All Aboard the Rabies Train
A Prevention Collaborative

Jennifer Chase, MS
Public Health in the Rockies
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Overview

• What is rabies?
• Rabies distribution in animals
• Evaluation and improvement of rabies prevention protocol
• Roles and responsibilities in investigations
• Algorithms for rabies exposure investigations
Rabies Public Service Announcement
RABIES DISEASE
Rabies is spread from animals

- The virus is in saliva and nervous tissue (spinal fluid/cord and brain)
- It attacks the nervous system
- Nearly always fatal
- Mammals are susceptible
- Distinct variants in wild animals
RABIES IN ANIMALS
Domestic Animals Rabies in U.S.

Rabies in Domestic Animals, 1958-2008

- Reduction in rabies in domestic animals due to widespread pet vaccination
Terrestrial Rabies Variants, United States, 2009-2013

Bats are not shown on the map because bat variant rabies is found throughout the U.S.
Rabies Reservoir Species (RRS)

• Principal RRS are bats, skunks, raccoons, foxes
• Other wild mammals concerning due to spillover
  • Coyotes, mountain lions, bobcats
• Rodents & lagomorphs: considered almost zero risk
• Rabies (still) rare in domestic pets and livestock
Skunk Variant Rabies in Colorado

- Coyote in eastern CO in June 2007 with skunk variant rabies
- Gradual and persistent geographic spread from eastern border to I25 corridor
- Spillover infections
  - Cat, horse, cow
  - Wild: coyote, fox, raccoon, mountain lion, mule deer, muskrat
Rabies Surveillance in Terrestrial Mammals, Colorado 2007 to 2015

418 Rabies Positive Mammals
- Skunk
- Cat
- Other Mammals

Bat Surveillance data is not included on this map
Tri-County Rabies Positive

Red = 2008 - 2014
Yellow = 2015 - 2016
White = Spillover infections
## TCHD Rabies Exposure Assessments

<table>
<thead>
<tr>
<th>Type of exposure</th>
<th>2014</th>
<th>2015</th>
<th>2016 (as of 9/2/16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Animal Total</td>
<td>386</td>
<td>563</td>
<td>472</td>
</tr>
<tr>
<td>Human RRS</td>
<td>30</td>
<td>50</td>
<td>74</td>
</tr>
<tr>
<td>Human Pet</td>
<td>343</td>
<td>498</td>
<td>373</td>
</tr>
<tr>
<td>Human Other</td>
<td>13</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Pet Animal</td>
<td>**</td>
<td>140</td>
<td>104</td>
</tr>
<tr>
<td>Pet RRS</td>
<td>**</td>
<td>109</td>
<td>84</td>
</tr>
</tbody>
</table>
EVALUATION AND IMPROVEMENT OF RABIES PROTOCOL
Factors Influencing Improvement

- Manual created in 2010; last updated in 2012
- Guidance was subject to interpretation
- Approaches differed
- Roles and responsibilities unclear
- Duplication of efforts
- Workload concerns
- External partnerships under-utilized
TCHD Rabies Workgroup Formed

• Began in November 2014
• 7 permanent members
  • 3 Environmental Health
  • 3 Disease Control/Epidemiology staff
  • 1 Administrative Assistant
• Managers and field staff
• Met 29 times for at least 2 hours each for 22 months
Rabies Workgroup Goal

Prevent rabies infections in humans and domestic animals.
Rabies Workgroup Objectives

1. Prioritize response to animal bites
2. Build consistency in response
3. Define roles and responsibilities
4. Maximize external relationships
5. Reduce occupational exposures
6. Increase efficiencies in process
7. Evaluate surveillance for skunk rabies
Rabies Workgroup Steps

1. Set timelines and assign tasks
2. Evaluate current process for investigations
   • Reporting to case closure
   • Analysis of systems and tools
3. Vet workgroup decisions with staff and AC
4. Educate and train
Rabies Workgroup Deliverables

• Revised TCHD Rabies Prevention and Control Manual
  • Changes to management of domestic pets
• Training for staff
• Training for animal control
• Standardized intake/risk assessment forms
• Quarantine and post-exposure prophylaxis templates
<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>ANIMAL TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGHEST</td>
<td>Rabies Reservoir Species</td>
</tr>
<tr>
<td></td>
<td>• Bats</td>
</tr>
<tr>
<td></td>
<td>• Skunks</td>
</tr>
<tr>
<td></td>
<td>• Fox</td>
</tr>
<tr>
<td></td>
<td>• Raccoons</td>
</tr>
<tr>
<td></td>
<td>• Exposures that occurred internationally while visiting a rabies-endemic country (wild animal, dog or other domestic animal, monkey)</td>
</tr>
<tr>
<td></td>
<td>Other Wild Animal</td>
</tr>
<tr>
<td></td>
<td>• Carnivore (coyote, bobcat, other)</td>
</tr>
<tr>
<td></td>
<td>• Large Rodent (muskrat, beaver),</td>
</tr>
<tr>
<td></td>
<td>• Monkey</td>
</tr>
<tr>
<td></td>
<td>• Any other highly suspect animal (exhibiting abnormal behavior or neurologic signs) including any wild or domestic animals and livestock</td>
</tr>
<tr>
<td></td>
<td>Wolf hybrids</td>
</tr>
<tr>
<td></td>
<td>Feral/stray animals</td>
</tr>
<tr>
<td></td>
<td>• Dog</td>
</tr>
<tr>
<td></td>
<td>• Cat</td>
</tr>
<tr>
<td>LOWEST</td>
<td>Domestic owned</td>
</tr>
<tr>
<td></td>
<td>• Dog</td>
</tr>
<tr>
<td></td>
<td>• Cat</td>
</tr>
<tr>
<td></td>
<td>• Ferret</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
</tr>
</tbody>
</table>
Key External Partners

• Animal Control Agencies
• Colorado Parks and Wildlife
• US Department of Agriculture
• Veterinarians
• Hospitals
• Pharmacies
Rabies Workgroup Successes

- Domestic pet bites referred to AC
  - 2016 referred 56% (329) animal bites to AC
- No data entry of routine animal bites
- Risk assessment integrated into intake
- Improved guidance on:
  - Humans exposed to RRS
  - Domestic pets exposed to other animals
  - Humans exposed to domestic pets
Rabies Workgroup Successes

• Better defined roles and responsibilities
• Improved relationships with animal control
• Reduced workload
• Increased occupational safety
Occupational Exposures Reduced

• Training for animal control
• Animal control referrals for decapitation
• Decapitation contracts
• Clear guidance on PPE for decapitation
• Select number of staff with rabies pre-exposure vaccination
Do you know what this is?

Drain with a bucket beneath it to collect blood.
ROLES AND RESPONSIBILITIES OF RABIES INVESTIGATIONS
Rabies Exposures: Assessment of Human Exposures to Domestic Animals

1. Domestic Dog or Cat Bite or scratch penetrates skin
   - NO: STOP No further action needed
   - YES: Refer to local animal control to investigate incident

2. Was dog/cat exposure outside U.S.?
   - NO: Refer to DIS. Look up if rabies endemic in country. Consult Disease Intervention Manager.
   - YES: Was dog/cat available for observation?

3. Is biting dog/cat available for observation?
   - NO: Animal control & victim attempt to locate dog/cat for 72 hours
     - NO: Animal not located or dead
       - Animal control contacts TCHD. Refer to DIS to assess rabies risk, pet vaccination history. If PEP recommended, consult Disease Intervention Manager.
       - YES: Animal control institutes 10 day quarantine. Determine pet rabies vaccination status.

4. Is dog/cat currently healthy and no rabies symptoms?
   - NO: Animal control contacts TCHD. Get veterinary evaluation. Is illness consistent with rabies?
     - YES: Arrange decapitation for rabies testing. Assure proper PPE used. Notify DIS.
     - NO: Does dog/cat remain healthy during quarantine?
       - YES: STOP Animal control recommends rabies booster if due. No further action needed
       - NO: Notify all parties of test results

5. Rabies test results:
   - Negative: Notify all parties of test results
   - Positive: Recommend PEP
Rabies Exposures: Assesment of Human Exposures to Rabies Reservoir Species or Other Highly Suspect Animals

**Biting Animal Species**
- Small rodent (squirrel, prairie dog) or rabbit
- Rabies Reservoir Species (RRS) or other Highly Suspect Animal

**Was exposure sufficient to allow rabies transmission?**
- Complete Rabies Exposure Intake Form to assess

**Is the biting animal available for testing?**
- Test Animal. Notify DIS.
  - Positive: Refer to DIS
  - Negative: Recommend PEP
- Recommend PEP if indicated

**STOP**
- No further action needed
TCHD Resources to Share

• TCHD Rabies Prevention and Control Manual
• When to Notify Public Health (for AC)
• Intake and assessment forms
• Algorithms for exposure assessments
• Infection control for decapitation
• Human PEP poster for hospitals
• And more!
QUESTIONS?