Introduction to Tickborne Diseases

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Overview of Tickborne Diseases

• Introduction
• Lyme disease
• Tickborne rickettsial diseases
• Babesiosis
• Prevention of tickborne diseases
• Case ascertainment exercise
Tickborne Diseases

- Diseases spread by bites from infected ticks
- Can be caused by bacteria, viruses, and parasites
- Most infections occur in the spring and summer months
- Geographic distribution of tick species impacts location of human infections
Tick Life Cycle

• Hard ticks have four life stages
  – Egg
  – Six-legged larvae
  – Eight-legged nymph
  – Adult
• Most ticks prefer to feed on different hosts at each life stage
• Ticks can feed on mammals, birds, reptiles, and amphibians
Risk of human infection greatest in late spring and summer.
Symptoms of Tickborne Diseases

- Many diseases produce similar symptoms
- Asymptomatic or mild to life-threatening illness
- Most common symptoms
  - Fever/chills
  - Aches and pains
  - Rash
    - Proportion of people with rash varies among diseases
    - Distinctive rash appearance among diseases
Treatment of Tickborne Diseases

• Supportive therapy
• Antibiotic therapy for bacterial tickborne diseases
  – Doxycycline commonly used
  – Duration of therapy varies by disease
Diagnosis of Tickborne Diseases

- Can be difficult to diagnose
- Clinical signs and symptoms
- Patient history
  - Tick bite or tick exposure
- Laboratory findings
- Diagnostic tests
  - Serology
  - Polymerase chain reaction (PCR)
  - Immunohistochemistry (IHC)
  - Culture
Tickborne Diseases in the United States

- Lyme disease
- Rocky Mountain Spotted Fever
- Other Spotted Fevers
- Ehrlichiosis
- Anaplasmosis
- Babesiosis
- STARI
- Powassan
- Tularemia
- Others
Lyme Disease

• Most common tickborne disease in US
• Bacterial disease
  – *Borrelia burgdorferi*
• Transmitted by blacklegged tick and western blacklegged tick
Geographic Distribution of Blacklegged Tick

Blacklegged Tick
(Ixodes scapularis)
Rocky Mountain Spotted Fever and Other Spotted Fevers

• Bacterial diseases
  – *Rickettsia rickettsii*
  – *Rickettsia parkeri*
  – *Rickettsia philipi* (proposed)

• Transmitted by American dog tick, Rocky Mountain wood tick, brown dog tick, Pacific coast tick, and Gulf coast tick
Geographic Distribution of American Dog Tick

American Dog Tick
(Dermacentor variabilis)
Geographic Distribution of Brown Dog Tick

Brown Dog Tick
(Rhipicephalus sanguineus)
Ehrlichiosis and Anaplasmosis

• Bacterial diseases
  – *Ehrlichia chaffeensis*
  – *Ehrlichia ewingii*
  – *Anaplasma phagocytophilum*

• Transmitted by blacklegged tick, lone star tick, and western blacklegged tick
Geographic Distribution of Lone Star Tick

Lone Star Tick
(Amblyomma americanum)
Babesiosis

- Caused by parasites that infect red blood cells
  - Species found to infect humans include *Babesia microti, B. divergens, and B. duncani*
- Transmitted by blacklegged tick
- Less commonly congenital transmission and blood donor-associated cases have been identified
STARI (Southern Tick Associated Rash Illness)

- Cause is unknown
- Rash appearance similar to Lyme disease
- Has not been linked to arthritic, neurologic, or chronic symptoms
- Transmitted by lone star tick
- Most cases found in southeastern US
Powassan

• Arbovirus
• Causes encephalitis
• Most cases in northern US
• Transmitted by blacklegged tick and a related tick, *Ixodes cookei*
Tularemia

- Less common tickborne disease
- Bacterial disease
  - *Francisella tularensis*
- Transmitted by American dog tick, lone star tick, and Rocky Mountain wood tick
- Other transmission routes include deer fly bites, inhalation, ingestion, skin contact with infected animals
- Cases found in every state except Hawaii
Other Tickborne Diseases

• Tickborne relapsing fever
• Colorado tick fever
• Tickborne diseases abroad
  – Tickborne encephalitis
  – Crimean-Congo hemorrhagic fever
Summary

• Numerous tickborne diseases can infect humans and cause disease
• Several tick species transmit tickborne diseases
  – Found in various geographic regions
• Symptoms can be similar among tickborne diseases
• Diagnosis can be difficult
More Information to Come...

- Lyme disease
- Tickborne Rickettsial diseases
  - Rocky Mountain Spotted Fever
  - Ehrlichiosis
  - Anaplasmosis
- Babesiosis
- Prevention of tickborne diseases
Case Investigation Procedure

1. Positive lab report received at health department
2. Call healthcare provider
3. Collect clinical data, patient history, supplemental labs
4. Follow up if no response after 3-4 days
5. If needed, attempt to contact patient
6. Collect exposure and other relevant information from case
7. Attempt patient contact for 5-10 days
8. Enter all data into WVEDSS and send case to regional review