An Overview of Plague:
CO and NM
Jennifer House
DVM, MPH, DACVPM
Plague

- *Yersinia pestis*
  - Gram negative
  - Non-spore forming

- Endemic in Western States only

- Most cases occur in
  - New Mexico
  - Colorado
  - Arizona
  - California
Human Plague Cases in the Western U.S., 1970-2016

1 dot placed randomly in most likely county of exposure for each confirmed plague case
Human Plague Cases, Colorado (1956-2017) and New Mexico (1949-2017)
282 total cases
39 fatalities
69 total cases
10 fatalities
Animals

- **Wildlife**
  - Rodent reservoir (specific one unknown)
  - Rodents such as Prairie dogs, Tree Squirrels, are highly susceptible and can amplify the risk

- **Companion Animals**
  - Cats—highly susceptible
  - Dogs—more resistant but can still get sick
  - Pets can bring fleas into the home and expose people

- **Livestock**
  - Mostly resistant
Animal Plague Cases, Colorado 2005-2017

405 Total Positives
Routes of Transmission

• Flea bite
  • Majority of cases exposed this route
  • Infected fleas - dead rodents

• Direct contact with blood/tissue
  • Ground Squirrels
  • Domestic Cats

• Droplet inhalation
  • Wildlife
  • Human-to-Human
Exposure Source of Human Plague Cases (n=69), 1959-2018

- Flea: 57%
- Cat: 12%
- Rabbit: 7%
- Dog: 7%
- Woodrat: 2%
- Unknown: 12%
- Squirrel: 3%

The pie chart visually represents the percentage of human plague cases attributed to each exposure source.
Forms of Disease

- **Bubonic**
  - Fever, headache, chills
  - Swollen, tender, and painful lymph nodes (bubo)

- **Septicemic**
  - Fever, chills, weakness, abd pain, shock
  - Tissues may turn black and die

- **Pneumonic**
  - Fever, headache, weakness,
  - Rapidly developing pneumonia,
    - SOB, chest pain, cough, and bloody mucous

Other less typical forms are possible.
Forms of human plague, Colorado 1959 - 2018 (n=69)

- Bubonic: 70%
- Septicemic: 23%
- Pneumonic: 7%
Disease Cycles

- Sylvatic (wild)
- Enzootic
  - Steady level of disease
  - Low rodent mortality
- Epizootic
  - Increased rodent mortality
  - Fleas seek out new hosts
  - Expansion into human occupied areas
  - Greatest threat to humans
**Disease Cycles**

- **Urban**
- Infected fleas or rodents move into urban areas
- Domestic rodents infected
  - High rodent mortality
- Fleas seek new host
  - Domestic cats, dogs, and even humans
Seasonality?

- Can occur ANY month of the year
- Most common in the hot summer months
Does Climate Play a Role?
Between 1900 and 2012, 1006 confirmed or probable human plague cases occurred in the United States.
Human Plague Cases by Decade, New Mexico 1949-2017
In recent decades, an average of seven human plague cases have been reported each year (range: 1–17 cases per year).
Awareness

- Report suspected animal die offs
  - Public Health Officials
  - Animals may serve as sentinels
- Education of public
  - Risks, transmission, prevention
  - Notices to avoid specific areas/parks/etc
- Take extra precautions during epizootics
Prevention and Control

- Pets:
  - Isolate infected pet
  - Limit number of people in contact
  - Personal protection
    - (mask, gloves, eye protection)
  - Flea Control of other dogs and cats
Prevention and Control

- Prevent pets from free roaming
t  - cats and dogs
- Rodent control
  - Eliminate rodent habitat around home
    - Brush, food sources, firewood, junk
- Insect repellents for skin & clothes
- Insecticide use in epizootic areas
Investigation Objectives

- Identify sources of exposure
- Identify persons at risk of infection
- Identify additional cases
- Prevention and control measures
- Environmental assessment
Case #1

- June 28—Develops Fever and cough
- June 29—Hospitalized with pneumonia
- July 6—Develops respiratory distress and transferred to facility with infectious disease specialists

Testing (Sputum)
- Hosp. Lab grew gram negative rods
  - Automated system ID *Pseudomonas luteola*
  - HCP did NOT suspect Plague
- CDPHE identified *Yersinia pestis* by PCR
  - Confirmed Plague diagnosis by culture and serum antibodies
Case #1 History

- June 24—Patient’s dog develops sudden, unexplained illness
- June 25—Dog has respiratory distress and has bloody discharge from nose and mouth, euthanized
- June 26—Dog sent for necropsy, plague not suspected or tested for
- July 8—Stored specimens *Yersinia pestis* positive
Case #2

- August 1—Develops Bubo
- August 2—Hospitalized w/ suspect plague
- Testing (Whole Blood)
  - Hosp. Lab grew gram negative rods
  - Automated system ID *Pseudomonas luteola*
  - HCP did NOT believe this to be Plague
- CDPHE cultured *Yersinia pestis*
- Confirmed Plague diagnosis
Case #3

- **August 26th**—Fever, vomiting, back pain
- Exposures consistent with plague
- **August 29th**—Pt. hospitalized
- **Testing (Whole Blood)**
  - Hosp. Lab grew gram negative rods
  - Automated system ID’d *Yersinia pestis*
  - HCP did NOT believe this to be Plague b/c the patient did not have bubos
- CDPHE cultured *Yersinia pestis*
- Confirmed Plague diagnosis
Case #4

- October 28th—Fever and painful lymph node
- October 30th—Hospitalized
  - Sepsis and bubo
  - Isolate sent directly to CDPHE
  - CDPHE cultured *Yersinia pestis*
  - Confirmed Plague diagnosis
Case #5

- December 26 - Influenza-like illness & enlarged lymph nodes
- January 5th
  - Hosp lab automated system identified *Yersinia pseudotuberculosis*
- January 22nd
  - CDPHE cultured *Yersinia pestis*
  - Confirmed Plague diagnosis
What specimens do you take?

- Depends on Form of Disease
  - Lymph node aspirate
  - Blood culture
  - Sputum
  - Bronchial/tracheal wash
  - Postmortem organ tissues

- Goal is to isolate bacteria
Plague Treatment

- Take specimens first—then start!
- Do not wait for lab results to treat.
- Antibiotic choices:
  1. Streptomycin (or Gentamicin)-injectible
  2. Levofloxacin
  3. Moxifloxacin
  4. Doxycycline
  5. Ciprofloxacin

- Relapse of fever following antibiotic therapy may indicate a secondary site of infection.
Other Reportable Vector-borne Diseases within Colorado
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Hantavirus

SIN NOMBRE
West Nile virus

VECTOR: CULEX TARSALIS AND CULEX PIPIENS
West Nile virus cases, Colorado, 2017

Running weekly case count, 2002-2017 (2003 suppressed)

For questions, feedback, or more information contact us at 303-692-2700
Rabies

SOUTH CENTRAL SKUNK VARIANT AND BAT VARIANTS
Rabid Animals, Colorado, 2009-2018

- Bats
- Skunks
- Other Wildlife
- Domestic
Tularemia
FRANCISELLA TULARENSIS
Human Tularemia Cases, Colorado 1996-2017

135 Total Cases
Animal Tularemia Cases, Colorado 2005-2017

237 Total Animal Positives
Kissing Bugs in Colorado
THE VECTOR OF TRYPANOSSOMIA C RUIZ
Known to be in CO 6 counties (so far)
Zika virus in Colorado
INTERNATIONAL TRAVELERS
Zika Cases by Month of Onset

- January 2016: 2
- March 2016: 1
- May 2016: 1
- July 2016: 11
- September 2016: 5
- November 2016: 2
- January 2017: 1
- May 2017: 2
- July 2017: 1
- September 2017: 1
## Zika Cases by Exposure Country

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Questions?

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