Gastrointestinal Infections of the Small Intestine and Stomach

1. Following a one week vacation in Mexico, a 22 year-old student presents with 3 days of watery diarrhea, some nausea, no vomiting or fever. She has abdominal cramping relieved by bowel movements but no other abdominal pain. Symptoms began a day before returning home, and have continued for the past two days. On exam, she is afebrile and well hydrated. Abdominal exam shows mild left lower quadrant tenderness, with no guarding or rebound.

What is the most appropriate management of this patient?

A. Stool culture
B. Empiric fluoroquinolones
C. Abdominal films
D. No therapy
E. Metronidazole

The recommended response is D.

This clinical scenario is most consistent with traveler’s diarrhea and the most common pathogen is Enterotoxigenic *E. coli*. In the absences of fever or blood in the stools there is no indication for empiric antibiotic. The history is much more compatible with an acute bacterial infection rather than a parasite. Thus, metronidazole would not be indicated. Given absence of fever and blood in the stool, a stool culture is likely to be of low yield, nor is abdominal x-ray indicated. The correct answer is to do nothing. If the patient does not get better then consideration could be given to stool culture and sending stools for ova and parasites.

2.
A 45 year old man has had 3 days of nausea without vomiting, following which he developed watery diarrhea and low grade fever. One day prior to being seen he noted right lower quadrant tenderness and arthralgias of both elbows and knees. He remembers preparing a pig for a festival 2 days before becoming ill. On admission, abdominal exam was pertinent for moderate right lower quadrant tenderness without mass; low grade fever. WBC 13,000, stool shows fecal leukocytes; culture is pending. A CT of the abdomen showed thickening of the terminal ileum and right colon. What is the likely pathogen?

A. Cryptosporidia
B. Yersinia
C. Enterotoxigenic E. coli
D. Norovirus
E. Giardia lamblia

The recommended response is B.

The CT scan shows thickening of ileum and the right colon. While appendicitis can cause this, the presentation of initial right lower quadrant pain rather than peri umbilical pain which is more typical for appendicitis. Watery diarrhea is also unusual for appendicitis. The most likely diagnosis with a history of exposure to pigs would be Yersinia which is often associated with the eating of hog intestine or chitterlings. Cryptosporidia causes a watery diarrhea without any mucosal changes in the ileum or the colon. Norovirus and Giardia would present similar to cryptosporidia with watery diarrhea and no abnormalities seen in the colon or in the terminal ileum. Diarrhea due to Enterotoxigenic E. coli is watery but would not cause ileitis. Crohn’s disease is also a possibility, but the acute onset and the association of fever are unlikely for Crohn’s disease to present so acutely. Thus, the diagnosis is one of infection until proven otherwise, and compatible with Yersinia.
3. What is the best management strategy for patient in question 2?
   A. Colonoscopy and ileoscopy with biopsy
   B. Await results of stool cultures
   C. Metronidazole 250 mg orally four times daily
   D. Ciprofloxacin 500 mg orally twice a day
   E. Rifaxamin

The recommended response is D.

The best management strategy is empiric antibiotics, given the fact that the patient has diarrhea, fever, and mucosal abnormalities on CT scan and thus would fit the category of being moderately ill. Colonoscopy and ileoscopy could be done if the patient does not improve but a trial of empiric antibiotics would make the most sense first. This is most likely a bacterial pathogen. Ciprofloxacin would be a better choice than metronidazole. Arthralgias can be seen with inflammatory bowel disease as an extra intestinal manifestation but also can be seen as a Reiter’s type syndrome associated with infectious colitis. Serum serologies for rheumatologic disease would not be indicated this early in the evaluation as it is a post-inflammatory arthritis. Also, because there is associated arthritis it does make sense to treat the underlying cause of infectious diarrhea.

A 44 year old man from Vietnam who has been in the U.S. for 13 years presents with epigastric and right sided abdominal pain for several months, with a 30 pound weight loss and watery diarrhea, but no fever, chills or night sweats. Physical exam is normal. Three stool ova and parasite exams are negative. A CT scan of the abdomen shows 3 circumferential areas of bowel wall thickening with fat standing in the right colon and adenopathy. At colonoscopy, (see figure 1) there is also a small segment of nodular inflammation in the transverse colon.

The most likely diagnosis is:
- A. Tuberculosis
- B. MAC
- C. Lymphoma
- D. Schistosomiasis
- E. Crohn’s disease

The recommended response is A.

The ulcer at the ileocecal valve is very suggestive of tuberculosis. The segmental nature of the abnormalities and the right sided location strongly favor diagnosis of tuberculosis if this is an infectious ideology while the Crohn’s disease would be a similar presentation in a patient raised in the U.S.. Crohn’s is less likely given this patient’s ethnic background. Without any evidence for HIV mycobacterium avian complex (MAC) and lymphoma are far less likely and are unlikely to present with colonic ulcers such as seen here. Schistosomiasis is not endemic in Vietnam.

5. Colonic biopsies show chronic inflammation with granulomas. AFB stains are negative and biopsy culture for AFB does not grow. What other diagnostic tests will be most helpful?

A. Ameba titers
B. Strongyloides serology
C. First step panel
D. HIV testing
E. Urine culture for leptospirosis

The recommended response is B.

While the endoscopic and clinical features above strongly suggest tuberculosis with negative for cultures from the biopsy, even with the presence of granulomas, this is effectively ruled out. Ameba is unlikely to present in such a fashion and would have been seen in the colorectal biopsies. Again, inflammatory bowel disease unlikely. HIV could be considered, but first all infections should be ruled out. Strongyloides serologies were sent and were positive in this patient. He responded well to treatment with Invermectin. Had these been negative, empiric treatment for tuberculosis would have been reasonable.

A 40 year old woman hospitalized after a car accident undergoes surgery to stabilize a spinal injury. She develops a spinal abscess and requires long term antibiotics with metronidazole and moxiflaxacin and is discharged to a chronic care facility. A month later she develops acute abdominal distension, she does not have diarrhea and has had no bowel movement for 3 days. On evaluation in the ER she has hypotension, fever, and respiratory compromise. A WBC count is 36,000. CT scan shows marked colon wall thickening (Figure 2). A rapid stool test for *C. difficile* is positive for toxin A.

What is the most appropriate next step?

A. Colonoscopy with decompression  
B. Exploratory laparotomy and colectomy  
C. NG tube and IV antibiotics  
D. Urgent left hemicolecetomy  
E. Antibiotics per rectum

The recommended response is B.

The patient already is presenting with significant evidence of toxic colon and imminent perforation. The most appropriate step is exploratory laparotomy and colectomy. Colonoscopy is not needed for diagnosis as a rapid stool test for toxin A was positive and may also be dangerous. NG tube and antibiotics are unlikely to be helpful in a patient so sick. Antibiotics per rectum are unlikely to be helpful when the patient is this sick. Left hemicolecetomy would not adequately remove the diseased colon. A total colectomy with ileostomy should be done.

A 35 year old nurse returns from volunteer work at a refugee camp in northern Thailand. While there, she developed watery diarrhea, fever, and left lower quadrant pain. After 3 days the diarrhea became bloody. She has been given empiric ciprofloxacin, but after 2 days, she is no better. Stool culture is positive for Campylobacter. What is the next best step in treatment?

A. Change antibiotics to Azithromycin
B. Continue ciprofloxacin at a higher dose
C. Add metronidazole to cover for ameba
D. Check stools for C. difficile
E. Add Pepto bismol

The recommended response is A.

A patient with Campylobacter colitis who does not get better after several days of empiric ciprofloxacin is likely to have a strain that is ciprofloxacin-resistant. The correct answer is to switch to azithromycin for which most of these strains still remain sensitive. Treating at a higher doses of ciprofloxacin is unlikely to be effective. With positive Campylobacter culture a search for a second pathogen such as ameba is less important. Clostridium difficile is unlikely given the short time on antibiotics and the presence of another pathogen. Pepto bismol will not be helpful given severity of her illness.

8.
A 19 year old college student passes a large thin white object (see Figure 3). He has noted mild watery diarrhea and a 10 pound weight loss. He had traveled extensively in Russia the previous summer, and enjoys sushi.

Which of the following is most likely?

A. Ascaris  
B. Taenia solium  
C. Taenia saginatum  
D. Diphyllobothrium latum  
E. Hymenolopsis nana

The recommended response is D.

The picture shows a tapeworm. Ascaris can be seen grossly in the stools but looks different. While any of the tapeworms are possible, the history of eating sushi strongly suggests the freshwater fish tapeworm D. latum associated with fish and could be seen with salmon sushi as salmon migrate in a fresh water phase. The appropriate treatment is Invermectin.

9.
What is appropriate treatment for the patient in question 8?

A. Praziquantel
B. Invermectin
C. Nitazoxanide
D. No therapy
E. Metronidazole

The recommended response is B.

The appropriate treatment is Invermectin.
A 19 year old woman presented to an emergency room with 3 days of crampy lower abdominal pain – initially diffuse but localized to the right lower quadrant for the past 24 hours. She had had 5 loose bloody stools over the past day, and had had completed a week of ciprofloxacin for a urinary tract infection 6 days prior. She takes oral contraceptive pills. On exam, she was afebrile, well hydrated, with mild right lower quadrant tenderness on exam. WBC is 8800; normal liver and renal function. A stool culture is pending. CT abdomen showed thickening of cecum and terminal ileum with fat stranding consistent with appendicitis.

A. What is the next best step?
   A. Admit and observe
   B. Immediate surgery
   C. Immediate colonoscopy
   D. Angiography
   E. Empiric metronidazole

The recommended response is A.

While appendicitis does present with right lower quadrant pain, the presence of diarrhea with blood makes this diagnosis is far less likely. Thus, immediate surgery would not be indicated. In the acute setting, colonoscopy is not indicated, because if the diagnosis is appendicitis, a walled off perforation could be made worse. Empiric metronidazole is not indicated as *Clostridium difficile* disease does not seem likely given this clinical presentation and it is reasonable to wait for results of *C. difficile* testing. While ischemic colitis and STEC infection can present with right colon changes, the history is less suggestive despite the presence of oral contraceptive pills. The correct answer is admit and observe and await results of stool culture.
Patient in question 10 improved and became afebrile but on day 3 she was noted to be confused. Labs showed BUN 45, creatine 2.5, platelet count of 25,000. What is the most likely explanation of these findings?

A. Hemolytic Uremic Syndrome
B. Dehydration
C. Emboli
D. Drug reaction
E. *E. coli* sepsis

The recommended response is A.

The patient has developed the complication of STEC (*E. coli* 0157:H7) infection consistent with hemolytic uremic syndrome. This explains both the right sided colitis (with absence of fever) as well as this renal failure and thrombocytopenia. Her confusion may be due to CNS vasculitis. Dehydration is unlikely to cause this level of uremia. Embolic phenomenon or drug reactions are unlikely. *E. coli* sepsis of other varieties does not cause HUS.

12.
A 44 year farmer from Tennessee is admitted to a teaching hospital with 4 months of watery diarrhea (4 – 5 watery bowel movements/day), 20 pound weight loss and right lower quadrant abdominal pain. On exam, he appears chronically ill. Abdomen is benign. Chest x-ray is normal. CT scan shows colon wall thickening in ileocolonic distribution. At colonoscopy, there are ileitis and shallow ulcers in the cecum. Biopsies show granulomas. Steroids are begun but his condition worsens. Which of the following diagnostic possibilities is unlikely?

A. Histoplasmosis  
B. Tuberculosis  
C. Yersinia  
D. Sarcoïd  
E. Blastocystis hominis

The recommended response is E.

This presentation of ileocolonic abnormalities with a biopsy showing granulomas raises the possibility of Crohn’s disease, but given the lack of response to therapy for Crohn’s disease with further immunosuppression other infectious diarrhea should be considered. Granulomas can be seen with Histoplasmosis, Tuberculosis, Yersinia and sarcoïd. Cultures from the colonoscopy biopsies grew out Histoplasmosis and the patient responded to therapy.

13.
A 45 year old woman returns from a month in India with watery diarrhea and weight loss. Stool examination is shown. **Figure 4.** What is the best treatment strategy is?

A. Metronidazole  
B. Metronidazole and iodoquinol  
C. No treatment is needed  
D. Rifaxamin  
E. Ciprofloxacin

The recommended response is B.

The photograph shows trophozotes of ameba consistent with invasive amebiasis. The red cells in the cytoplasm of the organism are consistent with pathogenic ameba as opposed to the nonpathogenic *E. dispar*. Rifaxamin and ciprofloxacin will be ineffective for this parasitic infection. The appropriate therapy is metronidazole for the tissue phase and iodoquinol for the treatment of the luminal organisms.

A 50 year old woman developed *C. difficile* diarrhea after a week of antibiotics for sinusitis. She is treated with metronidazole for 10 days; 5 days later, diarrhea recurs and stools are again positive for *C. difficile* toxin A. Retreatment with metronidazole results in resolution of symptoms within 5 days. After this 10 day course of metronidazole, diarrhea returns in 4 days. Stool is negative for *C. difficile*, but diarrhea resolves on vancomycin.

What is the best treatment plan?

A. Continue vancomycin for 30 days then stop it  
B. Continue vancomycin and add VSL #3  
C. Treat with vancomycin for ten days, then taper and pulse dose  
D. Switch to rifaximin  
E. Three month tapering of metronidazole

The recommended response is C.

This patient has recurrent *Clostridium difficile* infection. The most appropriate management strategies are retreatment with vancomycin or metronidazole, but a pulse and taper dose is more effective than simply repeating a ten day course and abruptly stopping. Given the fact that the antibiotic treatment needs to be on a longer time frame, vancomycin is more appropriate than metronidazole which has risks of irreversible peripheral neuropathy. Rifaximin has not been formally tested for treatment of CDAD

15. A 30 year old woman has had alternating diarrhea and constipation for the past ten years. Physical exam is normal. Stool for enteric pathogens is negative, but a stool exam for ova and parasites shows rare Blastocystis hominis (fewer than 5 organisms).

A. Treat with metronidazole  
B. Resend stool culture  
C. Test well water  
D. No treatment  
E. Treat family members

The recommended response is D.

Blastocystis hominis can be seen in the stools. While there is debate as to whether or not this is a pathogen, most feel that it is not pathogenic. However, if a patient is immunosuppressed or Blastocystis hominis is present in large numbers, it might be reasonable to give a therapeutic trial to see if diarrhea resolves, but just as reasonable would be no treatment at all.

A 45 year old woman presents with watery diarrhea which began while on vacation in Guatemala 4 days ago. She does not have fever, nausea or blood in her stools. She is not orthostatic and her abdomen is benign. Stool is negative for occult blood.

What is the most likely pathogen causing her symptoms?

A. Vibrio cholerae
B. *Shigella* dysenteriae
C. Enterotoxigenic *E. coli*
D. Enterohemorrhagic *E. coli*.
E. Enteroaggregative *E. coli*

The recommended response is C.

The cause of watery diarrhea in a traveler to an underdeveloped area is most likely Enterotoxigenic *E. coli*. Vibrio cholerae is unlikely in Central America and presents with a more profuse watery diarrhea. *Shigella* is more likely to present with blood and mucus and tenesmus. Enterohemorrhagic *E. coli* also presents with a watery diarrhea which then turns bloody. Enterotoxigenic *E. coli* is the most likely answer.

17.
A 45 year old physician has nausea and vomiting for 4 – 6 hours followed by watery diarrhea. He had eaten at a brunch buffet the day before, which included raw oysters.

Which of the following is an unlikely diagnosis?

A. Staphylococcal toxin.
B. Norovirus
C. Vibrio parahaemolyticus
D. Vibrio vulnificans
E. Clostridium perfingens

The recommended response is A.

Watery diarrhea associated with raw shellfish, specifically oysters, is Vibrio parahaemolyticus or vibro vulnificans until proven otherwise, as this is the leading cause of seafood associated gastroenteritis in the United States. Viruses such as norovirus can also cause seafood related diarrhea. It is usually acquired by eating raw oysters from warm water estuaries. Staphylococcal food poisoning usually presents with vomiting within four to six hours of ingestion of suspected food due to preformed toxin. C. perfringens is unlikely given the time interval.

18.
Ameba cysts are found in the stool of a young African immigrant man with Crohn’s disease. What is the next step?

A. Treat with metronidazole
B. Send ameba serologies
C. Treat with ivermectin
D. Flexible sigmoidoscopy and biopsy
E. Do nothing

The recommended response is B.

Ameba cysts seen in the stool can either be pathogenic or the nonpathogenic strain of E. dispar the latter is far more likely. If the trophozoites show phagocytized red blood cells they are likely pathogenic. If not, the best way to determine pathogenicity is to look for amebic titers in the blood. If these are elevated, this confirms invasive amebias.


19. Guillain-Barre syndrome is most commonly associated with which of the following infections?

A. Campylobacter
B. Ciguatera fish toxin
C. Salmonella
D. Vibrio parahaemolyticus
E. Shigella

The recommended response is A.

Guillain Barre syndrome is most commonly associated with Campylobacter infection. Ciguatera fish toxin presents with vomiting, diarrhea and abdominal cramping three to six hours after eating contaminate fish. Neurologic symptoms (3 – 72 hours with meat) include paresthesias, painful urination, blurred vision and nerve palsies. There have been no epidemiologic links of Guillian-Barre syndrome to Salmonella, Vibro parahaemolyticus or Shigella.

20. 
*Giardia lamblia* infection is best diagnosed by?

A. A single stool O + P  
B. Stool antigen EIA test  
C. String test  
D. Duodenal biopsy  
E. Empiric metronidazole

The recommended response is B.

Stool antigen is the most sensitive test for detection of *Giardia*. All of the test methods can be used for detection. The string test is not widely available. Empiric metronidazole but is reasonable if suspicion is high and the other diagnostic tests are negative.

21. Colorectal biopsy can help distinguish acute self limited colitis (ASLC) from IBD. Which feature is unlikely in ASLC?

A. Crypt abscess
B. Basal plasmacytosis
C. Mucin depletion
D. Lymphocytes
E. Plasma cells

The recommended response is B.

Chronic inflammatory changes are seen biopsies with inflammatory bowel disease even early in the course of disease. Specifically, these are distorted crypts, basal or lymphoid aggregates, basal plasmacytosis and mixed acute and chronic inflammatory cells in the lamina propria. With infectious colitis normal crypt architecture is preserved and the inflammation when present is predominately acute. Crypt abscesses are seen in both as is mucin depletion.

A 70 year old man is admitted to the veteran’s hospital for treatment of chronic lymphocytic leukemia. He served in the Philippines during World War II. After 5 days of chemotherapy, he develops nausea, vomiting, watery diarrhea and a cough. CBC shows no eosinophilia. Figure 5 is his sputum.

What is the most likely diagnosis?
A. Ascariasis
B. Miliary Tuberculosis
C. Hyperinfection syndrome due to strongyloides
D. Pneumonitis from chemotherapy
E. C. difficile

The recommended response is C.

The sputum shows a strongyloid larva. This clinical picture is consistent with hyperinfection syndrome due to strongyloides. Having served in World War II in the area, occult strongyloides infection is very common and is usually latent and asymptomatic, but with immunosuppression, the organism can cause an autoreinfection syndrome with migration through the lungs. Eosinophilia is common with strongyloides but may be absent with hyperinfection syndrome.
23.

What is the appropriate therapy for patient in question 22?

A. IV metronidazole
B. IV metronidazole, steroids + ivermectin
C. Isoniazid
D. Vancomycin orally
E. Ivermectin

The recommended response is B.

The appropriate therapy is treatment for the parasite and also covering with antibiotics and steroids. There is a high fatality rate associated with this syndrome. Treatment with antibiotics or ivermectin alone is not sufficient.

24.
Supplementation with which of the following may improve outcomes in infectious diarrhea in children?

A. Zinc  
B. Calcium  
C. Magnesium  
D. Selenium  
E. Iron  

The recommended response is A.

There is evidence in children that zinc supplementation improves outcomes in chronic diarrhea. Zinc deficiency has been shown to cause diarrhea.

25. A 30 year old man returns from Japan with watery diarrhea. An exam is positive for Entamoeba coli.

Which of the following statements is true?

A. This organism is nonpathogenic but associated with contaminated water.
B. This organism is pathogenic when present in large numbers.
C. This organism is associated with ingestion of raw fish.
D. This organism can be seen as part of the normal flora in the southeastern US.
E. This organism is associated with iron deficiency anemia.

The recommended response is A.

Entamoeba coli is a parasite which is not felt to be pathogenic but often indicates that someone has been exposed to contaminated water and may have other organisms. It is not associated with raw fish (Pathogens that would include Diphyllobothrium latum or anisakiasas). The organism is not seen as part of the flora and is not associated with iron deficiency anemia. (although this is seen with hookworm)

26.
Which organism is most common cause of food borne illness on cruise ships?

A. S. aureus preformed toxin
B. Noncholera vibrios
C. Norovirus
D. Salmonella
E. Clostridium perfringens

The recommended response is D.

A review of 50 outbreaks of food borne disease on cruise ships affecting 10,000 people shows that Salmonella was the most common pathogen. Others that were common were ETEC, Shigella and Norovirus. The latter, a calicivirus and a much publicized cause. With Norovirus, or Norwalk virus, many epidemics have been characterized in this setting with close quarters. Prevention of epidemics rests on careful hand washing and avoiding exposure to aerosolized vomit. People with norovirus can remain contagious for weeks which makes it difficult to control epidemics.

27. How many deaths occur each year in the United States due to food poisoning?

A. 500  
B. 1,000  
C. 5,000  
D. 3,000  
E. 10,000

The recommended response is C.

There are 5,000 deaths per year due to food poisoning in the United States.

CDC net  
Figures

Figure 1
Figure 2