**Zoonoses and You**
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**Zoonosis**
- An infection or infestation shared in nature by humans and other animals
  - Stedman’s Medical Dictionary, 27th Edition

**Zoonotic Skew**
- 1709 Human Pathogens 49% zoonotic
- 156 emerging human pathogens 73% zoonotic
- Emerging pathogens 3 times more likely to be zoonotic.
  - Taylor & Woodhouse, ICEID 2000

**Zoonotic Agents of Concern**
- CDC has categorized biological agents of concern
- All but one Class A agent is zoonotic:
  - Viral Hemorrhagic Fevers
  - Plague
  - Tularemia
  - Anthrax
  - Smallpox
  - Botulism

**Zoonotic transmission**
- Possible routes:
  - Fecal Oral – bacterial, parasitic
  - Inhalation
  - Direct Contact
  - Vector Borne – mosquitoes and ticks
  - Penetrating Wounds

**Fecal-oral transmission**
- *Salmonella*  
- *Campylobacter*  
- *E. coli O157:H7*  
- *Giardia*  
- *Cryptosporidia*  
- *Ancylostoma*  
- *Toxoplasma*  
- *Listeria*  
- *Trichinella*  
- *Toxocara*
Salmonella

- Bacteria
- Frequently reported in Virginia (>1000 cases/year)
- ~30,000 reported to CDC/year
- Over 1 million cases suspected
- ~2000 serotypes cause disease

Salmonella

- Commonly associated with meat, poultry, and dairy
- Wide reservoir in animals and environment

Salmonella Outbreaks

- 2000-06 in Virginia
  - Range 3-7/year
  - Some multistate
  - Common serotypes: *enteritidis*, *typhimurium*, *newport*
  - Foods: eggs, tomatoes, beef, mangoes, salad

Salmonella Outbreaks, US

- *Salmonella Stpaul*

Salmonella Outbreak in 2003, VA

- Incubation 6-72 hours
- Vomiting, stomach cramps, diarrhea
- 15-20 bacteria to infect
- Mostly self-limiting

Date of onset – December 2003

Case
Culture positive

Cases
**Salmonella-Prevention**

- Avoid consumption of raw meats and raw dairy
- Avoid temperature abuse and cross contamination
- Wash produce thoroughly
- Hand washing

**E. Coli O157:H7**

- Reportable in VA since 1999
- ~70 cases reported/year in VA
- CDC estimates 73,000 cases/year

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**E. coli O157:H7 in the news**

WASHINGTON (Reuters) - U.S. food safety inspectors said Tuesday they will expand tests and recall infected meat more rapidly to combat E. coli contamination of meat products after the largest American manufacturer of hamburger patties went out of business this month. The U.S. Agriculture Department’s Food Safety and Inspection Service said in a briefing the number of E. coli recalls climbed to 15 so far in 2007 compared to the five cases reported in all of 2005.

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**E. Coli O157:H7**

- E. coli found in intestines of all animals and humans
- O157:H7 found in cattle and maybe deer produces a toxin

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**E. Coli O157:H7**

- Thought that 10 bacteria can infect
- Incubation 3-4 days
- Bloody diarrhea, stomach cramps
- Potential kidney failure
E. Coli-Prevention

- Avoid cross contamination
- Thoroughly cooking all foods
- Avoid consumption of raw meats and raw dairy
- Wash produce thoroughly
- Hand washing

Giardia

- Protozoan parasite
- ~400 cases reported in VA/year
- ~20,000 cases reported in US/year
- Most common intestinal parasite IDed by PH labs in the US

Giardia

- Found in soil, food, water, or surfaces that have been contaminated with infected feces
- 1 organism can cause disease
- Can be found in a wide variety of animals

Giardia Outbreaks in Virginia

- 10/06 Giardia associated with a public pool
- 9/06 Giardia associated with a daycare

Giardia-Prevention

- Carefully dispose of sewage wastes so as not to contaminate surface or groundwater
- Avoid drinking improperly treated water
- Hand washing
**Cryptosporidium**
- Protozoan parasite
- ~40 cases reported in VA/year
- ~3000 cases reported in US/year

**Cryptosporidium**
- Young cattle, pigs, horses and sheep can manifest clinical signs
- Immunosuppressed animals
- Hardy in the environment
- Not species specific

**Cryptosporidium**
- Incubation about 7 days
- Clinical symptoms:
  - Diarrhea
  - Abdominal cramps
- Asymptomatic carriers are common

**Cryptosporidium - Prevention**
- Persons with diarrhea should not use public swimming facilities
- Avoid water or food that may be contaminated
- Hand washing

**Inhalation Transmission**
- Psittacosis
- Histoplasmosis
- Hantavirus
- *Coxiella burnetii* (Q Fever)
- Tuberculosis

**Psittacosis**
- Caused by *Chlamydia phila psittaci*
- Rarely reported in VA
- <50 cases reported/year in US
Psittacosis
- Birds shed intermittently in feces and respiratory secretions
- Often no signs in infected birds
- Stress initiates shedding/illness

Psittacosis
- Inhaled from desiccated droppings/secretions, dust from feathers
- Incubation 1-4 weeks
- Fever, headache, rash, chills
- Only rare instances of person to person spread

Psittacosis Investigation
- 7/06: Psittacosis in a hobby breeding operation in southwest Virginia
- 12/07: Pet store follow up

Psittacosis-Prevention
- Diagnose and treat sick birds
- Clean bird cages regularly
- Use of protective clothing and equipment when working with birds

Histoplasmosis
- Histoplasmosis is a fungal disease
- This fungus grows in soil and material contaminated with bat or bird droppings
- The fungal spores become airborne when the soil is disturbed
- People breathe in the spores and become infected

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**Histoplasmosis**
- Most people exposed to the fungus have no ill effects
- The acute form of the disease is characterized by respiratory symptoms
- The disseminated form can be fatal
- Young children and older persons are at an increased risk for severe disease

**Histoplasmosis**
- Reduce exposure
  - Avoid areas with accumulations of bird or bat droppings
  - Wear personal protective equipment when necessary

**Direct Contact Transmission**
- **Leptospirosis**
- **Tularemia**
- **Brucellosis**
- **HP H5N1 avian influenza**
- **Methicillin-resistant Staphylococcus aureus** (MRSA)

**Leptospirosis**
- Caused by spiral shaped bacteria (leptospires)
- Over 200 serovars have been described
- Wild and domestic animals are reservoirs; serovars vary with species of animal

**Leptospirosis-Transmission**
- Direct and indirect
  - Contact with urine, infected tissues, bite wounds, venereal transmission
  - Contact with contaminated water sources, food, bedding
  - Contact with mucous membranes and/or abraded/scratched/water-softened skin

**Leptospirosis-Animals**
- Wide variety of clinical signs or asymptomatic
- Depends on species, immunity, age, stage of gestation, serovar
  - Renal disease
  - Liver disease
  - Coagulopathy
  - Abortion/infertility
  - Decreased milk production
**Leptospirosis-Human**
- Severity of illness can vary
- Initial symptoms often flu-like and usually begin 10 days after exposure (range 2-30)
- Can cause renal disease and coagulopathy
- Person to person transmission rare
- Antibiotic prophylaxis typically not recommended

**Leptospirosis-Human Exposures**
- Most human illness caused by occupational or recreational exposures
  - Infected wildlife
  - Infected domestic animals
  - Contaminated recreational water

**Leptospirosis-Control**
- Avoid contact with urine, other fluids of sick animals
  - Good barrier precautions: gloves, face protection, hand washing
- Isolate infected animals if possible
- Vaccinate livestock and pets
- Avoid water with potential contamination
- Control rodents

**Methicillin-resistant *Staphylococcus Aureus* (MRSA)**
- *Staph. aureus* very common in people
  - 30% of people colonized at any time; transient
- MRSA first described in 1968 and increasingly important cause of human healthcare associated infections since then
- Emergence of community associated MRSA (CA-MRSA) in 1990s
  - <2% of general public colonized with MRSA

**MRSA in People**
- Transmission by direct contact
- Skin and Soft Tissue Infections predominate (especially in CA-MRSA)
- Other documented infections include UTIs, sinusitis, pneumonia and surgical site infections

**MRSA in Animals**
- First described in 1972 (bovine)
- Has been reported in many animals
  - Dogs, cats, horses, pigs and others
- Sporadic reports in 1990s
MRSA in Animals
- Later reports of larger numbers of infections and suggestions of interspecies transmission
- Types of infections similar to humans
  - Skin and soft tissue, surgical site
- Transmission by direct contact
  - Direction unclear

Antech data
- >1000 isolates in 2007
- 27% of *S. aureus* from ears (dogs)
- 50% of *S. aureus* skin infections (dogs)
- 75% *S. aureus* wound infections (dogs)
- About 5% of all wound infections and 3% of all ear infections

MRSA in Animals
- Colonization rate estimated at 3%
  - Uncommon, but increasing
  - Reports of higher prevalence in pets of people with CA-MRSA
- Colonization transient
  - Typically a few weeks

MRSA-Infection Control
- Consider screening pets if infection is persistent within a household
- No evidence that decolonization of animals is effective
- Treatment options for colonized pets not well defined and may not be necessary

MRSA-Infection Control
- Keep cuts/scrapes clean and covered
- Avoid direct and indirect contact with wound drainage
- Prompt attention to skin infections
- Clean hands and shower regularly, particularly after skin to skin contact and contact with shared environmental surfaces

Vector Borne Transmission
- Arboviral encephalitis
  - Examples: West Nile virus (WNV), Eastern equine encephalitis (EEE)
- Rocky Mountain spotted fever
- Lyme disease
- Ehrlichiosis
West Nile Virus

- Mosquito borne
- 1999 - First identified in US
- 2002 - First identified in VA
- Number of cases in US have ranged from 62 to ~3800/year
- Number of cases in VA have ranged from 0 to 29

West Nile Virus

- Non-Neuroinvasive Disease
  - Mild, flu-like, self limiting
  - Resolves in ~1 week
- Neuroinvasive Disease
  - ~1/150 people
  - Meningitis, encephalitis

West Nile Virus “Iceberg”

- ~20% "West Nile Fever"
- ~80% Asymptomatic

WNV-Prevention

- Long, loose, light clothing
- Repellants - DEET (<50% adults; <30% children)
- Screens on windows
- Avoid environments/times of day when mosquitoes biting

WNV-Prevention

- Mosquito Control
  - Eliminate breeding sites
    - proper drainage
    - remove or turn over water containers
    - change bird baths weekly
  - Larvicide
  - Adulticide - aerial spraying after Hurricane Isabel
Lyme disease

First discovered in 1975
- Lyme, Connecticut
Tick borne disease
- ~20,000 cases/year in US
- ~200 cases/year in VA
Dogs considered good sentinels

Lyme disease

Erythema migrans (EM)
- 3 to 32 days after tick exposure
Headache, fever, stiff neck
Muscle aches and joint pain
Swollen lymph nodes
Potential chronic complications

EM Lesion

Lyme disease-Prevention

- Avoid tick-infested areas such as tall grass and dense vegetation.
- Keep grass cut and underbrush thinned in yards.
- Wear light-colored clothing.
- Tuck pant legs into socks and boots.
Wear long sleeved shirts buttoned at the wrist.
Lyme disease-Prevention

- Conduct tick checks on yourself, your children and your pets every four to six hours.
- Apply tick repellent to areas of the body and clothing that may come in contact with grass and brush.
- Tick control for pets.

Wound Transmission

- Tetanus
- Cat Scratch disease
- Rabies

Good Resources

- www.cdc.gov/healthypets
- www.cdc.gov/ncidod/dvrd/rabies
- www.nasphv.org

Good Resources

- www.vdh.virginia.gov
  - VDH Programs
  - Epidemiology Program
  - Zoonotic and Environmental Epidemiology