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## Animal Bites / Injuries

### Overview

For a complete description of diseases transmitted to humans via animal -inflicted injuries (bites, scratches, etc.) and for additional information, refer to the following sources:

- Control of Communicable Diseases Manual (CCDM) <sup>(1)</sup>
- Red Book, Report of the Committee on Infectious Diseases <sup>(2)</sup>
- The Merck Veterinary Manual <sup>(3)</sup>
- Rabies section of this Manual

### Case Definition

#### ***Clinical Description***

The potential for zoonotic (animal-to-human) transmission of disease must be considered in any situation where a person is injured by an animal. Of the approximately 1700 known human pathogens, about 50 percent are zoonotic. Of the 156 emerging pathogens, 73 percent are zoonotic. Of the 14 most likely agents of bioterrorism, 57 percent are zoonotic. In considering the likelihood of disease transmission, many factors must be assessed, such as the species of animal, type of injury, severity of injury, vaccination status of animal and/or human (when applicable), interval between incident and treatment, and various attributes of the injured person (age, underlying health, etc.). Zoonotic diseases can be transmitted by a variety of means such as trauma (bite or scratch), direct contact, arthropod vectors, aerosols, and contamination of food and water. Animal bites are a major mechanism of pathogen conveyance.

#### ***Case classification*** <sup>(4)</sup>

*Confirmed (reportable):* “Animal bite wound to human” – only bites from mammals are reportable (all mammal bites are reportable). A “bite wound” is defined as breaking of the skin by the teeth of an animal. In some situations, a physician’s assessment might be needed to determine whether a bite wound exists.

Other traumatic exposures of humans to animals (such as a scratch) could result in disease transmission. Local public health agencies (LPHAs) are encouraged to follow up such cases, as circumstances dictate. While not reportable, the Missouri Department of Health and Senior Services (DHSS) will assist LPHAs in investigating such incidents and in devising prevention/control strategies, at the request of the LPHA.

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## Disease Risk by Species

Some of the pathogens transmitted by direct animal trauma include:

- Dogs and Cats: rabies; bacterial infections (*Capnocytophaga canimorsus*, *Pasteurella multocida* and *P. haemolytica*, *Staphylococcus aureus*, streptococci, anaerobes, *Moraxella*, *Corynebacterium*, *Neisseria*, tetanus, tularemia).
  - Cats: cat “scratch” fever (*Bartonella henselae*, *B. quintana*); plague.
    - Rodents (domestic): bacterial infection.
- Rodents (wild): rabies (from larger rodents such as beavers and groundhogs); bacterial infection (including tetanus and tularemia); rat bite fever – rare (*Streptobacillus moniliformis*, *Spirillum minus*).
- Wild Animals (terrestrial, non-rodent) e.g., skunk, fox, raccoon, opossum: rabies; numerous bacterial pathogens (including tetanus and tularemia).
  - Bats: rabies.
- Primates (non-human): rabies; numerous bacterial pathogens (including tetanus); simian B herpesvirus (macaques or non-macaques housed with macaques); hepatitis A, B, and C (certain great apes). Note: Primate exposures generally also require assessment for potential aerosol transmission of tuberculosis.

## Disposition of Animals in Bite/Injury Incidents

- Animal Quarantine:
  - The only species for which the 10 -day quarantine is formally recognized are dogs, cats, and ferrets. Wild animals are never quarantined (they are euthanized and tested, with the exception of very low-risk species such as lagomorphs and small rodents). Large domestic animals (cattle, horses, etc.) and captive wild animals (e.g., non-human primates) are handled on a case-by-case basis.
  - If a quarantine is warranted, the LPHA should contact the animal owner to establish quarantine at an animal control facility (if available) or local veterinarian 's clinic (at animal owner’s expense as required in 322.140 RSMo). A home quarantine may be acceptable under some circumstances, as described below.
  - If a secure animal control facility or veterinarian’s clinic is not available/used, the LPHA should present the animal owner with notice that the owner must quarantine the animal in a secure location and that they are assuming all liability for the quarantine (including patient medical care if the animal escapes from quarantine and

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postexposure prophylaxis is required).

- If the owner is unwilling to quarantine the animal, DHSS may issue an “Order of Quarantine” to the local law enforcement official to quarantine the animal.
- Animal Testing:
  - Testing of animals for rabies in lieu of quarantine is indicated in some instances, including:
    - Dogs, cats, and ferrets currently exhibiting symptoms compatible with rabies.
    - Unwanted dogs, cats, and ferrets that would be euthanized following a quarantine (if one was to be accomplished).
    - Wild animals, with the usual exception of lagomorphs and small rodents.
  - Animals are tested for rabies by having the brain tested at the Missouri State Public Health Laboratory (SPHL). There are no reliable rabies tests that can be conducted on a living animal.
  - The LPHA should have the person in possession of the animal (owner, animal control officer, etc.) present the animal to a veterinarian for euthanasia, removal of the head, and packaging of the specimen for shipment to the laboratory. These procedures may vary with the species of animal involved, e.g., the entire body of small animals such as puppies and kittens may be shipped to the laboratory in lieu of removing the head; the brain of very large animals (horses, cattle) should be removed from the skull and shipped to the laboratory.
  - The LPHA should advise the veterinarian on matters such as method of packaging specimens, address and point of contact at the laboratory, and courier pick -up points for the SPHL. LPHA staff should not personally euthanize animals nor conduct any invasive procedures needed to ship specimens to the laboratory. Staff may package those specimens where the entire body is submitted, as long as they take precautions against contamination (e.g., use gloves when handling the animal).
  - If the owner is unwilling to have an animal tested for rabies, DHSS may issue an “Order to Euthanize and Test for Rabies” to the local law enforcement official to have the animal presented to a veterinarian so the appropriate specimen can be submitted to the laboratory.

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### **Determination of Risk in Animal Bite/Injury Incidents**

- In an animal bite/injury incident, the animal is normally either put under a rabies quarantine for ten days or euthanized and the brain submitted for rabies testing. In either situation, the LPHA should monitor the process until it has a successful public health outcome.
  
- Quarantine:
  - Veterinary or animal control facility: This is the normal procedure when an animal has not received a rabies vaccination or the vaccination is out of date. The LPHA should ensure that the quarantining official has a point of contact and telephone number at the LPHA so that this individual can be contacted immediately if the animal begins to show signs of rabies. The LPHA should then arrange for the animal to be immediately euthanized and the brain submitted to the laboratory for testing.
  
  - Home of the animal's owner : A less preferable method of quarantine is at the animal owner's home. This may be an authorized alternative under some local animal control ordinances. In these instances, it is usually reserved for low -risk situations, i.e., animal's rabies vaccination is up -to-date, animal is in apparent good health, owner is able to secure the animal on the premises, and the incident was provoked. Whenever a home quarantine is instituted, the LPHA should present the owner with a notice (see "Letter of Notification") that they must quarantine the animal in a secure location and that they are assuming all liability for the quarantine (including patient medical care if the animal escapes from quarantine and postexposure prophylaxis is required). A "secure" location is defined as being inside the owner's home or in a well fenced -in area outdoors. Tethering the animal outdoors, even for short period, is never a suitable method of securing the animal. The LPHA or other official (law enforcement, animal control) should physically check on the animal beginning, mid, and end of quarantine to ensure that the animal is still securely confined and is in apparent good health. If LPHA staff do not directly conduct this function, they should regularly contact the official who is making these inspections.
  
- Rabies testing:
  - If rabies testing is indicated in lieu of quarantine or during a quarantine, the LPHA should use the services of a local veterinarian to ensure that the appropriate specimen is submitted to the laboratory for testing. The LPHA

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should provide the veterinarian with necessary information and should disseminate final laboratory results to interested parties such as the patient, animal owner, law enforcement, and animal control officials.

- The LPHA should, in almost all instances, recommend that an animal bite/injury patient seek medical evaluation. The LPHA should consult with the patient and the patient’s physician to ensure that the physician has all information needed for decision making and that basic wound precautions have been taken (e.g., wound cleansed, need for antibiotics assessed, tetanus vaccination current). In the event that rabies postexposure prophylaxis is needed, the LPHA should provide the physician with product-ordering information if needed and follow up with the patient to ensure that the month-long series of shots is obtained.
- If an animal bite/injury results in the potential transmission of diseases other than rabies (e.g., herpes B virus, tuberculosis), the LPHA should also arrange for the animal and exposed person to receive indicated laboratory tests and appropriate prophylaxis for the person.
- DHSS will work with the LPHA in determining disease risk factors, developing recommendations, facilitating proper animal disposition, and ensuring patient follow up. If routine quarantine procedures do not work, an “Order of Quarantine” may be issued by DHSS. A similar order can be issued to have the animal seized, euthanized, and tested if that should become necessary.

### **Information Needed for Investigation**

- **Verify that the person has sustained an injury from an animal.**
- **Establish the extent of exposure.** Determine if additional persons (household members, visitors, neighbors, etc.) have been exposed to the animal.
- **Determine if the individual’s exposure has been assessed by a physician.** If the wound was recently sustained, advise the person to wash it thoroughly with soap and water for at least 15 minutes. Most individuals should be referred to a physician. Medical personnel should clean the wound further, provide antibiotic therapy and tetanus immunization if needed, and assess for other threats such as rabies.
- **Determine the circumstances of the incident.** Obtain information from reliable sources regarding the actions of the animal and injured person at the time of the incident.
- **Obtain information about the animal.** This includes information such as physical description, rabies vaccination status (if applicable), apparent health, present location,

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and animal’s veterinarian (if applicable).

- **Contact Veterinary Public Health (573-751-6113) or the Regional Communicable Disease Coordinator to collaborate in the investigation, as needed.**

### **Control Measures**

Control measures vary, depending upon the disease in question. For rabies control, the following four cardinal public health measures should be emphasized to the public (especially children):

- Ensure dogs, cats, and ferrets are up -to-date on rabies vaccinations; vaccinations are also available for horses, cattle, and sheep.
- Keep pets under control; do not allow them to run loose.
- Avoid contact with stray pets and wild animal s; do not keep wild animals or wild animal crosses as pets.
- Report wild animals exhibiting unusual behavior or stray pets to animal control officials.

### **Laboratory Procedures**

- **Rabies Testing**: Human and animal testing procedures through the SPHL are described in the “Rabies” section of this Manual. Additional information on laboratory procedures can be obtained from Veterinary Public Health, the Regional Communicable Disease Coordinator, or the SPHL. The SPHL telephone number is 573 -751-3334 and the web site is: <https://health.mo.gov/lab/>.
- **Simian B Herpesvirus** : Human and primate (non-human) testing is available through the B Virus Resource Laboratory, Georgia State University, Atlanta, GA. The website for this laboratory is: <https://biotech.gsu.edu/virology/>. The web site provides information on simian B herpesvirus, specimen submission instructions, a case evaluation checklist, etc. The following specimens should be submitted for the bitten human who is being tested: serum collected at the time of the bite, plus two weeks and six weeks post -bite; bite wound culture. The following specimens should be submitted from the non-human primate: serum (antibody testing) and buccal mucosal swab (culture) at the time of the bite.
- **Note**: The process of obtaining specimens from non -human primates should be undertaken only by an experienced veterinarian who understands the procedures and risks involved.

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- Note:** Macaque bites should be regarded as a medical emergency until suspicion of herpesvirus is disproven. Antiviral prophylaxis must be administered within 24 hours of the bite if it is to be effective. The treating physician should not wait for herpesvirus serology test results to come back on the macaque (these results are used to determine further medical follow up and to help establish the prognosis). Asymptomatic adults are generally prophylaxed with valacyclovir while acyclovir is used for children.
- Note:** Simian B herpesvirus exposure risk assessments are complex, and LPHAs/physicians are encouraged to consult with the Missouri Department of Health and Senior Services.
- Other Laboratory and Clinical Testing: Information regarding testing for other pathogens may be obtained from Veterinary Public Health, 573 -751-6113.

### **Reporting Requirements**

- Mammalian animal bites are a Category I(A) condition and shall be reported to the local health authority or to the Missouri Department of Health and Senior Services (DHSS) within 24 hours of first knowledge or suspicion by telephone, facsimile or other rapid communication.

  - For all bites, complete a “Disease Case Report” (CD-1) and send the completed form to the DHSS Regional Health Office.
  - For all bites, complete an “Animal Bite/Injury – Supplemental Case Report.”
  - Entry of the completed CD-1 into the MOHSIS database negates the need for the paper CD-1 to be forwarded to the Regional Health Office.
  - Send the completed secondary investigation form to the Regional Health Office.
  - All outbreaks or "suspected" outbreaks of zoonotic disease must be reported as soon as possible (by phone, fax or e-mail) to the Regional Communicable Disease Coordinator. This can be accomplished by completing the Missouri Outbreak Surveillance Report (CD-51).
  - Within 90 days of the conclusion of an outbreak, submit the final outbreak report to the Regional Communicable Disease Coordinator.

### **References**

- Chin, James ed. “Other Infections Associated with Animal Bites.” Control of Communicable Diseases Manual. 17<sup>th</sup> ed. Washington, DC: American Public Health Association, 2000: 89 -90 (refer also to sections on specific diseases).

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2. American Academy of Pediatrics. “Bites Wounds”, “*Pasteurella multocida* Infections”, and “Rabies.” In: Pickering, L. 2000 Red Book: Report of the Committee on Infectious Diseases . 25<sup>th</sup> Ed. Elk Grove Village, IL. 2000: 155 -159, 426-427, 475-482.
3. The Merck Veterinary Manual. “Zoonoses.” 8<sup>th</sup> Ed. Ed. Susan E. Aiello. Whitehouse Station, NJ: Merck & Co., Inc., 1998: 2161. <https://www.merckvetmanual.com/public-health/zoonoses> (search “zoonoses”).
4. Missouri Department of Health and Senior Services - Section for Communicable Disease Prevention, surveillance case definition.

### **Web Resources and Information**

1. Missouri Revised Statutes, RSMO Chapter 322, “Protection Against Rabies,” August 28, 2002, <https://revisor.mo.gov/main/OneChapter.aspx?chapter=322>
2. Rabies vaccination must be given by licensed veterinarian:
  - RSMO 322.010, “Definitions,” August 28, 2002  
<https://revisor.mo.gov/main/OneSection.aspx?section=322.010&bid=17210&hl=>
  - 4 CSR 270-4.031, “Minimum Standards for Practice Techniques,” paragraph (4)(B),  
<https://www.sos.mo.gov/cmsimages/adrules/csr/previous/4csr/4csr0906/4c270-4.pdf>
3. Centers for Disease Control and Prevention, “Rabies”, <https://www.cdc.gov/rabies/index.html>
4. B Virus Resource Laboratory, Georgia State University, Atlanta, GA. The website for this laboratory is: <https://biotech.gsu.edu/virology/>.