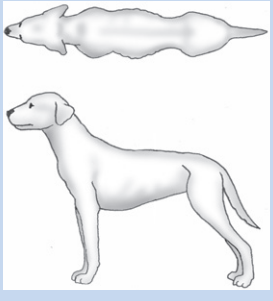
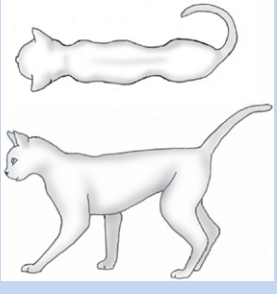
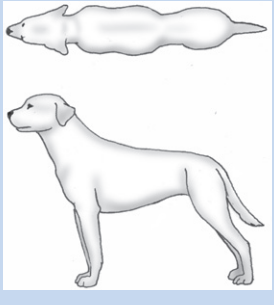
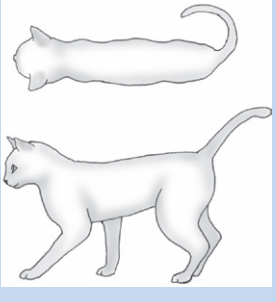
Normal parameters vary with exercise, stress, and environmental temperature. Averages represent a range occurring above and below the average. Remember too that a smaller animal will be on the higher end of the range because of increased metabolism.

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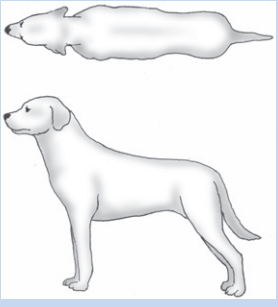
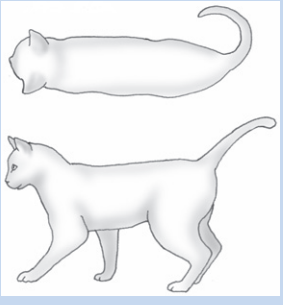
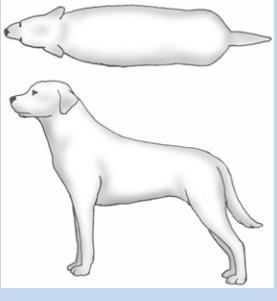
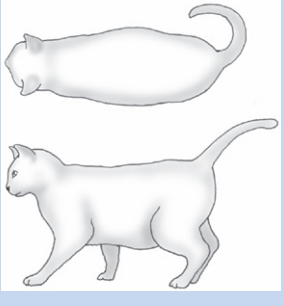
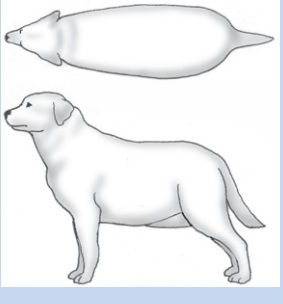
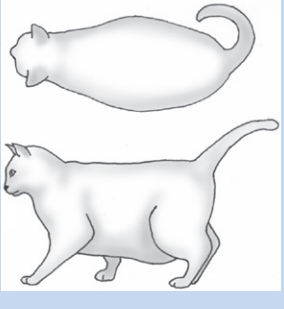
APPENDIX

H

BODY CONDITION SCORE

Canine	Body Condition Score	Feline
	**1: Very Thin** *Ribs:* easily visible and felt with no cover *Waist:* severe waist *Tail Base:* lumbar vertebrae and pelvic bones are raised with no fat between the skin and bone *Side View:* severe abdominal tuck *Overhead View:* accentuated hourglass shape	
	**2: Underweight** *Ribs:* easily felt with minimal fat cover *Waist:* easily noted *Tail Base:* bones are raised with minimal fat between the skin and bone *Side View:* prominent abdominal tuck *Overhead View:* marked hourglass shape	

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Canine	Body Condition Score	Feline
	**3: Ideal** *Ribs:* easily felt with slight fat cover *Waist:* observed behind ribs *Tail Base:* smooth contour but bones can be felt under a thin layer of fat *Side View*: abdominal tuck *Overhead View:* well-proportioned waist	
	**4: Overweight** *Ribs:* difficult to feel with moderate fat cover *Waist:* poorly discernible *Tail Base:* some thickening but bones can be felt under a moderate layer of fat *Side View:* no abdominal tuck *Overhead View:* back is slightly broadened	
	**5: Obese** *Ribs:* difficult to feel under thick fat cover *Waist:* absent *Tail Base:* thickened and difficult to feel bones beneath prominent layer of fat *Side View:* fat hangs from the abdomen *Overhead View:* markedly broadened and prominent paralumbar fat deposits	

Source: Jack, Candyce M., & Watson, Patricia M. (2008). *Veterinary Technician's Daily Reference Guide: Canine and Feline*, 3rd ed., reproduced with permission from Wiley.

APPENDIX

I

BLOOD COLLECTION TUBE TYPES

1. *Red Top Tube:* Contains no anticoagulant. Used for serum or clotted whole blood. Separate serum from clot within 45–60 minutes from time of blood collection. Use for serum samples.
2. *Tiger Stripe Tube:* Red and black striped top. This is a serum separator tube. Contains no anticoagulant. Does contain a yellowish plug seen at the bottom of the tube, a clot activation gel, to enhance separation of serum from clot. Separate serum from clot within 45 minutes of venipuncture. Centrifuge to enhance serum separation but do not do so before clotting is complete. Do not use for therapeutic drug level monitoring; otherwise, use is the same as for red top tube.
3. *Lavender Top Tube:* This is used for unclotted whole blood or plasma. Contains potassium EDTA, an anticoagulant. Does not contain a preservative. Used for complete blood count (CBC).
4. *Gray Top Tube:* Contains a preservative, sodium fluoride, and an anticoagulant. Used for gulcose tolerance testing.
5. *Blue Top Tube:* The anticoagulant is sodium citrate.
6. *Green Top Tube:* Heparin is the anticoagulant and is used for iron absorption tests and CBCs. However, the white blood cells deteriorate very quickly in heparin so blood smears must be made.
7. *Yellow Top Tube:* Contains 1 mL of ACD solution, an anticoagulant.
8. *Royal Blue Top Tube:* This tube type is used for trace metal studies. The anticoagulant is sodium EDTA.

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APPENDIX

J

BLOOD COLLECTION PROTOCOL

The validity of a laboratory result is dependent upon the quality of the sample used.

Step 1

Patient Preparation: Consult with veterinarian first before advising or implementing the withholding of food. Very small animals and those with certain diseases should not be fasted prior to blood withdrawal.

a. *Outpatient:* Advise the owner to withhold food for 4–6 hours prior to blood withdrawal.
b. *Hospitalized:* Withdraw food, but not water, overnight. Collect blood sample first thing in the morning before being fed.
c. *All patients:* Confirm patient identity three times
   - before taking into blood collection area
   - immediately before drawing blood sample
   - before returning to hospital housing or owner.

Step 2

a. Collect supplies needed
   - Needle: dependent on patient size.
     - 22 ga: patients 2–20 kg
     - 20 ga: patients 30–60 kg
     - 18 ga: large animal patients
   - Blood collection tubes
     - Determine what is needed based on tests required.
     - Determine tube sizes based on quantity needed. Ideally, each tube is filled three-fourths full.

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- Test tube holder—Place tubes in order of filling. Not all tubes may be used.
  - Yellow or yellow/black—blood culture tube
  - Red—no additive tube
  - Light blue—coagulation tube
  - Dark green—sodium heparin anticoagulant tube
  - Light green—lithium heparin anticoagulant and gel separator
  - Lavender—EDTA anticoagulant tube
  - Pale yellow—acid citrate dextrose (ACD) coating
  - Light gray—oxalate/fluoride
  - Red/gray or gold—gel separator and clot activator
- Skin antiseptic
- Cotton balls or gauze sponges in a Ziploc bag
- Elastic wrap or adhesive tape
- Scissors (optional)
- Blood collection system of phlebotomist's choice
- Patient's medical record. Confirm:
  - patient identity
  - tests requested
- Identification labels for each tube
- Examination gloves, goggles, and lab coat as the minimum personal protective equipment (PPE)

Step 3

a. Fill all required tubes in the proper order.
b. All tubes with an additive must be thoroughly mixed. Do so by
   - Inverting tubes *gently*, top to bottom, counting 10–12 complete 180° inversions.
   - This must be done immediately after completion of blood collection *and* before the clotting process begins.

Step 4

a. Apply label to each tube.

APPENDIX

K

PAIN SCALE FOR CATS

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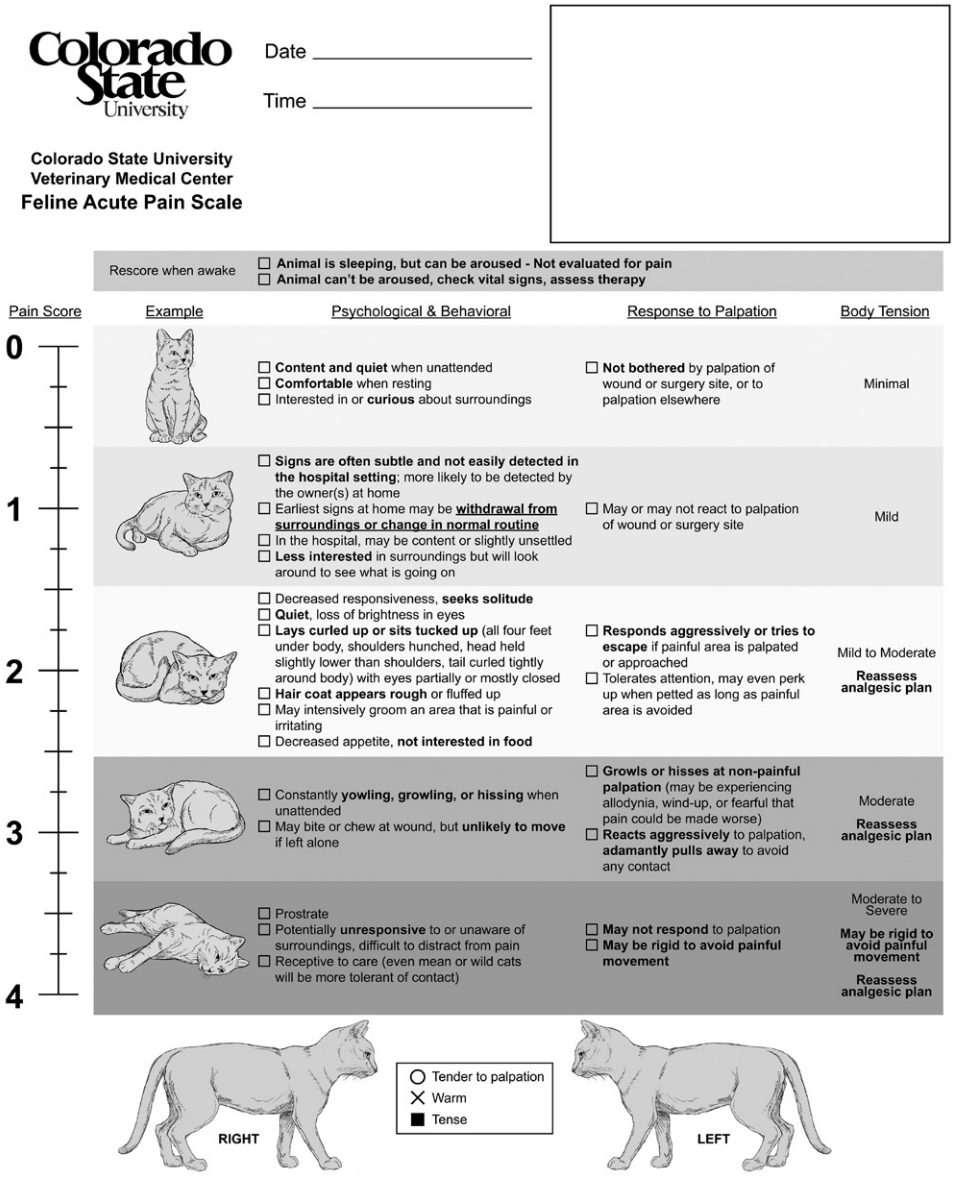


Figure K-1. Colorado State University Veterinary Medical Center Feline Acute Pain Scale. Courtesy of Dr. Peter Hellyer.

A

Modified Pain Scale Recommended for the Evaluation of Acute Postsurgical Pain in Dogs and Cats

Time:		_____	_____
Posture:			
Normal	(0)	_____	_____
Rigid	(1)	_____	_____
Hunched	(2)	_____	_____
Tense	(2)	_____	_____
Abnormal body posture	(3)	_____	_____
Define: _____			
Guarding affected area	(4)	_____	_____
Does the Dog or Cat Seem to Be:			
At rest	(0)	_____	_____
Comfortable	(0)	_____	_____
Restless	(1)	_____	_____
Uncomfortable	(2)	_____	_____
Rolling, thrashing	(3)	_____	_____
Dilated Pupils? (Yes: 1; No: 0)		_____	_____
Salivation? (Yes: 1; No: 0)		_____	_____
Vomiting? (Yes: 1; No: 0)		_____	_____
If Yes, Number of Times/5 Min		_____	_____
Vocalization:			
Not vocalizing	(0)	_____	_____
Barking (If abnormal for this dog: 1)		_____	_____
Crying or whimpering	(2)	_____	_____
Groaning, hissing	(3)	_____	_____
Screaming	(4)	_____	_____

Figure K-2. Modified Glasgow Pain Scale. Modified from the University of Melbourne Pain Scale and the Glasgow Composite Pain Tool. When using this scale, observe the dog or cat for the presence or absence of specific behaviors and monitor for improvement in pain behaviors over time. If a specific score is desired, assign numbers in parentheses and add up to obtain overall pain score. The numeric scoring system has not been validated at this time. *Source*: Gaynor, James S., & Muir, W. W. (2009). *Handbook of Veterinary Pain Management*, with permission from Mosby.

B

Modified Pain Scale Recommended for the Evaluation of Acute Postsurgical Pain in Dogs and Cats—cont'd

Mental Status:			
Aggressive		_____	_____
Obtunded		_____	_____
Disinterested		_____	_____
Nervous/anxious/fearful		_____	_____
Happy/content		_____	_____
Happy/bouncy		_____	_____
Submissive		_____	_____
Change in mental status? (Yes: 1; No: 0)		_____	_____
Walking:			
Assessment not carried out/too sedated	(0)	_____	_____
Will not walk/stand		_____	_____
Note: _____			
None of these	(0)	_____	_____
Stiff	(1)	_____	_____
Ataxic	(1)	_____	_____
Slow or reluctant to rise or sit	(2)	_____	_____
Lame	(2)	_____	_____
Palpation: When Touched Did the Dog or Cat . . .			
None of these	(0)	_____	_____
Look toward wound	(1)	_____	_____
Anxious	(1)	_____	_____
Cry	(2)	_____	_____
Flinch	(2)	_____	_____
Snap/bite/hiss	(3)	_____	_____
Growl or guard wound	(3)	_____	_____

Figure K-2. (*Continued*)

GLOSSARY

Abomasum Fourth ruminant stomach compartment most like the monogastric stomach.

Acute renal failure A sudden onset of kidney failure from toxic overload or poisoning.

Adrenal glands Located on top of the kidney, they control inflammation and provide stress hormones.

Agonal Refers to the process of dying.

Agonal breathing Patients seem as though they are gasping for breath but in reality it is a muscle spasm.

Alcohol (isopropyl or ethyl) Substance used to disinfect objects or as an antiseptic on skin.

Alimentary canal The digestive tract.

Alkalies (lye) Strong alkaline solutions that are capable of neutralizing acids. Commonly used for washing or cleansing products.

Alveoli Plural form of the word alveolus, which is an air sac in the lungs or a honeycomb pit in the wall of the stomach.

American Animal Hospital Association (AAHA) A national organization that sets standards for veterinary hospitals.

American Veterinary Medical Association (AVMA) A national organization representing the individual veterinarian.

Anaerobic organism An organism that does not require oxygen for life or growth. Oxygen can actually inhibit or cause death to the organism.

Anaphylaxis An unusual or exaggerated allergic reaction by an animal to foreign proteins or other substances.

Animal and Plant Health Inspection Service (APHIS) USDA organization that regulates the handling of research animals.

Animate Alive or referring to a living being.

Anogential distance An area between the vulva and anus on animals.

Anorexia Lack of appetite or desire for food.

Antibodies Plural for antibody, which is a protein that acts to destroy antigens as an immune response.

Antigen An invader that is foreign to a body and evokes an immune response.

Antiseptics Substances that can reduce the spread or growth of microorganism on living tissue.

Appendicular skeleton The bones of the limbs and their means of attachment.

Arrhythmia An irregular heartbeat.

Arterioles Small arteries that terminate as capillaries.

Arthritis The inflammation of joints caused by infections or metabolic or developmental causes.

Aspiration The act of inhaling or withdrawing air or fluid from body tissues or medication bottles.

Asthma Respiratory condition marked by a wheezing sound when the animal breathes, often caused by airway obstruction.

Ataxia Difficulty coordinating movement.

Atria The two upper chambers of the heart.

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Atrial fibrillation A rapid fluttering beat of the atria of the heart.

Auscultate To listen to internal organs with a stethoscope.

Autoclaving Common technique using high temperatures, pressure, and steam to sterilize surgical equipment and instruments.

Autoimmunity When the immune system attacks the body or organism that is producing the antibodies.

Autolysis Breakdown of cells from enzymes that are contained within the cell.

Autonomous nervous system (ANS) Nervous system division that responds in times of stress.

Axillary Refers to the area on the body that is the armpit.

Bactericide A substance that destroys bacteria.

Bacteriostat A substance that inhibits growth of bacteria.

Bronchioles Branches of the bronchus in the lungs.

Buccal Refers to the inside of the cheek.

Capillaries The plural form of capillary: tiny blood vessels that are one cell in thickness and are the terminal ends of arterioles.

Capillary action Wicking action that lifts fluids into its "capillary tube."

Cardiac output The volume of blood ejected from the left ventricle in 1 minute.

Caudal Refers to moving toward the tail from a current location or to the tail itself.

Central nervous system (CNS) Brain and spinal cord.

Cesarean section Procedure to deliver offspring by surgical incision.

Chlorhexidine Antibacterial compound that is available in three forms: hydrochloride, gluconate, or acetate, used as an antiseptic or disinfectant for both inanimate objects and living tissue.

Chlorine Common substance used in cleaning and disinfecting solutions.

Chloroxylenol Common antiseptic solution, a chlorine derivative.

Chronic heart failure (CHF) When the heart does not pump well enough to distribute the blood around the body and is in a progressive state of failure.

Chronic renal failure Ongoing progressive failure of the kidneys to properly filter the blood.

Colon Large intestine.

Congenital Refers to existing abnormalities at birth, acquired during development inside uterus.

Connective tissue Category of tissue that includes bones, ligaments, tendons, and fat.

Conscious proprioception The knowledge of where the appendages are.

Contact time Time required for an antimicrobial solution to work effectively.

Contaminants Organisms or debris that can potentially cause an infection.

Contraindications A condition or symptom that renders a treatment to be inadvisable.

Controlled drugs Prescription drugs that have the potential for addiction or abuse, also referred to as controlled substances (CS), regulated by the DEA.

Costochondral junction Where a rib and the costal cartilage join.

Chattel Tangible and mobile personal property.

Common law Law based on legal precedent, rather than government rulings.

Contract law Law governing the relationship between the veterinarian and the client.

CPU Abbreviation for central processing unit.

Cranial Refers to moving toward the skull from the current location or relating to the skull.

Cud Solid portion of the chewed food that is burped up for chewing.

Cytology The study of cells.

Deciduous tooth A young tooth that is shed as the patient matures.

Decubitus ulcer A bedsore or ulcer formed from local interference with the circulation, also called pressure sores; usually occurs over a bony prominence such as a hip or elbow.

Defecation The act of expelling feces from the anus.

Degenerative myopathy Condition or disorder that causes weakness in the affected muscles.

Dermis The vascular layer of the skin.

Diarrhea Abnormally watery stool.

Dilated cardiomyopathy Enlargement of the heart.

Discoid lupus Benign form of lupus that is classified as an autoimmune disease.

Disinfectant Chemical agent that destroys infectious organisms.

Disinfection Reducing the spread of growth of microorganisms on inanimate objects.

Distal Locations on appendages that are far from the point of attachment or origin.

Distemper Viral disease leading to seizures and tremors.

Dorsal Refers to an animal's upper surface or moving toward or on the back.

Dram Unit of apothecary weight used commonly in pharmacology that is equal to an eighth of an ounce or 60 grains.

Drug Enforcement Agency (DEA) U.S. government agency responsible for enforcing controlled substance laws and specific rules for ordering, storing, and dispensing medications.

Duodenum First part of the small intestine.

Dysplasia Poorly developed or abnormally growing structure.

Dystocia Difficult or slow delivery of offspring.

Ectoparasites External parasites living on the surface of the host's body.

Electrocardiogram (ECG) Graphic record or tracing produced by an electrocardiograph.

Electrocardiograph Any instrument that records changes of the electric potential during heartbeats, used to diagnose heart disease.

Encephalomyelitis An inflammation of the brain and spinal cord.

Endocarditis Inflammation of the inside layer of the heart.

Endoscope Fiber optic instrument used for examination of areas of the body not easily seen or accessed. There are three types: flexible, semirigid, and rigid.

Endoscopy Visual examination of the interior structures of the body with an endoscope.

Endosteum Vascular lining of the inner cavity of a bone.

Enervate To remove a part of a nerve or to cut a nerve.

Epidermis The outermost layer of the skin.

Epithelium The tissues that comprise the linings and coverings of the body and its organs.

Ethics Rules or principles that govern right conduct; the values and guidelines that govern veterinary practice.

Ethylene oxide gas Gas fumigant used for surgical equipment that is sporicidal and viricidal. Because it is explosive when used in concentrations over 3%, it is combined with carbon dioxide as a sterilizing or disinfecting agent.

Fascia Connective tissue outside muscles that covers or binds them.

Feces The waste product of food; all living beings expel digested wastes.

Feral Untamed; often refers to an animal that has escaped from domesticity and is running wild.

Fomites Inanimate objects that are capable of transmitting microorganisms that can cause disease.

Formaldehyde Chemical that is used as a preservative agent for tissues.

Gastric dilatation Dilation and expansion of the stomach.

Gastric dilatation and volvulus (GDV) Dilation, expansion, and twisting of the stomach; also known as bloat.

Gastritis Inflammation of the stomach.

Gastroscopy Inspection of the interior of the stomach with a gastroscope.

Gestation The time from conception to delivery.

GIGO effect An old computer science acronym meaning "garbage in, garbage out."

Glutaraldehyde A disinfectant used in aqueous solution for sterilization of non-heat-resistant equipment.

Gonads General term for sex organs.

Gross contaminants Contamination that is visual to the naked eye.

Heart murmurs Atypical sounds of the heart usually indicating a malfunction or structural defect.

Heaves Asthma or emphysema in horses.

Hematoma Unclotted mass of blood from a damaged blood vessel.

Hemolyzed Refers to damaged red blood cells that have released their hemoglobin.

Hepatic lipidosis Accumulation of fat in the liver and hypertryglyceridemia; may develop in obese cats that are persistently anorexic.

Hip dysplasia Poorly formed hips.

Histology The study of tissues.

Human–animal bonds The emotional bonds that exist between humans and their animals.

Hydrogen peroxide Solution used as a mild antiseptic and bleaching agent.

Hyperadrenocorticism (Cushing's) Excessive production of adrenocorticotropic hormone (ACTH) by the pituitary gland.

Hypertension Abnormally high blood pressure.

Hyperthermia Abnormally high body temperature.

Hyperthyroidism Excessive functioning of the thyroid gland, resulting in increased metabolism, heart rate, and high blood pressure.

Hypertrophic cardiomyopathy A condition in which heart walls have enlarged or increased in bulk.

Hypoadrenocorticism (Addison's) A condition in which there is insufficient adrenocortical secretion, resulting in weakness, weight loss, low blood pressure, and gastrointestinal disturbances.

Hypodermis Beneath the dermis.

Hypothyroidism Deficient thyroid activity, low metabolic rate.

Iatrogenic Refers to adverse condition that is caused by medical personnel or a medical treatment or procedure.

Ileum Distal portion of the small intestine.

Ileus Painful distension of the abdomen, failure of peristalsis.

Inanimate Not alive; lacking power of motion.

Incontinence The inability to hold urine or feces.

Induced ovulation Copulation has to take place in order for ovulation to occur.

Inguinal Refers to the groin area.

Institutional Animal Care and Use Committee (IACUC) Organization that sets policies and procedures for the care and treatment of animals at research or educational institutions.

Insufflation Blowing powder, vapor, or gas into a body cavity.

Integument The skin.

Intussusception The slippage of a section of intestine within an adjacent portion of intestine, similar to a "spy glass."

Irritable bowel disease (IBD) Condition in which the intestines are overly sensitive to food or stress.

Jejunum Middle part of the small intestine.

Laparoscopy Examination of the peritoneal cavity utilizing a laparoscope.

Laryngeal paralysis (LP) Nerve damage or hereditary condition that causes tissues in the larynx to block the airway.

Larynx Upper part of the respiratory passage; contains the voice box.

Lateral Away from the middle of the body or limb.

Lavage The flushing or washing out of a body cavity or wound.

Liability A legal responsibility.

Ligaments Strong bands of connective tissue that connect bones to other bones or that keep organs in place.

Lingual Refers to the tongue.

Liver Large filtering organ in the abdomen.

Local ordinances Town, village, and county laws.

Lumen A cavity inside a tube.

Lymphadenopathy Swelling of the lymph node(s).

Lymphocytes White blood cells that provide an immune response.

Lymphoma Cancer of the lymphatic system.

Malpractice Failure of a professional to render proper services.

Material safety data sheets (MSDS) Sources of information on the hazards of each material found within the hospital.

Medial Toward the middle of the body or limb.

Meniscus A cresent or crescent shape.

Microbes Organisms that cannot be seen with the naked eye, often associated with bacteria.

Micturition Urination.

Monogastric Refers to a digestive system with one stomach compartment.

Muscles The tissues that contract to provide movement.

Myopathy General term for muscle disease.

Nares Opening of the nasal cavity.

Nasogastric tube Soft rubber or plastic tube that is inserted through a nostril and into the stomach.

Nasopharynx The part of the throat behind the nose.

National Association of Veterinary Technicians of America (NAVTA) A national organization that represents veterinary technicians.

Necrosis Localized death of tissue.

Necrotic Refers to localized tissue death.

Negligence Failure to take care to prevent harm to others.

Neoplasm New growth (lump); tumor.

Nephrons The filtering units of the kidney.

Nerves The tissues that conduct messages via impulses.

Neurons Functional cells of the nervous system.

Neurotransmitters The chemical messengers that connect the nervous system.

Nits The eggs of ectoparasites such as lice.

Nosocomial Refers to infections or diseases that are acquired during a hospital stay.

Nucleus Part of the cell that controls the activity of the cell.

Nystagmus Rapid flicking motion of the eyes.

Occupational Safety and Health Administration (OSHA) U.S. government agency regulating safety in the workplace.

Omasum Third of the ruminant stomach compartments.

Orchiectomy Surgical excision of the testicles.

Organelles Organs within a cell.

Organs Units of specific function within the body.

Oropharynx The part of the throat below the soft palate, above the epiglottis, and continuous with the mouth.

Orthopneic Refers to difficulty in breathing, usually when patient is lying down.

Osteosarcoma Cancer of the bone.

Ova Eggs; female sex cells.

Ovaries Female reproductive organs.

Over-the-counter (OTC) drugs Drugs for which no prescription is needed.

Ovulation Release of eggs.

Pancreas Dual-role gland that produces digestive enzymes and insulin.

Pancreatitis Inflammation of the pancreas.

Panosteitis Inflammation of all the bones.

Parasympathetic nervous system Part of the nervous system that does not require conscious control, smooth muscle contraction, secretions, breathing, and so on.

Parathyroid Gland responsible for calcium regulation.

Paresis Partial paralysis.

Parturition The act or process of giving birth.

Patent ductus arteriosis Abnormal persistence of the left sixth aortic arch after birth, leaving an open lumen in the ductus arteriosus, between the descending aorta and the pulmonary artery.

Pathogens Microorganisms capable of causing disease.

Penrose drain A tube sutured into a wound cavity to permit body fluids to escape while the wound is healing.

Peripheral nervous system Nerves of the body that correspond with the CNS.

Perisoteum Outer covering of a bone.

Perivascular Refers to the tissues that surround a blood vessel.

Personal protective equipment (PPE) Gloves, gowns, masks, and other coverings to protect an individual from infection.

Pharyngostomy tube Esophagostomy tube for feeding when the oral cavity must be bypassed following injury or surgery.

Pinna The portion of the ear that is formed by cartilage.

Pitting edema A pit or depression in tissues that are fluid-filled.

Pituitary gland Called the "master gland," as it controls other glands.

Placenta Life support system for the fetus.

Pleural effusion Fluid in the tissues of the lungs.

Pneumonia Inflammation and consolidation of the lungs caused by infection.

Polydactyl Having more toes than normal.

Polymyositis Inflammation of many muscles.

Popliteal Refers to the caudal knee.

Prehension Taking in food by seizing or grasping.

Prescription drugs (Rx) Medicines that can be dispensed only from a legal prescription written by a licensed veterinarian.

Prions Small infectious proteins that are self-replicating.

Protist Member of the Kingdom Protista, which includes bacteria, algae, slime molds, fungi, and protozoa.

Proximal In the case of appendages, refers to close to the point of attachment.

Pulmonary arteries Vessels that take blood from the heart to the lungs.

Purulent Containing or flowing with pus.

Pustules Elevated or raised spots filled with pus.

Quarantine Place or period of detention for animals coming from infected areas; restrictions are placed on entering or leaving regions where cases of communicable disease are suspected.

Quaternary Bonded to four other atoms; type of disinfectant.

Radiograph Indirect view of the interior of a patient; produced by gamma rays.

Radiology Branch of science dealing with use of X-rays, radioactive substances, and other forms of radiant energy in diagnosis and treatment of disease.

Reciprocity The case where privileges are granted to those from another jurisdiction.

Reconstitute To restore a product to its liquid state by adding water or other aqueous solution.

Refractometer Instrument used to determine specific gravity and total protein.

Residual activity Refers to when compounds that are capable of inhibiting microbial growth remain active long after being ingested or injected.

Reticulum Second part of the ruminant stomach.

Rostral Refers to locations on the head that are toward the nose.

Rumen First part of the ruminant stomach.

Ruminant An animal with a four-compartment stomach.

Saddle thrombus Clot that blocks off circulation to the rear part of the animal; often manifested as paralysis in the hind limbs.

Secondary infections Disease processes that occur after the patient is debilitated from another infection or a weakened immune state.

Seizure Sudden convulsion caused by abnormal electrical discharge in the brain.

Slough Devitalized or dead tissue that is splitting away from the body.

Sperm Male sex cells.

Sphincter Ring of muscle that can be contracted to control flow from a body opening.

Spore Minute, typically one-celled, reproductive unit capable of giving rise to a new individual without sexual reproduction. These are typically fungi and protozoa.

Sprain Overstretching a ligament.

Statutory law The written law of government.

Sterilization Procedure to make an inanimate object free from living microorganisms.

Strain Overstretching, overuse, or misuse of muscles.

Subcutaneous Beneath the skin.

Submandibular Beneath the bottom jaw.

Substantive law The body of law within a single area such as contract laws, property laws, and crimes.

Supragingival Under the gingival.

Sympathetic nervous system Responds in times of stress, creating the fight or flight response.

Synapse Space between neurons where the nerve impulse passes from one nerve to another.

Systemic vascular resistance Resistance of blood flow through the vascular system.

Systolic pressure The pressure on the walls of the arteries as the blood is pumped through them from the heart.

Tachycardia Rapid heart rate.

Tachypnea Rapid breathing.

Technocompetency or technology competency Refers to an essential workforce skill.

Telemedicine The practice of medicine at a distance through the use of technology.

Tendons Connective tissues that connect muscles to bones.

Tertiary Of third rank; top or third layer of a bandage.

Testes Male reproductive organs.

Thyroid Gland that controls the metabolism.

Trachea "Windpipe" that transports air to and from the lungs.

Tympanic membrane A thin membrane that separates the middle ear from the inner ear; it vibrates in response to sound.

Ungual process The modified toe bone of ungulates that ends in a hoof, claw, or nail such as in horses, cows, or elephants.

Universal precautions Measures to avoid transmission of infection from a patient or a patient's body fluids.

Urinalysis Chemical analysis of urine.

Urination Releasing urine.

Uroliths Bladder stones.

Vaccination Injection of microorganisms that have been rendered harmless but will still induce an immune response.

Vas deferens The spermatic vessel.

Ventral Refers to the belly side of an animal.

Ventricles The lower two chambers of the heart.

Venules Small veins.

Vestibular disease Dizziness or circling caused by infection of the inner ear.

Veterinary–client–patient relationship (VCPR) A legal and medical relationship between the veterinarian, animal, and owner in which the veterinarian has physically examined the animal before providing treatment, surgery, or prescriptions and maintains the relationship through reexamination that occurs at least once yearly.

Veterinary Practice Acts State laws regulating veterinarians and veterinary hospitals and clinics.

Virucide Chemical agent that causes death to viruses.

Virustatic Refers to something that inhibits the growth or spread of viruses.

Volvulus Twisting of the intestines or stomach.

Vomitus Vomited material.

Weights and measurements Units used by pharmacists to measure medications.

Withholding time Period of time during which a medication is halted to allow for clearance of the drug from the body in animals raised for meat or milk; period of time during which animals are withheld from the market after being treated with certain drugs.

Zoonosis Animal disease that is transmissible to humans.

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