

**Center for Public Health
Preparedness Grand Rounds**

Bioterrorism and Zoonoses

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Zoonosis

“Those diseases and infections which are
naturally transmitted between vertebrate
animals and man” (WHO)

“[diseases] that generally circulate in
animals hosts and are occasionally
transmitted to humans” (K. Rothman)

Characteristics of Zoonotic Diseases

- Causes disease in animals
 - But not necessarily!
 - Animal host is natural reservoir
 - But not always

Characteristics of Zoonotic Diseases (cont.)

- Transmission route to humans highly variable
 - Directly from animals
 - Environmental source
 - Vector-borne

Factors in the Emergence of Zoonotic Diseases in Humans

- Increased movement of people & animals
- Changes in food processing, importation & consumption

Factors in the Emergence of Zoonotic Diseases in Humans

cont.

- Changes in agricultural practices
 - Growing human population and increased urbanization
 - Environmental changes
 - Changes in distribution of animal/vector populations
 - Increasing immunocompromised population

Why do zoonoses matter?

- Some agents are common in our environment, pose a direct threat to humans
- Emerging disease threats
 - H5N1 influenza
 - Nipah
 - West Nile
 - Monkeypox
- Bioterrorism

Category 'A' BT Agents

- Anthrax (*Bacillus anthracis*)*
- Plague (*Yersinia pestis*)*
- Tularemia (*Francisella tularensis*)*
- Viral Hemorrhagic Fevers (Filoviruses and Arenaviruses)*
- Botulism (*Botulinum toxin*)
- Smallpox (*Variola major*)

* Zoonotic agents

Category B Agents

- Bacterial
 - Brucellosis*
 - Q Fever *
 - Glanders *
 - Melioidosis *
 - Food/ Water Borne Pathogens *
 - Psittacosis *
- * Zoonotic Agents

Category C BT Agents

- Viral
 - Viral encephalitides *
 - Nipah, Hanta* (Category 'C')
 - Tick-borne flaviviruses*
 - Toxins
 - Staph Enterotoxin B
 - Ricin
 - Tricothecene mycotoxins
- * Zoonotic Agents

Not Zoonoses

- Smallpox
- Meningococcal infection (*Neisseria meningitidis*)
- "Avian TB" (*Mycobacterium avium*/intracellulare)
- Pinworm (*Enterobius vermicularis*)
- Human Scabies
- SARS?

Epidemiology of Zoonotic Diseases

- Surveillance
- Case Investigation
- Control and Treatment of Cases
- Prevention

Surveillance: Human

- Many zoonoses currently reportable (e.g., BT agents, psittacosis, rabies, monkeypox)
- Some zoonoses are not currently reportable (e.g., leptospirosis, cat scratch disease)
- Other diseases may be zoonotic, but not investigated as zoonoses (e.g., enteric pathogens)

Surveillance: Animal

- Enhance surveillance for and detection of emerging zoonotic diseases in animals
 - Natural infections (West Nile)
 - Intentional release (Anthrax)
- Provide guidelines for response to detection of an emerging zoonotic disease in animals

Surveillance: Animal (cont.)

- Under State Ag Law, all infectious diseases in animals reportable to the State Veterinarian
- Principle issues regarding animal surveillance:
 - Who should get the report? (Ag or Health)
 - What is the baseline level of disease vs. emerging problem or intentional release (e.g. Q fever)?
 - What is the protocol for investigation and follow-up?

Surveillance: Animal (cont.)

May include monitoring animal/vector populations:

- Animal morbidity & mortality by a particular zoonosis (e.g. rabies)
- Presence of agent in sentinel animals (e.g. plague in rodents, arboviruses in birds)
- Changes in size & distribution of animal reservoirs & vectors of a disease (e.g. monitoring populations of deer & ticks)

Case Investigation: Human

- Clinical history
 - Onset, symptoms, tests done, pending
- Exposure history
 - Depends on disease suspected/confirmed
 - Travel, food, animals, other cases, occupation

Case Investigation: Human

(cont.)

- Contact Tracing
 - Depends on the disease suspected/confirmed
 - Family, friends, coworkers, daycare, events, etc.

Case Investigation: Animal

- Clinical history
 - Onset, symptoms, tests done, pending
- Exposure history
 - Depends on disease suspected/confirmed
 - Travel, food (raw diets), other animals/people
 - Think about animal activities (boarding, shows, dog parks, training, vet, events)

Case Investigation: Animal (cont.)

- Contact Tracing
 - Consider animal activities
- Problems with clinical history
 - May be incomplete, patient can't talk
 - Owner may not seek care, \$\$
 - Veterinarian may be uncomfortable or unable to share info (confidentiality issues under state education law)
 - Investigator needs to understand disease process

Case Investigation: Animal (cont.)

- Problems with exp. history, contact tracing
 - Someone needs to know what to ask about, need to understand “owner behavior”

Prevention and Control

- Will depend on the specific disease and mode of transmission.
 - Vaccination
 - Infection control (handwashing, etc.)
 - Quarantine/isolation
 - Euthanasia

Responsibilities of Public Health Professionals

- Know the diseases of concern, but rely on vets for clinical expertise
- Establish good communication with the veterinary community
- Plan for response to potential cases

Work with Veterinarian Professionals to:

- Integrate them into the public health system
- Be aware of, contribute to, assist in development of surveillance programs
- Be involved with emergency response plans at all levels

Contacts for Public Health Professionals

- Phone numbers to know
 - State Veterinarian
 - State Public Health Veterinarian
 - Animal and Plant Health Inspection Service (APHIS) Area Veterinarian in Charge
 - Public Health Officials



Zoonotic Disease Scenario Monkeypox

1. A prairie dog owner calls because her pet has skin lesions and weepy eyes
 - Who will examine the animal? (and pay for it)
 - Who will investigate the source of the animal?
 - How will you assure infection control for:
 - Public Health staff
 - Veterinarian
 - What about the young children who were at the owners' house last weekend?

Monkeypox (cont.)

2. A vet sees a prairie dog with skin lesions, animal came from an implicated dealer
 - What will you tell the staff who handled the animal?
 - Who will get specimens to the state lab?
 - Who will investigate contacts?
 - How will you assure infection control for:
 - Public Health staff Veterinarian

Zoonotic Disease Scenario Possible Anthrax

- November, 2001: A woman visits NYC with her dog
- Claims a stranger on the subway pet her dog, left a "white powder" on its head
 - Who will examine the dog and collect specimens?
 - Where will the specimens be sent?
 - If this were a local event, who will be contacted for further investigation?

Salmonellosis

- Five human cases of *S. typhimurium* enteritis identified
 - 2 licensed veterinary technicians (LVTs) at vet clinic X
 - 3 clients of clinic X
 - Onset dates 7/22 – 8/22
 - All cases had matching PFGE patterns
 - Not a common PFGE type

Salmonellosis: issues

- Should the vet clinic be notified?
 - Who will do it?
- What is the next step in the investigation?
 - Who will visit clinic X?
 - Are there specimens to be taken?
 - What questions should be asked at clinic X?

Salmonellosis (cont.)

- All three owners brought pets in for similar dental procedures
 - All had subsequent transient diarrheal illness
- Is a public health intervention necessary?
 - Community notification? Hospitals? Vets?
- Should a client list be obtained? Can it be obtained?

Key conclusions

- Pets, livestock and wildlife can and do get zoonotic diseases
 - Sentinels for human disease
 - Source of infection for people, also infected BY people

Key conclusions

- Important to understand disease process, epidemiology in humans and animals
 - Leptospirosis: rarely direct transmission from pets
 - Salmonellosis: shed increases with antibiotic use, dental patients get antibiotics

Key conclusions

- Important to have clear legal grounds for intervention
 - Federal, state, local regulations
 - Reporting requirements, quarantine issues, client/patient information access
 - Remember client confidentiality: animals don't care, but owners do!

Key conclusions

- Important to work closely with Ag Dept.
 - Legal authority
 - Laboratory and field resources
- Good working relationship with local vets essential to public health
 - Rely on a vet as we would a primary care physician

Key conclusions

- Understand different economic structure
 - No insurance, no mandate for care, little institutionalized medicine (charity care)
- Little routine infection control
 - No smallpox vaccination
 - No N95 respirator masks
 - Rarely have facilities to effectively isolate patients