

# Human and Animal Rabies; Rabies Post-Exposure Prophylaxis

## **Important Notice:**

All public health recommendations for routine investigations are based on “Control of Communicable Diseases Manual, 20<sup>th</sup> edition, 2015” (CCDM) unless otherwise stated. Use the CCDM as primary resource for case investigations that require routine follow up. In cases of complicated situations or unique issues not addressed by this manual, please refer to the Administrative Rules of Montana (ARM) Chapter [37.114](#) or contact the designated subject matter expert at the Communicable Disease Epidemiology section at the Montana DPHHS for further clarification.

## **PROTOCOL CHECKLIST**

- Confirm diagnosis or status of laboratory testing (when possible), see case definition (see section 3.3 and 4.1)
- Review background information on the disease and its epidemiology (see section 2)
- Prioritize reported cases for follow up, investigate and interview as appropriate (see section 1.2)
- Contact provider to gather more information
- Retrieve pertinent rabies reporting forms per the Montana Communicable Disease Reporting Reference for Local Public Health Jurisdictions from the CDEpi Resource Page at <http://dphhs.mt.gov/publichealth/cdepi/CDCPBResources/CDEpi> then click Disease Specific Resources (M-Z)
- Review rabies guidance documents from the CDEpi Resource Page under the Rabies Resource heading.
- For exposures that may warrant PEP, ascertain the following information from the healthcare provider, and/or patient, or other reporting source:
  - Location and date of potential exposure
  - Contact information for the person potentially exposed to rabies, and the animal owner, if applicable
  - Identify animal species, rabies vaccination status (if applicable), circumstances of potential exposure
  - Ascertain location of animal, if known, and if animal is confined
  - If the animal is dead, ascertain if it is available for testing
  - Identify if any other individuals were potentially exposed
  - For bites:
    - Ask when the last tetanus immunization was given, and if the patient was updated
    - What wound care was given, if any
    - Anatomical location of the wound
  - If rabies PEP was already administered by a provider, determine what exactly was given
  - If the individual who was exposed has ever received a rabies vaccination series
  - Address patient’s questions or concerns

- **Potential human cases of rabies must be reported within 24 hours via the DPHHS 24/7 number 406-444-0273**
  - Potential exposures to rabies and if they were recently treated with rabies PEP or received a pre-exposure rabies vaccination series
  - Collect clinical information (i.e.-Medical provider suspects rabies and why)
  - Notify CDEpi through the 24/7 line, and ask to speak to one of the CDEpi staff
  - CDEpi may set up a clinical consult with the CDC for the provider regarding testing and treatment of the patient
- **For rabies PEP administration**, notify state health department of PEP administration or recommendation for PEP by faxing rabies PEP form within 7 days of the date of the recommendation or administration.
- **Human and animal cases of rabies must be reported initially by phone within 24 hours per (ARM) [37.114.204](#) (see section 1.3)**

## 1 DISEASE REPORTING

### 1.1 Provider notification to Public Health Authorities

Any person, including, but not limited to a physician, dentist, nurse, medical examiner, other health care practitioner, administrator of a health care facility or laboratory, public or private school administrator, or laboratory professional who knows or has reason to believe that a case exists of a reportable disease or condition defined in the Administrative Rules of Montana (ARM) [37.114.203](#) must immediately report to the local health officer.

### 1.2 Local Health Department Follow-up Responsibilities

Immediately after being notified of a case or a potential outbreak of a reportable condition, the local health officer must investigate and implement control measures as indicated by “control the transmission of disease” per ARM [37.114.314](#).

#### [37.114.571](#) RABIES EXPOSURE

(1) Control measures outlined in the Control of Communicable Diseases Manual must be applied for confirmed or suspected exposures to a human by a species susceptible to rabies infection.

(2) The local health officer must investigate each report of possible rabies exposure and gather, at a minimum, information about the circumstances of the possible rabies exposure; nature of the exposure; name, age, and address of the exposed individual; vaccination status of the animal in question; treatment of the exposed person; and eventual outcome for both animal and person involved.

(3) As soon as possible, after investigating a report of possible rabies exposure, the local health officer must inform the exposed person or the individual responsible for the exposed person if that person is a minor whether or not treatment is recommended to prevent rabies and provide a referral to a health care provider.

(4) Whenever the circumstances involve a dog, cat, or ferret, the local health officer must:

- (a) arrange for the animal to be observed for signs of illness during a ten-day quarantine period at an animal shelter, veterinary facility, or other adequate facility, and ensure that any illness in the animal during the confinement or before release is evaluated by a veterinarian for signs suggestive of rabies; and
- (b) if the symptoms observed are consistent with rabies, order the animal euthanized and the head sent to the Department of Livestock's diagnostic laboratory at Bozeman for rabies analysis. The local health officer may also order an animal euthanized subsequent to isolation, and the brain analyzed.

### **1.3 Local Health Department Reporting to State Public Health Authorities**

- Human and animal cases of rabies must be reported to the Montana Department of Public Health and Human Services (DPHHS) within 24 hours (ARM [37.114.204](#)). Human rabies case reports should be submitted through MIDIS after the initial phone notification.
- The rabies PEP case report form needs to be submitted to DPHHS when a provider administers PEP (with or without public health consultation), or when PEP is recommended but not administered, within seven days of the recommendation.

## **2 THE DISEASE AND ITS EPIDEMIOLOGY**

### **2.1 Public Health Significance in Montana:**

Worldwide, rabies is estimated to cause approximately 55,000 deaths yearly. The United States reports approximately 3 deaths due to rabies annually. Vaccination of dogs and cats and rapid identification of potential exposures with timely administration of rabies PEP keeps the incidence low in the US. In Montana, the most common animals to test positive for rabies have been bats and skunks. On occasion, dogs, cats, horses, and cattle have tested positive in recent years. Two human deaths in Montana occurred in 1996 and 1997. Both of these cases tested positive for bat variants of the rabies virus.

### **2.2 Clinical Description of Illness**

Refer to the CCDM and ACIP guidance for relevant post exposure prophylaxis for human exposure, human rabies disease information, and rabies epidemiology.

## **3 CASE DEFINITION**

### **3.1 Clinical Description**

#### **Animal rabies**

The first symptoms of rabies may be nonspecific and include lethargy, fever, vomiting, and anorexia. Signs progress within days to cerebral dysfunction, cranial nerve dysfunction, ataxia, weakness, paralysis, seizures, difficulty breathing, difficulty swallowing, excessive salivation, abnormal behavior, aggression, and/or self-mutilation.

#### **Human rabies**

Rabies is an acute encephalomyelitis that almost always progresses to coma or death within 10 days after the first symptom.

### **3.2 Laboratory Criteria for Diagnosis**

#### **Animal rabies**

A result of one of the following:

- A positive direct fluorescent antibody test (preferably performed on central nervous system tissue)
- Isolation of rabies virus (in cell culture or in a laboratory animal)

#### **Human rabies**

One or more of the following four laboratory results:

- Detection of Lyssavirus antigens in a clinical specimen (preferably the brain or the nerves surrounding hair follicles in the nape of the neck) by direct fluorescent antibody test, OR
- Isolation (in cell culture or in a laboratory animal) of a Lyssavirus from saliva or central nervous system tissue, OR
- Identification of Lyssavirus specific antibody (i.e. by indirect fluorescent antibody (IFA) test or complete rabies virus neutralization at 1:5 dilution) in the cerebrospinal fluid (CSF), OR
- Identification of Lyssavirus specific antibody (i.e. by indirect fluorescent antibody (IFA) test or complete rabies virus neutralization at 1:5 dilution) in the serum of an unvaccinated person, OR
- Detection of Lyssavirus viral RNA (using reverse transcriptase-polymerase chain reaction [RT-PCR]) in saliva, CSF, or tissue.

### **3.3 Case Classification**

#### **Animal Rabies**

##### Confirmed

A case that is laboratory confirmed.

#### **Human Rabies**

##### Confirmed

A clinically compatible case that is laboratory confirmed by testing at a state or federal public health laboratory.

#### **Human exposure to animal species susceptible to rabies**

Exposures to animals which are possibly rabid are evaluated on a risk-based scenario considering the animal species, type of exposure, and results of an observation (if applicable). Considerations for prophylaxis may also include whether the animal was provoked, if the animal was domestic or wild, and results of rabies testing (see the [MT Rabies Exposure Assessment Tree](#)).

## 4 ROUTINE CASE INVESTIGATION

In accordance with ARM [37.114.314](#) conduct an epidemiologic investigation to determine the source of and possible transmission of infection. Refer to the CCDM regarding additional aspects related to investigation.

### 4.1 Confirm the Diagnosis

Review the clinical presentation and laboratory results to confirm the diagnosis. Consult with the CCDM and CSTE case definition (section 3) to determine if this is a case.

### 4.2 Laboratory Requirements

Specimens for human rabies case testing (when active disease is suspected) is required to be sent to MTPHL for confirmation as identified in ARM [37.114.313](#).

For more information on analysis and specimen collection please contact the laboratory conducting the test or the Montana Public Health Laboratory (MTPHL) at 1-800-821-7284. The MTPHL Laboratory Services Manual can be accessed at <http://www.dphhs.mt.gov/publichealth/lab/diagnostictesting.shtml>

### 4.3 Case Investigation-Human Rabies

- Testing for potential human cases of rabies must be approved with CDEpi and MTPHL prior to submission to CDC. When a provider calls with a potential case of human rabies, clinical information is required to approve testing with CDC. Please have them notify you via the local 24/7 number, and collect the following information:
  - Potential exposures to rabies and if they were recently treated with rabies PEP or PREP (see more detail below)
  - Clinical information (i.e.-infectious disease doc suspects rabies and why)
- Notify MT DPHHS through our 24/7 line, and ask to speak to one of the CDEpi staff
  - CD Epi may set up a clinical consult with the CDC regarding testing and treatment of the patient
- Ask about possible exposures to animals susceptible to rabies. The incubation period for rabies is widely variable (3-8 weeks up to several years). Ascertain the following information:
  - **Bats**-handling of live or dead bats, bats in home while individuals are sleeping, incapacitated, or with children too young to verbalize contact
  - **Pets, feral domesticated animals, wildlife, and livestock**-contact with secretions or tissues including bites and harvesting of tissues for testing or consumption
  - If other individuals were similarly exposed concurrently with the patient

### 4.4 Investigation of a human exposure to animal species susceptible to rabies or animal is positive for rabies

A potential exposure to rabies would include:

- **Bats**-Pertaining to bats, potentially exposed individuals need to be reasonably certain an exposure, such as a bite, scratch or other high-risk physical contact, did not occur. Normal roosting and flying activity less likely to create an undetected exposure. Persons who may not be able to make that assessment:
  - Deeply sleeping person
  - Unattended child
  - Mentally disabled person
  - Intoxicated person
- **Pets, feral domesticated animals, wildlife, and livestock**-contact with secretions or tissues including bites and harvesting of tissues for testing or consumption may be deemed a potential exposure.

Determining the need for post-exposure prophylaxis after an exposure occurs:

- **Dogs, cats, and ferrets**-To determine if rabies post-exposure prophylaxis is indicated, gather the information listed in the investigation protocol checklist (page 1). Determination of whether or not to administer PEP is based on several factors. The first choice for dogs, cats, and ferrets is to observe the animal for 10 days (day 0 is the date of the exposure). If the animal becomes ill during the observation period, the animal should be evaluated by a veterinarian to determine the need for testing. If the animal is alive and asymptomatic at the end of ten days, PEP is not indicated.
- **Livestock and wildlife**-For exposures from wildlife and livestock, rabies risk can only be assessed through testing as these animals cannot be observed to rule out rabies. If the animal specimen is positive for rabies (or the sample is unsuitable), PEP is indicated depending on the assessment of the exposure (i.e.-direct contact with saliva to broken skin through a bite or mucous membrane exposure). PEP is not indicated with a negative rabies result. Circumstances of the exposure can be considered prior to testing. See the CCDM Rabies Post Exposure Prophylaxis guide for more information. The inability to locate the animal involved with the exposure, or a reluctance to test animals, may result in a rabies PEP recommendation.

Rabies post-exposure prophylaxis series:

- For individuals who have not been previously vaccinated with rabies vaccine, rabies PEP consists of:
  - *Rabies immune globulin (IG) at 20 IU/kg given on day 0*
  - *Rabies vaccine given on day 0, 3, 7, and 14.*
- For individuals who have previously received rabies IG and/or vaccination (pre-exposure or PEP), *a two dose rabies vaccination booster is given on day 0 and 3. DO NOT* administer rabies IG to individuals who have been previously vaccinated with pre-exposure or post exposure rabies vaccine series.
- Individuals who are immunosuppressed may require an altered regimen. Consult DPHHS with regards to individuals who have immunosuppression or incomplete rabies vaccination series prior to administration at 406-444-0273.

#### **4.5 Contact Investigation**

No contact investigation is required for individuals who are exposed to a rabid or potentially rabid animal, though individuals who were exposed to the same animal must be identified. For human rabies cases, human to human transmission is unusual. Breaches of medical personnel's personal protective equipment (PPE) while performing procedures involving saliva or fluid and tissues from the CNS may be assessed. Blood, urine, and feces of rabies patients are not considered infectious.

#### **4.6 Environmental Evaluation**

Local evaluation can be performed by a jurisdiction's authorities if feral animals or wild animals are commonly in contact with residents. For the removal bats in homes, resources are available at <http://dphhs.mt.gov/publichealth/cdepi/diseases/rabies.aspx> to assist home owners.

### **5 CONTROL MEASURES**

Implement the control measures outlined in ARM [37.114.571](#) and utilize the control measures indicated in the CCDM for this disease. Contact DPHHS CDEpi for consultation and questions at 406-444-0273.

#### **5.1 Case Management**

For individuals exposed to a known or suspected rabid animal, the patient should be counseled on the necessity of PEP, and possible side effects of the regimen. Rabies PEP is a medical urgency, but not an emergency. Time can be taken to locate animals implicated in an exposure for observation (when applicable) and/or testing. PEP is highly effective when given in a timely manner, and should be started as soon as possible when indicated.

#### **5.2 Contact Management**

See section 4.4.

#### **5.3 Environmental Measures**

See section 4.6.

#### **5.4 Special Circumstances**

Human cases of rabies are not candidates for organ donation. If a human case be identified post-mortem, ascertain if any tissues or organs were collected for donation.

### **6 ROUTINE PREVENTION**

#### **6.1 Immunization Recommendations**

- Individuals at risk for contracting rabies should receive a pre-exposure rabies vaccination series, and is recommended for veterinarians, veterinary technicians, animal control officers, animal shelter workers, rabies lab personnel and persons working with wildlife (see reference D, page 19 for more information)

- Pre-exposure vaccination series may also be indicated for persons spending 1 month or more in countries with endemic dog rabies and in which PEP would likely be significantly delayed to geographic distances/ lack of medical infrastructure

## 6.2 Prevention and Counseling Recommendations

### Prevention

- Promote rabies vaccination of pets
- Promote prevention of exposures for bites and other exposures, especially with children
- Coordinate with medical providers, animal control/law enforcement, and other reporting sources to ensure prompt reporting of potential rabies exposures to public health authorities

### Counseling

- Humans exposed to potentially rabid or rabid animals are not infectious of rabies
- Rabies is not spread through fomites
- The rabies virus is inactivated through desiccation
- Persons who have been potentially exposed to rabies will not transmit rabies to others, and there is no need to isolate an individual who may have been exposed to rabies

## 7 ACKNOWLEDGEMENTS

We would like to acknowledge the Washington, Kansas, Oregon and Florida State Departments of Health and the Centers for Disease Control and Prevention (CDC) for developing the format of this document.

## 8 REFERENCES AND ADDITIONAL INFORMATION

### Important references:

- A. "Control of Communicable Diseases Manual, 20<sup>th</sup> edition, 2015" (CCDM) American Public Health Association <https://secure.apha.org/imis/ItemDetail?iProductCode=978-087553-0185&CATEGORY=BK>
- B. MT DPHHS Rabies webpage <http://dphhs.mt.gov/publichealth/cdepi/diseases/rabies.aspx>
- C. "Use of a Reduced (4-Dose) Vaccine Schedule for Postexposure Prophylaxis to Prevent Human Rabies," MMWR March 19, 2010, Vol. 59, No. RR-2 <https://www.cdc.gov/mmwr/pdf/rr/rr5902.pdf>
- D. "Human Rabies Prevention —United States, 2008," MMWR May 7, 2008, Vol. 57 <http://dphhs.mt.gov/Portals/85/publichealth/documents/CDEpi/DiseasesAtoZ/rabies/2008RabiesMMWR.pdf>