Surveillance for Selected Zoonotic Diseases

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Learning Objectives

1. Describe what makes a communicable disease “zoonotic”
2. Know the causative organism for tularemia, brucellosis, and Q-Fever
3. Know the major routes of transmission for tularemia, brucellosis, and Q-Fever
4. Locate guidance for Case Definition and Disease Investigation Steps for reportable diseases in NC
Zoonotic Disease and Public Health

- Animals can be sentinels for human disease
- Animals can be reservoirs for human disease
- Unknown background rates of potential zoonotic disease
- Reduce human risk by understanding human exposure
- People do strange things with animals...
Know Your Sources of Information

2010 North Carolina Division of Public Health
Communicable Disease Manual

Public Health Management of Reportable Diseases and Conditions
Use the most recent version!
Tularemia

- Reportable disease of people and animals
- You may hear about this from…
  - Human health care provider
  - Veterinarian
  - Paper or Electronic Lab Report
- Notify your Health Director prior to investigating
  - Tularemia is a Category A bioterrorism agent
What is Tularemia?

Appalachian Cottontail Rabbit

Marsh Rabbit

Cottontail Rabbit

Rabbits of NC from the NC Wildlife Resources Commission
How are people exposed?

Image from Burlington Free Press

Image from Outdoor Life Magazine
Transmission of Tularemia to People

The Cat’s Role

Photo courtesy of:
American Society for Surgery of the Hand
NC Tularemia Cases

- Most cases associated with
  - field dressing rabbits
  - bites
- Other routes of transmission possible
  - Arthropod bite
  - Inhalation
  - Consumption of undercooked meat
Classic Tularemia Exposures

- Tularemia, Lawn Mowers, and Rabbits’ Nests
  JOURNAL OF CLINICAL MICROBIOLOGY
  August 2005

- Tularemia Transmitted by Insect Bites
  Wyoming, 2001--2003
  MMWR Feb. 25, 2005
<table>
<thead>
<tr>
<th>Forms of Tularemia Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ulceroglandular</td>
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<tr>
<td>2. Glandular</td>
</tr>
<tr>
<td>3. Oculoglandular</td>
</tr>
<tr>
<td>4. Oropharyngeal</td>
</tr>
<tr>
<td>5. Pneumonic</td>
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<tr>
<td>6. Typhoidal</td>
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<tr>
<td>7. Septic</td>
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</tbody>
</table>
Case Definition - Tularemia

Case classification

- Probable: a clinically compatible case with laboratory results indicative of presumptive infection
- Confirmed: a clinically compatible case with confirmatory laboratory results
Case Definition – Tularemia
Lab Criteria

– *Presumptive*
  • Elevated serum antibody titer(s) to *F. tularensis* antigen (*without documented fourfold or greater change*) in a patient with no history of tularemia vaccination OR
  • Detection of *F. tularensis* in a clinical specimen by fluorescent assay

– *Confirmatory*
  • Isolation of *F. tularensis* in a clinical specimen OR
  • Fourfold or greater change in serum antibody titer to *F. tularensis* antigen
Case Investigation - Tularemia

• Collect clinical and lab information
• Apply case definition
• Determine source of exposure
  – If source is suspected to be Bioterrorism in origin, notify authorities
Tularemia Prevention

• Teach prevention to those at greatest risk for exposure (e.g., hikers, campers, and hunters)
• Protective clothing, repellents containing DEET, and permethrin on clothing
• Hunters and others who handle potentially infected animals should wear gloves
• Game meat should always be cooked thoroughly
• Grassy areas should be surveyed before mowing and any dead animals removed
Abandoning cats is cruel to cats and harmful to wildlife. Never abandon cats outdoors. Use your local animal shelter.

For more information visit www.abcbirds.org

Tularemia / Animal Bite Prevention

• Reduce ED visits
• Minimize pain/suffering
• Reduce exposures to Rabies and Tetanus

Educate the public to take proper care of their pets!
Q Fever

• Reportable disease of people and animals
• You may hear about this from…
  – Human health care provider
  – Veterinarian
  – Paper or Electronic Lab Report
• Notify your Health Director prior to investigating
  – Q Fever is a Category B bioterrorism agent
Check the Online CD Manual

The Disease Investigation Steps are listed in the CD Manual.

Check with your Regional Nurse Consultant or On-Call Epidemiologist for assistance with case investigation.
What is Q Fever?

Domestic Goat; *Capra hircus*  
Domestic Sheep; *Ovis aries*

Photos from University of Michigan Animal Diversity Web
Transmission from Animal to Man

The organism replicates to very high levels in the placenta and is then shed in the reproductive tract fluids, exposing people attending the parturition.
Disease Presentation in Man

- Ranges from asymptomatic or severe in humans
- Characterized by fevers, chills, severe headache, malaise, and severe sweats
- Chronic Q fever occurs months to years after acute infection and manifests primarily as endocarditis involving abnormal cardiac valves
Case Definition Criteria
Q Fever

Clinical evidence
Acute fever and one or more of the following: rigors, severe retro bulbar headache, acute hepatitis, pneumonia, or elevated liver enzyme levels.
Case Definition Criteria – Q Fever
Lab Criteria

• Laboratory confirmed:
  – Fourfold change in IgG-specific antibody titer to *C. burnetii* phase II antigen by indirect IFA between paired serum samples, or
  – Detection of *C. burnetii* DNA in a clinical specimen via PCR assay, or
  – Demonstration of *C. burnetii* in a clinical specimen by IHC, or
  – Isolation of *C. burnetii* from a clinical specimen by culture.

• Laboratory supportive:
  – Has a single IFA IgG titer of $\geq 1:128$ to phase II antigen
  – Has serologic evidence of elevated IgG or IgM antibody reactive with *C. burnetii* antigen by ELISA, dot-ELISA, or latex agglutination.
Investigation of Q Fever Case

Determine source of exposure
  – Travel?
  – Occupation?
  – Food?

Implement control measures if common source identified
Brucellosis

• Reportable disease of people and animals
• You may hear about this from…
  – Human health care provider
  – Veterinarian
  – Paper or Electronic Lab Report
• Notify your Health Director prior to investigating
  – Brucella is a Category B bioterrorism agent
What is Brucellosis?
<table>
<thead>
<tr>
<th>Brucella Species</th>
<th>Animal Species Affected</th>
<th>NC Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>B. abortus</em></td>
<td>Cattle</td>
<td>Eliminated in commercial herds</td>
</tr>
<tr>
<td><em>B. suis</em></td>
<td>Swine</td>
<td>Eliminated in commercial herds</td>
</tr>
<tr>
<td><em>B. melitensis</em></td>
<td>Goats</td>
<td>Not present in US goat herd</td>
</tr>
<tr>
<td><em>B. canis</em></td>
<td>Dogs</td>
<td>Found in dogs, low pathogenicity in people</td>
</tr>
</tbody>
</table>
Cooperative State Federal Brucellosis Eradication Program

USDA Uniform Methods and Rules set minimum standards for states to achieve eradication in cattle
Cooperative State Federal Brucellosis Eradication Program

Similar program established in early 1990’s for swine
Eradicated, yet cases still occur in NC ... Why?

- People travel
- People like to consume unpasteurized dairy...
- Animals are imported from foreign countries
- Many countries
  - Have not controlled brucella in their livestock
  - This keeps their citizens and animal herds at risk
Brucellosis is present in Feral Swine

Feral Swine are present in NC and recent evidence has shown infection in our feral swine population. This places hunters and commercial herds at risk of exposure; both must be protected.
Acquisition of Brucellosis in People

Risk factors associated with NC brucellosis cases

- Hispanic ethnicity
- recent immigration from, travel to, or military deployment to a brucellosis-endemic country
- consumption of unpasteurized milk, cheese or other dairy product
- work in a slaughterhouse, veterinary practice or laboratory
- killing, skinning, consuming game animals such as buffalo, elk, feral hogs, wild boar, etc
Recognizing Illness in People

• History of Exposure
• Clinical signs
  – Asymptomatic
  – Acute febrile illness
  – Nonspecific flu-like symptoms
  – Night sweats
  – Splenomegaly, hepatomegaly, coughing, pleuritic chest pain
  – GI disturbance
• Laboratory evidence of infection
Case Definition – Brucellosis
Lab Criteria

Definitive:

- Culture and identification of *Brucella* spp. from clinical specimens
- Evidence of a fourfold or greater rise in *Brucella* antibody titer between acute-and convalescent-phase serum specimens obtained greater than or equal to 2 weeks apart

Presumptive:

- *Brucella* total antibody titer of greater than or equal to 160 by standard tube agglutination test (SAT) or *Brucella* microagglutination test (BMAT) in one or more serum specimens obtained after onset of symptoms
- Detection of *Brucella* DNA in a clinical specimen by PCR assay
Implement Control Measures

- If a common source of exposure is identified, prevent further exposure
- Educate public about case prevention
- Unpasteurized dairy is bad for public health
  - Consuming only pasteurized products to prevent Brucellosis and Q fever will also prevent other illnesses…
Bringing it all Back Home

• Zoonotic Diseases are relatively rare
• Compare 2003-2007 average # cases/year (NC)
  • Chlamydia trachomatis: 30,096
  • Gonorrhea: 15,866
  • Salmonellosis: 1,667
  • RMSF: 602
  • Brucellosis: 2
  • Tularemia: 1
  • Q Fever: 4

We know that you have many other demands on your time.
You may forget the details about these diseases.
Please call DPH with any questions and we can help with your investigation.