FOODBOURNE ILLNESSES
II Gastroenteritis

St. Charles Bend Grand Rounds
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UNIVERSITY OF CALIFORNIA IRVINE
SCHOOL OF MEDICINE

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• NO DECLARATIONS OR PAID ASSOCIATIONS
SAVE THE UNIVERSITY OF CALIFORNIA AND
THE IRVINE HEALTH ASSOCIATION A
PHILANTHROPIC ORGANIZATION DEDICATED
TO IMPROVING HEALTH CARE IN ORANGE
COUNTY, CALIFORNIA

AGENTS CAUSING GASTROENTERITIS

• MICROORGANISMS
• VIRUSES
• BACTERIA
• PARASITES
• TOXIC CHEMICALS

STOOL CULTURES IN THE USA ARE POSITIVE
FOE BACTERIAL PATHOGENS IN ONLY 1.5 TO
6.0 % OF CASES

GASTROINTESTINAL INFECTIONS
PATHOGENIC MECHANISMS

• PREFORMED TOXINS
• STAPHYLOCOCCI
• BACILLUS CEREUS
• TOXINS MADE AFTER INGESTION
• VIBRIOS
• ENTEROTOXIC E COLI
• SHIGELLA TOXIN E COLI
• CLOSTRIDIUM PERFRINGENS
• INVADE AND DAMAGE EPITHELIUM
• SALMONELLA
• SHIGELLA
• CAMPYLOBACTER
• YERSINIA
• VIBRIOS
TYPES OF GI MANIFESTATIONS

- SMALL BOWEL LOCALIZATION
- WATERY
- FREQUENT
- LARGE VOLUME
- CRAMPS, BLOATING
- LARGE BOWEL LOCALIZATION
- FREQUENT SMALL VOLUME
- PAINFUL
- BLOOD, MUCOUS, PUS

EVALUATION

- DURATION, FREQUENCY, CHARACTER OF STOOLS
- TIME FROM SUSPECT FOOD TO ILLNESS
- PRESENCE OF FEVER
- PRESENCE AND TYPE OF PAINS
- VOLUME STATUS OF PATIENT
- COMORBIDITIES, PREGNANCY
- DURATION OF ILLNESS

MAJOR GI MANIFESTATIONS

- VOMITING
- STAPH
- B CEREUS
- NOROVIRUSES
- WATERY DIARRHEA
- CLOSTRIDIUM PERFRINGENS
- ETEC
- VIRUSES
- CYTOSPORIDIA
- CYCLOSPORIDIA
- INFLAMMATORY DIARRHEA
- STEC
- SHIGELLA
- CAMPYLOBACTER
- SALMONELLA
- ENTAMEBA HISTOLYTICA
- C DIFF
- C DIFF

INDICATORS OF MORE SERIOUS ISSUES

- BLOODY DIARRHEA
- HIGH FEVER
- PERSISTING FEVER
- SEVERE PAIN
- ABNORMAL PHYSICAL FINDINGS
- VOLUME DEPLETION
- HISTORY OF INFLAMMATORY BOWEL DISEASE
NEED TO CULTURE

• PRESENCE OF MORE SERIOUS SYMPTOMS OR SIGNS
• PERSISTENCE OF DIARRHEA OR FEVER
• SERIOUS COMORBIDITIES
• EPIDEMIC ILLNESSES
• PUBLIC HEALTH CONCERNS

VIRAL ETIOLOGY GASTROENTERITIS

• NOROVIRUS
• ROTAVIRUS
• ADENOVIRUSES
• ASTROVIRUSES
• OTHERS

BACTERIAL ETIOLOGY GASTROENTERITIS

• SALMONELLA
• CAMPYLOBACTER
• SHIGELLA
• E COLI (ETEC, STEC)
• CLOSTRIDIUM DIFFICILE, PERFRINGENS
• YERSINIA
• VIBRIOS (CHOLERA, VULNIFICANS, PARAHEMOLYTICUS)

PROTOZOA ETIOLOGIES GASTROENTERITIS

• ENTAMEBA HISTOLYTICA
• GIARDIA LAMBLIA
• CRYPTOSPORIDIA
• CYCLOSPORIDIA
• OTHERS
<table>
<thead>
<tr>
<th>NOROVIRUSES</th>
<th>ROTAVIRUSES</th>
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<tbody>
<tr>
<td>• MOST COMMON CAUSE OF EPIDEMIC GASTROENTERITIS (19-21 MILLION CASES/YR USA)</td>
<td>• PRIOR TO VACCINE, 1 IN 70 CHILDREN ADMITTED TO HOSPITAL WITH ROTAVIRUS DIARRHEA BEFORE AGE 5</td>
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<td>• &gt;90% YOUNG ADULTS SEROPOSITIVE</td>
<td>• FECAL ORAL SPREAD</td>
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<td>• PERSON TO PERSON SPREAD (10 VIRAL PARTICLES)</td>
<td>• INCUBATION PERIOD 2 TO 7 DAYS</td>
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<td>• VOMITING MOST COMMON</td>
<td>• FEVER, DIARRHEA, VOMITING, ABDOMINAL PAIN</td>
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<td>• IP 24 TO 48 HR DURATION 12 TO 60 HOURS</td>
<td>• LASTS UP TO 8 DAYS</td>
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<td>• REPEAT INFECTION POSSIBLE</td>
<td>• LIVE VIRUS VACCINE AVAILABLE: 85 TO 98% PROTECTIVE FOR SEVERE DISEASE</td>
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<td>• TREAT WITH FLUID AND ELECTROLYTES</td>
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<tr>
<th>SALMONELLA</th>
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<tr>
<td>• S ENTERICA; OVER 2500 VARIANTS BUT 10 SEROTYPES ACCOUNT FOR 73% OF INFECTIONS</td>
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<tr>
<td>• FOUR SYNDROMES</td>
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<tr>
<td>• GASTROENTERITIS</td>
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<tr>
<td>• ENTERIC FEVER</td>
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<tr>
<td>• LOCALIZED INFECTION</td>
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<td>• BACTEREMIA</td>
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<tr>
<td>• REQUIRES LARGE INOCULUM</td>
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<tr>
<td>• 2 TO 4 MILLION INFECTIONS/YEAR USA</td>
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<td>• ASSOCIATED WITH ANIMALS AND ANIMAL PRODUCTS</td>
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<td>• 1/10,000 EGGS INFECTED</td>
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<td>• INCUBATION PERIOD 12 TO 24 HOURS</td>
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<td>• FEBRILE DIARRHEA WITH CRAMPS</td>
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<td>• LASTS 4 TO 10 DAYS,</td>
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<td>• STOOL CULTURE</td>
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<td>• ANTIBIOTICS NOT USUALLY INDICATED</td>
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SHIGELLA GASTROENTERITIS

- Approximately 125,000 cases/year USA
- Very infectious, few bacteria required
- Human to human spread (20-40% in families)
- Incubation period 1 to 4 days
- Toxin produced
- Children under 5 most common
- High fever, blood, mucus stools
- Duration 2 to 3 days
- Culture stool
- Quinolones

SHIGELLA COMPLICATIONS

- Reactive arthritis
- Hemolytic uremic syndrome
- Seizures

CAMPYLOBACTER

- Almost 1 million cases per year USA
- 2 major types but Jejuni most common
- Associated with animal products: poultry (60%), meat
- Incubation period 5 to 7 days
- Blood in stools often
- Duration 7 days
- 1/3 high fever, rigors, myalgias, arthralgias
- Complications: reactive arthritis, Guillain Barre syndrome
- Treatment: quinolones, macrolides

YERSINIA ENTEROCOLITICA

- 3 pathogenic species, 2 cause diarrhea
- Zoonotic especially associated with pigs, pork
- IP 4 to 6 days
- Causes abdominal pain, fever, nausea, vomiting,
- Pain may be RLQ (mimic appendicitis)
- Complications: perforation, intussusception, megacolon
- Duration 12-22 days
- Culture stool, blood, tissues
- Antibiotics+/− quinolones, cephalosporin
**E COLI**

- ENTEROTOXIGENIC (TOURISTA) IP 12-24 HOURS AND DURATION 1 TO 5 DAYS)
- ENTEROHEMORRHAGIC (157/057,H104/H4) IP 4 DAYS, SHIGA TOXIN PRODUCERS
- ENTEROPATHOGENIC (NO TOXIN)
- ENTEROINVASIVE
- ENTEROAGGREGATIVE

**ENTEROTOXIGENIC E COLI**

- ORGANISMS CAN PRODUCE HEAT STABLE OR HEAT LABILE TOXINS, OR BOTH AND COLONIZING FACTOR
- INFECTIOUS DOSE OF ONE MILLION TO 1 BILLION VIRUS PARTICLES FROM FOOD AND LIQUIDS
- FREQUENT CAUSE OF DIARRHEA UNDER AGE 2
- AND IN TRAVELERS
- SUDDEN ONSET OF SECRETORY DIARRHEA WITH WATERY STOOLS AND VOMITING
- LASTS UP TO FIVE DAYS
- CONSERVATIVE TREATMENT BUT ANTIBIOTICS EFFECTIVE

**ENTEROHEMORRHAGIC E COLI TOURISTA**

- SHIGA TOXIN (VEROCYTOXIN) PRODUCING STRAINS
- MAINLY FROM CATTLE WHO ARE ASYMPTOMATIC
- ESPECIALLY E COLI H157/H7 AND 0104/H4
- TOXIN DAMAGES ENDOTHELIUM AND CAN BE ABSORBED
- LINKED TO HAMBURGERS, LEAFY GREENS, MILK, JUICE
- CRAMPS, SEVERE BLOODY DIARRHEA, LITTLE OR NO FEVER.
  LASTS 1 TO 12 DAYS
- DIAGNOSIS BY TOXIN DETECTION
- CONSERVATIVE TREATMENT NO ANTIBIOTICS
- HEMOLYTIC UREMIC SYNDROME IN 5 TO 10%
- MORTALITY 1 TO 2%

**STAPHYLOCOCCI**

- ORGANISM CONTAMINATES FOOD AND PRODUCES TOXIN
- INCUBATION PERIOD 6 HOURS
- SEVERE VOMITING
- DURATION 12 TO 24 HOURS
- CULTURE FOOD
- FLUID AND ELECTROLYTE REPLACEMENT
**BACILLUS CEREUS**
- Produces spores contaminates food especially rice
- Forms toxin as rice sits before frying
- 2 syndromes
  - Diarrhea: IP 8-16 HR, duration 24 HR
  - Vomiting: IP 1-5 HR, duration 6-24 HR
- Culture food
- Fluid and electrolytes

**CLOSTRIDIUM PERFRINGENS**
- Spore forming
- Contaminates food especially meat
- Toxin produced in intestine
- Incubation period P 8 to 16 Hrs
- Diarrhea
- Duration 12-24 hours.
- Culture food
- Fluid and electrolytes

**VIBRIO**
- Includes Vibrio cholera, hemolyticus, vulnificans
- Parahemolyticus associated with sea food: oysters, clams, shrimp
- Produces hemolysin
- IP 4 to 90 hours.
- Diarrhea, cramps, nausea, vomiting, fever
- Duration 8 HRS TO12 DAYS
- Culture
- Treatment: doxycycline, quinolones

**AMOEBIC DYSENTERY**
- Acquired from cysts in food, water
- Most cases asymptomatic
- IP 2 to 6 weeks
- Produces lower abdominal pain, weight loss, diarrhea, stool with blood, mucus
- Often afebrile
- 0.5% becomes fulminant
- May lead to liver abscess
- May become chronic
- Diagnosis: stool exam, AG detect, serology, PCR
- Treat metronidazole (750MG TID 10 DAYS) plus paromomycin (25 to 30 MG/KG DAY 7 DAYS)
GIARDIASIS

- Acquired by ingestion of cysts from food or water
- Incubation period (IP) 5 to 6 days
- Mostly afebrile, malaise, weight loss, diarrhea, bloating
- Can become chronic
- Diagnosis by stool exam
- Metronidazole 250mg tid for five days

CRYPTO AND CYCLOSPORIDIA

- Crypto. Cysts associated with water.
- IP 7 to 10 days
- Diarrhea, malaise, cramps, low fever
- Resolves 10 to 14 days
- Diagnosis by microscopy
- Rx supportive but nitazoxanide/azithromycin if needed

- Cyclospora: Cysts fecally contaminated produce
- IP 1 week
- Watery diarrhea, bloating, cramps
- Duration 3 weeks or longer
- Dx microscopy
- Rx: DS TMP. SMX for 7 to 10 days

CLOSTRIDIUM DIFFICILE

- Always consider for people on antibiotics
- More than three stools/day
- Frequent leukocytosis
- Frequent recurrences
- Especially common in elderly
- Can lead to toxic megacolon
- Mortality of 7%

CONSERVATIVE TREATMENT

- Fluid and electrolytes (4 TBSP sugar + teaspoon salt or 1/2 salt + 1/2 NaHCO3 + apple juice or other potassium source to total one liter or 5 cups)
- Antimotility drugs if no fever blood or mucous in stool or other signs of toxicity
- Loperamide 2 tabs (ie 4 milligrams) 4 times day for 2 days
ORAL PREPARATIONS

- Rehydrating Solutions
- Sports Drinks
- Electrolyte Solutions
- Bland Diet
- Toast and Soups
- BART: Bananas, Applesauce, Rice, Toast

ANTIEMETICS

- Prochlorperazine
- Metaclopramide
- Ondansetron
- Granisetron

ANTIDIARRHEAL AGENTS

- Antimotility Agents
- Loperamide
- Diphenoxylate Hydrochloride 2.5 Plus Atropine Sulfate .025
- Antisecretory Agents
- Bismuth Subsalicylate
- Probiotics
- Lactobacillus Acidophilus
- Saccharomyces Boulardii
- Absorbents
- Kaolin/Pectin

ANTIBIOTICS

- Empirically
- Severe Disease
- Factors Suggesting Invasive Bacteria
- Host Factors
- Prolonged Illness (>1 Week)
- Public Health Concerns
- Positive Culture Shigella, Campylobacter
PREVENTION

• PREVENT IT
• PEEL IT
• PACKAGE IT
• PURIFY IT
• PIPING HOT