



TREATMENT OF ANIMAL BITES IN PATIENTS ADMITTED TO PEDIATRIC SERVICES

Indications for antimicrobial therapy for animal bites (including human). See [Actions](#) for additional management:

- **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 strep <i>Staph epidermidis</i> Corynebacterium sp. <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) of a 7:1 formulation, see comments.</p> <p><u>PCN allergy^{1,2} or contraindication to β-lactams³:</u> Clindamycin 10 mg/kg/dose PO TID (max: 450 mg/dose) + TMP-SMX* 6 mg TMP/kg/dose PO BID (max: 320 mg/dose)</p>	<p><u>Preferred:</u> Ampicillin-sulbactam* 50 mg ampicillin/kg/dose IV q6h (max: 2 g ampicillin/dose)</p> <p><u>PCN allergy^{1,2}</u> Ceftriaxone 50 mg/kg/dose IV q24h (max: 2 g/dose) + Clindamycin 10 mg/kg/dose IV q8h (max: 600 mg/dose)</p> <p><u>High²-risk cephalosporin allergy or contraindication to β-lactams³:</u> Clindamycin 10 mg/kg/dose IV q8h (max: 600 mg/dose) + Levofloxacin* <5 years: 10 mg/kg/dose IV q12h ≥5 years: 10 mg/kg/dose IV q24h (max: 750 mg/dose)</p>	<p>Pre-emptive 3 days</p> <p>Mild infection 5 days</p>	<p>Lack of elevation in the presence of any edema is a common cause of therapeutic failure.</p> <p>For serious infections, MRSA coverage is reasonable until ruled out especially in human bites.</p> <p>Dog bites in patients with asplenia, chronic liver disease, immunosuppression are at high risk of severe sepsis due to <i>Capnocytophaga canimorsus</i></p> <p><u>7:1 formulation:</u> 875 mg/125 mg tablet, 400 mg/57 mg/5 mL, or 200 mg/28.5 mg/5 ml</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>Monkey bites require additional work-up for <i>Macacine herpes virus</i>⁴. Follow this link detailed protocol</u></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>Complicated infections 10-14 days Recommend ID consult</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	Preferred: Amoxicillin-clavulanate* 25 mg amoxicillin/kg/dose PO BID (max: 875 mg amoxicillin/dose) of a 7:1 formulation, see comments. <u>PCN allergy^{1,2}</u> Cefpodoxime* 5 mg/kg/dose PO BID (max: 400 mg/dose) + Metronidazole 10 mg/kg/dose PO TID (max: 500 mg/dose) <u>High²-risk cephalosporin allergy or contraindication to β-lactams³:</u> Metronidazole 10 mg/kg/dose PO TID (max: 500 mg/dose) + Levofloxacin* <5 years: 10 mg/kg/dose PO BID ≥5 years: 10 mg/kg/dose PO Daily (max: 750 mg/dose)	Preferred Piperacillin-tazobactam* 75 mg piperacillin/kg/dose IV q6h (max: 4 g piperacillin/dose) <u>PCN allergy^{1,2}</u> Ceftriaxone 50 mg/kg/dose IV q24h (max: 2 g/dose) + Metronidazole 10 mg/kg/dose IV q8h (max: 500 mg/dose) <u>High²-risk cephalosporin allergy or contraindication to β-lactams³:</u> Metronidazole 10 mg/kg/dose IV q8h (max: 500 mg/dose) + Levofloxacin* <5 years: 10 mg/kg/dose IV q12h ≥5 years: 10 mg/kg/dose IV q24h (max: 750 mg/dose)	Pre-emptive 3 days Mild infection 5 days Complicated infections 10-14 days Recommended ID consult	<u>7:1 formulation:</u> 875 mg/125 mg tablet, 400 mg/57 mg/5 mL, or 200 mg/28.5 mg/5 ml 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	Preferred: Amoxicillin-clavulanate* 25 mg amoxicillin/kg/dose PO BID (max: 875 mg amoxicillin/dose) of a 7:1 formulation, see comments. + Ciprofloxacin* 15 mg/kg/dose PO BID (max: 750 mg/dose) <u>PCN allergy^{1,2} or contraindication to β-lactams³:</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 (max: 600 mg/dose) ≥12 years: 10 mg/kg/dose PO BID (max: 600 mg/dose)	Preferred Piperacillin-tazobactam* 75 mg piperacillin/kg/dose IV q6h (max: 4 g piperacillin/dose) <u>PCN allergy^{1,2}</u> Vancomycin per dosing guideline + Cefepime* 50 mg/kg/dose IV q8h (max: 2 g/dose) + Metronidazole 10 mg/kg/dose IV q8h (max: 500 mg) <u>High²-risk cephalosporin allergy or contraindication to β-lactams³:</u> Vancomycin per dosing guideline + Aztreonam* 50 mg/kg/dose IV q8h (max: 2 g/dose) + Metronidazole 10 mg/kg/dose IV q8h (max: 500 mg)		A minority of snake bites become infected and need antibiotics. Most infections are associated with the introduction of pathogenic bacteria during management in the field. Antibiotics should be determined by culture results. For serious infections, MRSA coverage is reasonable until ruled out. <u>7:1 formulation:</u> 875 mg/125 mg tablet, 400 mg/57 mg/5 mL, or 200 mg/28.5 mg/5 ml

Pre-emptive and Empiric Treatment Antimicrobial therapy				
Animal and Usual Organism	Oral Therapy	Intravenous Therapy	Duration	Comments
Rat <i>Streptobacillus moniliformis (USA)</i> <i>Spirillum minus (Asia)</i>	If no evidence of infection prophylactic antibiotics can be considered Penicillin VK <12 years: 15 mg/kg/dose PO QID (max: 500 mg/dose) ≥12 years: 500 mg PO QID <div style="text-align: center;">OR</div> 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. 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.
	If clinical evidence of infection Penicillin* 50,000 units/kg/dose IV q4h (max: 2 million units/dose) <div style="text-align: center;">OR</div> Ceftriaxone 50 mg/kg/dose IV q24h (max: 2 g/dose) <div style="text-align: center;">OR</div> Doxycycline 2.2 mg/kg/dose IV/PO BID (max: 100 mg/dose)			

Empiric Vaccination Recommendations			
Animal	Organism	Vaccination indications	Vaccination Recommendations
ALL	<i>Clostridium tetani</i> (tetanus)	<u>Vaccination Not Indicated:</u> Vaccinated <5 years ago with DTaP, Tdap, or Td AND received ≥3 doses of the primary series <u>Vaccination Indicated:</u> Vaccinated ≥5 years prior, received <3 doses of the primary series, OR unknown	<u>Patients <7 years old:</u> DTaP (Infanrix®) IM x1 dose <u>Patients ≥7 years old who received <5 doses of vaccination series:</u> Tdap (ADACEL®) IM x1 dose, followed by completion of a catch-up series. <u>Patients ≥11 years old who received <1 doses (or unknown) of Tdap:</u> Tdap (ADACEL®) IM x1 dose <u>Patients ≥11 years old who received ≥1 doses of Tdap:</u> Td (TENIVAC®) IM x1 dose <u>If received <3 doses (or unknown) of primary regimen or severely immunocompromised (regardless of vaccination status):</u> Tetanus Immune Globulin (HYPERLET®) ⁶ 250 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 further 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 vaccine</u> ⁹ : Human Diploid Rabies Vaccine ⁸ IM x2 doses (dosed on days 0 and 3) Further questions can be directed to Infectious Diseases.

*Renal adjustment may be necessary. See [Pediatric Antimicrobial Dosing Guidelines](#).

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.)

References

- Abrahamian FM, Goldstein EJC. Microbiology of Animal Bite Wound Infections. [Clinical Microbiology Reviews. 2011;24\(2\):231-246.](#)
- American Academy of Pediatrics. Bite Wounds. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. Red Book®: 2015 REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES. American Academy of Pediatrics; 2015; 205-210.
- American Academy of Pediatrics. Wound Care and Tetanus Prophylaxis. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. Red Book®: 2015 REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES. American Academy of Pediatrics; 2015; 202.
- Chamber, HF, Eliopoulos GM, Gilbert DN, Saag MS. The Sanford Guide to Antimicrobial Therapy 48th edition. Sperryville, VA, USA : Antimicrobial Therapy, Inc, 2018
- Cohen JI, Davenport DS, Stewart JA, et al. Recommendations for prevention of and therapy for exposure to B virus (Cercopithecine Herpesvirus 1). [Clin Infect Dis. \(2002\) 35 \(10\): 1191-1203.](#)
- Geisler WM, Malhotra U, Stamm WE. [Bone Marrow Transplant. 2001 Dec;28\(12\):1171-3.](#)
- John E. Bennett, Raphael Dolin, Martin J. Blaser. Mandell, Douglas, And Bennett's Principles and Practice of Infectious Diseases 8th edition. Philadelphia, PA : Elsevier/Saunders, 2015.
- Johns Hopkins ABX Guide, Johns Hopkins Guide. Retrieved from

https://www.unboundmedicine.com/medline/view/Johns_Hopkins_ABX_Guide/540602/all/About

- Miami-Dade Fire Rescue Venom Response Program. Special venom considerations. <https://www.miamidade.gov/fire/about-special-venom.asp>
- Michigan Department of Health and Human Services. Emerging and Zoonotic Infectious Diseases Section. [Rabies assessment flowchart](#).
- Stevens DL, Bisno AL, Chambers HF, et al. Practice guidelines for the management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. [Clin Infect Dis. \(2014\) 59 \(2\): e10-e52.](#)
- 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 allergies:** pruritus without rash, remote (>10 years) unknown reaction, patient denies allergy but is on record, urticaria/hives with no other symptoms, mild/severe rash with no other symptoms (see exceptions in severe non-IgE reactions below). **If a patient has a low-risk allergy to cephalosporins, they may still receive penicillin, amoxicillin, ampicillin, or piperacillin.** See [β-lactam allergy evaluation and empiric guidance](#) for further information.
2. **High-risk allergies:** Anaphylaxis, respiratory symptoms, angioedema/swelling, cardiovascular symptoms (syncope/passing out, arrhythmia). **If a patient has a high-risk allergy to penicillins, they may receive cefpodoxime, ceftriaxone or cefepime.** See [β-lactam allergy evaluation and empiric guidance](#) for further information.
3. Severe non-IgE reactions that are contraindications to further beta-lactam use (**except aztreonam, which can be used unless the reaction was to ceftazidime or cefiderocol**) unless approved by Allergy: organ damage (kidney, liver), drug-induced immune-mediated anemia/thrombocytopenia/leukopenia, rash with mucosal lesions (Stevens Johnson Syndrome/Toxic Epidermal Necrosis), rash with pustules (acute generalized exanthematous pustulosis), rash with eosinophils and organ injury (DRESS – drug rash eosinophilia and systemic symptoms), rash with joint pain, fever, and myalgia (Serum Sickness). See [β-lactam allergy evaluation and empiric guidance](#) for further information.
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.

Antimicrobial Subcommittee Approval:11/2018, 03/2020, 06/2023	Originated: Unknown
P&T Approval:12/2018, 05/2020, 07/2023	Last Revised: 07/2023
Revision History: 03/2020: Aligned recommendations with Adult guideline, added B virus treatment 09/2020: Adjusted allergy wording 07/2023: Adjusted allergy recommendations, updated tetanus indications and vaccine recommendations, added amox/clav formulation information	

The recommendations in this guide are meant to serve as treatment guidelines for use at Michigan Medicine facilities. If you are an individual experiencing 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. If obtained from a source other than med.umich.edu/asp, please visit the webpage for the most up-to-date document.