

# DISEASE CONTROL 101: ENTERIC DISEASES

LAURA CRONQUIST  
FOODBORNE/VECTORBORNE AND SPECIAL PROJECTS  
EPIDEMIOLOGIST  
DECEMBER 3, 2015



---

---

---

---

---

---

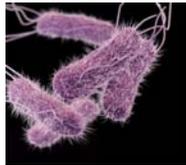
---

---

## SALMONELLOSIS

### Causative Agent

- *Salmonella* bacteria
  - Gram-negative
  - Rod-shaped
- Species
  - *Salmonella enterica*
  - *Salmonella bongori*
- Serotypes
  - Over 2,500
  - Most common
    - *Salmonella* Typhimurium
    - *Salmonella* Enteritidis



---

---

---

---

---

---

---

---

## SALMONELLOSIS

### Sources of Infection

- Eating contaminated food
  - Often foods of animal origin
  - Cross-contamination of any food is possible
- Drinking contaminated water
- Contact with infected animals
  - Touching infected animals and not washing your hands
  - Direct contact with the area where an infected animal lives

### High risk groups

- Children younger than 5 years of age
- Adults older than 65 years of age
- Immunocompromised



---

---

---

---

---

---

---

---

## SALMONELLOSIS

### Symptoms

- Diarrhea (may be bloody)
- Fever
- Abdominal cramps and/or pain
- Nausea
- Vomiting

### Incubation Period

- Usually 12—36 hours (range 6 hours to 16 days)

### Duration

- Typically 4—7 days



---

---

---

---

---

---

---

---

## SALMONELLOSIS

### Diagnosis

- Laboratory testing of a clinical specimen
  - Stool
  - Urine
  - Blood
  - Wound



---

---

---

---

---

---

---

---

## SALMONELLOSIS

### Treatment

- Uncomplicated gastroenteritis
  - Antibiotics are **not** recommended
  - Rehydration
  - Electrolyte replacement
- Antibiotics are *only* recommended for patients who:
  - Have serious illness
  - Are at high risk for serious disease or complications



---

---

---

---

---

---

---

---

## SALMONELLOSIS

**Exclusion Criteria**

- Day care exclusion
  - Exclude until asymptomatic
- Food employee exclusion
  - Exclude until asymptomatic and 2 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics
- Health care employee exclusion
  - Exclude until asymptomatic



---

---

---

---

---

---

---

---

## SALMONELLOSIS

**Statistics**

- United States
  - 1.2 million illnesses per year
  - 450 deaths per year
- North Dakota
  - 2014: 87 cases



---

---

---

---

---

---

---

---

## TYPHOID FEVER

**General Information**

- Life-threatening illness caused by *Salmonella* Typhi
- Human reservoir
- Signs and symptoms: high fever, weakness, stomach pain, headache, anorexia, rash (sometimes)
- Treatment: antibiotics
- Vaccine is available for travelers

**Statistics**

- United States
  - About 5,700 cases annually
- North Dakota
  - 2014: 2 cases



---

---

---

---

---

---

---

---

## TYPHOID FEVER

### Exclusion Criteria

- Day care exclusion
  - Exclude until asymptomatic and 3 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics
- Food employee exclusion
  - Exclude until asymptomatic and 3 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics
- Health care employee exclusion
  - Exclude until asymptomatic and 3 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics



---

---

---

---

---

---

---

---

## E. COLI

### Causative Agent

- *Escherichia coli* bacteria
  - Gram-negative
  - Rod-shaped



### Sources of Infection

- Consumption of contaminated food
- Consumption of unpasteurized (raw) milk
- Consumption of contaminated water
- Contact with infected animals
- Contact with the feces of infected people



---

---

---

---

---

---

---

---

## E. COLI

### Symptoms

- Diarrhea (often bloody)
- Fever (usually not high)
- Severe abdominal cramps and/or pain
- Nausea
- Vomiting

### Incubation Period

- Usually 3—4 days (range 2—10 days)

### Duration

- Typically 5—7 days



---

---

---

---

---

---

---

---

**E. COLI**

**Diagnosis**

- Laboratory testing of a clinical specimen
  - Stool

**Treatment**

- Non-specific supportive therapy
  - Fluid and electrolyte replacement
- Antibiotics should **not** be used
  - May increase the risk of serious complications (i.e., HUS)



---

---

---

---

---

---

---

---

**E. COLI**

**Serious complications**

- Hemolytic Uremic Syndrome (HUS)
  - Occurs in about 5—10% of cases
  - Characterized by:
    - Hemolytic anemia
    - Thrombocytopenia
    - Acute renal dysfunction
  - Signs and symptoms may include:
    - Decreased frequency of urination
    - Extreme fatigue
    - Loss of pink color in cheeks and inside lower eyelids



---

---

---

---

---

---

---

---

**E. COLI**

**Exclusion Criteria**

- Day care exclusion
  - Exclude until asymptomatic and 2 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics
- Food employee exclusion
  - Exclude until asymptomatic and 2 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics
- Health care employee exclusion
  - Exclude until asymptomatic and 2 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics



---

---

---

---

---

---

---

---

## E. COLI

**Statistics**

- United States
  - 73,000 illnesses per year
  - 61 deaths per year
- North Dakota
  - 2014
    - 12 cases of O157:H7
    - 27 cases of non-O157



---

---

---

---

---

---

---

---

## CAMPYLOBACTER

**Causative Agent**

- Gram-negative bacteria
- S-shaped or spiral rods



**Sources of Infection**

- Raw and undercooked poultry
- Unpasteurized (raw) milk
- Untreated water



---

---

---

---

---

---

---

---

## CAMPYLOBACTER

**Symptoms**

- Diarrhea (may be bloody)
- Abdominal pain
- Fever
- Malaise
- Nausea
- Vomiting

**Incubation Period**

- Usually 2—5 days (range 1—10 days)

**Duration**

- Several days to 2 weeks



---

---

---

---

---

---

---

---

## CAMPYLOBACTER

### Diagnosis

- Laboratory testing of a clinical specimen

### Treatment

- Non-specific supportive therapy
  - Fluid and electrolyte replacement
- Antibiotics indicated only for patients who have severe disease or those who are at high risk for severe disease



---

---

---

---

---

---

---

---

## CAMPYLOBACTER

### Statistics

- United States
  - Most common bacterial cause of diarrhea
  - Over 1.3 million cases per year
  - About 76 deaths per year
- North Dakota
  - 2014: 120 cases



---

---

---

---

---

---

---

---

## SHIGELLOSIS

### Causative Agent

- Gram-negative *Shigella* bacteria
- Straight rods
- Non-motile



### Sources of Infection

- Person-to-person
- Contaminated food
- Contaminated water



---

---

---

---

---

---

---

---

## SHIGELLOSIS

**Symptoms**

- Diarrhea (sometimes bloody)
- Abdominal pain
- Fever
- Sometimes include: toxemia, vomiting, cramps, tenesmus

**Incubation Period**

- Usually 1—2 days (range 12—96 hours)

**Duration**

- Usually 4—7 days



---

---

---

---

---

---

---

---

## SHIGELLOSIS

**Diagnosis**

- Laboratory testing of a clinical specimen

**Treatment**

- Non-specific supportive therapy
  - Fluid and electrolyte replacement
  - Rest
- Antibiotics indicated only for patients who have severe disease
  - Antimicrobial susceptibility testing



---

---

---

---

---

---

---

---

## SHIGELLOSIS

**Exclusion Criteria**

- Day care exclusion
  - Exclude until asymptomatic and 2 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics
- Food employee exclusion
  - Exclude until asymptomatic and 2 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics
- Health care employee exclusion
  - Exclude until asymptomatic and 2 consecutive negative stool specimens collected 24 hours apart and 48 hours after completion of antibiotics



---

---

---

---

---

---

---

---

## SHIGELLOSIS

### Statistics

- United States
  - Estimated 500,000 cases per year
- North Dakota
  - 2014: 21 cases



---

---

---

---

---

---

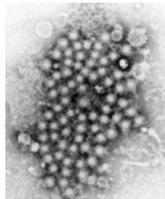
---

---

## HEPATITIS A

### Causative Agent

- Hepatitis A virus (HAV)
  - Positive-strand RNA virus



### Sources of Infection

- Person-to-person
- Contaminated food
- Contaminated water



---

---

---

---

---

---

---

---

## HEPATITIS A

### Clinical case definition for acute viral hepatitis:

1. Discrete onset of symptoms
  - Nausea
  - Anorexia
  - Fever
  - Malaise
  - Abdominal pain
2. Jaundice or elevated serum aminotransferase levels
  - ALT
  - AST



---

---

---

---

---

---

---

---

## HEPATITIS A

### Symptoms

- Nausea
- Anorexia
- Abdominal pain
- Fever
- Malaise

### Incubation Period

- About 28 days (range 15—50 days)

### Duration

- Usually less than 2 months
  - 10—15% cases have prolonged disease for up to 6 months




---

---

---

---

---

---

---

---

---

---

## HEPATITIS A

### Diagnosis

- Laboratory testing of blood specimen for anti-HAV IgM

### Treatment

- Non-specific supportive care

### Post-exposure immunization of contacts

- When given within 14 days of exposure, Hepatitis A vaccine or Immunoglobulin is 80-90% effective in preventing Hepatitis A
  - Also recommended pre-exposure for travelers to high risk countries




---

---

---

---

---

---

---

---

---

---

## HEPATITIS A

### Exclusion Criteria

- Day care exclusion
  - Exclude for 1 week after onset of illness
- Food employee exclusion
  - Exclude if jaundiced within 7 days or diagnosed with Hepatitis A within 14 days of illness onset
- Health care employee exclusion
  - Exclude/Restrict from patient care areas or food handling
  - Return to regular duties 1 week after onset of illness




---

---

---

---

---

---

---

---

---

---

## HEPATITIS A

### Statistics

- United States
  - Estimated 3,500 cases per year
- North Dakota
  - 2014: 8 cases



---

---

---

---

---

---

---

---

## CRYPTOSPORIDIOSIS

### Causative Agent

- *Cryptosporidium*
  - Microscopic parasite
  - Protective outer shell

### Sources of Infection

- Contaminated water
- Contaminated food
- Person-to-person



---

---

---

---

---

---

---

---

## CRYPTOSPORIDIOSIS

### Symptoms

- Watery diarrhea
- Abdominal pain and/or cramps
- Fever
- Nausea
- Vomiting
- Weight loss

### Incubation Period

- Usually 7 days (range 1—12 days)

### Duration

- Usually 1—2 weeks (range 3—28+ days)



---

---

---

---

---

---

---

---

## CRYPTOSPORIDIOSIS

### Diagnosis

- Laboratory testing of a stool specimen

### Treatment

- Non-specific supportive therapy for most patients
  - Fluid and electrolyte replacement
- May be treated with antiprotozoal medication



---

---

---

---

---

---

---

---

## CRYPTOSPORIDIOSIS

### Statistics

- United States
  - Estimated 3,500 cases per year
- North Dakota
  - 2014: 146 cases



---

---

---

---

---

---

---

---

## GIARDIASIS

### Causative Agent

- *Giardia*
  - Microscopic parasite
  - Protective outer shell

### Sources of Infection

- Contaminated water
- Contaminated food
- Person-to-person



---

---

---

---

---

---

---

---

## GIARDIASIS

**Symptoms**

- Diarrhea
- Greasy stool that can float
- Abdominal cramps
- Gas or flatulence
- Nausea
- Weight loss

**Incubation Period**

- About 7—10 days (range 3—25 days)

**Duration**

- Usually 2—6 weeks



---

---

---

---

---

---

---

---

## GIARDIASIS

**Diagnosis**

- Laboratory testing of a stool specimen

**Treatment**

- Medications
- Fluid and electrolyte replacement



---

---

---

---

---

---

---

---

## GIARDIASIS

**Statistics**

- United States
  - Estimated 3,500 cases per year
- North Dakota
  - 2014: 39 cases



---

---

---

---

---

---

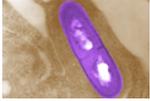
---

---

## LISTERIOSIS

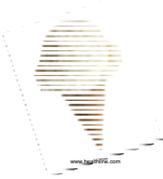
**Causative Agent**

- *Listeria monocytogenes*
  - Gram-positive bacteria
  - Single short rods or chains



**Sources of Infection**

- Cold and/or wet places
  - Soft cheeses
  - Deli meats
  - Hotdogs
  - Food processing plants
- Dairy products



www.nda.gov



---

---

---

---

---

---

---

---

## LISTERIOSIS

**Symptoms**

- Fever
- Muscle aches
- Sometimes preceded by diarrhea or other GI symptoms

**Incubation Period**

- Typically 2—3 weeks

**Duration**

- Usually 2—6 weeks



---

---

---

---

---

---

---

---

## LISTERIOSIS

**Diagnosis**

- Laboratory testing of a specimen from a normally sterile site

**Treatment**

- Antibiotics



---

---

---

---

---

---

---

---

## LISTERIOSIS

### Statistics

- United States
  - Estimated 3,500 cases per year
- North Dakota
  - 2014: 1 case



---

---

---

---

---

---

---

---

## VIBRIOSIS

### Causative Agent

- *Vibrio* bacteria species
  - Gram-negative
  - Rod-shaped

### Sources of Infection

- Contaminated water or food sources
- Raw or undercooked shellfish



---

---

---

---

---

---

---

---

## VIBRIOSIS

### Symptoms

- Watery diarrhea
- Abdominal cramping and/or pain
- Nausea
- Vomiting
- Fever
- Can cause wound or soft tissue infections

### Incubation Period

- Depends on species; usually 12—72 hours

### Duration

- Depends on species



---

---

---

---

---

---

---

---

**VIBRIOSIS**

**Diagnosis**

- Laboratory testing of clinical specimen

**Treatment**

- Recommendations vary depending on species
  - If *V. vulnificus* suspected, treat immediately
  - Treatment usually not necessary for *V. parahaemolyticus*
- Fluid and electrolyte replacement



---

---

---

---

---

---

---

---

**VIBRIOSIS**

**Statistics**

- United States
  - 944 cases in 2012
- North Dakota
  - 2014: 1 case



---

---

---

---

---

---

---

---

**CHOLERA**

**Causative Agent**

- Toxigenic *Vibrio cholerae* serogroup O1 or O139

**Incubation Period**

- Typically 2—3 days (range: a few hours to 5 days)

**Symptoms**

- Most cases are mild or asymptomatic
- 5—10% have severe disease
  - Profuse watery diarrhea, vomiting, leg cramps
  - Can lead to dehydration and shock, death

**Treatment**

- Fluid and electrolyte replacement, antibiotics



---

---

---

---

---

---

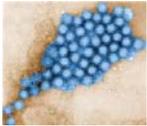
---

---

## NOROVIRUS

**Causative Agent**

- Noroviruses
  - Highly contagious!



**Sources of Infection**

- Contaminated food or drinks
- Touching contaminated surfaces or objects, then putting your fingers in your mouth
- Direct contact with someone who is infected
  - Outbreaks are often linked to daycare centers, nursing homes, schools, and cruise ships

 NORTH DAKOTA DEPARTMENT OF HEALTH

---

---

---

---

---

---

---

---

## NOROVIRUS

**Symptoms**

- Nausea
- Abdominal cramping and/or pain
- Vomiting
- Diarrhea
- Sometimes: fever/chills, headache, muscle aches, fatigue

**Incubation Period**

- Usually 12—48 hours

**Duration**

- About 1—3 days

 NORTH DAKOTA DEPARTMENT OF HEALTH

---

---

---

---

---

---

---

---

## NOROVIRUS

**Diagnosis**

- Laboratory testing of clinical specimen

**Treatment**

- Fluid and electrolyte replacement

 NORTH DAKOTA DEPARTMENT OF HEALTH

---

---

---

---

---

---

---

---

## NOROVIRUS

### Exclusion Criteria

- Day care exclusion
  - Exclude until 48 hours after symptoms have resolved
- Food employee exclusion
  - Exclude until 48 hours after symptoms have resolved
- Health care employee exclusion
  - Exclude until 48 hours after symptoms have resolved



---

---

---

---

---

---

---

---

## NOROVIRUS

### Statistics

- United States
  - 19—21 million cases of acute gastroenteritis
  - 56,000—71,000 hospitalizations
  - 570—800 deaths
- North Dakota
  - Single cases are not reportable



---

---

---

---

---

---

---

---

## QUESTIONS?



---

---

---

---

---

---

---

---