

Acute Viral and Bacterial Gastroenteritis

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NURS 5415 – Women's Health III



Overview Acute Gastrointestinal Illness

- 2nd most common cause of disease worldwide
- Clinical picture affected by infectious agent (viral, bacterial, parasite)

Pathogenic Mechanisms

- Inoculum size
- Adherence
- Exotoxin production
- Invasion

Inoculum size

- Number of microorganisms ingested needed to cause disease
- E. Coli and Salmonella, Vibrio Cholera -- 10×10^5 to 10×10^8
- Shigella and Giardia --10-100 organism
- Transmission (person to person, food)

Adherence

- Microorganism must adhere to GI mucosa
- Advantage if organism can compete with bowel flora and colonize mucosa
- Specific cell surface proteins of pathogen will determine virulence

Exotoxin production

- Enterotoxins-
 - Secretory mechanism-watery diarrhea
 - Cholera toxin, enterotoxic E. Coli
- Cytotoxins-
 - Destroys mucosal cells-Dysentery inflammation & bloody diarrhea
 - S. dysenteriae, Clostridium difficile, enterohemorrhagic E. Coli
- Neurotoxins-PNS
 - Produced outside host- symptoms soon after ingestion i.e Staph

Invasion

- Multi pathogenic mechanism
- Dysentery
 - Cytotoxins
 - Destroys intestinal cell

Invasion

- Salmonella typhi & Yersinia enterocolitica
 - Penetrate intestinal mucosa, no cell damage
 - Replicate in Peyer's patches and intestinal lymph nodes
 - Blood dissemination
 - Enteric fever: fever, HA, abd pain

Host Defenses

- Normal Flora
 - At risk: ABX use
- Gastric Acid
 - At risk: gastric surgery, antacid, H2 blockers, (except rotavirus)

Host Defenses

- Intestinal motility
 - At risk: opiate and antimotility, anatomic abnormalities, DM
- Immunity
 - Cell mediated immune response,
 - at risk: immunosuppressed
 - Mucosal immune system

Clinical Evaluation

- Duration of symptoms (>2wks)
- Is there fever?
- What is the appearance of the stool?
 - Blood/mucous-colon ulceration
 - Bulky white stool-small intestinal malabsorption
 - "Rice-water" cholera or other toxigenic process

Clinical Evaluation

- What is the frequency of bowel movement (dehydration)
- Does patient have abdominal pain?
 - Inflammatory process i.e. Shigella, Campylobacter
 - Muscle cramps/electrolyte loss cholera
 - Bloating-giardiasis

Clinical Evaluation

- Is there tenesmus? (Shigellosis)
- Has the patient been vomiting?
 - Toxin/food poison
 - Systemic illness or obstruction
- Is there evidence of a common source of infection?

Epidemiology

- Travel history
- Location

Travel History

- 20-50 % Of travelers to Asia, Africa, South and Central America infected
- Traveler's diarrhea most common travel-related illness
 - Enterotoxigenic E. Coli most common pathogen (15-50 %)
 - Invasive dysentery -Salmonella, Shigella, & Campylobacter
 - Giardia drinking contaminated fresh water supplies

Location

- C. Difficile, Salmonella most common nosocomial infections
- Rotavirus most common nosocomial infection in pediatric units
- Geriatric chronic units C. Difficile (ABX use/colonization of bowel)
- Listeria -pregnancy, AIDS,Cancer

Physical Exam Level of Dehydration

- Mild dehydration
 - thirst, dry mouth, dec axillary sweat and urine output, wgt loss
- Moderate dehydration
 - orthostatic B/P, skin tenting, sunken eyes or fontanelle
- Severe dehydration
 - hypotension, tachycardia, confusion, shock

Diagnostic Approach

- Must distinguish between inflammatory vs non inflammatory
- Inflammatory (invasive or cytotoxin)
 - Fecal polymorphonuclear leukocytes
 - Dysentery
 - Site: colon

Diagnostic Approach

- Non inflammatory (enterotoxin)
 - No fecal leukocytes
 - Watery diarrhea
 - Site: proximal small bowel
- Bacterial food poisoning
 - Pathogen can be identified by time of inoculation to develop SX

Laboratory evaluation

- Fecal smear for WBC
- Routine culture to identify pathogenic E. Coli
- Latex agglutination to identify rotavirus
- Stool cultures for Salmonella, Shigella, Campylobacter (fever/inflammatory SX)
- Blood and CNS cultures Listeria

Nonspecific therapy

- For noninflammatory enterotoxic
- Adequate hydration WHO recommends
 - 3.5 g NaCl, 2.5 g NaCO₃, 1.5 g KCl 20 g Glucose per Liter H₂O

Nonspecific Therapy

- Bismuth subsalicylate
 - Antimicrobial compound
 - Antisecretory and anti-inflammatory properties
 - Does not sig. alter bowel flora
- Antiperistaltic agents
 - Avoid with inflammatory disease
 - Reduces frequency of stool ok for enterotoxic diarrhea

Antibiotics

- 3 day of Bactrim, Cipro, Doxy
 - C. Difficile DC abx if need Vancomycin or oral Metronidazole
- Prophylaxis
 - Bismuth subsalicylate 525 mg 2 tabs QID (3weeks)
 - Antibiotics: effective however:
 - Side effects
 - Drug resistant organisms

Viral Gastroenteritis

- Rotavirus
 - Replication exclusively in small intestinal epithelial cells
 - Pathogen of the very young child
- Norwalk virus (enteric calicivirus)
 - Shed in stool in small amounts
 - Not able to classify due to small numbers and duration
 - Pathogen of the older child and adult

Rotavirus Epidemiology

- Climate temperate/tropical
- Most common cause of severe dehydrating diarrhea in <3 y/o
- Adult exposed to infected child
- 10 % of travelers diarrhea
- AIDS chronic/acute diarrhea
- Transmission fecal/oral

Rotavirus Pathophysiology

- Destroys mature villous tip cells small intestine
- Replaces with immature absorptive cells
- Result osmotic diarrhea 2 to malabsorption

Rotavirus Clinical Course

- Mild to severe to fatal
- Onset abrupt
 - Vomiting followed by diarrhea
 - Fever (30% hospitalized children)
- Duration 2-6 days
- Stool mucous occasional RBC
- Concurrent URI not related
- Immunocompromised child
- Incomplete immunity

Rotavirus Diagnosis, Treatment, and Prevention

- Large amounts viral shedding in stool
- Commercial immunoassays for antigen in stool
- DNA probe specific-sensitive
- Severe dehydration most pronounced symptom
- Oral sometimes IV rehydration
- Vaccine is feasible for developing countries

Norwalk Epidemiology

- Occurs year round
- 58-70 % humans worldwide have antibodies
- Developed countries 33% of nonbacterial GE epidemics
- Food borne epidemics (oysters, green salads)
- Water borne epidemics (camp, school, cruise ships, nursing homes)

Norwalk Pathophysiology

- Architectural changes in small proximal bowel
- Small amounts of viral shedding in stool short duration
- Cells involved with viral duplication not identified
- Histologic alterations -results in mild steatorrhea and CHO malabsorption

Norwalk Clinical Course

- Incubation 18-72 hrs
- Abrupt onset nausea, abd cramps, followed by vomiting &/or diarrhea
- Low grade fever 50 %
- Occ. HA, myalgias, & abd pain
- WBC usually wnl
- RBC & WBC not found in stool
- Duration 24-48 hours
- No long term immunity (> 2yrs)

Norwalk Diagnosis, Treatment, and Prevention

- Acute and self limiting
- Treatment not necessary
- Vaccine unlikely

Conclusion
Have fun ! Dr. Chaney

