

Animal Bites and Rabies Prophylaxis

Current guideline and significant revision written by Mindy M. Pomtree, MD, in collaboration with the ANGELS Team, January 2, 2016 and finalized February 25, 2016.
Guideline originally developed by Anna Seal, MD, April 12, 2012 and titled "Dog Bites". Last reviewed December 7, 2016 by Mindy M. Pomtree, MD.

Key Points

- Approximately 4.7 million people in the United States are bitten every year by dogs and cats, resulting in 1% of all emergency department visits.
- Dogs are responsible for 80% to 90% of attacks, cats 5% to 10%, rodents 2% to 3%, followed by other wild or domesticated animals.
- Infection is the most common complication of any bite wound.
- Causative organism for infected bite wounds varies, but *P. Multocida* and *Staphylococcus* species are the most commonly identified.
- Irrigation is the most important step in preventing infection in lacerations that are not primarily puncture wounds.
- Rabies is a rare, but deadly, complication that must be considered.
- A careful history is essential in identifying wounds at high risk for complications.

Definition

- An animal bite is defined as closure of the maxillary and mandibular teeth around tissue that causes bruising, crush injury, laceration, abrasion, or puncture wounds.
- When existing open wounds come into contact with animal saliva or other animal body fluids, complications similar to those of bite wounds can occur. This should be considered in the management of such wounds.
- Regardless of the species of animal inflicting the injury, assess and manage the bite according to the general concepts outlined below.

Assessment and Diagnosis

History

- Determine circumstances of the injury, including animal species and/or breed, familiarity, animal and child immunization history, setting, provocation, animal's current location, and other factors.
- Determine the timing of the injury for infection and wound closure considerations; this is essential.
- Notify appropriate animal control authorities or law enforcement for both reporting and quarantine purposes.
 - In Arkansas, all pet bites must be reported.
 - The owner of the biting pet is prohibited from transporting, selling, or destroying the animal until released by authorities.
 - Health care providers may directly contact their county's animal services department or local police department nonemergency line.
 - Health care providers in Arkansas also may contact the Arkansas Department of Health (ADH) Communication Center at 1-800-633-1735 for a 24-hour on-call consultation service. See the [Rabies Risk Assessment Decision Tree](#) on the ADH website.

Past Medical History

- Take note of chronic illnesses that could increase risk of complications, such as immune compromise.
- Review current medications and drug allergies.
- Confirm (and update as needed) tetanus vaccination, as well any prior rabies vaccinations or preexposure prophylaxis.

Physical Exam

- Identify wound type: contusion, abrasion, simple laceration, puncture, avulsion, or crush injury.
- Take measurements and margins.
- Assess for gross contamination or any obvious foreign bodies.
- Assess neurovascular status and motor function. Complete full range of motion to assess for tendon injury or joint capsule penetration.
- Assess for established infection if there was delay in seeking medical treatment.

Laboratory Tests

Indications for Imaging

- Obtain x-rays as needed to rule out fractures, possible joint involvement, foreign bodies (ie, retained canine teeth), or infection as evidenced by subcutaneous gas or signs of osteomyelitis.
- Image all clenched fist injuries, puncture wounds near bones, and penetrating scalp injuries.
- Use ultrasound to evaluate abscess formation.
- Consider head and maxillofacial computed tomography (CT) scan to determine the extent of potential fractures to the skull and facial bones as indicated by severity of injury.

Indications for Culture

- There is no need to culture fresh wounds (<8 hours old).

- Obtain aerobic and anaerobic wound cultures for wounds >8 to 12 hours old and wounds with signs of active infection (ie, purulent drainage, abscess formation, foul odor). Indicate to the laboratory that the specimen is from a bite wound.

Referral

Consider referral to a higher level of care for the following situations:

- Inability to adequately care for animal bite injuries for any reason
- Multiple and/or severe injuries, particularly of the head, neck, and/or facial lacerations
- Systemic signs of infection (If possible before transfer, culture the wound then start appropriate IV antibiotics.)
- Involvement of bone, joint, tendon, or nerve

Management

Analgesia

- Topical agents, such as LET (ie, lidocaine [4%], epinephrine [0.1%], and tetracaine [0.5%]), are most effective over highly vascular areas and in infants and toddlers. This agent is less effective with increasing dermal thickness.
- Injectable lidocaine will obtain adequate wound anesthesia for most lacerations. Consider using lidocaine with epinephrine to aid in vasoconstriction and stop excess bleeding.
- Conscious sedation is useful for multiple or severe lacerations that require extensive management.

Wound Cleaning and Debridement

Puncture wounds present significant challenges to wound care. The steps for wound cleaning and debridement are described in [Table 1](#).

Table 1. Wound Cleaning and Debridement

To view a larger image on your device, please click or touch the image.

Table 1. Wound Cleaning and Debridement

Step	Description
Clean	Gently sponge away any visible dirt with soft, moistened sterile gauze.
Sterilize	Sterilize the wound with a 1% povidone iodine solution. <ul style="list-style-type: none">• Make this solution by mixing 1:10 parts 10% standard povidone iodine solution and normal saline.• Do not use strong antiseptic solutions (eg, chlorhexidine, alcohol). They may damage wound edges and delay healing.
Irrigate	<ul style="list-style-type: none">• Irrigate the lacerations with high-pressure normal saline for at least 100 mL per centimeter of wound length.• Puncture wounds should not be irrigated with high pressure as it increases the risk of anaerobic infection.• You may use either a 30-to-60 mL syringe with an 18-gauge needle, IV bag with adapter, or specialized irrigation apparatus.
Perform debridement if needed	<ul style="list-style-type: none">• Trim any devitalized tissue and remove any visible contaminants.• Superficially irrigate the wound, but avoid high-pressure irrigation directly into the wound as this may force contaminants deeper into the wound.

Wound Closure

Primary Closure

Primary closure, or closer by primary intent, is the surgical closing of a wound with suture or staple.

- Primary closure is appropriate for clinically uninfected wounds that are <6 to 8 hours old and should be strongly considered in areas of cosmetic importance (ie, facial lacerations).
- Primary closure of head and neck wounds, along with antibiotic prophylaxis, is associated with low-risk of infection secondary to increased vascularity in this region and its nondependent location.
- Simple interrupted suturing technique is preferred to allow for isolated suture removal if infection is suspected in the future.
- Tissue adhesives (“glue”) is contraindicated and should *not* be used for closure of any animal bite.

Secondary Closure

Secondary closure, or closure by secondary intent, provides healing through granulation and reepithelialization. The skin edges are left open as the wound heals.

- Secondary closure should be considered for the following:

- Wounds >12 hours old (>24 hours on the face)
- Wounds at high risk of infection or with active infection
- Wounds that are heavily contaminated or with extensive damage (ie, crush injuries)
- Puncture wounds
- Bites involving the hands and feet
- In immunocompromised victims
- To prepare a wound for secondary closure, clean and irrigate as usual. Iodoform gauze may be placed and removed at 24-to-48-hour follow up. Wound edges may be loosely approximated with tape.
- Scar formation is more likely with secondary closure and may need revision later if cosmesis is of concern.

Wound Dressing

- Facial and scalp wounds do not require dressing.
- Antibiotic ointment and bandages should be applied to other wounds after closure.
- Consider splinting extremities for up to 72 hours to facilitate healing and maintain functionality.

Rabies Prophylaxis Considerations

Definition

- Rabies is an almost universally fatal viral illness that effects the central nervous system.
- Rabies is spread by contact with the saliva, brain, or nervous system tissue of infected animals. Blood, urine, and feces are not infective.

Assessment

The following situations warrant rabies immunoglobulin and vaccine administration.

- Anyone found to have been asleep in the room with a bat.
 - Just 2% to 3% of bats in the United States are infected with rabies; however, most US cases of rabies in humans are due to unreported or unrecognized exposure to bats.
- **Rabies positive.** Those obtaining a bite from an animal that has tested positive for rabies.
- **Skunk, raccoon, fox, coyote, or bat.** Persons obtaining a bite from a skunk, raccoon, fox, coyote, or bat.
- **Unprovoked attacks.** Victims of unprovoked attacks from strays or domestic mammals that are not captured for 10 days of monitoring or euthanization and subsequent testing.
 - Consider administering immunoglobulin within 24 hours in these cases, even if the animal is suspected to be captured. The ideal time frame is 24 hours although prophylaxis can be effective if delayed.
- **Asymptomatic rodents and livestock.** Animals such as chickens, horses, cattle, and goats are considered extremely low risk injuries. However, you should discuss these injuries with the local health department. In Arkansas, call the Arkansas Department of Health at 501-661-2000.
- **No current rabies vaccination.** Domestic animals not up to date with their rabies vaccination should be monitored for signs of rabies for 10 days; contact local animal control for reporting.
- **Wolf dog hybrids.** The monitoring period for wolf dog hybrids has not been established. There is no proven rabies vaccination schedule for wolf dog hybrids.
 - For this reason, persons bitten by wolf dog hybrids should undergo prophylaxis

procedures. The animal should be euthanized and subsequently tested for rabies.

Method

- Rabies prophylaxis includes human rabies immunoglobulin (HRIG), 20 units/kg, half volume, injected in the wound (with the exception of facial wounds) with the remainder given in the deltoid.
- Rabies vaccine also should be given at the time of HRIG, but in a different bodily location, such as the opposite deltoid. The recommended schedule for rabies vaccination includes the first injection as day 0, then again on days 3, 7, and 14.
 - Cases in which the animal can be monitored or tested allow for prophylaxis to be postponed until a positive test returns or other signs of infection manifest; however, each case must be considered individually.
 - Immunocompromised victims should receive a 5-injection course (ie, on days 0, 3, 7, 14, 28).
 - Complications are rare in children. Mild systemic symptoms are reported in 15% to 25% of adults.
- Treatment of persons who have received preexposure rabies prophylaxis varies based upon the type of prophylaxis.
 - Consider each case individually.
 - Preexposure rabies prophylaxis treatment is outlined in the American Academy of Pediatrics *Redbook* (see [Resources](#)).

Antibiotic Prophylaxis Considerations

Dog and Cat Bites

- Infections arise from the biting animal's oral flora, host's own flora, or contamination from the environment.
- Common organisms isolated from infected dog and cat bites include *Pasteurella* species, *S. aureus*, and *S. epidermidis*. Less common are *streptococci*, *anaerobes*, *Capnocytophaga* species, *Moraxella* species, *Corynebacterium* species, and *Neisseria* species.
- Antibiotic treatment of dog and cat wounds is outlined in [Table 2](#).
- Course is 3 to 5 days with close follow up for prophylaxis. For infected wounds, course is 7 to 10 days.
- Avoid antibiotic prophylaxis in only the most trivial, nonfacial wounds in immunocompetent victims.
- Crush injuries, as well as wounds on the hands, feet, and genitalia, are considered at high risk for infection.

Table 2. Antibiotic Treatment of Dog and Cat Wounds

To view a larger image on your device, please click or touch the image.

Table 2. Antibiotic Treatment of Dog and Cat Wounds

	Recommended Antibiotic
No allergies	<ul style="list-style-type: none"> • Oral amoxicillin clavulanate <p style="text-align: center;"><i>or</i></p> <ul style="list-style-type: none"> • IV ampicillin sulbactam
Penicillin allergic	<ul style="list-style-type: none"> • Oral or IV clindamycin <p style="text-align: center;"><i>plus</i></p> <ul style="list-style-type: none"> • One of the following: <ul style="list-style-type: none"> • Extended spectrum cephalosporin • TMP-SMX (Trimethoprim-sulfamethoxazole)—also known as co-trimoxazole, Bactrim, and Septra

Other Animal Bites

Rats/Rodents

- *Streptobacillus moniliformis*, an aerobic gram-negative organism, is the causative organism in one form of rat bite fever. It is found in 50% of healthy rats. The organism is difficult to isolate.
- Rat bite fever has a variable incubation period from 3 to 10 days.
- Symptoms are abrupt onset of fever, headache, myalgias, chills, and vomiting.
 - Bite wound is typically healed before the onset of symptoms.
 - In 75% of cases, symptoms are accompanied by a variable rash, which may be erythematous maculopapular, petechial, and increased on the extremities.
 - Presentation may be confused with Rocky Mountain spotted fever.
- Penicillin is the prophylactic medication of choice for either form of rat bite fever.
- The less common form of rat bite fever caused by *spirillum minus* has a longer incubation period and less myalgia and/or arthritis.
- Treat with IV penicillin G for 7 days followed by oral penicillin V for another week. Tetracycline or streptomycin can be used for penicillin allergic patients.

Rabbits

- Rabbit bites can transmit *Francisella tularensis*. Ulceroglandular tularemia is the most common form (45%).
- Signs include
 - Ulcerative lesion at the site of inoculation in 2 to 4 days
 - Fever and lymphadenopathy
- Treat with gentamicin.
- Prophylaxis is not effective and should not be initiated.

Monkeys

- An orthopoxvirus (monkeypox) can be transmitted by exposure to saliva, blood, or other body fluids from an infected monkey. It also can be transmitted by infected African squirrels, rats and mice, and rarely US prairie dogs and humans.

- Incubation period is 10 to 14 days.
- The incubation period is followed by sudden onset malaise, fever, myalgia, headache, severe backache, cough, abdominal pain, vomiting, and generalized lymphadenopathy.
- Prodrome is 2 to 4 days followed by exanthema head-to-distal progression. Fever goes away as rash progresses. Erythematous macules then rapidly change to firm papules, then rapidly vesiculate then pustular over 2 to 3 days.
- Diagnosis includes the following:
 - Isolation in viral culture
 - Polymerase chain reaction (PCR)
 - Electron microscopy with virus morphology consistent with monkeypox *or* immunohistochemical staining of tissues
- Treatment includes the following:
 - Supportive treatment for isolated cases
 - For an epidemic, smallpox vaccine is 85% effective in preventing or attenuating the disease within 2 weeks of exposure.
 - Isolation droplet and airborne infection control

Home Instructions

- Caregivers should care for the wound as follows:
 - Gently wash and inspect wounds daily for signs of infection.
 - Pat the wound dry.
 - Cover with antibiotic ointment and gauze.
 - Repeat as dressing becomes wet or soiled.
- Gently wash scalp wounds every 24 hours with mild shampoo.
- Swab undressed wounds with half-strength hydrogen peroxide 3 to 4 times daily to prevent blood clot formation along the wound edges.
- Keep abrasions covered with antibiotic ointment until well healed.

Follow-up Care

- Bite wounds should be inspected by a health care provider for signs of infection in 24 to 48 hours following initial treatment.
- Sutures in the head and neck may be removed after 5 days.
- Sutures to the trunk and extremities may be removed in 7 to 10 days.
- Sutures overlying joints and areas of tension may be removed after 10 to 14 days.
- Delay of suture removal may result in local inflammation, suture expulsion, and scar formation along wound edges.

Resources

- Arkansas Department of Health: 501-661-2000 or 800-462-059
- [Rabies Risk Assessment Decision Tree](#) available on the Arkansas Department of Health website.
- Phone numbers for questions concerning care of bitten humans, immunization, and quarantine of animals:
 - State Public Health Veterinarian at 501-280-4136 (during working hours)
 - Arkansas Department of Health Communication Center at 800-633-1735 (24-hour on-call consultation service)

This guideline was developed to improve health care access in Arkansas and to aid health care providers in making decisions about appropriate patient care. The needs of the individual patient,

resources available, and limitations unique to the institution or type of practice may warrant variations.

References

References

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