Rabies Surveillance and Prevention Recommendations for Peace Officers
Rabies

- Lyssavirus belonging to the Rhabdoviridae family
- RNA virus
- "bullet-shaped virus"
- Viruses travel within the nerves system in mammals
- Within the brain, virus multiplies rapidly
- Signs of disease begin to develop

Rabies is a virus that affects the central nervous system.
Rabies Background

• In the most recent report (2018) more than 90 percent of rabies cases reported each year in the United States occurred in wildlife.

• Different variants (bat, skunk, raccoon, etc.) cases in North Dakota

• Skunks are responsible for most reported animal

  - 7.2% foxes
  - 20.3% skunks
  - 30.3% raccoons
  - 33% bats

https://www.cdc.gov/rabies/location/usa/surveillance/wild_animals.html
Terrestrial Rabies Reservoirs (2019)

Rabid Cats and Dogs Reported in the U.S. (2018)
Rabies
in North Dakota

- Average of 477 animals tested per year
- Average of 25 positive rabies animals per year
- 332 animals tested in 2012
- 5% positive per year
### Rabies in North Dakota 2020

#### Positive Animals Rabies Cases by County, North Dakota, 2020

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**State Totals**

- 8
- 2
- 3

Rabies in North Dakota 2020
Human Rabies Around the World

- Rabies is a global health issue
- Most rabies cases occur in countries with inadequate diagnostic facilities and surveillance systems for rabies
- Exposure to rabid dogs is the cause of over 99% of human exposures and over 99% of human rabies deaths
- Limited access to healthcare and resources
- Human cases are underreported

WASHINGTON - A 24-year-old American soldier died of rabies after being bitten by a dog last year in Afghanistan, US health officials said Thursday following an investigation into the rare case.

The otherwise healthy soldier started experiencing symptoms of shoulder and neck pain and tingling sensations in his hands soon after arriving at Fort Drum, N.Y., in mid-August 2011.

By the time he was admitted to an emergency room, he was dehydrated and hydrophobic, meaning he developed an intense fear of blood and drinking. His condition escalated to include nausea, vomiting, anxiety and tremors.

The disease, caused by a virus that infects the central nervous system, usually spreads after a person is bitten by an infected animal or when saliva from an infected animal comes in contact with a person's mucous membranes or open wounds.

A man from Boise County died last week from a rabies infection, according to state and local health officials. It is the first such death in Idaho since 1978.
Rabies in the U.S.

- Web site - www.who.int/en/
- Conditions to the NDDOH
  Cases of human and animal rabies are mandatory reportable
  Most from domestic animal exposure
  Estimated 30,000 to 60,000 human exposures:
    - Bites (8), Contact (8), Transplant (1), unknown (8)
    - Exposure Type
      - Bat (13), Dog (8), Raccoon (3), unknown (1)
    - Variant Type
  - 25 human cases 2009-2018
  - Human cases – 1 to 3 each year

Cost of PEP

- Cost to fully vaccinate is variable, average of $2,500 to $5,000
- Approx. $500 to $2,500 in vaccination costs
- Est. $364,000 potentially avoided costs by vaccinating pets
Rabies Exposure

• Definition of rabies exposure – Introduction of virus-laden saliva into the body through a bite or contact of the virus-laden saliva or neural tissue with an open wound or the mucous membranes.

• Blood, feces, urine is not infectious

All animal bites or other possible exposures should be assessed by a healthcare provider!
Rabies Exposure Timeline

- **Wild Animals**
  - Unknown infective period
  - Unknown incubation period
  - If infected, the animal can die.

- **Dog, Cat, & Ferret**
  - 2-10 days infective period
  - Unknown incubation period
  - Unknown infectious period

- **Human**
  - 2-12 weeks incubation period
  - As long as 2 years infectious period

- May be infectious for a number of days before clinical signs appear. When investigating human exposures, it is recommended to consider the 10 days prior to onset of clinical signs (or date of death if no signs of illness) as part of the animal's infectious period.

- It is unknown as to how long a wild animal can shed rabies virus in its saliva before clinical signs of illness appear. Any exposure to a wild animal that cannot be tested, even if apparently healthy, should be treated as if the animal is rabid.

- It is unknown as to how long a wild animal can shed rabies virus in its saliva before clinical signs of illness appear. Any exposure to a wild animal that cannot be tested, even if apparently healthy, should be treated as if the animal is rabid.
Rabies Exposure Assessment Algorithm

1. Risk assessment should include type of exposure, the species of animal involved, and circumstances of the exposure.

2. No exposure to bite, scratch, uncooked meat, or other contact.

3. Did animal exhibit signs of rabies? ( headache, convulsions, salivating, hypersensitivity to sound)
   - Yes: PEP is not recommended if unusual circumstances exist. Do not proceed.
   - No: Proceed to next step.

4. Was animal expressive? (transmitted through saliva)
   - Yes: PEP is indicated.
   - No: Proceed to next step.

5. Small rodents include squirrels, hamsters, mice, rats, gerbils, chinchillas, gerbils, mice, and voles.

6. PEP is not recommended if unusual circumstances exist. Continue to next step.

7. Person was exposed to a domestic animal such as a cow, horse, sheep, pig, or domestic cat.

8. Test animal for rabies. (PEP may be indicated)
   - Yes: Test animal for rabies. (PEP may be indicated)
   - No: Proceed to next step.

   - Yes: Test animal for rabies. (PEP may be indicated)
   - No: Proceed to next step.

10. Test animal for rabies.
    - Yes: Test animal for rabies. (PEP may be indicated)
    - No: Proceed to next step.

11. If animal exhibited any signs of rabies (e.g., the animal was vicious or unprovoked) or the bites occurred in a high-risk region, consider starting PEP immediately.

12. Two types of exposure exist: a bite exposure, or an exposure to animal droppings or saliva. For these cases, PEP must be considered.

13. PEP is indicated if: (a) bite exposure or animal saliva; (b) not diagnosed as rabies.

14. PEP is not recommended if unusual circumstances exist. Continue to next step.

15. Procedure for diagnosing rabies:
   - Enzyme immunoassay:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Virus isolation:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Antigen detection:
     - Yes: Further testing is required.
     - No: Further testing is not required.

16. PEP is indicated if: (a) rabies is confirmed; (b) further testing is not required.

17. PEP is not recommended if unusual circumstances exist. Continue to next step.

18. Procedure for diagnosing rabies:
   - Enzyme immunoassay:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Virus isolation:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Antigen detection:
     - Yes: Further testing is required.
     - No: Further testing is not required.

19. PEP is indicated if: (a) rabies is confirmed; (b) further testing is not required.

20. PEP is not recommended if unusual circumstances exist. Continue to next step.

21. Procedure for diagnosing rabies:
   - Enzyme immunoassay:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Virus isolation:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Antigen detection:
     - Yes: Further testing is required.
     - No: Further testing is not required.

22. PEP is indicated if: (a) rabies is confirmed; (b) further testing is not required.

23. PEP is not recommended if unusual circumstances exist. Continue to next step.

24. Procedure for diagnosing rabies:
   - Enzyme immunoassay:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Virus isolation:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Antigen detection:
     - Yes: Further testing is required.
     - No: Further testing is not required.

25. PEP is indicated if: (a) rabies is confirmed; (b) further testing is not required.

26. PEP is not recommended if unusual circumstances exist. Continue to next step.

27. Procedure for diagnosing rabies:
   - Enzyme immunoassay:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Virus isolation:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Antigen detection:
     - Yes: Further testing is required.
     - No: Further testing is not required.

28. PEP is indicated if: (a) rabies is confirmed; (b) further testing is not required.

29. PEP is not recommended if unusual circumstances exist. Continue to next step.

30. Procedure for diagnosing rabies:
   - Enzyme immunoassay:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Virus isolation:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Antigen detection:
     - Yes: Further testing is required.
     - No: Further testing is not required.

31. PEP is indicated if: (a) rabies is confirmed; (b) further testing is not required.

32. PEP is not recommended if unusual circumstances exist. Continue to next step.

33. Procedure for diagnosing rabies:
   - Enzyme immunoassay:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Virus isolation:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Antigen detection:
     - Yes: Further testing is required.
     - No: Further testing is not required.

34. PEP is indicated if: (a) rabies is confirmed; (b) further testing is not required.

35. PEP is not recommended if unusual circumstances exist. Continue to next step.

36. Procedure for diagnosing rabies:
   - Enzyme immunoassay:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Virus isolation:
     - Yes: Further testing is required.
     - No: Further testing is not required.
   - Antigen detection:
     - Yes: Further testing is required.
     - No: Further testing is not required.

37. PEP is indicated if: (a) rabies is confirmed; (b) further testing is not required.
TREATMENT OF WOUNDS & VACCINATION

- Not previously vaccinated
  - Wound cleansing
  - Soap & water, wound irrigation.

- Vaccine
  - Rabies immune globulin (RIG)
  - 20 IU/kg body weight
  - If possible, full dose should be infiltrated around the wound site.
  - Remainder in anatomical site distant from vaccination site.
  - 4-doses: Days 0, 3, 7, 8, 14.
  - 1 ml, IM (deltoid area, or outer thigh for small children).
  - Immunosuppression: 5 doses on days 0, 3, 7, 14 and 28.

- Wound irrigation.
  - Soap & water, wound irrigation.
  - Not previously vaccinated
  - Treatment of wounds & vaccination
Treatment of Wounds & Vaccination

- Previously vaccinated
  - Wound cleansing
  - Soap & water, wound irrigation.
  - Rabies immune globulin (RIG)
    - Should NOT be administered!
  - Vaccine
    - 1 ml, IM (deltoid area, or outer thigh for small children).
    - 2 doses: Days 0 & 3.
Rabies Vaccination

- Pre-exposure vaccination
  - 2 doses of 1 mL, IM (deltoid area, or outer thigh for small children).
  - Days 0, 7
  - NO RIG

- Booster doses
  - 1-1.5 mL, IM booster dose if does not have evidence of virus neutralizing antibodies in serum at 1:5 serum dilution by the RFFIT (rapid fluorescent focus inhibition test).
A man is jogging in his neighborhood and runs past a house where the family dog is leashed to a fence. He gets too close and the dog bites him on the leg.

Rabies Exposure Scenario – Case 1
Rabies Exposure Scenario – Case 1

• The jogger likely provoked the dog by getting too close, causing the dog to bite him.

• Regardless of vaccination status, the dog should be seen by a veterinarian to determine its current health status. The dog should then be isolated and observed for a 10-day period.

• The dog should be seen by a veterinarian at the end of the observation period and a vet determines that it is healthy, then the jogger does not need PEP.

• If these signs occur, the jogger should be given PEP immediately and the dog should be euthanized and sent for confirmatory testing. If the rabies test on the animal is negative, PEP can be stopped.

• Studies have shown that dogs, cats or ferrets that are infected and contagious does not need PEP.

• If these signs show clinical signs within 10 days, the dog should be isolated and observed for a 10-day period. The dog should be seen by a veterinarian at the end of the period.

• The dog should then be isolated and observed for a 10-day period.

• The dog should be seen by a veterinarian to determine its current health status. Regardless of vaccination status, the dog should be seen by a veterinarian if it is healthy, and the dog does not need PEP.
A girl is sitting on a park bench with her mother on a warm summer day. All of a sudden, she feels pain in her lower leg and notices that a raccoon has bitten her.
Rabies Exposure Scenario – Case 2

- The girl was a subject of an unprovoked attack by a wild animal. Unless the wild animal is caught, tested and found not have rabies, the girl should be given PEP.
A woman wakes up at her house one morning and finds a bat flying around her bedroom. She chases it out of her house and mentions it to her neighbor. Her neighbor recalls reading something about “bats and rabies” and suggests that the woman discuss the issue with her family physician.
Rabies Exposure Scenario – Case 3

- Bites and scratches from bats can be very minor and often go undetected.
- It is therefore recommended that any person who finds a bat in his or her bedroom after a period of unattended sleeping be given PEP.
- If the bat can be caught and tested for rabies, then PEP can be stopped in the event of a negative test result.

...
A 10 week old puppy is attacked by a skunk. The owner of the skunk tests positive for rabies, but the puppy has not been vaccinated against rabies because he was too young. The skunk did not have an exposure to the skunk, but the puppy has not been vaccinated against rabies. The owner is able to shoot the skunk and has it tested for rabies.
Rabies Exposure Scenario – Case 4

- Rabies vaccine should be administered after entry into isolation or up to 28 days before release.
  - Then a designated caregiver: have direct contact with people and other animals, other
  - The puppy should be in an enclosure where it is unable to have direct contact with people and other animals, other
  - If the owner is unwilling to euthanize, the animal
  - Rabies vaccine should be administered and tested for rabies.
  - The puppy should be placed in strict isolation for six months.

Dogs, cats, and ferrets that have never been
A woman comes to the ER with an animal bite. Upon questioning, the woman states that the bite came from a raccoon that she was keeping as a pet.
Rabies Exposure Scenario – Case 5

- Title 36 of the North Dakota Century Code prohibits ownership of skunks and raccoons.
- The raccoon should be confiscated and be euthanized and tested for rabies.
- If the raccoon is not available for testing, the woman should receive PEP.
North Dakota Rabies Control Act of 1999

6. If an animal is suspected of having rabies and is under the care of a licensed veterinarian, the veterinarian shall examine the animal and shall order isolation of the animal until the animal is determined to be free of rabies or until it is killed as may be required by the local health officer. If an animal is found to have rabies, the animal shall be killed and disposed of in a manner prescribed by the local health officer.

5. Report findings as applicable.

4. If an animal is humanely killed under this section, then at the request of the state health officer, the animal shall be submitted for a post-mortem examination to the state veterinary diagnostic laboratory. The state health officer may order the animal to be destroyed at the expense of the owner or to be retained as evidence of the disease.

3. The department, on an annual basis, may require a report on the department's plan for rabies control and prevention.

2. The department, on an annual basis, may require a report on the department's plan for rabies control and prevention.

1. The department, on an annual basis, may require a report on the department's plan for rabies control and prevention.

23-36-03. Enforcement authority.
available for law enforcement or animal control services.

section is limited to cases involving a wild mammal and is applicable only if no other agency is

The duty of the game and fish department to cooperate and provide assistance under this

suspicion of exposure to rabies and does not constitute a continuous request for assistance.

request from the department means only a request for assistance as to a particular and singular

request, and any other preventive measures the department requests. For purposes of this section, a

united states department of agriculture animal and plant health inspection service shall provide

United States Department of Agriculture, Animal and Plant Health Inspection Service, wildlife services program of the

raccoon data that it is issued under section 23-36-04 and upon written request of the department.

If a warrant is issued under section 23-36-05, assistance of state and local agencies.

animal

under this section must include a request to guarantee, impound, or humane kill and test the

by an administrative search warrant issued under chapter 29-29.1. A warrant to seize in animal

animal on the department's behalf, may seize in animal located on private property only if authorized

except in the case of an emergency, the department, or another state or local agency acting


North Dakota Rabies Control Act of 1999
1. The owner of an animal is liable for the cost of quarantine and veterinary services, and for the cost of any postexposure treatment received by an individual who is possibly exposed to rabies by the owner's animal if the animal is not a licensed or registered as required by any State or local law or rule applicable to that species.

2. b. Continuous or vaccine that is not required by any State or local law or rule applicable to that species.

2. a. Licenced or registered as required by any State or local law or rule applicable to the owner's animal. If the animal is not exposed to rabies by the owner's animal, it is required by any State or local law or rule applicable to that species.

1. The owner of an animal is liable for the cost of quarantine and veterinary services, and for the cost of any postexposure treatment received by an individual who is possibly exposed to rabies by the owner's animal if the animal is not a licensed or registered as required by any State or local law or rule applicable to that species.
Housekeeping Items

In order to get credit for this presentation:

1. Take the quiz at this link. You will need to score a 70% on the quiz in order to receive credit. The quiz can be retaken up to three times. [http://www.ndhealth.gov/disease/post/]

2. This presentation will be posted on-line for the remainder of the year. NDDoH will be trying to attain CEU credit through the year as well.

If you have questions about this presentation or recommendations for future webinars please email: Michelle Dethloff at mdethloff@nd.gov