Acute Diarrhea in Adult : Diagnosis and Management

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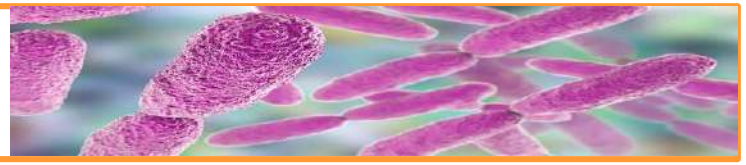
INTRODUCTION

- Global Burden of Disease Study : diarrhea was the 9th leading cause of death globally in 2015 [1]
- Most cases of diarrhea are associated with contaminated food and water sources, and > 2 billion people → no access to basic sanitation [2]
- diarrhea is often a "nuisance disease" in the healthy individual

[1] Global Burden of Disease Study 2015. Lancet Infect Dis 2017; 17: 909–48
[2] World Health Organization. Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG Baselines

Diarrhea DEFENITION :



→ passage of loose or watery stools, typically at least 3x in a 24-hour
  - Watery stools are increased water content of the stool, caused by impaired water absorption and/or active water secretion by the bowel.

- Definitions → **duration** of symptoms:
  - **Acute** – 14 days or fewer in duration
  - **Persistent diarrhea** – > 14 -30 days in duration
  - **Chronic** – more than 30 days in duration
- **Invasive diarrhea**, or **dysentery** : diarrhea with visible blood or mucus.
  Dysentery is commonly associated with fever and abdominal pain

Shane AL, Mody RK, Crump JA, Tarr PI, Steiner TS, Kotloff K, et al. Infectious Diseases Society of America Clinical Practice Guidelines for the Diagnosis and Management of Infectious Diarrhea. Clin Infect Dis. 2017;65

Etiology : **Watery diarrhea**

Likely pathogens	Mean Incubation Period	Classic / common food sources	Other epidemiologic clues
Norovirus	24 to 48 hours	Shellfish, prepared foods, vegetables, fruit	▪ Outbreaks in: • Restaurants • Health care facilities • Schools and childcare centers • Cruise ships • Military populations
Clostridioides (formerly *Clostridium*) *difficile**	N/A	N/A	▪ Antibiotic use ▪ Hospitalization ▪ Cancer chemotherapy ▪ Gastric acid suppression ▪ Inflammatory bowel disease
Clostridium perfringens	8 to 16 hours	Meat, poultry, gravy, home-canned goods	
Enterotoxigenic *Escherichia coli*	1 to 3 days	Fecally contaminated food or water	▪ Travel to resource-limited settings
Other enteric viruses (rotavirus, enteric adenovirus, astrovirus, sapovirus)	10 to 72 hours	Fecally contaminated food or water	▪ Daycare centers ▪ Gastroenteritis in children ▪ Immunocompromised adults
Giardia lamblia	7 to 14 days	Fecally contaminated food or water	▪ Daycare centers ▪ Swimming pools ▪ Travel, hiking, camping (particularly when there is contact with water in which beavers reside)
Cryptosporidium parvum	2 to 28 days	Vegetables, fruit, unpasteurized milk	▪ Daycare centers ▪ Swimming pools and recreational water sources ▪ Animal exposure ▪ Chronic diarrhea in advanced HIV infection

Musher DM, Musher BL. Contagious acute gastrointestinal infections. N Engl J Med. 2004;351(23):2417

Etiology : **Inflammatory diarrhea** (fever, mucoid bloody stools)

Likely pathogens	Mean Incubation Period	Classic / common food sources	Other epidemiologic clues
Nontyphoidal *Salmonella*	1 to 3 days	Poultry, eggs, and egg products, fresh produce, meat, fish, unpasteurized milk or juice, nut butters, spices	▪ Animal contact (petting zoos, reptiles, live poultry, other pets) ▪ Travel to resource-limited settings
Campylobacter spp	1 to 3 days	Poultry, meat, unpasteurized milk	▪ Travel to resource-limited settings ▪ Animal contact (young puppies or kittens, occupational contact)
Shigella spp	1 to 3 days	Raw vegetables	▪ Daycare centers ▪ Crowded living conditions ▪ Men who have sex with men ▪ Travel to resource-limited settings
Enterohemorrhagic *E. coli*	1 to 8 days	Ground beef and other meat, fresh produce, unpasteurized milk and juice	▪ Daycare centers ▪ Nursing homes ▪ Extremes of age
Yersinia spp	4 to 6 days	Pork or pork products, untreated water	▪ Abnormalities of iron-metabolism (eg, cirrhosis, hemochromatosis, thalassemia) ▪ Blood transfusion
Vibrio parahemolyticus	1 to 3 days	Raw seafood and shellfish	▪ Cirrhosis
Entamoeba histolytica	1 to 3 weeks	Fecally contaminated food or water	▪ Travel to resource-limited settings ▪ Men who have sex with men

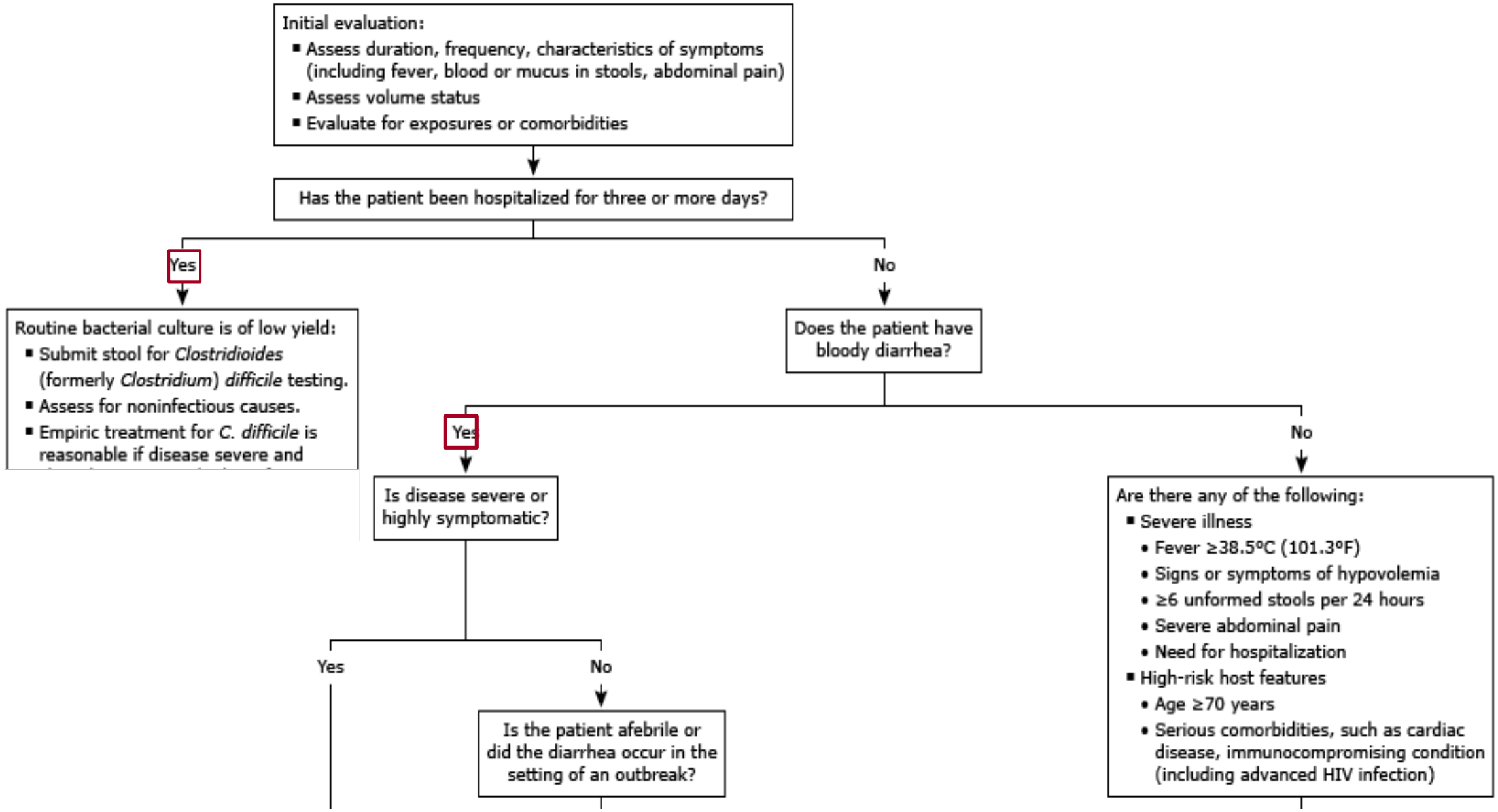
Evaluation for acute diarrhea

Evaluation acute diarrhea is warranted for individuals with :

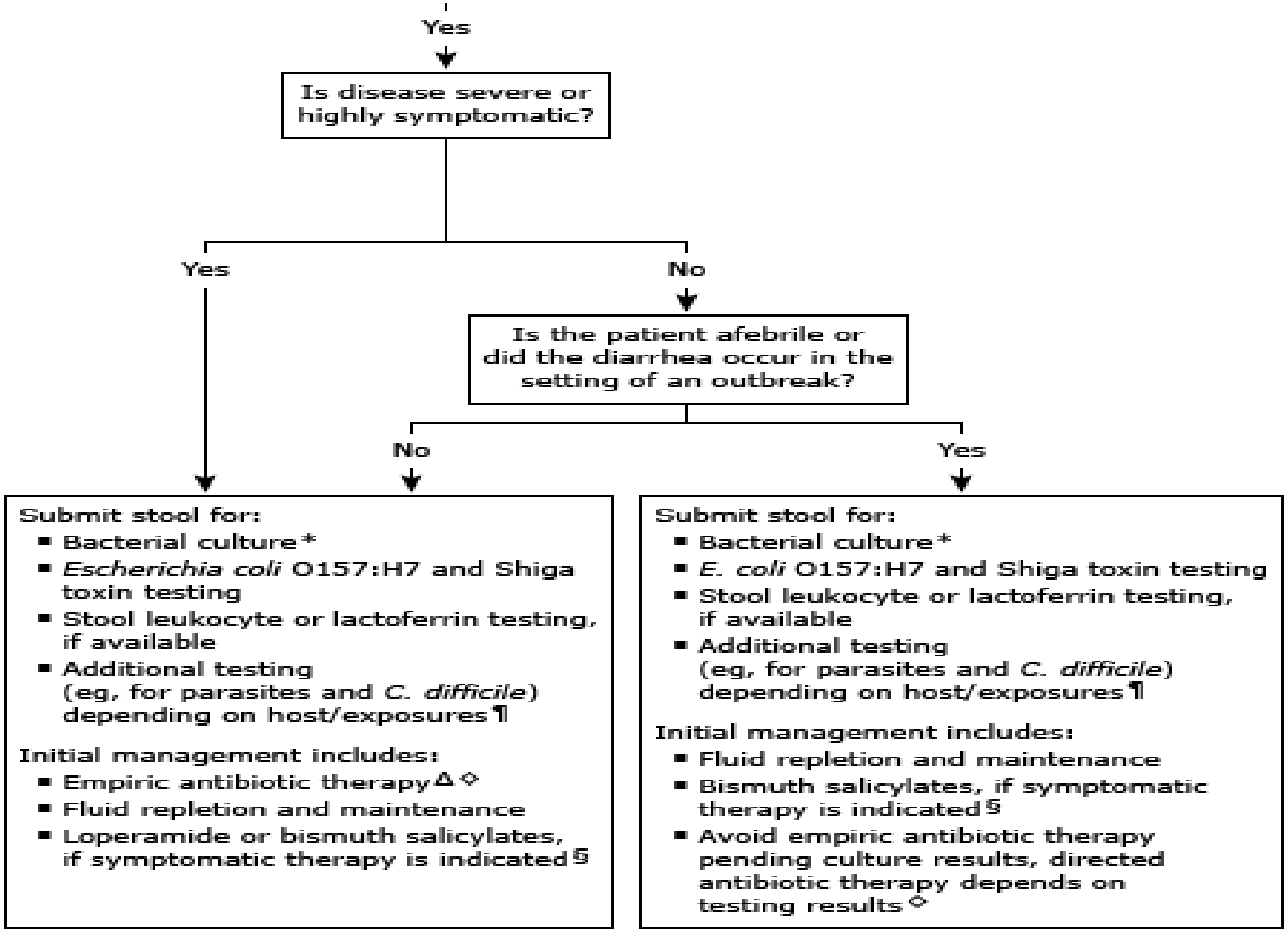
- persistent **fever**
- bloody diarrhea
- severe abdominal pain
- symptoms of volume depletion (eg, dark urine, symptoms of orthostasis)
- or a history of inflammatory bowel disease

Hospitalization may be warranted in :

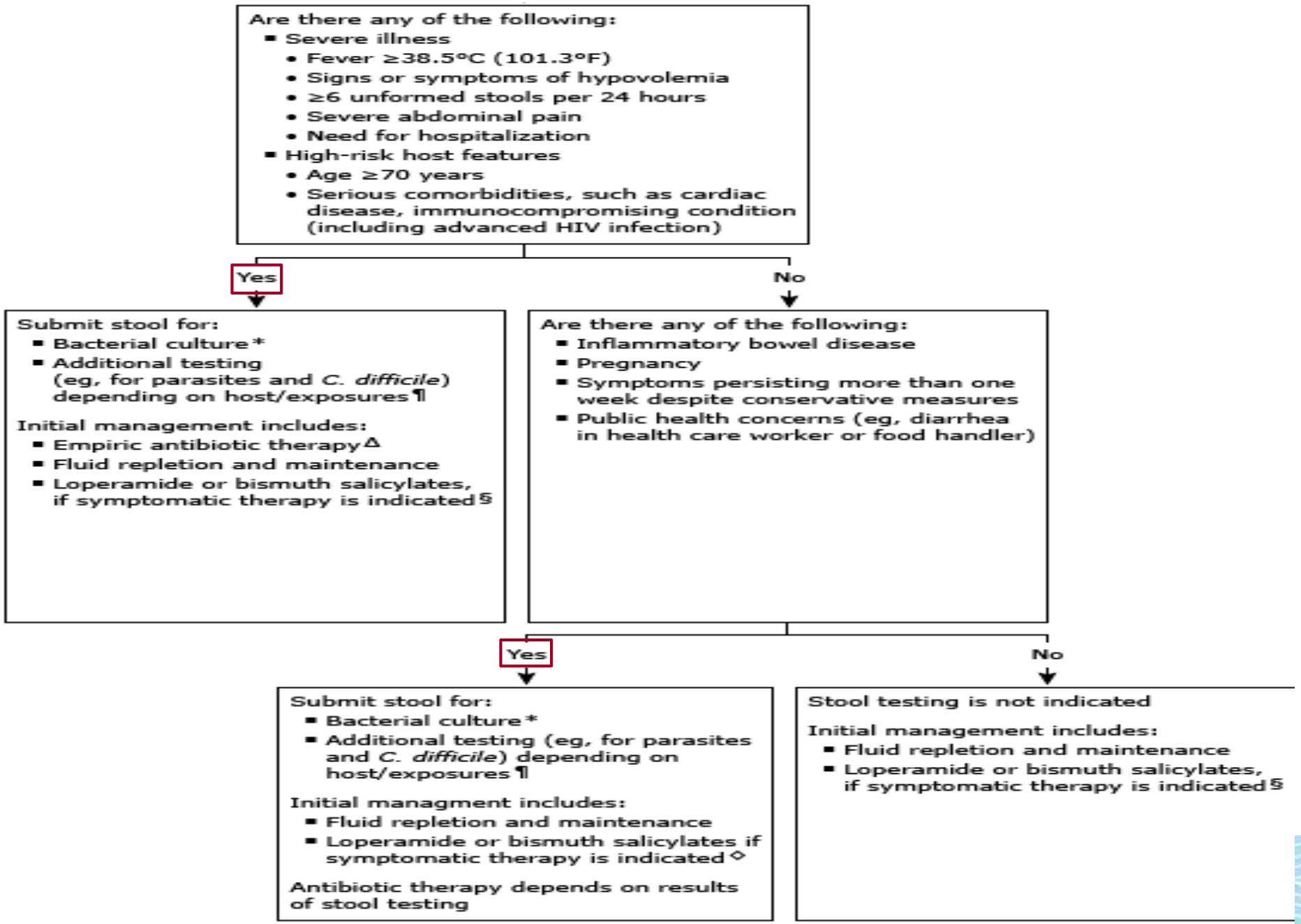
- medical history of immunosuppression (eg, treatment for malignancy, history of transplantation, or advanced HIV infection)
- significant vascular or cardiovascular disease


Initial evaluation:
Assess duration, frequency, characteristics of symptoms (including fever, blood or mucus in stools, abdominal pain)
Assess volume status
Evaluate for exposures or comorbidities
Has the patient been hospitalized for three or more days?
Yes
No
Routine bacterial culture is of low yield:
Submit stool for Clostridioides (formerly Clostridium) difficile testing.
Assess for noninfectious causes.
Empiric treatment for C. difficile is reasonable if disease severe and
Does the patient have bloody diarrhea?
Yes
No
Is disease severe or highly symptomatic?
Are there any of the following:
Severe illness
Fever ≥38.5°C (101.3°F)
Signs or symptoms of hypovolemia
≥6 unformed stools per 24 hours
Severe abdominal pain
Need for hospitalization
High-risk host features
Age ≥70 years
Serious comorbidities, such as cardiac disease, immunocompromising condition (including advanced HIV infection)
Yes
No
Is the patient afebrile or did the diarrhea occur in the setting of an outbreak?

Evaluation of Acute diarrhea (2) : have **bloody diarrhea**



Evaluation of Acute diarrhea (3) : no bloody diarhea



CLINICAL SIGN : acute watery diarrhea

- Small bowel pathogens were watery diarrhea and in large bowel is more inflammatory (fever and bloody or mucoid stool)
- Most foodborne infections will typically manifest as a mixture of diarrhea, nausea, vomiting, and abdominal discomfort
- Syndromes that begin with diarrhea but progress to fever and systemic complaints, such as **headache** and **muscle aches**, should raise the possibility of other etiologies, including **a typhoidal illness** (particularly in travelers from resource-limited settings)

Exposure (1)

- **Food history** – Consumption of unpasteurized dairy products, raw or undercooked meat or fish, or organic vitamin preparations may suggest certain pathogens
  - Within **six hours** – suggests ingestion of a **preformed toxin** of *Staphylococcus aureus* or *Bacillus cereus*, particularly if nausea and vomiting were the initial symptoms
  - **At 8 to 16 hours** – suggests infection ***Clostridium perfringens***
  - At **more than 16 hours** – suggests either viral or other bacterial infection (eg, contamination of food with enterotoxigenic or EHEC or other pathogens)

Exposure (2)

- Exposure to **animals** (poultry, turtles, petting zoos) has been associated with *Salmonella* infection.
- Travel to a resource-limited setting increases the risk of **bacterial diarrhea** and also informs the risk of certain parasitic infections
- Occupation in **daycare** centers has been associated with infections with *Shigella*, *Cryptosporidium*, and *Giardia.* **Rotavirus** is a potential consideration, but in countries that routinely immunize infants against rotavirus, infection due to rotavirus has decreased substantially

Medical history

- Recent antibiotic use (clue to the **presence of C. difficile infection)**
- Proton pump inhibitors, can increase the risk of infectious diarrhea
- Past medical history (→ identify an **immunocompromised host** or the possibility of **nosocomial infection**)
- Pregnancy increases the risk of listeriosis following consumption of contaminated meat products or unpasteurized dairy products approximately 20-fold

Etiology

- Most cases of acute diarrhea are due to infections and are self-limited. The major causes of acute infectious diarrhea include **viruses** (norovirus, rotavirus, adenoviruses, astrovirus, and others), **bacteria** (*Salmonella*, *Campylobacter*, *Shigella*, enterotoxigenic *Escherichia coli*, *Clostridiium difficile*, and others), and **protozoa** (*Cryptosporidium*, *Giardia*, *Cyclospora*, *Entamoeba*, and others)
- In **severe diarrhea** bacterial causes are responsible for most cases.
  - In a study of 173 healthy adults with severe acute community-acquired diarrhea. A bacterial pathogen was identified in 87 percent of cases. Protozoa are less commonly identified as the etiologic agents of acute gastrointestinal illness

Dryden MS, Gabb RJ, Wright SK Empirical treatment of severe acute community-acquired gastroenteritis with ciprofloxacin. Clin Infect Dis. 1996;22(6):1019

INDICATIONS for microbiology stool testing

Severe illness

- Profuse watery diarrhea with signs of hypovolemia
- Passage of >6 unformed stools per 24 hours
- Severe abdominal pain
- Need for hospitalization
- Other signs or symptoms concerning for inflammatory diarrhea (Bloody diarrhea, passage of many small volume stools containing blood and mucus, temperature ≥38.5ºC

High-risk host features

- ✓ **Age ≥70 years**
- ✓ **Comorbidities**, such as cardiac disease, which may be exacerbated by hypovolemia or rapid infusion of fluid
- ✓ **Immunocompromising** condition (including advanced HIV infection)
- ✓ Inflammatory bowel disease
- ✓ **Pregnancy**
- ✓ Symptoms persisting for more than one week
- ✓ Public health concerns (eg, diarrheal illness in food handlers, health care workers, and individuals in day care centers)

Management : Fluid Replacement (1)

- The most critical therapy : is **rehydration**, preferably by the oral route, with solutions that contain water, salt, and sugar
- Diluted fruit juices with saltine crackers and broths or soups may meet the fluid and salt needs in patients with mild illness
- Oral rehydration solutions (ORS)
- ORSs : in many small bowel diarrheal illnesses, intestinal glucose absorption via sodium-glucose cotransport remains intact. Thus, in diarrheal disease caused by any organism that depends on small bowel secretory processes, the **intestine remains able to absorb water if glucose and salt are also present** to assist in the transport of water from the intestinal lumen.
- Adults with severe hypovolemia should initially receive intravenous fluid repletion. Once they are replete, they can be switched to ORS

Avery ME, Snyder JD. Oral therapy for acute diarrhea. The underused simple solution. N Engl J Med. 1990;323(13):891.

Oral rehydration solutions (ORS) WHO - 1

- Total osmolality between 200 - 310 mOsm/L
- Equimolar concentrations of glucose and sodium
- **Glucose** concentration <20 g/L (111 mmol/L)
- **Sodium** concentration between 60 and 90 mEq/L
- Potassium concentration between 15 and 25 mEq/L
- Citrate concentration between 8 and 12 mmol/L
- Chloride concentration between 50 and 80 mEq/L

Oral rehydration solutions (ORS) WHO – 2

- Fluids with a molar ratio of glucose in excess of sodium (eg, fruit juices, soda, or sports beverages) will increase diarrheal losses because the higher unabsorbed glucose load will increase the osmolality in the lumen, resulting in decreased water absorption

- Fluids with excess sodium concentration compared with glucose (eg, chicken broth) will increase diarrheal losses, as there is no organic solute for facilitated transport of sodium. Fluids with high sodium concentration also may result in hypernatremia.

Dietary recommendations

- **adequate nutrition** during an episode of acute diarrhea is important to facilitate electrolyte renewal
- if patients are anorectic or have **nausea** and **vomiting**, a short period of **consuming only liquids will not be harmful**. Boiled starches and cereals (eg, potatoes, noodles, rice, wheat, and oat) with salt are indicated in patients with watery diarrhea; crackers, bananas, soup
- **Foods with high fat content should be avoided** until the gut function returns to normal after a severe bout of diarrhea.
- Dairy products (except yogurt) may be difficult to digest in the presence of diarrheal disease. This is due to secondary lactose malabsorption

Antibiotic Therapy for Acute Diarrhea

Pathogen	Antibiotic*
Bacteria	
Campylobacter spp.	1. Azithromycin, 500 mg OD orally, 3 days 2. Erythromycin, 500 mg BD iv, 5 days
Salmonella spp. (non-typhi)	1. Ciprofloxacin, 500/400 mg BD orally/iv, 7 days 2. TMP-SMZ, 960 mg BD orally/iv, 7 days
Shigella spp.	1. Ciprofloxacin, 1000 mg single dose orally 2. Azithromycin, 250 mg OD orally, 5 days (first day 500 mg) 3. TMP-SMZ, 960 mg BD orally, 3 days
Yersinia spp.	1. TMP-SMZ, 960 mg BD orally/iv, 5 days 2. Ciprofloxacin, 500 mg /400 mg BD orally /iv, 5 days

Bos, et al. SWAB guidelines for antimicrobial therapy of acute infectious diarrhoea. 2006

Antibiotic Therapy for Acute Diarrhea

Escherichia coli spp.	
STEC 0157	None
ETEC	1. TMP-SMZ, 960 mg BD orally, 5 days 2. Ciprofloxacin, 500/400 mg BD orally /iv, 3 days or single dose 1000 mg orally
EPEC, EIEC, EAEC	See ETEC
Vibrio cholerae O1 or O139	Doxycyclin, 300 mg single dose orally or TMP-SMZ, 960 mg BD orally, 3 days or ciprofloxacin, 1000 mg single dose orally
Toxigenic *Clostridium difficile*	1. Metronidazole, 500 mg TD orally, 10 days 2. Vancomycin, 125 mg Q6h orally, 10 days

Bos, et al. SWAB guidelines for antimicrobial therapy of acute infectious diarrhoea. 2006

Antibiotic Therapy for Acute Diarrhea _ Parasite

Parasites	
Giardia lamblia	1. Tinidazole, 2 g single dose orally 2. Metronidazole, 2 g OD orally, 3 days
Entamoeba histolytica	Metronidazole, 750 mg TD orally, 5-10 days or tinidazole, 2 g OD orally, 3 days
Entamoeba histolytica carrier state	1. Paromomycin, 500 mg TD orally, 10 days 2. Clioquinol
Entamoeba dispar	None
Cryptosporidium spp.	None
Cyclospora spp.	TMP-SMZ, 960 mg BD orally, 7 days
Isospora spp.	None

Bos, et al. SWAB guidelines for antimicrobial therapy of acute infectious diarrhoea. 2006


Thank You