



TREATMENT OF ANIMAL BITES IN PATIENTS ADMITTED TO PEDIATRIC SERVICES

Indications for antimicrobial therapy for animal bites (including human):

- **Cat bite** wounds
- Moderate or severe bite wounds (especially if edema or crush injury)
- Puncture wounds, especially if penetration of bone, tendon sheath, or joint
- Deep or surgically closed facial bite wounds
- Hand and foot bite wounds
- Genital area bite wounds
- Immunocompromised or asplenic
- Wounds with signs of infection

Pediatric Infectious Disease consultation is strongly recommended for patients with complicated infections (asplenic/immunocompromised patients, infections involving CNS or bones and joints, moderate/severe wounds which injuries extend beyond soft tissue involvement, etc.).

Pre-emptive and Empiric Treatment Antimicrobial therapy

Animal and Usual Organism	Oral Therapy	Intravenous Therapy	Duration	Comments
<p><u>Dog</u> <i>Pasteurella canis</i> <i>Capnocytophaga canimorsus</i> <i>S. aureus</i> <i>Fusobacterium spp.</i> Oral flora</p> <p><u>Cat</u> <i>Pasteurella multocida</i> <i>Staphylococcus spp</i> Oral flora</p> <p><u>Human</u> Viridans streptococcus <i>Staph epidermidis</i> <i>Corynebacterium sp.</i> <i>Staph aureus</i> <i>Eikenella sp.</i> <i>Bacteroides sp.</i> <i>Peptostreptococcus sp.</i> Oral flora</p>	<p><u>Preferred:</u> Amoxicillin-clavulanate 25 mg amoxicillin/kg/dose PO BID (max: 875 mg amoxicillin/dose)</p> <p><u>PCN allergy:</u> Clindamycin 10 mg/kg/dose PO TID (max: 450 mg/dose) + TMP-SMX 5 mg/kg/dose PO BID (max: 160 mg/dose)</p>	<p><u>Preferred:</u> Ampicillin-sulbactam 50 mg ampicillin/kg/dose IV q6h (max: 2 g ampicillin/dose)</p> <p><u>Low¹/Medium²-risk PCN allergy:</u> Ceftriaxone 50 mg/kg/dose IV q24h (max: 1 g/dose) + Clindamycin 10 mg/kg/dose IV (max: 600 mg/dose)</p> <p><u>High³-risk PCN allergy:</u> Clindamycin 10 mg/kg/dose IV (max: 600 mg/dose) + Levofloxacin <5 years: 10 mg/kg/dose IV/PO q12h ≥5 years: 10 mg/kg/dose q24h (max: 750 mg/dose)</p>	<p><u>Pre-emptive</u> 3 days</p> <p><u>Mild infection</u> 5 days</p>	<p>Elevation is required if any edema is present. Lack of elevation is a common cause of therapeutic failure.</p> <p>For serious infections, addition of MRSA coverage is reasonable until MRSA is excluded especially in human bites.</p> <p>Dog bites in patients with asplenia, chronic alcoholism, chronic liver disease, immunosuppression are at high risk of severe sepsis due to <i>Capnocytophaga canimorsus</i></p>
<p><u>Monkey bites</u> Similar to human flora</p> <p>From the genus <i>Macaca</i> (macaque monkeys only) B Virus (herpesvirus 1) Macaque bites, scratches, infected tissue exposure, needlestick injuries, cage scratches, and mucosal splash have been associated transmission to humans</p>	<p><u>Antibacterial therapy:</u> See dog/cat/human bite above</p> <p><u>Antiviral postexposure prophylaxis (indicated in all macaque B virus exposures):</u> Valacyclovir 20 mg/kg PO TID (max: 1,000 mg/dose)</p> <p><u>Antiviral treatment with CNS symptoms present:</u> Ganciclovir 5 mg/kg IV q12h</p> <p><u>Antiviral treatment without CNS symptoms present:</u> Acyclovir 15 mg/kg IV q8h</p>		<p><u>Complicated infections</u> 10-14 days Recommend ID consult</p>	<p>Require additional work-up for <i>Macacine herpes virus</i>⁴</p> <p><u>Antiviral postexposure prophylaxis:</u> 14 days</p> <p><u>Antiviral treatment:</u> Until symptom resolution and ≥2 cultures are negative for B virus, then stepdown to 6 - 12 months post-exposure prophylaxis</p>

Pre-emptive and Empiric Treatment Antimicrobial therapy				
Animal and Usual Organism	Oral Therapy	Intravenous Therapy	Duration	Comments
<u>Non-meat eaters</u> Pig Ferrets / weasels Horse Sheep Raccoons Skunks	Same as <u>dog/cat/human</u>	Same as <u>dog/cat/human</u>		In 2015 according to the CDC, 5,508 cases of animal rabies were reported, 92.4% involved wildlife. Major animal groups were as follows: <ul style="list-style-type: none"> • Bats 30.9% • Raccoons 29.4% • Skunks 24.8% • Foxes 5.9% • Cats 4.4% • Cattle 1.5% • Dogs 1.2%
<u>Meat eaters</u> Bears Coyote / Wolf Bobcat Fox	Same as <u>reptiles</u>	Same as <u>reptiles</u>		
<u>Reptiles</u> (Iguana, turtle, lizard) Oral flora <i>Salmonella</i> spp <i>Yersinia</i> spp <i>S. marcescens</i> <i>Aeromonas</i> spp	<u>Preferred:</u> Amoxicillin-clavulanate 25 mg amoxicillin/kg/dose PO BID (max: 875 mg amoxicillin/dose) <u>Low¹/Medium²-risk PCN allergy:</u> Cefpodoxime 5 mg/kg/dose PO BID (max: 400 mg/dose) + Metronidazole 10 mg/kg/dose PO TID (max: 500 mg/dose) <u>High³-risk PCN allergy:</u> Metronidazole 10 mg/kg/dose PO TID (max: 500 mg/dose) + Levofloxacin <5 years: 10 mg/kg/dose IV/PO q12h ≥5 years: 10 mg/kg/dose IV/PO q24h (max: 750 mg/dose)	<u>Preferred</u> Piperacillin-tazobactam 75 mg piperacillin/kg/dose IV q6h (max: 4 g piperacillin/dose) <u>Low¹/Medium²-risk PCN allergy:</u> Ceftriaxone 50 mg/kg/dose IV q24h (max: 1 g/dose) + Metronidazole 10 mg/kg/dose IV q8h (max: 500 mg/dose) <u>High³-risk PCN allergy:</u> Metronidazole 10 mg/kg/dose IV q8h (max: 500 mg/dose) + Levofloxacin <5 years: 10 mg/kg/dose IV/PO q12h ≥5 years: 10 mg/kg/dose q24h (max: 750 mg/dose)	<u>Pre-emptive</u> 3 days <u>Mild infection</u> 5 days <u>Complicated infections</u> 10-14 days Recommend ID consult	For serious infections, addition of MRSA coverage is reasonable until MRSA is excluded.
<u>Snake bites⁵</u> Oral flora Fecal flora of ingested prey <i>Staphylococcus</i> spp. <i>Streptococci</i> <i>Escherichia coli</i> <i>Morganella morganii</i> <i>Enterococcus faecalis</i> <i>Pseudomonas aeruginosa</i> ED Snake Bite Envenomation Protocol	<u>Preferred:</u> Amoxicillin-clavulanate 25 mg amoxicillin/kg/dose PO BID (max: 875 mg amoxicillin/dose) + Ciprofloxacin 15 mg/kg/dose PO BID (max: 750 mg/dose) <u>PCN allergy:</u> Ciprofloxacin 15 mg/kg/dose PO BID (max: 750 mg/dose) + Metronidazole 10 mg/kg/dose PO TID (max: 500 mg/dose) + Linezolid <12 years: 10 mg/kg/dose PO TID ≥12 years: 600 mg PO BID	<u>Preferred</u> Piperacillin-tazobactam 75 mg piperacillin/kg/dose IV q6h (max: 4 g piperacillin/dose) <u>PCN Allergy</u> Vancomycin per dosing guideline + Aztreonam 40 mg/kg/dose IV q8h (max: 2 g/dose) + Metronidazole 10 mg/kg/dose IV q8h (max: 500 mg)		Only a minority of snake bites become infected and need antibiotics. Antibiotics should be determined by culture results. Most infections of snakebites are associated with the introduction of pathogenic bacteria during attempts at management in the field. For serious infections, addition of MRSA coverage is reasonable until MRSA is excluded.

Pre-emptive and Empiric Treatment Antimicrobial therapy				
Animal and Usual Organism	Oral Therapy	Intravenous Therapy	Duration	Comments
Rat <i>Streptobacillus moniliformis</i> (USA) <i>Spirillum minus</i> (Asia)	If no evidence of infection prophylactic antibiotics can be <u>considered</u> Penicillin VK <12 years: 15 mg/kg/dose PO QID (max: 500 mg/dose) ≥12 years: 500 mg PO QID OR Doxycycline 2.2 mg/kg/dose PO BID (max: 100 mg/dose)		<u>Duration</u> 3 days	Up to 10% of rat bites can lead to infection. <i>S. moniliformis</i> can also be carried by hamsters and other laboratory rodents.
	If clinical evidence of infection Penicillin 50,000 units/kg/dose IV q4h (max: 2 million units/dose) OR Ceftriaxone 50 mg/kg/dose IV q24h (max: 1 g/dose) OR Doxycycline 2.2 mg/kg/dose PO BID (max: 100 mg/dose)		<u>Duration</u> 10-14 days for uncomplicated infections	Handling of a dead rat has been reported to cause rat bite fever. Can observe if decide not to use antibiotics as most patients will present within 7 days.
Recommend ID consult for follow up purposes				

Empiric Vaccination Recommendations			
Animal	Organism	Vaccination indications	Vaccination Recommendations
ALL	<i>Clostridium tetani</i> (tetanus)	Those vaccinated <5 years ago with DTaP, Tdap, or Td revaccination is not indicated Those vaccinated >5 years ago or never vaccinated, vaccination is indicated	<u>Never received Tdap:</u> Tdap (ADACEL®) IM x1 dose <u>If previously vaccinated with Tdap:</u> Td (TENIVAC®) IM x1 dose <u>If severe or uncleaned wound and ≤2 previous vaccines (or unknown vaccination history):</u> Tetanus Immune Globulin (HYPERTET®) ⁵ 250 units IM x1 dose
Bats, Raccoons, Skunks, Foxes, Coyotes, Mongooses, Woodchucks, Dogs, Cats, Ferrets, Most other carnivores ⁷	<i>Lyssavirus</i> spp. (rabies)	Contact health department for further direction on animal containment and testing (see below text for instructions) If the animal tests positive for rabies or the status is unknown and the animal has a high likelihood of being a carrier, rabies immune globulin and vaccine can be considered (see Michigan Rabies Assessment for guidance)	<u>If immunocompetent and previously unvaccinated with rabies vaccine:</u> Rabies Immune Globulin 20 units/kg infiltrated to the wounds (with remaining administered IM into the deltoid) x1 dose + Human Diploid Rabies Vaccine ⁸ IM x4 doses (dosed on days 0, 3, 7, and 14) <u>If immunocompromised and previously unvaccinated with rabies vaccine:</u> Rabies Immune Globulin 20 units/kg infiltrated to the wounds (with remaining administered IM into the deltoid) x1 dose + Human Diploid Rabies Vaccine ⁸ IM x5 doses (dosed on days 0, 3, 7, 14, and 28) <u>If previously vaccinated with rabies vaccine⁹:</u> Human Diploid Rabies Vaccine ⁸ IM x2 doses (dosed on days 0 and 3) Further questions can be directed to Infectious Diseases.

ACTIONS

1. Inform the patient that the animal bite will be reported to the Public Health Department and to Law Enforcement (for purposes of reporting to the appropriate Animal Control Authorities).
2. All animal bites and exposures to bats should be reported to the Washtenaw County Public Health Department (WCPHD) by staff. Complete the attached Animal Bite Report form and fax to WCPHD at (734) 544-6706. Go to WCPHD website for more info: <https://www.washtenaw.org/1795/Rabies>
3. Contact WCPHD at (734)544-6700 for advice regarding sending bats or other animals for rabies testing.
4. Hospital Security, Law Enforcement & Animal Control Notification:
 - a. Healthcare provider must report the bite to UMHS Hospital Security by providing Security with the following information: animal bite victim's name; hospital registration number; date of birth; hospital location/room number.
 - b. Upon notice from health care provider, Hospital Security will dispatch a security officer to obtain the details about the animal bite incident from the animal bite victim. The type of information obtained includes:
 - i. Full Name and address of the victim;
 - ii. Information about the animal (e.g., type of animal, whether wild or domestic pet, etc., as applicable);
 - iii. If known and applicable, name and address of the animal's owner;
 - iv. Location where the incident occurred;
 - v. Cause, character and extent of the injury;
 - vi. How the incident occurred; and
 - vii. Other related and/or aggravating circumstances regarding the incident (e.g., was animal provoked)
 - c. In cases where a patient or his/her personal representative is not able to provide the information directly to the Hospital Security Officer (e.g., unconscious patient, no personal representative available) the Hospital Security Officer may obtain information about the animal bite (e.g., location, severity, etc.) verbally from the treating health care providers.
 - d. UMHS Hospital Security reports only the animal bite information set forth in Section 4B above to the University of Michigan Department of Public Safety (DPS) via phone and security dispatch report (DPS thereafter notifies the appropriate law enforcement agency/animal control officer for the jurisdiction in which the bite occurred).
5. Wound management:
 - a. Stabilization/Evaluation – Animal bites should be treated as contusions though they may also have significant lacerations or deep punctures. Initial treatment with ice and elevation will help reduce swelling. Direct pressure will control actively bleeding wounds. Consideration should be given to potential injury to deep or surrounding structures. A careful neurovascular examination of the injured area should be performed prior to the instillation of local anesthetics. A musculoskeletal exam should be performed with attention to integrity of deep and adjacent structures. Consider imaging if concern for boney injury or foreign body exists (e.g., plain radiograph or ultrasound). Lacerations over the metacarpophalangeal joints should raise suspicion for possible human bite (i.e., fight bite) injuries.
 - b. Clean wound – Appropriate local anesthesia facilitates adequate wound cleaning. Wounds should be washed with soap and water as soon as possible thorough wound cleaning may help reduce likelihood of rabies transmission.
 - c. Lacerations – To reduce the counts of bacteria present in the wound, the surface should be cleaned with povidone iodine and the depths irrigated with copious amounts of saline using pressure irrigation from a syringe. Wounds should be explored for foreign body, or deep structure injury, devitalized tissue should be debrided. Wounds over or near joints should be explored carefully through a range of motion to assess for damage to the underlying tendon sheath, fascia, joint capsule, etc.
 - d. Puncture wounds – Inspect wound for evidence of deep puncture, especially if the wound is located in the scalp or near a joint. Remove any foreign bodies or gross wound contaminants. Superficially irrigate the wound, avoiding high pressure irrigation into the wound. Avoid removal of deep tissue (e.g., "coring").
 - e. Wound closure – Closure of a bite wound may increase the risk of infection depending on species inflicting the bite, location, type and age of wound and host factors. In general, wound closure is discouraged except in locations where cosmetic or functional impairment may result. (e.g., facial bite wounds, etc.)

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- University of Michigan Health System Emergency Department Guideline 02-10-131 ([UMHS ED Snake Bite Envenomation Protocol](#))
- University of Michigan Health System Emergency Department Guideline 02-16-087 ([Monkey Bite/Scratch/Exposure Protocol](#))
- University of Michigan Health System Emergency Department Policy 02-16.3-014 ([Animal Bites, excluding monkeys](#))
- Washtenaw County Public Health. Animal bites & bats & rabies. <https://www.washtenaw.org/1795/Rabies>

Footnotes:

1. Low-risk: pruritus without rash, remote (>10 years) unknown reaction, mild rash (self-resolves without additional medical intervention) with no other symptoms, no other symptoms, patient denies allergy but is on record
2. Medium-risk: Urticaria/hives with no other symptoms, severe rash with no other symptoms (requires medical intervention and/or requires ER visit/hospitalization). Severe rash defined as: rash that requires medical intervention (corticosteroids, anti-histamines) and/or requires ER visit or hospitalization
3. High-risk: Any of the following – respiratory symptoms, angioedema, cardiovascular symptoms, anaphylaxis
4. Macaque monkey bites require additional workup for Macacine herpesvirus 1 (Herpes Simiae or Herpes B), please see the [ED Monkey Bite/Scratch/Exposure Protocol](#) (Macacine herpesvirus 1)
5. Snake bites require contact with Michigan Poison Control (1-800-222-1222, ask specifically to speak with the toxicologist). Poison Control tracks available anti-venom supply and can assist in rapidly obtaining appropriate anti-venom. Please see the [ED Snake Bite Envenomation Protocol](#)
6. IVIG can be used in place of Tetanus Immune Globulin if Tetanus Immune Globulin is unavailable.
7. Bites of squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice and other rodents, rabbits, hares, and pikas almost never require rabies post-exposure prophylaxis
8. Rabies vaccinations should not be administered at or near the same site as the Rabies Immune Globulin. Rabies vaccinations should not be administered to the gluteal region; may decrease efficacy
9. Patients who received post exposure prophylaxis for a previous exposure, people who received a 3-dose, IM pre-exposure regimen, or those who have a documented adequate rabies virus antibody titer after previous immunization with any vaccine.

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The recommendations in this guide are meant to serve as treatment guidelines for use at Michigan Medicine facilities. If you are an individual experiencing a medical emergency, call 911 immediately. These guidelines should not replace a provider's professional medical advice based on clinical judgment, or be used in lieu of an Infectious Diseases consultation when necessary. As a result of ongoing research, practice guidelines may from time to time change. The authors of these guidelines have made all attempts to ensure the accuracy based on current information, however, due to ongoing research, users of these guidelines are strongly encouraged to confirm the information contained within them through an independent source.

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