

# EMERGENCIES

Emergency care is just that—care applied to a potentially serious condition as soon as possible while you are trying to reach your veterinarian. One of the cardinal rules in dealing with any emergency is for you to remain calm. If you panic, you won't be thinking clearly and you will panic your dog. Take a deep breath, quietly reassure your dog, and then do what is necessary. Don't hesitate to ask for help, and remember that your dog is relying on you.

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## Home Emergency Medical Kit

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Container for equipment	Tweezers
Penlight	Scissors
Blanket	Grooming clippers
Nylon leash	Needle-nose pliers
Muzzle (nylon or leather)	K-Y lubricant or petroleum jelly
Rectal thermometer	Rubbing alcohol
Surgical gloves	Betadine or similar antiseptic scrub
Cotton balls	Hydrogen peroxide
Cotton swabs	Topical antibiotic ointment
Gauze pads (3 inches, 70 mm, square)	Sterile saline eye wash
Gauze roll (3 inches, 70 mm, wide)	List of emergency phone numbers:
Ace bandage (3 inches, 70 mm, wide)	Your veterinarian's office
Surgical adhesive tape (1 inch, 25 mm wide)	24-hour emergency clinic
Syringe (plastic) without a needle	ASPCA Animal Poison Control Center (888) 426-4435
Compressed activated charcoal tablets (5 grams each)	

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## Handling and Restraint

Any dog, no matter how docile he may be, has the potential to bite when he is severely injured, frightened, or in pain. It is important to recognize this and take proper precautions to keep from being bitten.

An injured dog who growls, snarls, or raises his hackles is sending a clear message. Do not approach or attempt to restrain this dog. Call your local animal shelter or animal care and control agency for help.

### MUZZLES

All dogs should be muzzled for any handling or treatment that may be frightening or painful. Cloth muzzles are easy to store and can be slipped on easily. Soft muzzles with Velcro closures in the back can be ordered through your veterinarian or a pet supply store. An open cage muzzle is preferred for an injured or sick dog. It allows the dog to breathe easily, and if the dog vomits he will not aspirate the vomitus. Keep the muzzle with your Home Emergency Medical Kit (see page 1).

If you don't have a commercial muzzle, you can make an acceptable substitute using adhesive tape, a piece of cloth, a length of roll gauze, or a leash. Wind the tape around the dog's muzzle. Or make a large loop with the other materials that you can slip over the dog's muzzle. Then tighten this down around the dog's muzzle, bring the two ends under the dog's ears, and tie the ends behind his head. Make sure the muzzle is not so tight that the dog cannot open his mouth slightly to breathe.

There are circumstances in which a dog should not be muzzled. It can be dangerous to muzzle a dog who is vomiting, coughing, having difficulty breathing, or aggressively resisting the muzzle. Never muzzle an unconscious dog.

### RESTRAINING FOR EXAMINATION AND TREATMENT

For the cooperative dog, routine procedures such as grooming, bathing, and even medicating seldom require restraint. Gentle handling and a soothing voice will coax most dogs to accept such handling. Approach the task with quiet confidence. Dogs are quick to sense anxiety in their owners and copy it.

For examinations and treatments that may excite or hurt the dog, it is important to restrain the dog *before* attempting the treatment. Once a dog is restrained, he usually settles down and accepts the procedure with little complaint.



**A cage muzzle should be used if the dog is vomiting or breathing rapidly.**



**A cloth muzzle is convenient and can be slipped on easily.**



**A strip of adhesive tape makes an expedient temporary muzzle.**

The headlock is an excellent restraint for a large dog. First muzzle the dog. Then hold the dog securely against your chest with one arm around his neck and the other around his waist. This is the most commonly used restraint for a quick procedure such as giving an injection.

To restrain a small dog, support the abdomen with one arm and grasp the outside front leg. Immobilize the head with the other arm. Hold the dog close to your body.



**The headlock is an excellent restraint for a large dog. For treatment, the dog should be muzzled.**



**This is a good way to restrain and carry a small dog.**

An Elizabethan collar, named for the high neck ruff popular during the reign of Queen Elizabeth I of England, is also an excellent way of restraining dogs who are prone to bite. The collar is also used to keep a dog from scratching at his ears, removing sutures, and biting at wounds and skin sores. These collars can be purchased from pet supply stores and some veterinarians (your veterinarian may also be able to lend you one). The size of the collar must be tailored to the dog. For the dog to be able to eat and drink, the outer edge of the collar should not extend more than one to two inches beyond the dog's nose. Most dogs adjust well to an Elizabethan collar. If the dog refuses to eat or drink with the collar on, temporarily remove it.



**An Elizabethan collar is an excellent restraint for dogs who tend to snap.**

A newer option is the BiteNot collar. This high-necked collar prevents a dog from turning his head to bite. As with an Elizabethan collar, good fit is important. The collar must be just as long as the dog's neck.

Another way to restrain the dog is to lay him on his side by grasping the inside front and back legs and then sliding the dog down your knees to the floor. Hold his legs out straight and keep pressure with your forearms on his chest and pelvis to prevent him from getting up.



**A BiteNot collar is a humane restraint frequently used by veterinarians. It may be more comfortable for a dog than the Elizabethan collar.**



**To lay the dog down on his side, grasp the inside front and back legs and slide him down your knees.**



**Hold his legs out straight and use your forearms to keep him on the floor.**

## **CARRYING AN INJURED DOG**

Incorrectly picking up or carrying a dog can make injuries much worse. Never pick up a dog by his front legs, as this can result in a dislocated elbow or shoulder.

Carry a small dog cuddled in your arms with the injured side away from your body. With a large dog, place one arm around his chest or between his front legs. Place the other arm around his rump—or between his back legs if you suspect a hind-limb injury. Hold the dog close to your chest so you can't drop him if he squirms.



**Carry an injured dog with one arm around his chest and the other around his back legs.**

## TRANSPORTING AN INJURED DOG

A dog in shock should be transported lying down on a flat surface or in a hammock stretcher to facilitate breathing and to prevent a sudden drop in blood pressure.

Suspect a broken back or spinal cord injury in any dog who is unconscious or unable to stand after a fall from a height or after being struck by a car. These dogs require special handling. See *Treating Head Injuries*, page 358, and *Spinal Cord Injuries*, page 375, for more on what to do in these cases.

## Artificial Respiration and Heart Massage

Artificial respiration is the emergency procedure used to assist air exchange in an unconscious dog. Heart massage (chest compressions) is used when no heartbeat can be felt or heard. When chest compressions are combined with artificial respiration, it is called cardiopulmonary resuscitation (CPR). Because cessation of breathing is soon followed by heart stoppage and vice versa, CPR is required in most life-threatening situations.

While CPR can be performed by one person, it is easier and more often successful when done by two. One person does the artificial respiration while the other does the chest compressions.

To determine which basic life-support technique will be required in an unconscious dog, see the chart on the next page. The following emergencies may require artificial respiration or CPR:

- Shock
- Poisoning
- Prolonged seizure
- Coma
- Head injury
- Electric shock
- Obstructed airway (choking)
- Sudden cessation of heart activity and breathing

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### Artificial Respiration or CPR?

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**Is the dog breathing?** Observe the rise and fall of the chest. Feel for air against your cheek.

If **YES**, pull out the tongue and clear the airway. Observe.

If **NO**, feel for a pulse.

**Does the dog have a pulse?** Feel for the femoral artery located on the inside of the mid-thigh.

If **YES**, start artificial respiration.

If **NO**, start CPR.

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### ARTIFICIAL RESPIRATION

Lay the dog on a flat surface with his right side down. Open his mouth and pull his tongue forward as far as you can. Clear any secretions with a cloth or handkerchief. Check for a foreign body. If present, remove it if possible. If it is impossible to dislodge, perform the *Heimlich Maneuver*, described on page 316.

#### ***For puppies and small dogs under 30 pounds (13.6 kg)***

1. Pull the tongue forward so it is even with the canine teeth. Close the dog's mouth.
2. Place your mouth over the dog's nose. Blow gently into the dog's nostrils. The chest will expand.
3. Release your mouth to let the air return. Excess air will escape through the dog's lips, preventing overinflation of the lungs and overdistension of the stomach.
4. If the chest does not rise and fall, blow more forcefully or seal the lips.
5. Continue at a rate of 20 to 30 breaths per minute (one breath every two to three seconds).
6. Continue until the dog breathes on his own, or as long as the heart beats.

#### ***For medium and large dogs***

1. Proceed as for small dogs, but seal the lips by placing a hand around the dog's muzzle to prevent the escape of air.
2. If the chest does not rise and fall, blow more forcefully.
3. The breathing rate is 20 breaths per minute (one breath every three seconds).



## CPR

CRP is a combination of artificial respiration and heart massage. If a dog needs heart massage, he also needs artificial respiration. On the other hand, if the dog resists your attempts to perform CPR, he probably does not need it!

### *For puppies and small dogs under 30 pounds (13.6 kg)*

1. Place the dog on a flat surface, right side down.
2. Place your cupped hands on either side of the rib cage *over the heart*, immediately behind the point of the elbow. (For puppies, use your thumb on one side of the chest and the rest of your fingers on the other.)
3. Compress the chest 1 inch to 1½ inches (2.5 to 4 cm—that should be one-quarter to one-third the width of the chest). Squeeze for a count of 1, then release for a count of 1. Continue at a rate of 100 compressions per minute.
4. With one-person CPR, administer a breath after every five compressions. With two-person CPR, administer a breath after every two to three compressions.



**To begin CPR, open the dog's mouth and pull his tongue forward as far as you can. Check for a foreign body.**



**Feel for the femoral pulse in the mid-thigh to determine if the dog has a heartbeat.**



**For artificial respiration, blow gently into the dog's nose every two to three seconds.**



**Chest compressions on a small dog. Note the placement of the hands on either side of the chest. The compression rate is 100 per minute.**



**Two-person CPR on a large dog. Note the placement of the hands for chest compressions. The compression rate is 80 per minute.**

***For medium and large dogs***

1. Place the dog on a flat surface, right side down. Position yourself behind the dog's back.
2. Place the heel of one hand over the widest portion of the rib cage, *not over the heart*. Place the heel of your other hand on top of the first.
3. Keep both elbows straight and push down firmly on the rib cage. Compress the chest one-quarter to one-third of its width. Compress for a count of 1, then release for a count of 1. Continue at a rate of 80 compressions per minute.
4. With one-person CPR, administer a breath after every five compressions. With two-person CPR, administer a breath after every two to three compressions.

Continue CPR until the dog breathes on his own and has a steady pulse. If vital signs do not return after 10 minutes of CPR, the likelihood of success is remote. Consider stopping CPR.

Note that CPR has the potential to cause complications, including broken ribs and *pneumothorax*. Also, *never* practice artificial respiration or heart massage on a healthy dog; you can seriously injure the dog.

**Shock**

Shock is caused by insufficient blood flow and oxygen to meet the body's needs. Adequate blood flow requires effective heart pumping, open, intact blood vessels, and sufficient blood volume to maintain flow and pressure. Adequate oxygenation requires an open respiratory tract and enough energy to breathe. Any condition that adversely affects the circulatory or respiratory systems can cause shock.

The cardiovascular system of an animal in shock will try to compensate for inadequate oxygen and blood flow by increasing the heart and respiratory rates, constricting the skin's blood vessels, and maintaining fluid in the circulation by reducing urinary output. This requires additional energy at a time when the vital organs aren't getting enough oxygen to carry out normal activities. After a time, shock becomes self-perpetuating. Untreated, it results in death.

Common causes of shock are hemorrhage, heart failure, anaphylactic (allergic) reactions, dehydration (heat stroke, vomiting, diarrhea), poisoning, and toxic shock associated with *sepsis* and *peritonitis*.

Signs of early shock include panting, rapid heart rate, bounding pulses, and a bright red color to the mucous membranes of the lips, gums, and tongue. Many of these signs will be missed or considered mild—perhaps regarded as signs of a dog who overexerted himself. The later signs are when most owners

notice and respond to their dog's condition. Signs of late shock (the ones seen most often) are pale skin and mucous membranes, a drop in body temperature, cold feet and legs, a slow respiratory rate, apathy and depression, unconsciousness, and a weak or absent pulse.

**Treatment:** First, evaluate. Is the dog breathing? Is there a heartbeat? What is the extent of the injuries? Is the dog in shock?

If so, proceed as follows:

1. If the dog is not breathing, administer artificial respiration (see page 8).
2. If there is no heartbeat or pulse, administer CPR (see page 8).
3. If the dog is unconscious, check to be sure that the airway is open. Clear secretions from the mouth with your fingers and a piece of cloth. Pull the tip of the tongue forward beyond the front teeth to make it easier for the dog to breathe. Keep the dog's head lower than his body by placing a blanket beneath his hindquarters.
4. Control bleeding as described under *Wounds*, page 42.
5. Wrap the dog in a coat or blanket to provide warmth and protect injured extremities.
6. Transport the dog to a veterinary hospital.



This is the best way to transport a dog in shock. If you don't have a stretcher, use a camp cot, a wooden plank, or even a folded wire crate with a blanket laid on top.

To avoid aggravating the shock:

- Calm the dog and speak soothingly.
- Allow the dog to assume the most comfortable position in which breathing is easiest. An animal will naturally adopt the position of least pain.
- When possible, splint or support any broken bones before moving the dog (see *Broken Bones*, page 15).
- All dogs who are unconscious or found lying down after an accident must be considered to have spinal cord injuries and should be handled accordingly (see *Spinal Cord Injuries*, page 375).
- Transport large dogs on a flat surface or in a hammock stretcher. Carry small dogs in a blanket with the injured parts protected.
- Avoid using a muzzle except for short periods, such as when moving the dog from the scene of the accident into a car, or from a car into the veterinary clinic. Muzzling can interfere with breathing in some situations.

## ANAPHYLACTIC SHOCK

Anaphylactic shock is an immediate, serious allergic reaction. It occurs when a dog is exposed to an *allergen* to which he has been sensitized. Sensitivity occurs through prior contact.

The most common drug allergen that causes anaphylactic shock is penicillin. The venom in the stings of bees and wasps can also occasionally produce anaphylactic shock. Some dogs have been known to experience shock after a vaccination, but this is not common.



**A dog receiving emergency treatment for anaphylactic shock, in this case following a routine vaccination. The dog responded well, and 30 minutes later was fine.**

Anaphylactic shock causes signs and symptoms different from those previously described for shock. Initially there may be local signs at the point of contact, including pain, itching, swelling, and redness of the skin. With acute anaphylaxis, the allergic response becomes generalized, either immediately or over the course of several hours. Signs are agitation, diarrhea, vomiting, difficulty breathing, *stridor* (harsh breathing sounds) from a swollen voice box, weakness, and circulatory collapse. In untreated cases, coma and death follow.

**Treatment:** Emergency treatment of anaphylactic shock involves administering intravenous or subcutaneous adrenaline, oxygen, antihistamines, IV fluids, and hydrocortisone—drugs not available in the home. This is why it is best to have your veterinarian give vaccines—he or she has the drugs and equipment to treat allergic reactions in time.

A dog who has had an allergic reaction to a drug in the past should not be given that drug again.

## Acute Painful Abdomen

An acute painful abdomen is an emergency that may lead to death of the dog unless treatment is started at once. The signs of an acute abdomen are the sudden onset of pain, along with whining and crying, retching and vomiting, extreme restlessness and inability to find a comfortable position, grunting, and labored breathing. The abdomen is extremely painful when pressed.

Characteristically, the dog may assume a prayer position with his chest to the floor and his rump in the air. As the condition worsens, the dog's pulse becomes weak and thready, the mucous membranes become pale, and the dog goes into shock.

If you see any of these signs, call your veterinarian at once! Early surgical intervention is life-saving.

One of the following conditions may be the cause of acute abdomen:

- Bloat
- Urinary stones obstructing the bladder
- Trauma to the abdomen with internal injury
- Rupture of the bladder
- Poisoning
- Rupture of the pregnant uterus
- Peritonitis
- Acute pancreatitis
- Intestinal obstruction
- Twisting of the intestines

## Broken Bones

Most fractures are caused by automobile accidents and falls from a height. The bones most commonly broken are the femur, pelvis, skull, jaw, and spine. Fractures are classified as open or closed. In an open fracture (also called a compound fracture), a wound exposes the bone. Often the bone is seen sticking through the skin. These fractures are contaminated by dirt and bacteria and thus are accompanied by a high rate of bone infection.

Signs of bone fracture include pain, swelling, inability to bear weight, and deformity with shortening of the affected leg.

**Treatment:** Injuries that cause fractures can also cause shock, blood loss, and trauma to internal organs. Controlling shock takes precedence over treating any fractures (see *Shock*, page 11).

A dog in pain is often uncooperative and may bite in self-defense. Take precautions to avoid being bitten. If necessary, muzzle the dog (see *Handling and Restraint*, page 2).

Open wounds over bones should be covered with a sterile dressing, using several gauze pads, if available. If you cannot get gauze pads, cover the wound with a clean cloth or towel and wrap loosely. If there is continued bleeding, carefully apply pressure to the site.

Splinting fractures relieves pain and prevents shock and further tissue damage while the dog is being transported to the veterinary hospital. The decision to splint is based on a number of factors, including the severity and location of the injury, the time it will take to get professional help, the presence of other injuries, and the availability of materials. Note that improper splinting can cause more harm than good. Do not attempt to splint the leg if the dog resists.

Always splint the limb in the position in which you find it. Do not attempt to straighten a crooked leg.

An effective splint is one that crosses the joints above and below the fracture. When the fracture is below the knee or elbow, fold a magazine, a newspaper, or a piece of thick cardboard around the leg. A cardboard roll, such as for paper towels or toilet paper, may work if you slit it open. Extend the splint from the toes to a point well above the knee or elbow. Hold the splint in place by wrapping it with a roll of gauze, a necktie, or tape. Do not wrap tightly.

Fractures above the elbow and knee are difficult to splint. The best way to prevent further damage is to keep the dog as still as possible.

Dogs in shock should be transported lying down, either on a flat surface or in a hammock stretcher, to facilitate breathing and prevent a drop in blood pressure. Head injuries and spinal cord injuries require special handling and transport, as described in chapter 12.

Fractures where the ends of bones are at angles or far apart must be reduced under general anesthesia by a veterinarian, to bring the ends together and realign the bone. This is accomplished by pulling on the leg to overcome the



A magazine makes a good temporary splint for leg fractures below the elbow or knee. Hold the magazine in place with tape. An effective splint crosses the joints above and below the fracture site.

muscular forces causing the displacement. Once reduced, the position of the bones must be maintained. In most dogs, with fractures above the knee or elbow the position is held with pins and metal plates, while fractures below the knee or elbow are immobilized with splints and casts. Fractures involving joints usually require open surgery and repair with pins, screws, and wire.

Displaced jaw fractures cause malposition of the teeth. The jaw should be adjusted and the teeth wired together to maintain the correct position until healing is complete.

Depressed skull fractures may require surgery to elevate the depressed fragments.

## Burns

Burns are caused by heat, chemicals, electric shocks, or radiation. Hot liquids may scald a dog. Sunburn is an example of a radiation burn. It occurs on the noses of dogs with insufficient pigment and on the skin of white-coated dogs who are clipped short in summer.

The extent of skin damage depends upon the length of exposure.

A **first-degree burn** causes the skin to become red, slightly swollen, and painful. It usually heals in about five days.

A **second-degree burn** is deeper and there is blistering. These burns are extremely painful. If there is no infection, healing is usually complete in 21 days.

A **third-degree burn** involves the full thickness of skin and extends into the subcutaneous fat. These burns appear charred, dry, and leathery. The hair comes out easily when pulled. Deep burns, because they destroy nerve endings, usually are not as painful as second-degree burns.



If more than 50 percent of the dog's body surface is involved with second-degree burns, or if more than 30 percent is involved with third-degree burns, survival is unlikely.

**Treatment:** All but minor burns require professional attention. Protect the area from further injury by wrapping it with a loose-fitting damp gauze dressing and proceed at once to the veterinary clinic. Extensive burns require intensive care to treat shock, adjust fluid and electrolyte losses, and prevent secondary infection.

If your dog appears to be suffering from electrical shock, use a wooden implement to slide any cords away from him before you touch him. Alternatively, unplug all cords or turn off the circuit breakers so that you won't get a shock too.

Small superficial burns that involve less than 5 percent of the body surface can be treated at home. Apply cool compresses (*not ice packs*) for 20 minutes to relieve pain and lessen the depth of the injury. Clip the coat over the burn and wash the skin gently with a surgical antiseptic such as dilute chlorhexidine solution (see *Wounds*, page 42). Apply a topical antibiotic ointment such as triple antibiotic, and bandage the area. The bandage should be removed daily and the wound medicated and redressed.

When acid, alkali, gasoline, kerosene, or other chemicals have caused the burn, or even come in contact with the skin, immediately flush the area with large amounts of water for 10 minutes. Wear rubber or plastic gloves and bathe the dog with mild soap and water. Blot dry. If there are any signs of burning (such as redness or blistering), call your veterinarian for further instructions.

## Cold Exposure

### HYPOTHERMIA (LOW BODY TEMPERATURE)

Prolonged exposure to cold will result in a drop in body temperature. Toy breeds, breeds with short coats, puppies, and very old dogs are most susceptible to hypothermia. Because a wet coat loses its insulating properties, hypothermia is a potential complication for all dogs who have been submerged in cold water. Hypothermia also occurs along with shock, after a long course of anesthesia, and in newborn puppies who get chilled because of inadequately heated whelping quarters. Prolonged cold exposure burns up stored energy and results in a low blood sugar.

Signs of hypothermia are violent shivering followed by listlessness, a rectal temperature below 95°F (35°C), weak pulse, lethargy, and coma. Note that hypothermic dogs can withstand prolonged periods of cardiac arrest, because the low body temperature also lowers the metabolic rate. CPR may be successful in such individuals.



To take a dog's rectal temperature using a digital thermometer, lubricate the thermometer and then insert it gently. You can place a hand under the dog's tummy to keep him from sitting down.

**Treatment:** Wrap the dog in a blanket or coat and carry him into a warm building. If the dog is wet (he fell into icy water), dry him vigorously with towels. Wrap the dog in a warm blanket and take his rectal temperature. If the temperature is above 95°F, continue the warm blankets and encourage the dog to swallow a sugar solution such as honey, or 4 teaspoons (32g) of sugar dissolved in a pint of water.

If the dog's rectal temperature is below 95°F, notify your veterinarian. While awaiting instructions, begin rapid warming by applying warm water bottles wrapped in towels to the dog's armpits and chest, then wrap the dog in a blanket. The temperature of the packs should be about that of a baby bottle (warm to the wrist). Take the rectal temperature every 10 minutes. Change the warming packs until the rectal temperature reaches 100°F (37.8°C). Do not apply heat directly to the dog, as this may cause burns. For the same reason, do not use a hair dryer to warm the dog.

How to warm a chilled puppy is discussed in *Reviving a Weak Puppy*, page 495.

## FROSTBITE

Frostbite occurs when a part of the body freezes. It often accompanies hypothermia. Frostbite tends to involve the tail, ear tips, pads of the feet, and scrotum. These parts are the most exposed and least protected by fur. Frostbite of the ears is discussed on page 211.

Frostbitten skin is pale white or blue. As circulation returns, it becomes red and swollen and may begin to peel. Eventually it looks black with a line of demarcation between live and dead tissue. Dead skin and tissue separates from the body in one to three weeks.

**Treatment:** Apply warm (not hot) water soaks to the frostbitten part for 20 minutes, or until the tissue becomes flushed. Never use snow or ice; tissue damage is made much more severe if thawing is followed by refreezing. Do not rub or massage the affected parts. Handle them carefully. Take your dog to a veterinarian for further evaluation and treatment.

Note that as sensation returns, frostbitten parts can be painful. Prevent the dog from biting at the skin and inflicting further injury using the restraint techniques described in *Handling and Restraint*, page 2. The total extent of damage may not be apparent for a week or more.

## Dehydration

Dehydration occurs when a dog loses body fluids faster than he can replace them. Dehydration usually involves the loss of both water and electrolytes. In dogs, the most common causes of dehydration are severe vomiting and diarrhea. Dehydration can also be caused by inadequate fluid intake, often associated with fever and severe illness. A rapid loss of fluids also occurs with heat stroke (see page 42).

A prominent sign of dehydration is loss of skin elasticity. When the skin along the back is pulled up, it should spring back into place. In a dehydrated animal, the skin stays up in a ridge.

Another sign of dehydration is dryness of the mouth. The gums, which should be wet and glistening, become dry and tacky. The saliva is thick and tenacious. In an advanced case, the eyes are sunken and the dog exhibits signs of shock, including collapse.

**Treatment:** A dog who is visibly dehydrated should receive immediate veterinary attention, including intravenous fluids, to replace fluids and prevent further loss.



**Loss of skin elasticity is a sign of dehydration. Note that this dog is getting intravenous fluids, which are extremely important in serious cases.**

For mild dehydration, if the dog is not vomiting you can give him an electrolyte solution by bottle or syringe into the cheek pouch (see *How to Give Medications*, page 566). Balanced electrolyte solutions for treating dehydration in children, such as Ringer's lactate with 5 percent dextrose in water or Pedialyte solution, are available at drugstores and are also suitable for dogs. Gatorade is another short-term substitute to help replace fluids. Administer the solution at a rate of 2 to 4 ml per pound (1 to 2 ml per kilo) of body weight per hour, depending on the severity of the dehydration (or as directed by your veterinarian).

Treatment of dehydration in infant puppies is discussed in *Dehydration*, page 493.

## Drowning and Suffocation

Any condition that prevents oxygen from getting to the tissues causes suffocation. The most common emergencies in this category are drowning, smothering in an airtight space, being overcome by toxic fumes (smoke, gasoline, propane, refrigerants, solvents, and others), choking from a foreign body in the throat, being poisoned by carbon monoxide, and suffering a penetrating wound of the chest.

Signs of oxygen deprivation (called *hypoxia*) are extreme anxiety, straining to breathe, and gasping for air (often with the head and neck extended), followed by loss of consciousness as the dog succumbs. The tongue and mucous membranes turn blue, a condition called *cyanosis*.

One exception to the blue color of hypoxia is carbon monoxide poisoning. Carbon monoxide turns the blood and mucous membranes bright red. Carbon monoxide poisoning is seen in dogs who are trapped in burning buildings, transported in the trunk of a car, or left in an unventilated enclosure such as a garage with the car engine turned on.

Although most dogs are good swimmers, drowning can occur if a dog swims too far out and becomes fatigued, falls through ice, is caught in a flood, or is unable to climb out of a swimming pool.

The sudden onset of gasping and struggling to breathe in a healthy dog suggests a foreign object lodged in the throat (see *Choking*, page 316).

**Treatment:** The immediate need is to reestablish breathing with fresh air. If breathing is shallow or absent, begin artificial respiration (see page 8). As soon as possible, transport your dog to the nearest veterinary facility for ventilation support.

Carbon monoxide poisoning is frequently associated with smoke inhalation and burns of the mouth and throat. Carbon monoxide binds with hemoglobin and blocks the delivery of oxygen to the tissues. Even though the dog is breathing deeply, oxygen transport will be compromised for several hours. Breathing

a high concentration of oxygen helps to overcome these effects. A veterinarian will be able to provide this therapy using an oxygen mask, a nasal tube, or an oxygen cage.

If the dog has an open wound in the chest (*pneumothorax*) with air sucking in and out, pinch the skin together over the wound to seal the chest. Maintain the seal with a bandage wrapped around the chest and transport the dog to the nearest veterinary facility.

The first step in treating drowning is to remove water from the dog's lungs. Hold the unconscious dog upside down by his middle (hold a small dog by his back legs) and allow as much water as possible to run out his nose and mouth. Then quickly position the dog on his right side with his head lower than his chest (accomplish this by placing a blanket or coat beneath his hindquarters) and begin artificial respiration. Check for a pulse. If there is none, begin CPR (see page 8). Continue until the dog breathes on his own or until no pulse is felt for 10 minutes. Dogs who drown in cold water are often hypothermic and can sometimes be resuscitated even though they have been under water for a considerable time.

Following resuscitation, the dog should be seen and treated by a veterinarian. Inhalation pneumonia is a frequent complication.

## Electric Shock

Electric shock (electrocution) can occur when dogs bite electric cords or come into contact with downed wires. A lightning strike is a rare cause of electrocution, but a dog does not have to be struck to be seriously injured or killed. A tall tree with deep roots and spreading branches can act as a conduit for a bolt of lightning, conducting electricity through the ground to any animal in the immediate vicinity. Most lightning strikes are fatal. The singed hair and skin give evidence of the cause of death.

A dog who gets an electric shock may be burned. The electric shock may cause an irregular heartbeat with circulatory collapse, followed by cardiac arrest. Electric current also damages the capillaries of the lungs and leads to the accumulation of fluid in the air sacs, a condition called *pulmonary edema*.

A characteristic sign of electric shock injury is finding the unconscious dog on the floor near an electrical outlet. Electric shocks cause involuntary muscle contractions of the dog's jaw that may prevent him from releasing his hold on a live wire. Dogs who survive electric shock may cough, have difficulty breathing, drool, have an offensive mouth odor, and have burns in the mouth.

**Treatment:** If your dog is found in contact with an electric cord or appliance, *do not touch the dog*. First shut off the main power and pull the plug. If that's not possible, use a piece of wood to move the source of the electricity off the dog, or to move the dog away from the electricity. If the dog is

unconscious and is not breathing, administer artificial respiration (page 8) or CPR, if needed (page 8). Dogs who revive from electric shock should be seen by a veterinarian at once.

The treatment of mouth burns is discussed on page 234.

**Prevention:** Electric cord shocks can be prevented by placing cords in inaccessible locations, covering cords with plastic sleeves, unplugging cords when not in use, and providing appropriate chewing toys for puppies and dogs.

## Heat Stroke

Heat stroke is an emergency and requires immediate treatment. Because dogs do not sweat (except to a minor degree through their foot pads), they do not tolerate high environmental temperatures as well as humans do. Dogs depend upon panting to exchange warm air for cool air. But when air temperature is close to body temperature, cooling by panting is not an efficient process.

Common situations that can set the stage for heat stroke in dogs include:

- Being left in a car in hot weather
- Exercising strenuously in hot, humid weather
- Being a *brachycephalic* breed, especially a Bulldog, Pug, or Pekingese
- Suffering from a heart or lung disease that interferes with efficient breathing
- Being muzzled while put under a hair dryer
- Suffering from a high fever or seizures
- Being confined on concrete or asphalt surfaces
- Being confined without shade and fresh water in hot weather
- Having a history of heat stroke

Heat stroke begins with heavy panting and difficulty breathing. The tongue and mucous membranes appear bright red. The saliva is thick and tenacious, and the dog often vomits. The rectal temperature rises to 104° to 110°F (40° to 43.3°C). The dog becomes progressively unsteady and passes bloody diarrhea. As shock sets in, the lips and mucous membranes turn gray. Collapse, seizures, coma, and death rapidly ensue.

**Treatment:** Emergency measures to cool the dog must begin at once. Move the dog out of the source of heat, preferably into an air-conditioned building. Take his rectal temperature every 10 minutes. Mild cases may be resolved by moving the dog into a cool environment.

If the rectal temperature is above 104°F, begin rapid cooling by spraying the dog with a garden hose or immersing him in a tub of cool water (not ice water) for up to two minutes. Alternatively, place the wet dog in front of an electric fan. Cool packs applied to the groin area may be helpful, as well as

wiping his paws off with cool water. Monitor his rectal temperature and continue the cooling process until the rectal temperature falls below 103°F (39°C). At this point, stop the cooling process and dry the dog. Further cooling may induce hypothermia and shock.

Following an episode of heat stroke, take your dog to a veterinarian as soon as possible. Heat stroke can be associated with laryngeal *edema* (see page 315). This seriously worsens the breathing problem and may require an emergency *tracheostomy*. An injection of cortisone before the onset of respiratory distress may prevent this problem.

Other consequences of hyperthermia include kidney failure, spontaneous bleeding, irregular heartbeat, and seizures. These complications can occur hours or days later.

**Prevention:**

- Dogs with airway disease and breathing problems should be kept indoors with air conditioning or at least a fan during periods of high heat and humidity.
- Never leave your dog in a car with the windows closed, even if the car is parked in the shade.
- When traveling by car, crate the dog in a well-ventilated dog carrier, or better yet, an open wire cage.
- Restrict exercise in hot weather.
- Always provide shade and plenty of cool water to dogs outdoors, particularly those kenneled on cement or asphalt surfaces.
- Offer cooler surfaces outdoors for dogs to lie on, such as wooden planking, mats, or grass.

## Poisoning

A poison is any substance harmful to the body. Dogs, being curious by nature, tend to explore out-of-the-way places such as wood piles, weed thickets, and storage areas. These environs put them into contact with insects, dead animals, toxic plants, and poison baits. It also means the exact cause of poisoning will not be known in many cases.

Intentional, malicious poisoning is a factor to consider whenever a dog is found dead without apparent cause. However, several studies have shown that most cases of sudden death are caused by accidents and natural events. Malicious poisoning does occur, but it is far less common than accidental poisoning.

General recommendations for the treatment of poisoning are discussed in the next section. In the sections that follow, specific poisons are discussed in the order in which they are most frequently seen by veterinarians.

## GENERAL TREATMENT OF POISONING

If your dog ingests an unknown substance, it is important to determine whether that substance is a poison. Most products have labels that list their ingredients, but if the label doesn't tell you the composition and toxicity of the product, call the ASPCA Animal Poison Control Center at (888) 426-4435 for specific information. The Poison Control Center has a staff of licensed veterinarians and board-certified toxicologists on call 24 hours a day, every day of the year. You will be charged a consultation fee of \$50 per case, which can be charged to most major credit cards. There is no charge for follow-up calls in critical cases. At your request, they will also contact your veterinarian. You can also log onto [www.asPCA.org](http://www.asPCA.org) and click on "Animal Poison Control Center" for more information, including a list of toxic and nontoxic plants.

Other poison control hotlines include the Angell Animal Poison Control Hotline, operated by Angell Animal Medical Centers and the Massachusetts SPCA (877-226-4355, [www.smspca.org](http://www.smspca.org)) and the Animal Poison Hotline, operated by the North Shore Animal League and PROSAR International Animal Poison Center at (888) 232-8870.

In some cases, you can call the emergency room at your local hospital, which may be able to give you information about how to treat the poison. Specific antidotes are available for some poisons, but they cannot be administered unless the poison is known, or at least suspected by the circumstances. Some product labels have phone numbers you can call for safety information about their products.

When signs of poisoning develop, the most important consideration is to get your dog to the nearest emergency veterinary facility at once. If possible, find the poison and bring the container with you. This provides the emergency personnel with an immediate diagnosis and expedites treatment.

If the dog has ingested the substance recently, residual poison is often present in his stomach. An initial and most important step is to rid the dog's stomach of any remaining poison. The most effective way to empty the stomach is to pass a stomach tube, remove as much of the stomach contents as possible, and then wash the stomach out with large volumes of water. This must be done by your veterinarian.

In many cases it is preferable to induce vomiting at the scene rather than proceed directly to the veterinary hospital. For example, if you see the dog swallow the poisonous substance, it is obviously best to make the dog vomit it right back up. Similarly, if the poison was ingested within two hours but it will take 30 minutes or longer to get to a veterinary facility, it is frequently advisable to induce vomiting at home. However:

### ***DO NOT induce vomiting***

- If the dog has already vomited
- If the dog is in a stupor, breathing with difficulty, or shows any sign of neurologic involvement



- If the dog is unconscious or convulsing
- If the dog has swallowed an acid, alkali, cleaning solution, household chemical, or petroleum product
- If the dog has swallowed a sharp object that could lodge in the esophagus or perforate the stomach
- If the label on the product says, “Do not induce vomiting.”

### ***How to Induce Vomiting and Prevent Poison Absorption***

Induce vomiting by giving the dog hydrogen peroxide. A 3 percent solution is most effective. Give 1 teaspoon (5 ml) per 10 pounds (4.5 kg) body weight of the dog. Repeat every 15 to 20 minutes, up to three times, until the dog vomits. Walking the dog after giving each dose may help to stimulate vomiting.

Syrup of ipecac has been recommended in the past, but hydrogen peroxide is a better choice for dogs. Syrup of ipecac (*not* ipecac fluid extract, which is 14 times stronger) is only 50 percent effective and can be dangerous to dogs. *It should not be used to induce vomiting unless specifically advised by your veterinarian.* The dose is .5 to 1 ml per pound (.45 kg) of body weight, with a maximum dose of 15 ml (1 tablespoon). Repeat in 20 minutes (once only) if the dog does not vomit.

Once the poison has been cleared from the dog's stomach, give him activated charcoal to bind any remaining poison and prevent further absorption. The most effective and easily administered home oral charcoal product is compressed activated charcoal, which comes in 5-gram tablets (recommended for the Home Emergency Medical Kit). The dose is one tablet per 10 pounds (4.5 kg) of body weight. Products that come in a liquid or as a powder made into a slurry are extremely difficult to administer at home with a syringe or medicine bottle. The slurry is dense and gooey, and few dogs will swallow it voluntarily. These products are best administered by stomach tube. This is routinely done by your veterinarian after flushing out the stomach.

If activated charcoal is not available, coat the intestines with milk and egg whites using  $\frac{1}{4}$  cup (60 ml) egg whites and  $\frac{1}{4}$  cup milk per 10 pounds (4.5 kg) of body weight. Administer into the dog's cheek pouch using a plastic syringe (see *How to Give Medications*, page 567).

Intensive care in a veterinary hospital improves the survival rate for dogs who have been poisoned. Intravenous fluids support circulation, treat shock, and protect the kidneys. A large urine output assists in eliminating the poison. Corticosteroids may be given for their anti-inflammatory effects. A dog in a coma may benefit from tracheal intubation and artificial ventilation during the acute phase of respiratory depression.

## Seizures

Seizures caused by poisons are associated with prolonged periods of *hypoxia* and the potential for brain damage. Continuous or recurrent seizures are controlled with intravenous diazepam (Valium) or barbiturates, which must be administered by a veterinarian.

Note that seizures caused by strychnine and other central nervous system poisons may be mistaken for epilepsy. This could be a problem, because immediate veterinary attention is needed in cases of poisoning, but not for most epileptic seizures. Seizures caused by poisoning usually are continuous or recur within minutes. Between seizures the dog may exhibit tremors, lack of coordination, weakness, abdominal pain, and diarrhea. In contrast, most epileptic seizures are brief, seldom lasting more than two minutes, and are followed by a quiet period in which the dog appears dazed but otherwise normal. If your dog is having a seizure, see the treatment section under *Epilepsy*, page 369.

## CONTACT POISONS

If your dog's coat or skin comes in contact with a poisonous substance or toxic chemical, flush the site with large amounts of water for 30 minutes. Wear rubber or plastic gloves and give the dog a complete bath in *lukewarm* water. Even if the substance is not irritating to the skin, it must be removed. Otherwise the dog may lick it off and swallow it.

## DRUG POISONS

Unintentional overdose with veterinary medications and accidental ingestion of both human and veterinary pills are the most common causes of poisoning in pets. Veterinary products, in particular, are often flavored to encourage a dog to take them, and will be eagerly consumed if they are discovered.

Many people give over-the-counter medications to their dogs without veterinary approval, to treat a variety of symptoms; they believe that what works for people works for dogs. Unfortunately, this is not correct. Drugs given to dogs in human dosages are often toxic—and some human drugs cannot be given to dogs in any amount.

Common pain relievers such as ibuprofen (Advil) and acetaminophen (Tylenol) are a particular problem. Dogs and cats do not have the necessary enzymes to detoxify and eliminate these drugs. This can lead to the accumulation of dangerous substances in the animal that are left behind when the drugs are metabolized. As few as two Tylenol tablets can produce severe organ damage in a medium-size dog. Symptoms develop quickly and include abdominal pain, salivation, vomiting, and weakness.

Other human drugs that produce a variety of toxic effects and are commonly involved in accidental poisonings include antihistamines, sleeping pills, diet pills, heart pill, blood pressure pills, and vitamins.

**Treatment:** If you suspect your pet has swallowed any drug, immediately induce vomiting. Call your veterinarian for further instructions. A specific antidote may be available for the drug in question.

**Prevention:** Accidental poisoning can be prevented by always consulting your veterinarian before administering any medication. Follow instructions exactly for frequency and dosage. Store all drugs in a secure place to prevent inadvertent consumption by pets and children. *Never assume that a human drug is safe for pets!*

## RODENT POISONS

Common rat and mouse poisons include anticoagulants and hypercalcemic agents. Both can be deadly if your dog ingests them.

### *Anticoagulants*

Anticoagulant rat and mouse poisons are the most commonly used household poisons. These products account for a large number of accidental poisonings in dogs and cats. Anticoagulants block the synthesis of vitamin K, essential for normal blood clotting. Vitamin K deficiency results in spontaneous bleeding.

Observable signs of poisoning do not occur until several days after exposure. The dog may become weak and pale from blood loss, have nose bleeds, vomit blood, have rectal bleeding, develop *hematomas* and bruises beneath the skin, or have hemorrhages beneath the gums. The dog may be found dead from bleeding into the chest or abdomen.

There are two generations of anticoagulants, both in current use. The first generation are cumulative poisons that require multiple feedings over several days to kill the rodent. These poisons contain the anticoagulants warfarin and hydroxycoumadin.

Second-generation anticoagulants contain bromadiolone and brodifacoum, poisons that are 50 to 200 times more toxic than warfarin and hydroxycoumadin. These products are more dangerous to pets and are capable of killing rodents after a single feeding. It is even possible for a small dog to be poisoned by eating a dead rodent with residual poison in its stomach.

Closely related to the second-generation anticoagulants are the long-acting anticoagulants of the indanedione class (pindone, diphacinone, diphenadione, and chlorphacinone). These products are extremely toxic.

**Treatment:** Seek immediate veterinary help. If at all possible, bring in the product container so the veterinarian can identify the poison. This is important because treatment depends on whether the poison was a first- or second-

generation anticoagulant. With observed or suspected recent ingestion, induce vomiting (see page 25).

Treatment of spontaneous bleeding caused by all anticoagulants involves administering fresh whole blood or frozen plasma in amounts determined by the rate and volume of blood loss. Vitamin K<sub>1</sub> is a specific antidote. It is given by subcutaneous injection and repeated subcutaneously or orally as necessary until clotting time returns to normal. With first-generation anticoagulants, this often occurs within a week. With long-acting anticoagulants, treatment takes up to a month because of the length of time the poison remains in the dog's system.

### ***Hypercalcemic Agents***

Hypercalcemic agents are poisons that contain vitamin D (cholecalciferol) as their effective agent. Cholecalciferol poisons work by raising the calcium content in blood serum to toxic levels, eventually producing cardiac arrhythmias and death. They are becoming increasingly popular because rodents do not develop resistance to them and, with the rare exception of a puppy or small dog, dogs who eat poisoned rodents will not develop toxicity. In virtually all cases, the dog must eat the poison itself to become ill.

In dogs, signs of hypercalcemia appear 18 to 36 hours after ingesting the poison. They include thirst and frequent urination, vomiting, generalized weakness, muscle twitching, seizures, and, finally, death. Among survivors, the effects of an elevated serum calcium may persist for weeks.

**Treatment:** If you suspect your dog has ingested one of these poisons within the past four hours, induce vomiting (see page 25) and notify your veterinarian. Veterinary treatment involves correcting the fluid and electrolyte imbalances and lowering calcium levels using diuretics, prednisone, oral phosphorus binders, and a low-calcium prescription diet. Calcitonin is a specific antidote, but it is difficult to obtain and has only short-term effects.

### **ANTIFREEZE**

Poisoning by antifreeze that contains ethylene glycol is one of the most common small animal toxicities. Antifreeze has a sweet taste that appeals to dogs. Exposure typically occurs when antifreeze drips from the car radiator and is lapped up by the pet. Dogs may also drink from the toilet bowl in vacation homes that have been winterized by pouring antifreeze into the bowl.

Less than 3 ounces (88 ml) is enough to poison a medium-size dog. The poison primarily affects the brain and the kidneys. Signs of toxicity are dose-related, and occur within 30 minutes to 12 hours after ingestion. They include depression, vomiting, an uncoordinated "drunken" gait, and seizures. Coma and death can occur in a matter of hours. Dogs who recover from acute intoxication frequently develop kidney failure one to three days later. Death is common.

**Treatment:** If you see or suspect that your pet has ingested even a small amount of antifreeze, immediately induce vomiting (see page 25) and take your dog to the veterinarian. If treatment will be delayed, administer activated charcoal (see page 25) to prevent further absorption of ethylene glycol. A specific antidote (4-methylpyrazole) is available to treat poisoning. It is most effective when given shortly after ingestion and early in the course of treatment. Intensive care in an animal hospital may prevent kidney failure.

**Prevention:** This common cause of pet and child poisoning can be prevented by keeping all antifreeze containers tightly closed and properly stored, preventing spills, and properly disposing of used antifreeze. A new generation of antifreeze products contain propylene glycol rather than ethylene glycol. The U.S. Food and Drug Administration has labeled propylene glycol as “generally recognized as safe,” which means it can be added to foods. However, that is in small amounts. Ingesting propylene glycol antifreeze can cause lack of coordination and, possibly, seizures, but is unlikely to be fatal.

## POISON BAITS

Animal baits containing strychnine, sodium fluoroacetate, phosphorus, zinc phosphide, and metaldehyde are used in rural areas to control gophers, coyotes, and other predators. They are also used in stables and barns to eliminate rodents. These baits are highly palatable and therefore may be accidentally ingested by a dog. Many are extremely toxic and kill in a matter of minutes. Fortunately, they are being used less frequently because of livestock losses, concerns about persistence in the environment, and the potential to poison pets and children.

### *Strychnine*

Strychnine is used as a rat, gopher, mole, and coyote poison. In concentrations greater than 0.5 percent its use is restricted to certified exterminators. It is available to the public in concentrations of 0.3 percent or less. With better regulation and the use of lower concentrations, strychnine is becoming a less common cause of accidental poisoning.

Signs of strychnine poisoning appear within two hours of ingestion. They include agitation, excitability, and apprehension, followed rather quickly by intensely painful convulsions with rigid extension of all four limbs. Seizures last about 60 seconds, during which time the dog throws his head back, stops breathing, and turns blue. The slightest stimulation, even touching the dog or clapping the hands, can trigger a seizure. This type of seizure response is typical only of strychnine.

Other signs of poisoning include tremors, champing, drooling, uncoordinated muscle spasms, collapse, and paddling of the legs.

**Treatment:** Induce vomiting (see page 25) immediately after ingestion. But do not induce vomiting if the dog is unresponsive, convulsing, or having difficulty breathing. Cover the dog with a coat or blanket and proceed as quickly as possible to the nearest veterinary clinic. Further treatment involves administering intravenous diazepam (Valium) or barbiturates to control seizures. The dog is placed in a dark, quiet room and disturbed as little as possible.

### ***Sodium Fluoroacetate***

Sodium fluoroacetate (compound 1080/1081), a very potent rat and gopher poison, is restricted to licensed pest control operators and is used infrequently in the United States. Dogs and cats have been poisoned by eating a dead rodent that has ingested the poison. The onset is sudden and begins with vomiting, followed by agitation, staggering, convulsions, and collapse.

**Treatment:** Treatment is similar to that described for strychnine poisoning (on this page).

### ***Metaldehyde***

This poison, often combined with arsenic, is found in rat, snail, and slug baits. It is also used as a solid fuel for camp stoves. The dry form looks and tastes like dog food. Signs of toxicity include excitation, drooling and slobbering, uncoordinated gait, muscle tremors, inability to stand, and continuous seizures that eventually lead to death from respiratory paralysis. Signs many appear immediately or up to three hours after ingestion. Dogs who survive the acute poisoning may die from secondary liver failure.

**Treatment:** Treatment is similar to that described for strychnine poisoning (on this page).

### ***Phosphorus***

This extremely toxic chemical is used in rat and roach poisons and is also found in fireworks, matches, and matchboxes. A poisoned dog may have a garlic odor to his breath. The first signs of intoxication are vomiting and diarrhea. This is followed by an interval of normal behavior, then by further vomiting, cramps, pain in the abdomen, convulsions, and coma.

**Treatment:** Induce vomiting (see page 25) when you suspect the dog has ingested a product or poison that contains phosphorus. Do not coat the bowel with milk or egg whites, as this can actually promote absorption. Take your dog to the nearest veterinary facility. There is no specific antidote.

### ***Zinc Phosphide***

This substance is found in rat poisons and is used by pest control professionals as a grain fumigant. Zinc phosphide in the stomach releases gas that has the odor of garlic or rotten fish. Intoxication causes depression, rapid labored breathing, vomiting (often of blood), weakness, convulsions, and death.

**Treatment:** Treatment is similar to that described for strychnine poisoning (page 33). The lavage must be done at a veterinary clinic. There is no specific antidote. The stomach should be lavaged with 5 percent sodium bicarbonate, which raises the gastric pH and delays the formation of gas.

## INSECTICIDES

There are dozens of products sold at hardware, home repair, and agricultural stores to kill ants, termites, wasps, garden pests, and other insects. Most of them contain organophosphates and carbamates as their active ingredients. With the development of pyrethrin insecticides that are equally effective but much less toxic, organophosphates and carbamates are being used less frequently.

### *Organophosphates and Carbamates*

The organophosphates include chlorpyrifos, diazinon, phosmet, fenthion, cythioate, and tetrachlorvinphos. The common carbamates are carbyl and propoxur. Most cases of organophosphate or carbamate poisoning occur because the dog ingested a poison bait. Exposure to high concentrations of chemicals in sprays and dusts also occurs.

Signs of toxicity are hyperexcitability, excessive salivation and drooling, frequent urination, diarrhea, muscle twitching, weakness, staggering, collapse, and coma. Death is by respiratory failure.

**Treatment:** If you suspect that your dog has ingested an insecticide poison, immediately induce vomiting (see page 25) and notify your veterinarian. With any sign of toxicity, the first priority is to get your dog to the veterinarian as quickly as possible.

The specific antidote for organophosphate poisoning (*not* carbamate poisoning) is 2-PAM (protopam chloride). Atropine is given for both organophosphate and carbamate poisoning to control excessive salivation, vomiting, frequent urination and defecation, and to reverse a slow heart rate. Seizures are controlled with diazepam (Valium) or barbiturates.

In the event of skin exposure, give the dog a bath with soapy water and rinse thoroughly to remove residual insecticide.

### *Chlorinated Hydrocarbons*

These compounds, of which the prototype is DDT, are added to sprays and dusts to control plant pests. Their use has been curtailed because of persistent toxicity in the environment. Only lindane and methoxychlor are approved for use around livestock. Chlorinated hydrocarbons are readily inhaled and easily absorbed through the skin. Toxicity can occur from repeated or excessive exposure.

Signs of toxicity appear rapidly. They include hyperexcitability with twitching of the face, followed by muscle tremors that begin at the head and progress back to involve the neck, shoulder, trunk, and rear legs. Seizures and convulsions are followed by respiratory paralysis and death.

**Treatment:** There is no specific antidote. Treatment includes supporting life functions, removing ingested poison from the stomach, and controlling seizures.

### ***Pyrethrins and Pyrethroids***

These compounds are incorporated into many insecticidal shampoos, sprays, dusts, dips, foggers, and sprays. Pyrethrins and the synthetic pyrethroids are much safer to use on and around dogs (and humans) than are other insecticides, and they are being used more widely. Many over-the-counter topical flea-control products have concentrated pyrethrins as their active ingredients. Some dogs may be adversely affected by that level of pyrethrins. Common chemicals in this class include permethrin, allethrin, fenvalerate, resmethrin, and sumethrin.

Signs of toxicity include drooling, depression, muscle tremors, staggering, vomiting, and rapid labored breathing. Toxicity occurs primarily in small dogs. Death is rare. Simultaneous exposure to organophosphates increases the toxicity of pyrethroids.

**Treatment:** Induce vomiting (see page 25) within two hours of ingestion. Call your veterinarian for further instructions. Do not induce vomiting if the product contains a petroleum distillate. With signs of toxicity, proceed immediately to the veterinary clinic.

For topical exposure, remove residual insecticide by bathing the dog in lukewarm water and Dawn dishwashing soap or canine shampoo to strip out the chemicals. (*Do not* use flea shampoo.) Rinse very thoroughly. Bathing in hot or cold water may actually increase the rate of absorption or cause hypothermia, which increases toxicity. After bathing, keep the dog warm.

**Prevention:** Most cases of poisoning occur because of improper application of flea-control products. That may be because the product is being used more often than the instructions call for, or is being combined with another flea-control product. Follow all instructions carefully.

### ***Arsenic***

This heavy metal is used in herbicides, insecticides, and wood preservatives. Sodium and potassium arsenate are used in ant poisons. Arsenic has a very rapid action and therefore poses a major risk for accidental poisoning. Death can occur quickly, even before symptoms are observed. Fortunately, the use of arsenic has been greatly curtailed.

Signs of poisoning include thirst, drooling, vomiting, staggering, intense abdominal pain, cramps, diarrhea, paralysis, and death. The breath of the dog has a strong garlic odor.



**Treatment:** Proceed at once to the nearest emergency veterinary facility. BAL (British Anti Lewisite) is a specific antidote and should be given as soon as the diagnosis is suspected.

## GARBAGE AND FOOD POISONS

Dogs who scavenge come into contact with garbage, decomposing food, and carrion, some of which contain endotoxins produced by bacteria and molds. Once ingested, these endotoxins are absorbed and poison the dog.

Signs appear within two to six hours. They include an acute painful abdomen accompanied by vomiting and diarrhea (often bloody). The dog may have noticeably bad breath. Shock and death can occur in severe cases.

**Treatment:** If you see your dog eating garbage or a dead animal, immediately induce vomiting (see page 25). Follow with liquid Pepto-Bismol; give a dose every 12 hours for two days. Administer by plastic syringe (see page 572 for more information on administration and dosage). If you have trouble getting the liquid into your dog, use the tablets. Try to keep your dog well hydrated.

Mild cases recover in one to two days. If the dog begins to vomit or develops other signs of poisoning, notify your veterinarian.

## CHOCOLATE

Most dogs like chocolate, but it can be dangerous. Chocolate contains methylxanthines (made up of caffeine and the alkaloid theobromine). Methylxanthines are not toxic to people in the concentrations found in candy and baked goods, but when ingested by dogs the effects can be lethal. Although some dogs tolerate chocolate far better than others, note that a dog who weighs 5 to 10 pounds (2.3 to 4.5 kg) could die after eating as little as 4 ounces (113 g) of baking chocolate (not candy); a dog who weighs 20 to 40 pounds (9 to 18 kg) after eating as little as 16 ounces (450 g); and a larger dog after eating two pounds (about 1 kg). Dogs have been poisoned by eating an entire pan of brownies or a chocolate cake.

Signs of chocolate toxicity occur within hours after the dog ingests the chocolate. They include hyperexcitability, vomiting, frequent urination, diarrhea, rapid breathing, weakness, seizures, and coma. Death, which is rare, occurs by cardiac arrest.

**Treatment:** If you know your dog has eaten chocolate within the past six hours and he has not already vomited, induce vomiting (see page 25). Record the type and amount of chocolate ingested (sweet and semisweet chocolate in candy bars is not nearly as toxic as baking chocolate). Then call your veterinarian for further instructions.

**Prevention:** Use commercial dog products as treats. Keep all chocolate stored securely to prevent accidental ingestion. Make sure everyone in your family, especially the children, understands that chocolate is dangerous for dogs.

## RAISINS, GRAPES, AND OTHER FOOD POISONS

Dogs who eat raisins and grapes are at risk for acute and possibly fatal kidney failure. Most dogs will vomit some of the raisins or grapes within hours of eating them, but the damage may already be done. Dogs suffering from grape poisoning stop eating, develop diarrhea, and become quiet with signs of abdominal pain. Eventually the blood calcium levels go up and kidney failure follows.

If your dog has eaten raisins or grapes, induce vomiting as soon as you can and take your dog to your veterinarian. He may need to stay for fluid therapy to flush out the toxins.

Macadamia nuts are another food that can be toxic to dogs. Dogs who have eaten these nuts will show mild to severe weakness in the rear legs. So far, dogs seem to recover with time, but treating with activated charcoal hastens recovery.

Onions have sulfur compounds that can lead to a special type of hemolytic anemia. This does not usually cause acute toxicity signs, but will be picked up on blood work. If your dog has ingested onions, induce vomiting and follow that with activated charcoal.

The active yeast in raw bread dough will produce ethanol as the bread rises. This can lead to ethanol poisoning in dogs who ingest it. Unsteady gait and unusual behavior may be the first signs noted. The dog should be taken to your veterinarian, where fluid therapy, along with activated charcoal and possibly the antidote yohimbine, may be administered.

Xylitol is an artificial sweetener used by many diabetic people and people who are dieting. Xylitol can cause a dramatic and rapid drop in blood sugar in dogs, and possibly fatal liver damage. If your dog consumes xylitol, even just in sugar-free gum, induce vomiting and contact your veterinarian.

## CORROSIVE HOUSEHOLD PRODUCTS

Corrosive and caustic chemicals (acids and alkalis) are found in household cleaners, toilet bowl cleaners, dishwasher detergents, anti-rust compounds, alkaline batteries, drain decloggers, and commercial solvents. When ingested, they cause burns of the mouth, esophagus, and stomach. Severe cases cause perforations of the stomach and strictures of the esophagus, which may develop over time due to the tissue damage.

**Treatment:** *Do not induce vomiting.* Vomiting can result in rupture of the stomach and burns of the esophagus. Rinse the dog's mouth immediately after contact and take him as quickly as possible to the nearest veterinary clinic. If you can't get to the vet very quickly, give the dog water or milk (30 ml per 6

pounds or 2.7 kg of body weight) by plastic syringe to dilute the acid or alkali in the stomach.

The practice of giving an acid to neutralize an alkali and vice versa is no longer recommended, because it causes heat injury to the tissues.

With topical exposure, flush the area with water for 30 minutes. If the substance is in the dog's eyes, see *Burns of the Eyes*, page 179.

## PETROLEUM PRODUCTS

Gasoline, kerosene, and turpentine can cause pneumonia if aspirated or inhaled. (Ingesting them usually causes gastrointestinal upset, but is not as serious.) Signs of toxicity include vomiting, rapid labored breathing, tremors, convulsions, and coma. Death is by respiratory failure.

**Treatment:** *Do not induce vomiting.* Treat as described in the previous section on for corrosive household products (page 34). Flush the mouth with water to remove petroleum residue. Petroleum products are extremely irritating to the skin and must be removed as quickly as possible. Bathe the skin using warm soapy water. For tar in the coat, see *Special Bath Problems*, page 111.

## POISONOUS PLANTS

Eating plants and vegetation is not a common cause of poisoning in dogs, but it does occur. Puppies going through the chewing stage are more likely to ingest indoor and outdoor plants. In adult dogs, chewing on plants may be a sign of boredom or frustration associated with separation anxiety or a recent change in the household routine. The variety of potentially poisonous plants and shrubs allows for a wide range of symptoms. Signs include mouth irritation, drooling, vomiting, diarrhea, hallucinations, rapid labored breathing, staggering, muscle tremors, seizures, coma, and death. Some plants cause sudden death without premonitory signs. Other plants contain chemicals that are extremely irritating to the skin.

Milkweed, lily-of-the-valley, laurel, azalea, foxglove, and oleander all contain cardiac glycosides of the digitalis class. Even though these plants have a bitter taste, pets do sometimes eat enough to cause death. Ornamental plants of the nightshade family, including Chinese lantern, Christmas cherry, and ornamental pepper, contain solanines that are toxic to the gastrointestinal system and brain. They, too, are a rare cause of death.

You'll find a list of common toxic plants, shrubs, and trees on pages 36–38, but this list does not include all potentially poisonous plants. If you're not sure about a plant, ask your veterinarian or the local plant nursery. The ASPCA also has a list of poisonous plants on its website ([www.aspc.org](http://www.aspc.org)). Your local Cooperative Extension is often a good source of information about poisonous plants. Note that with some plants, only certain parts are toxic. With others, the whole plant is poisonous.

**Treatment:** If you suspect your dog has ingested a poisonous plant, induce vomiting (see page 25) and call your veterinarian for further instructions.

**Prevention:** To prevent houseplant poisoning, determine which plants are toxic and either dispose of them or keep them in a place the dog is unable to reach. Outside, be careful of any sticks you throw for your dog that he may chew on. Fence off dangerous plants so your dog can't reach them.

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### Indoor Plants with Toxic Effects

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***Houseplants that cause a skin reaction after contact with the skin or mouth***

Chrysanthemum

Poinsettia

Creeping fig

Weeping fig

***Irritating plants, some of which contain oxalic acid, which causes mouth swelling, difficulty swallowing, respiratory problems, and gastrointestinal upsets***

Arrowhead vine

Malanga

Boston ivy

Marble queen

Caladium

Mother-in-law plant

Calla or arum lily

Neththysis

Dumbcane (diffenbachia)

Parlor ivy

Elephant's ear

Pothos or devil's lily

Emerald duke

Peace lily

Heart leaf (philodendron)

Red princess

Jack-in-the-pulpit

Saddle leaf (philodendron)

Majesty

Split leaf (philodendron)

Tuberous begonia

***Plants that contain a wide variety of poisons—most cause vomiting, an acutely painful abdomen, and cramps; some cause tremors, heart and respiratory and/or kidney problems, which are difficult for owners to interpret***

Amaryllis

Ivy species

Asparagus fern

Jerusalem cherry

Azalea

Nightshade

Bird-of-paradise

Pot mum

Creeping Charlie

Ripple ivy

Crown of thorns

Spider mum

Elephant's ear

Sprangeri fern

Umbrella plant

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 Outdoor Plants with Toxic Effects
 

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***Outdoor plants that can cause vomiting and diarrhea***

Bittersweet woody	Indian turnip
Castor bean	Indian tobacco
Daffodil	Larkspur woody
Delphinium	Poke weed
Foxglove	Skunk cabbage
Ground cherry	Soapberry
	Wisteria

***Trees and shrubs that may cause vomiting, painful abdomen, and diarrhea***

American yew	English yew
Apricot	Horse chestnut
Almond	Japanese plum
Azalea (rhododendron)	Mock orange
Balsam pear	Monkey pod
Bird-of-paradise bush	Peach
Buckeye	Privet
Cherry	Rain tree
English holly	Western black locust yew
	Wild cherry

***Outdoor plants with varied toxic effects***

Angel's trumpet	Mescal bean
Buttercup	Moonseed
Dologeton	Mushrooms
Dutchman's breeches	Nightshade
Jasmine	Pigweed
Jimsonweed	Poison hemlock
Locoweed	Rhubarb
Lupine	Spinach
May apple	Sunburned potato
Matrimony vine	Tomato vine
	Water hemlock

*continued*

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 Outdoor Plants with Toxic Effects (*continued*)
 

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**Hallucinogens**

Locoweed	Nutmeg
Marijuana	Periwinkle
Morning glory	Peyote
Poppy	

**Outdoor plants that cause convulsions**

Chinaberry	Nux vomica
Coriaria	Water hemlock
Moonweed	

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**LEAD**

Lead is found in fishing weights and is a base for some artists' paints. Other sources of lead include linoleum, drywall (sheetrock), batteries, plumbing materials, putty, lead foil, solder, golf balls, old paint chips, and tar paper. The use of commercial lead-free paints has significantly reduced the frequency of lead intoxication. Poisoning occurs primarily in puppies and dogs who chew and swallow objects that contain lead. Toxicity usually requires repeated exposure.

Acute lead intoxication is characterized by vomiting and a very painful abdomen. With chronic exposure, a variety of central nervous system signs can develop. They include seizures, uncoordinated gait, excitation, continuous barking, attacks of hysteria, weakness, stupor, and blindness. Chewing and champing fits may be mistaken for the encephalitis of distemper.

**Treatment:** If you suspect your dog has ingested lead, induce vomiting (see page 25). Seek veterinary attention. Blood tests will be done to check for lead levels. Specific antidotes to bind and remove lead from the dog's system are available from your veterinarian.

**ZINC**

Pennies made after 1982 have a zinc core. This heavy metal can be toxic to dogs, leading to hemolytic anemia, blood in the urine, and possible kidney failure. If you see your dog ingest pennies, induce vomiting. Many times, clinical signs do not show up for days, as the stomach acid dissolves the metal. Surgery to remove any pennies may be required and your dog may need hospitalization for fluids and to attempt therapy to chelate (remove from the body) the zinc.

## TOAD AND SALAMANDER POISONING

There are two species of poisonous toads in the United States: the Colorado River toad, found in the Southwest and Hawaii; and the marine toad, found in Florida. There is one species of poisonous salamander: the California newt, found in California.

All toads, even the ones that aren't poisonous, have a bad taste. Dogs who mouth them slobber, spit, and drool. This does not necessarily mean the dog has been poisoned. Toxicity depends upon the virulence of the toad or salamander venom, the size of the dog, and the amount of poison absorbed. The marine toad, for example, is highly poisonous, causing death in as few as 15 minutes.

Symptoms can vary from slobbering to convulsions, blindness, and death. Puppies and small dogs are more likely to develop toxicity.

**Treatment:** Repeatedly flush the dog's mouth using a garden hose, if necessary, and induce vomiting (see page 25). Be prepared to administer CPR (see page 8). Dogs with salamander poisoning generally recover quickly.

## Insect Stings and Bites

The stings of bees, wasps, and yellow jackets, and the bites of ants all cause painful swelling and redness at the site of the sting, usually on a hairless area such as the nose or feet. The swelling may include the face and neck, even if the dog was not stung on the face. If the dog is stung many times, he could go into shock as a result of absorbed toxins. Occasionally, anaphylactic shock (see page 13) develops in a dog who has been stung in the past.

The bites of black widow and brown recluse spiders are toxic to animals. The first sign is sharp pain at the site of the bite. Later the dog develops intense excitability, fever, weakness, and muscle and joint pains. Seizures, shock, and death can occur, especially with the bite of the black widow spider. An antivenin is available to treat these bites.

The stings of centipedes and scorpions cause a local reaction and, at times, severe illness. These bites heal slowly.

The bites of fleas, ticks, and other common insect parasites are discussed in chapter 4.

### **Treatment:**

1. Identify the insect.
2. If the stinger is found (a small black sac), remove it by scraping it out with your fingernail or a credit card. Do not squeeze or use tweezers, as this can inject more venom. (Only bees leave their stingers behind.)
3. Make a paste of baking soda and water and apply it directly to the sting.

4. Apply an ice pack to relieve the pain and swelling.
5. Apply calamine lotion to relieve the itching.
6. Your veterinarian may prescribe an antihistamine.

If the dog exhibits signs of hypersensitivity to the venom (agitation, face scratching, drooling, vomiting, diarrhea, difficulty breathing, collapse, or seizures), take him at once to the nearest veterinary facility for treatment of anaphylactic shock.

If your dog has a severe reaction to a bee sting, you should consult your veterinarian about keeping an Epi Pen kit available (the Epi Pen is a prepackaged injection of epinephrine used to counteract an anaphylactic reaction) and discuss the proper dose for your dog.

## Snakebites

Poisonous and nonpoisonous snakes are widely distributed throughout North America. Ninety percent of snakebites in dogs involve the head and legs.

In the United States there are four types of poisonous snakes: cottonmouths (also called water moccasins), rattlesnakes, copperheads, and coral snakes. The diagnosis of poisonous snakebite is made by the appearance of the bite, the behavior of the animal, and your identification of the species of snake.

In general, bites of nonpoisonous snakes do not cause swelling or pain. They show teeth marks in the shape of a horseshoe, but no fang marks.

### PIT VIPERS (RATTLESNAKES, COTTONMOUTHS, AND COPPERHEADS)

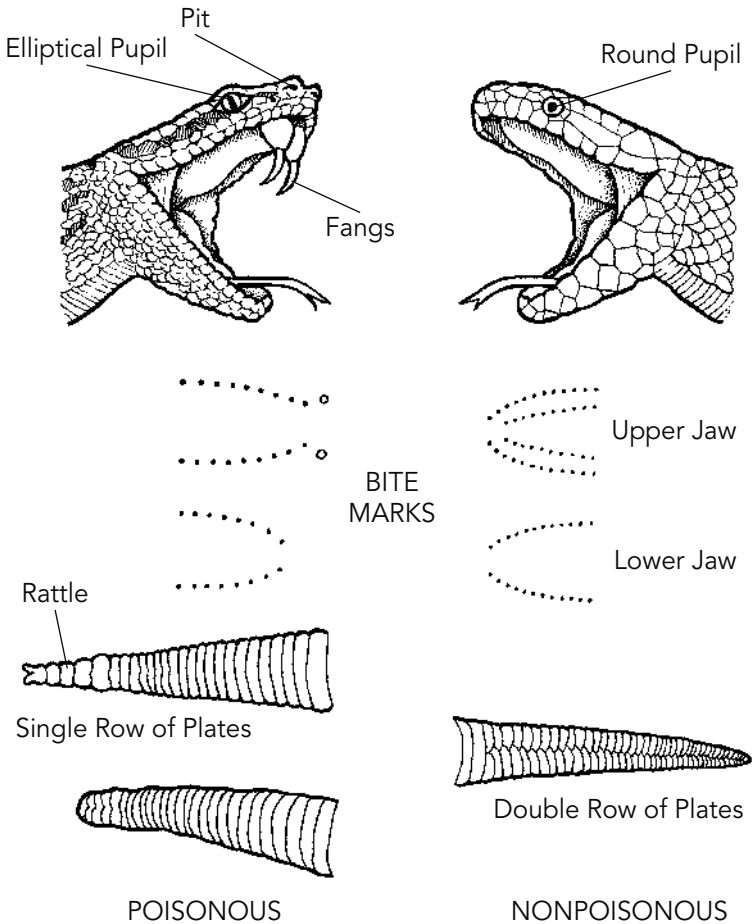
You can identify these species by their large size (4 to 8 feet, 1.2 to 2.4 m, long), triangular heads, pits below and between the eyes, elliptical pupils, rough scales, and the presence of retractable fangs in the upper jaw.

**The bite:** You may see one or two bleeding puncture wounds in the skin; these are fang marks. These marks may not be visible because of the dog's coat. The pain is immediate and severe. The tissues are swollen and discolored due to bleeding at the site of the bite.

Note that 25 percent of poisonous snakebites lack venom and thus do not produce a local reaction. While absence of local swelling and pain is a good sign, it does not guarantee the dog won't become sick. Severe venom poisoning has been known to occur without a local reaction.

**The dog's behavior:** Signs of envenomation may take several hours to appear because of variables such as time of the year, species of the snake, toxicity of the venom, amount injected, location of the bite, and size and health of the dog. The amount of venom injected bears no relationship to the size of





Compare the characteristics of pit vipers and nonpoisonous snakes. Note the elliptical pupil, pit below the eye, large fangs, characteristic bite, and single row of subcaudal plates on the belly of the pit viper.

the snake. Signs of venom poisoning include extreme restlessness, panting, drooling, vomiting, diarrhea, uncoordinated gait, respiratory depression, shock, and sometimes death.

## CORAL SNAKES

Identify this snake by its rather small size (less than 3 feet, .9 m, long), small head with black nose, and brightly colored alternating bands (red, yellow, and black) fully encircling the body. The fangs in the upper jaw are not retractable.

**The bite:** The puncture wounds from a bite are small and the pain is mild. There is little local reaction.

**The dog's behavior:** Coral snake venom is neurotoxic, meaning it affects the nerves and causes weakness and paralysis. Signs may be delayed for several hours. They include muscle twitching, pinpoint pupils, weakness, difficulty swallowing, shock, and collapse. Death is by respiratory paralysis.

## TREATING SNAKEBITES

First identify the snake and look at the bite. If the snake is not poisonous, clean and dress the wound as described in the section on *Wounds* (on this page). If it appears the dog has been bitten by a poisonous snake, *proceed at once to the veterinary hospital*. (If the snake has been killed, take it with you for identification. If not, try to describe it as completely as you can.) Some specific precautions:

- *Keep the dog quiet.* Venom spreads rapidly. Excitement, exercise, and struggling increase the rate of absorption. If possible, carry the dog.
- Do not wash the wound, as this increases venom absorption.
- Do not apply ice, as this does not slow absorption and can damage tissue.
- Do not make cuts over the wound and/or attempt to suck out the venom. This is never successful and you could absorb venom.
- Be aware that the snake's fangs may be venomous for up to two hours after it dies, even if you have cut off the head.

Veterinary treatment involves respiratory and circulatory support, antihistamines, intravenous fluids, and species-specific antivenin. The earlier the antivenin is given, the better the results. Because signs of envenomation are often delayed, all dogs who have been bitten by a poisonous snake—even those who don't show signs—should be hospitalized and observed for 24 hours.

If you live in an area where your dog is likely to come in contact with poisonous snakes, you may choose to take him through sensitization training. A skilled professional will use an electric collar to train your dog to fear and avoid snakes.

## Wounds

The two most important goals in treating wounds are to stop the bleeding and to prevent infection. Wounds are painful, so be prepared to restrain and muzzle the dog before treating the wound.

## CONTROLLING BLEEDING

Bleeding may be arterial (bright red blood will spurt out) or venous (dark red blood will ooze out), or sometimes both. Do not wipe a wound that has stopped bleeding, as this will dislodge the clot. Similarly, don't pour hydrogen

peroxide on a fresh wound. Peroxide dissolves clots and starts a fresh round of bleeding. It may also damage the tissues and delay healing.

The two methods used to control bleeding in an emergency situation are a pressure dressing and a tourniquet.

### **Pressure Dressing**

*The most effective and safest method for controlling bleeding is to apply pressure directly to the wound.* Take several sterile gauze squares (or, in an emergency, use any clean cloth such as a thickly folded pad of clothing) and place over the wound. Apply direct pressure for 5 to 10 minutes. Leave the dressing in place and bandage snugly. If material for bandaging is not available, hold the pack in place until help arrives.

Watch for signs of swelling of the limb below the pressure pack (see *Foot and Leg Bandages*, page 47). This indicates impaired circulation. If you see these signs, the bandage must be loosened or removed. Consider adding more bulk to the pack and apply a second bandage over the first. Transport the dog to a veterinary hospital.

### **Tourniquet**

Tourniquets can be used on the extremities and tail to control arterial bleeding that can't be controlled with a pressure pack. *Tourniquets should never be used if bleeding can be controlled by direct pressure.* Always place the tourniquet *above* the wound (between the wound and the heart).



**A tourniquet should be used only if bleeding cannot be controlled with a pressure dressing. The tourniquet is looped twice around the leg . . .**



**. . . and tightened by twisting.**

A suitable tourniquet can be made from a piece of cloth, belt, tire, or length of gauze. Loop the tourniquet around the limb as shown in the photo on page 43. Then tighten it by hand or with a stick inserted beneath the loop. Twist the loop until the bleeding stops.

A tourniquet should be loosened every 10 minutes to prevent tissue *hypoxia* and to check for persistent bleeding. If bleeding has stopped, apply a pressure bandage as described in the previous section. If bleeding continues, let the blood flow for 30 seconds and then retighten the tourniquet for another 10 minutes.

## TREATING WOUNDS

Nearly all animal wounds are contaminated with dirt and bacteria. Proper care and handling will reduce the risk of tetanus and prevent many infections. Before handling a wound, make sure your hands and instruments are clean. The five steps in wound care are:

1. Skin preparation
2. Wound irrigation
3. Debridement
4. Wound closure
5. Bandaging

### *Skin Preparation*

Remove the original pressure dressing and cleanse the area around the wound with a surgical scrub solution. The most commonly used solutions are Betadine (povidone-iodine) and Nolvasan (chlorhexidine diacetate). Both products are extremely irritating to exposed tissue in the concentrations provided in the stock solutions (Betadine 10 percent, chlorhexidine 2 percent), so be very careful that the solution does not get in the wound while scrubbing the skin around it. Dilute the solution to weak tea color for Betadine or pale blue color for Nolvasan.

Three-percent hydrogen peroxide, often recommended as a wound cleanser, has little value as an antiseptic and is extremely toxic to tissues.

After the scrub, start at the edges of the wound and clip the dog's coat back far enough to prevent any long hairs from getting into the wound.

### *Wound Irrigation*

The purpose of irrigation is to remove dirt and bacteria. The gentlest and most effective method of wound cleansing is by *lavage*, which involves irrigating the wound with large amounts of fluid until the tissues are clean and glistening. Do not vigorously cleanse the wound using a brush or gauze pad because this causes bleeding and traumatizes the exposed tissue.

Tap water is an acceptable and convenient irrigating solution. Tap water has a negligible bacterial count and is known to cause less tissue reaction than sterile or distilled water.

If possible, add chlorhexidine solution or Betadine solution to the tap water for antibacterial activity. Chlorhexidine has the greater residual antiseptic effect, but either antiseptic solution (not soap solutions) is satisfactory when correctly diluted. To dilute chlorhexidine, add 25 ml of the 2 percent stock solution to 2 quarts of water (2 l), making a 0.05 percent irrigating solution. To dilute Betadine, add 10 ml of the 10 percent stock solution to 2 quarts of water to make a 0.2 percent irrigating solution.

The effectiveness of the irrigation is related to the volume and pressure of the fluid used. A bulb syringe is a low-pressure system. It is least effective and requires more fluid to achieve satisfactory irrigation. A large plastic syringe removes a moderate amount of dirt and bacteria. A home Water Pik unit (used by people to clean their teeth) or a commercial lavage unit that provides a high-pressure stream of fluid is the most effective.

A garden hose with a pressure nozzle for the initial lavage, or a kitchen sink spray unit, followed by one of the methods just described to deliver the antiseptic, is a good alternative. You want to flush and clean the wound, not force dirt deeper into the tissues. Angle your flow of liquid to accomplish that and let the fluid pool to bring debris to the surface.

### ***Debridement***

Debridement means removing dying tissue and any remaining foreign matter using tissue forceps (tweezers) and scissors or a scalpel. Debridement requires experience to determine the difference between normal and devitalized tissue, and instruments to control hemorrhage and close the wound. Accordingly, wounds that require debridement and closure should be treated by a veterinarian.

### ***Closure***

Fresh lacerations on the lips, face, eyelids, and ears are best sutured or stapled to prevent infection, minimize scarring, and speed recovery. Lacerations longer than half an inch (1.25 cm) on the body and extremities probably should be closed, but small lacerations may not need to be. Small V-shaped lacerations heal best if they are closed.

Wounds contaminated by dirt and debris are quite likely to become infected if closed at the time of injury. These wounds should be left open or sutured around a drain that can be used for through-and-through irrigation. Similarly, wounds older than 12 hours should not be closed without drainage. Suturing or stapling should be avoided if the wound appears to be infected (is red, swollen, or has a surface discharge).

Your veterinarian may decide to close a wound that has been left open for several days and has developed a bed of clean tissue. Wounds that are clean after several days are resistant to infection and usually can be closed with



**A wound sutured around a drain allows for through-and-through flushing.**

impunity. Suturing such a wound is called delayed primary closure.

The length of time sutures or staples should remain in place depends on the wound's location and other characteristics. Most sutures and staples can be removed after 10 to 14 days.

### ***Puncture Wounds***

Puncture wounds are caused by bites and pointed objects. Animal bites, in particular, are heavily contaminated with bacteria. Bleeding may occur. There may also be bruising, particularly if the dog was picked up in the teeth of a bigger dog and shaken. Puncture wounds are often concealed by the dog's coat and may be easily overlooked until an abscess develops a few days later.

Treatment of a puncture wound requires a veterinarian. It involves surgically enlarging the skin opening to provide drainage, after which the area is irrigated with a dilute antiseptic surgical solution. These wounds should not be closed. If there is a large, open wound area, parts of the wound may be sutured with a drain left in place to allow air to get in and discharge to drainage. With all animal bites, keep in mind the possibility of rabies. If it is a bite wound from an unknown animal, a rabies booster may be needed.

Antibiotics are frequently prescribed for bite wounds and wounds that are heavily contaminated, such as puncture wounds.

### ***Home Treatment***

Small open wounds can be treated at home without sutures or staples. Medicate twice a day with a topical antibiotic ointment such as triple antibiotic. The wound can be left open or covered with a dressing. Make sure the dog is not constantly licking it. You can cover the area with a sock or a T-shirt to keep the dog away from the wound.

Infected wounds that are draining pus require the application of moist sterile compresses. A number of topical antiseptics are effective in treating superficial wound infections. They include chlorhexidine and Betadine (diluted as described in *Wound Irrigation*, page 44), Furacin (both the topical cream and 0.2 percent solution), 1 percent Silvadene cream, and topical antibiotics containing bacitracin, neomycin, and polymyxin B (triple antibiotic). Apply the topical antibiotic directly to the wound or place it first on a gauze pad. Change the dressing once or twice a day to facilitate pus drainage.

## BANDAGING A WOUND

Wounds may be left open or bandaged, depending on their location and other factors. Wounds on the head and neck are often left open to facilitate treatment. Many wounds of the upper body are difficult to bandage and do not benefit greatly from being covered.

Bandaging has the advantage of protecting the wound from dirt and contaminants. It also restricts movement, compresses skin flaps, eliminates pockets of serum, keeps the edges of the wound from pulling apart, and prevents the dog from biting and licking at the wound. Bandaging is most effective for wounds to the extremities. In fact, nearly all leg and foot wounds can benefit from a bandage.

Dressings over draining or infected wounds must be changed once or twice a day. The bandage should be bulky enough to absorb the drainage without soaking through.

### *Foot and Leg Bandages*

To bandage the foot, place several sterile gauze pads over the wound and secure with surgical adhesive tape. Be careful not to make the tape too tight. To secure a foot dressing, you will need to continue the bandage up the leg.

For leg wounds, cover the wound with sterile gauze pads. On top, pad the entire leg with plenty of cotton so the dressing won't become too tight and interfere with the circulation. Wrap first with roll gauze, then wrap the leg with elastic tape or bandage, as shown in the photographs on page 48. Your veterinarian or a veterinary technician can show you the best way to bandage a particular wound.



**To bandage a foot with a lacerated pad, first place the foot on several layers of sterile gauze.**



**Secure the gauze with surgical adhesive tape.**



**Finish with a leg bandage to hold the foot bandage in place.**

Veterinary wraps such as Vet Wrap work well, but you need practice to have the right amount of tension so you don't cut off circulation. Flex the knee and foot several times to be sure the bandage is not too tight and that there is good movement at the joints.

Over the next few hours, check the toes for coolness and observe the feet for swelling. Swelling of the leg below a bandage will be seen in the toes. When the toes are swollen, the nails are spread apart instead of being side by side. If this swelling is not treated by removing the bandage, the foot becomes cold and loses feeling. If there is any question about circulation, remove the bandage.

Put a plastic bag over a leg bandage when the dog goes outside so it will stay clean and dry. Use a sock or a T-shirt to protect the bandage or to cover wounds that are difficult to bandage.

Bandages over clean, healing wounds can be changed every two days, but should be inspected three or four times a day for signs of constriction, limb swelling, slippage, drainage, or soiling. With prolonged bandaging, watch for moisture between the toes. If there are signs of any of these problems, replace the bandage.

Wounds on the foot or leg may be covered with a splint as well as a bandage. The splint minimizes movement of the area and speeds healing. Watch for sores from a splint rubbing on the skin.





To make a leg bandage, apply a gauze square over the wound and pad the leg well.



Wrap the leg with an elastic tape or bandage. Do not stretch the elastic wrap as you apply it, or the dressing will be too tight. Check toes for swelling or redness at least three or four times a day.



The finished dressing; it should be changed every two days.



**A many-tailed bandage protects skin from scratching and biting, and is far more comfortable than a restrictive collar.**

### ***Many-Tailed Bandage***

This type of bandage is used to hold dressings in place and to protect the covered skin from the dog's scratching and biting. It is made by taking a rectangular piece of clean cloth and cutting the sides to make tails. Tie the tails together over the dog's back to hold the bandage in place.



**An eye bandage, properly applied.**

### ***Eye Bandage***

Your veterinarian may prescribe an eye bandage to help treat an eye ailment. Place a sterile gauze square over the affected eye and hold it in place by taping it around the head with one-inch-wide surgical adhesive. Be careful not to wrap the tape too tight. Apply the dressing so that the dog's ears are free. You may have to change the dressing from time to time to apply medication to the eye. Many dogs will need to wear an Elizabethan collar or a BiteNot collar to keep them from rubbing or pawing at the bandage.