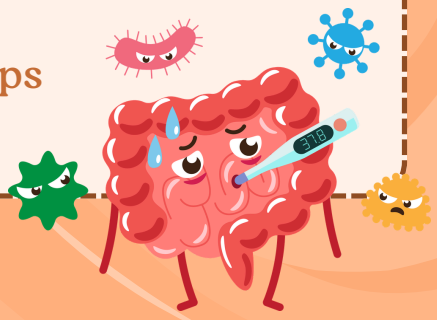
Gastrointestinal Infections

Matrix Unlocked

Gastroenteritis

- Inflammation of the mucous membranes of the stomach and intestines
- Most common cause: Viruses
  - Bacterial, protozoal, helminth (in developing countries)
- Source:
  - Closed communities
    - nursing homes, schools, cruise ships
  - Restaurant and catered meals



Clinical Features

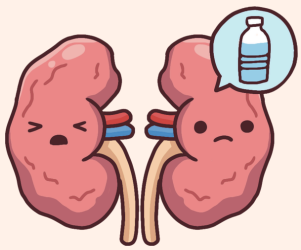
History

- Diarrhoea
  - Rapid onset
  - < 2 weeks
- Gastrointestinal symptoms
  - Nausea, vomiting, abdominal pain
- Associated symptoms
  - Fever, weight loss, fatigue, sore throat, cough, rhinorrhea, anorexia, headache, myalgia

Physical Examination

- Mild diffuse abdominal tenderness
- Soft abdomen
- ± Voluntary guarding

Red Flag Symptoms/Signs



- Severe volume depletion/dehydration
- Abnormal electrolytes or kidney function
- Bloody stool/rectal bleeding
- Weight loss
- Severe abdominal pain
- Prolonged symptoms (> 1 week)
- Hospitalization or antibiotic use in the past 3 to 6 months
- Age 65 or older
- Comorbidities (diabetes mellitus, immunocompromised)
- Pregnancy

Dehydration

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Signs in Adults (moderate to severe)

- Dry mucous membrane
- Decreased skin turgor
- Tachycardia
- Hypotension
- Altered mental status
- Prolonged capillary refill (>2 seconds)

Body Weight Loss	Signs in Children
No / mild dehydration: <5%	• No signs or decreased peripheral perfusion • Thirsty, alert and restless
Moderate dehydration: 5-10%	• Decreased peripheral perfusion • Thirsty, alert and restless • Rapid pulse • Sunken eyes and fontanelle • Dry mucous membranes • Deep acidotic breathing • Pinched skin retracts slowly (1-2 seconds)
Severe dehydration: >10%	All of the above plus • In infants: drowsy, limp, cold, sweaty, cyanotic limbs and altered conscious level • In older children: apprehensive, cold, sweaty, cyanotic limbs, rapid weak pulse, low blood pressure

Viral Causes

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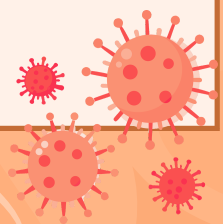
Virus	Important features
• Watery diarrhoea without blood • ±Fever (low grade) • Short incubation period	
Norovirus 24-48 hrs	• Outbreaks: restaurants, cruise ships, military populations
Rotavirus 10-72 hrs	• Most common cause of childhood diarrhoea • Children < 2 years • Outbreaks: daycare centers
Sapovirus	• Infants and toddlers • Milder than rotavirus
Astrovirus	• People of all ages • Winter months
Enteric adenovirus	• Children younger than 4 years • Occurs year-round, with a peak in summer
Other viruses (rare) • Coxsackievirus • Echovirus • Poliovirus • SARS-CoV-1 and 2 • Influenza B virus	• Typically have extraintestinal manifestations but may also cause mild gastroenteritis



Bacterial Causes

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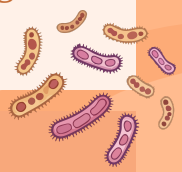
Bacteria	Imporant features
Watery diarrhoea	
Enterotoxigenic *Escherichia coli* (ETEC) 1-3 days	• Most common cause of traveller's diarrhoea
Clostridium difficile	• After broad-spectrum antibiotic use • Can cause pseudomembranous colitis
Vibrio cholerae Few hrs-5 days	• Inadequate access to clean water • Associated with endemic and epidemic • "Rice-water diarrhoea" in severe cases
Listeria monocytogenes 1 day	• Processed/delicatessen meats and fruits • ± Fever and systemic complaints such as headache, muscle aches and neck stiffness • Invasive infection in pregnancy, immunocompromed and extremes of age
Enterotoxin - producing bacteria (food poisoning)	
• Vomiting ± acute diarrhoea • Incubation period: <6 hrs	
Bacillus cereus	• Starchy foods (reheated fried rice)
Staphylococcus aureus	• Foods prepared by a food handler such as dairy, meats, eggs and salads



Bacterial Causes

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Bacteria	Imporant features
Inflammatory diarrhoea	
	• Blood/mucus in stool • Vomiting, abdominal pain
 Enterohemorrhagic *Escherichia coli* (EHEC) 1-8 days	• Ground beef, meat, unpasteurized milk • Produces Shiga toxin • Watery diarrhoea → bloody • Fever is absent or low grade ⚠ **Monitor for hemolytic uremic syndrome in children**
Nontyphoidal Salmonella 1-3 days	• Poultry, eggs, meat, unpasteurized milk • Not usually grossly bloody
Salmonella typhi 5-21 days	 • diarrhoea and constipation Week 1 → Stepwise fever Week 2 → Abdominal pain, Rose spots Week 3 → Hepatosplenomegaly, Intestinal perforation
Campylobacter jejuni 1-3 days	• Poultry, meat, unpasteurized milk • Complications: reactive arthritis and Guillain-Barré syndrome
 *Shigella spp.* 1-3 days	• Leading cause of invasive diarrhoea • In school/child-care-based settings • Among men who have sex with men • Produces Shiga-toxin
Yersinia enterocolitica 4-6 days	 • Pork, untreated water • Pharyngitis, mesenteric adenitis, reactive arthritis • ↓ iron metabolism (cirrhosis, hemochromatosis, thalassemia) increases the risk

Parasitic Causes

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Protozoa/Helminth Long incubation period	Important features
Entamoeba histolytica 1-3 weeks	• Fecally contaminated food or water • Rare complications: extraintestinal infections (hepatic abscess)
Giardia intestinalis 7-14 days	• Fecally contaminated food or water • Steatorrhea, abdominal cramps, bloating • Can develop into a chronic infection
Cryptosporidium parvum 2-28 days	• Infected animal (cattle) / person, or fecally contaminated food or water • Immunocompetent: self-limited • Immunocompromised: may become prolonged and severe

Infectious Causes of Bloody diarrhoea: CHEESY

- **C**ampylobacter
- Entero**H**emorrhagic *E Coli* (EHEC)
- **E**nteroinvasive *E Coli* (EIEC)
- ***Entamoeba histolytica***
- **S**almonella, **S**higella
- **Y**ersinia

Approach to acute non-bloody diarrhoea in adults in resource-rich settings

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Clinical assessment

Initial management:
- Fluid repletion + maintainence
- Symptomatic therapy

Are there any of the following?

Severe illness:
- Fever ⩾38.5°C
- Hypovolemia
- ⩾6 unformed stools per 24 hours
- Severe abdominal pain

High-risk:
- Age ⩾70 years
- Serious comorbidities
  - cardiac disease, immunocompromised

Yes

No

- Inflammatory bowel disease (IBD)
- Pregnancy
- >1 week despite conservative measures
- Public health concerns (health care worker / food handler)

Yes

No

Submit stool for:
- Bacterial culture
- Molecular testing

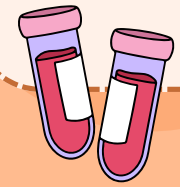
Additional testing based on host / exposures:
- C. difficile
- Parasites

No indication for stool testing or antibiotic

Diagnosis

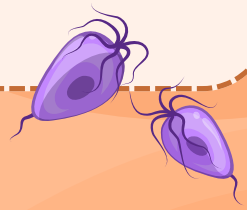
Viral gastroenteritis

- Usually clinical
- Unless in specific circumstances
  - Signs of volume depletion → full blood count & serum electrolytes



Parasitic gastroenteritis

- Stool microscopy, antigen detection assay and nucleic acid detection assays (PCR)
- Indications
  - Persistent diarrhoea (>7 days)
  - Advanced HIV infection (CD4 <200 cells/microL)
  - Men who have sex with men
  - Community waterborne outbreak



Bacterial gastroenteritis

- Salmonella, Campylobacter, and Shigella
  - Routine stool culture
- *Clostridium difficile*
  - Indications
    - Antibiotic use within 3 months
    - Hospitalized within 3 months
    - IBD
- Shigella
  - Antibiotic susceptibility testing to guide antibiotic therapy
- EHEC
  - Shiga toxin-based assays

Management

Viral infection

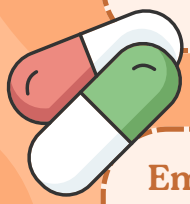
- Self-limiting
- Supportive treatment
  - Mild to moderate dehydration → Oral rehydration solutions (ORS)
  - Severe dehydration → IV normal saline or Ringer's lactate

Bacterial infection

Rehydration

For *C. difficile:*

- Stop any implicated antibiotics
- Choice of antibiotics:
  - Oral vancomycin
  - Metronidazole
  - Fidaxomicin



Empirical Antibiotics:

- Only consider for
  - Severe illness
  - High risk
- Choice of empirical antibiotics:
  - Azithromycin → preferred for patients with fever, dysentery, suspected fluoroquinolone-resistant pathogen
  - Ciprofloxacin

AVOID ANTIBIOTICS in children with bloody diarrhoea without sepsis until results of faecal testing are available

- **EHEC: Empirical antibiotics may precipitate HUS**

Targeted Antibiotics:

- Modify therapy based on microbiology results

Management

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Parasitic infection

Parasites	Treatment
Entamoeba histolytica	Asymptomatic: • Oral paromomycin Invasive amoebiasis: • Metronidazole OR Tinidazole • + Oral paromomycin
Gardia intestinalis	Metronidazole OR Tinidazole
Cryptosporidium parvum	Nitazoxanide

Symptomatic therapy

Antiemetics

Children:
- Ondansetron

Adults:
- Metoclopramide OR Ondansetron OR Prochlorperazine

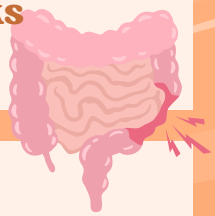
Antidiarrhoeal

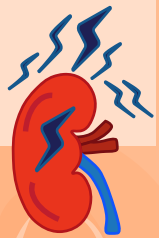
- Loperamide for adults

AVOID IN
- Infants and children
- Invasive bacterial infection (bloody diarrhoea, high fever, systemic symptoms)
- Severe ulcerative colitis (risk of toxic megacolon)

Prognosis / Complications

Complication	Risk factors
Acute illness • Syncope • Hypotension	• Old age • Immunocompromised • Pregnancy
Postinfectious • Irritable bowel syndrome (IBS) • Postinfectious functional dyspepsia	• Female sex • Anxiety • **Duration of diarrhoea greater than 3 weeks** • Hospitalization
Dehydration • Acute kidney injury (AKI) • Electrolyte abnormalities (hypokalemia, hyponatremia, hypernatremia)	• Infants < 6 months • Elderly • Gut anatomical abnormalities





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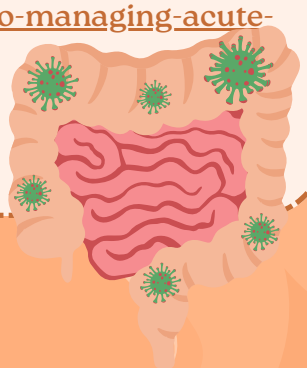

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Quiz Time!

Question 1

A 5-year-old boy develops diarrhoea after eating at a fast-food restaurant. The following day, his mother notices that he seems lethargic and brings him to the urgent care center. His blood pressure is 150/90 mm Hg. Laboratory tests show a haemoglobin level of 9 g/dL, platelet count of 40,000/mm3, and creatinine level of 2.8 mg/dL. What is the most likely cause of this patient's condition?

A. Campylobacter
B. Vibrio cholerae
C. Escherichia coli
D. Rotavirus
E. Shigella

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Quiz Time!

Question 2

A 34-year-old white woman is treated for a UTI with amoxicillin. Initially she improves, but 5 days after beginning treatment, she develops recurrent fever, abdominal bloating, and diarrhoea with six to eight loose stools per day. What is the best diagnostic test to confirm your diagnosis?

A. Identification of Clostridium difficile toxin in the stool
B. Isolation of Clostridium difficile in stool culture
C. Stool positive for white blood cells (fecal leukocytes)
D. Detection of IgG antibodies against Clostridum difficile in the serum
E. Visualization of clue cells on microscopic examination of stool