Module 9: Antimicrobial Stewardship in the Management of Acute Infectious Diarrhea

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Learning Objectives

By the end of this module, you should be able to:

1. Describe the role of antimicrobial stewardship in managing infectious diarrhea
2. Differentiate between viral and bacterial causes of diarrhea
3. Explain when antibiotics are necessary for treatment of diarrhea
4. Outline the risks of inappropriate antibiotic use

Introduction

- Gastrointestinal complaints including diarrhea, are a frequent cause of visits to healthcare providers
- The clinical spectrum of diarrheal illness is broad, as are the etiologic agents which include bacteria, viruses and parasites
- Patients with diarrhea often self-medicate, exposing themselves to medicines that are neither indicated nor effective
- While infection is a common cause of diarrhea, only a small portion of patients benefit from antibiotic therapy
- Empiric therapy for patients with bloody diarrhea should be individualized
- Standard Treatment Guidelines recommend the use of empiric antimicrobials only in certain circumstances

Infectious Aetiologies of Acute diarrhea

	Non-Inflammatory	Inflammatory
Common Aetiologies	**Viruses** • Rotavirus • Norovirus • Adenpvirus • Cytomegalovirus **Bacteria** • Enterotoxigenic Escherichia. coli (ETEC) • Clostridium perfringens • Staphylococcus aureus • Vibrio cholerae • Bacillus cereus **Parasites** • Giardia Intestinalis • Cryptosporidium parvum • Cyclospora cayetanensis	**Bacteria** • Salmonella, non-typhi • Shigella dysenteriae • Campylobacter jejuni • Enterohemorrhagic (Shiga toxic- producing E. coli) • Enteroinvasive E.coli • Clostridium difficile • Yersinia **Parasites** • Entamoeba histolytica
Mechanism of diarrhoea	Increased secretion	Invasive or toxic producing pathogens Mucosal damage and tissue destruction
Severity	Mild Watery diarrhoea	Severe Bloody Diarrhoea

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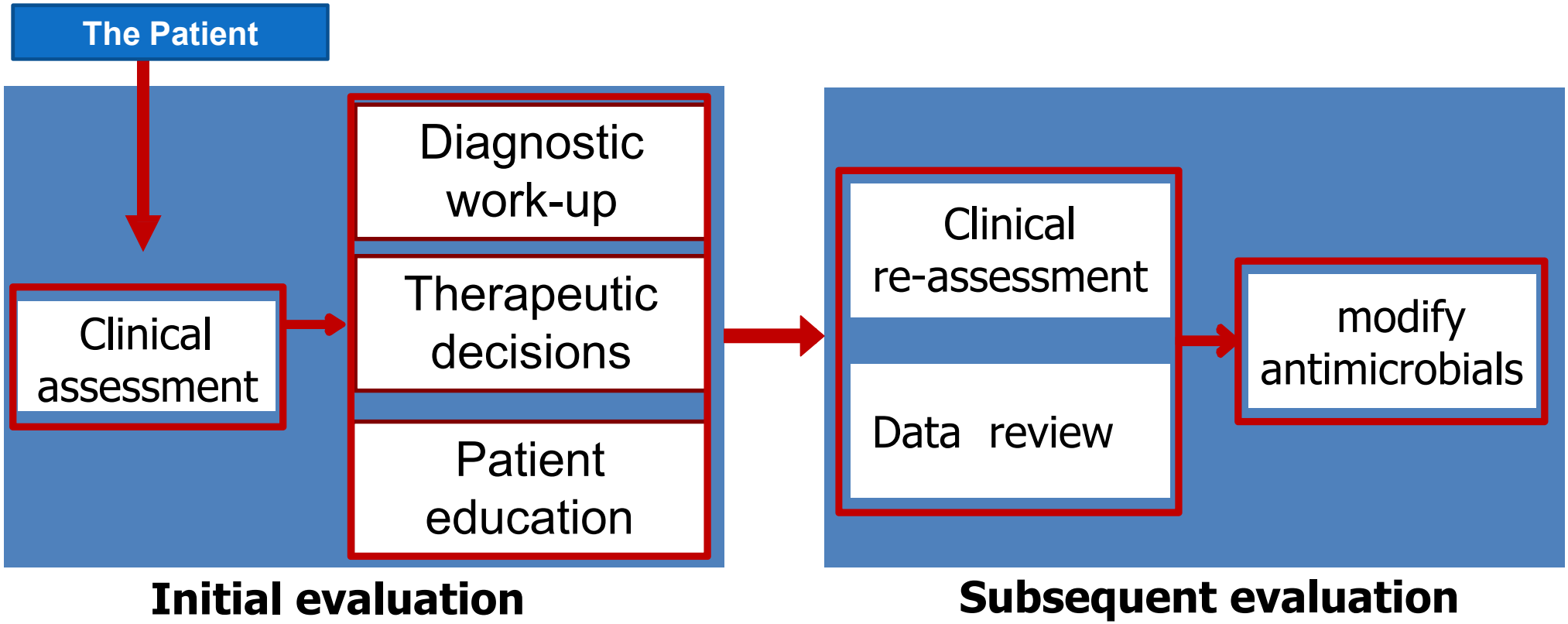
Patient Management Process



Nine Factors to Consider when Selecting an Antibiotic

1. Spectrum of coverage
2. Patterns of resistance
3. Evidence or track record for the specified infection
4. Achievable serum, tissue, or body fluid concentration e.g Urine
5. Allergy
6. Toxicity
7. Formulation (intravenous versus Per oral); if per oral assess bioavailability
8. Adherence/convenience e.g twice daily, once daily
9. Cost

Case Scenario 1

A healthy non-pregnant 18-year-old woman presents with a fever, abdominal cramping and diarrhea for 1 day. She has not vomited and has been taking fluids without difficulty.

She had 3 watery bowel movements in the last 24 hours without evidence of blood or mucus. The patient has just returned from a trip to a country with a high prevalence of diarrheal illness
She has not recently taken antibiotics and her physical examination is normal. There's no evidence of dehydration.

Take 2 minutes to plan for the clinical management of this condition

Case Scenario 1 Management Considerations

- Important points to consider when managing acute diarrhoea:
  - Is it bloody or watery?
  - What is the exposure history?
  - What is the immune status of the patient?
- Rehydration is the cornerstone of management of acute diarrhea, regardless of the etiologic pathogen and the severity of disease
- Diarrhea - either watery or bloody - provides clinicians with some focus on management

Case Scenario 1 Management Considerations ...

- Epidemics of watery diarrhea are commonly caused by viruses however, the infection with Vibrio cholerae must also be considered
- The most likely pathogens causing diarrhea in an individual patient depend on her exposure and travel history as well as her clinical presentation and the status of her immune system

Case Scenario 1 Management Considerations …

- For most cases of watery diarrhea, watchful waiting without empiric antimicrobial therapy is sufficient
- For patients, with travel history to country with a high prevalence of diarrheal illness

  viral gastroenteritis might not be likely cause of their symptoms and empirical therapy must be individualized

Case Scenario 1 Management Considerations …

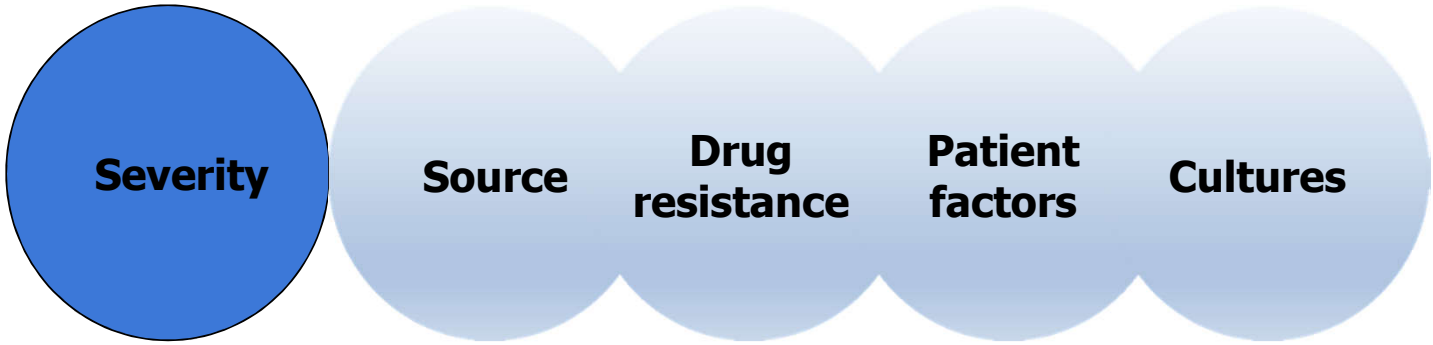
Travelers Diarrhoea

- Traveler's diarrhea is defined as clinically significant diarrhea that occurs during or within 2 weeks of returning home from travel
- It is usually self-limited diarrhea with symptoms lasting 1-5 days
- The most common etiologic agent is enterotoxigenic *E. coli*, although many other pathogens can cause the syndrome
- Other causes: norovirus, Enteroaggregative *E. coli, Campylobacter, Salmonella, Shigella*

Case Scenario 1 Management Considerations …

Severity of the patient's condition:

- **Not severe.** She has watery diarrhea but not bloody diarrhea. She has normal vital signs and no signs of systemic illness except for fever. She is not severely dehydrated. She will not require hospitalization.



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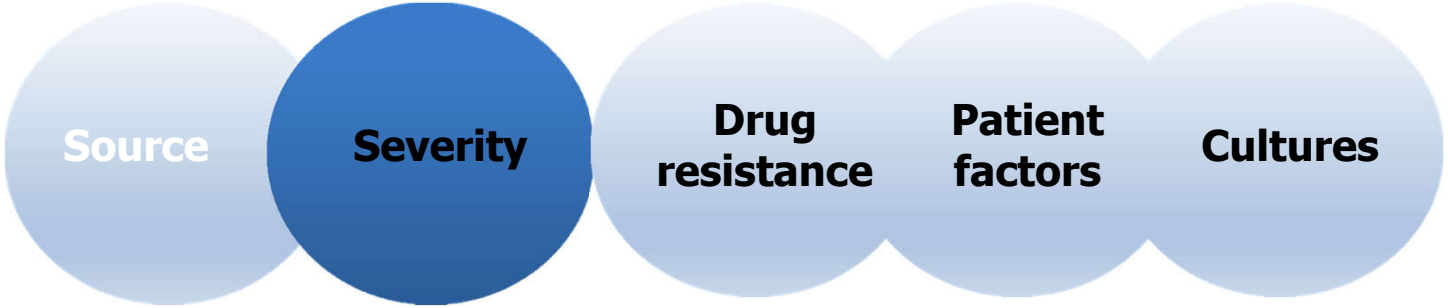
Case Scenario 1 Management Considerations …

Cause of patients diarrhea

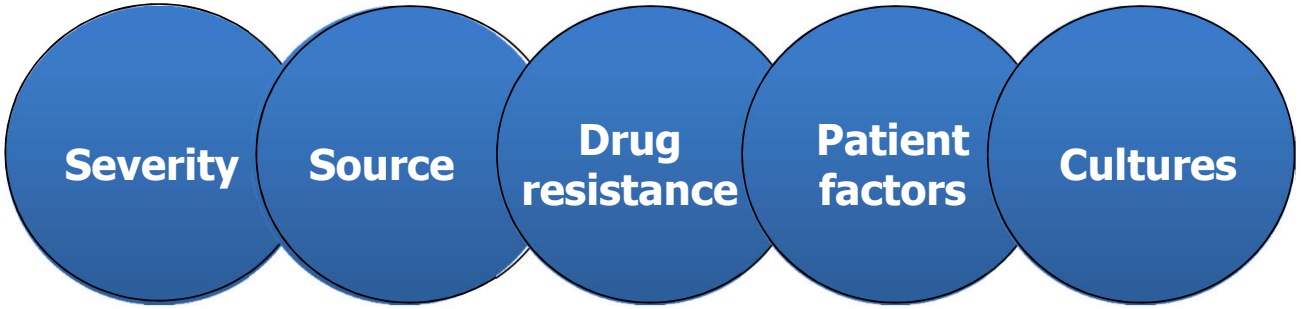
- This illness developed shortly after her trip so she most likely has traveler's diarrhea. While the traveler's diarrhea is most commonly caused by a bacterial pathogen, in some circumstances viruses and parasites can be the causative agents.



Case Scenario 1 Management Considerations …

Informed choice of antibiotic therapy

- If drug resistance data is available it should be considered for optimal antibiotic therapy



Case Scenario 1 Management Considerations …

Antimicrobial resistance

- Given the emergence of drug-resistant enteropathogens worldwide, infection with resistant organisms is certainly possible. However, given her mild presentation, empiric antimicrobial therapy is not indicated as most episodes of traveler's diarrhea are self-limited.

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Case Scenario 1 Management Considerations …

Stool cultures

- Given that most cases of infectious diarrhea are self-limited, stool cultures are not always necessary. They should be obtained from individuals with severe illness, bloody diarrhea, high fever, persistent symptoms or in patients with comorbidities such as HIV that confer greater risk for unusual pathogens
- In this specific case, stool cultures are likely not necessary

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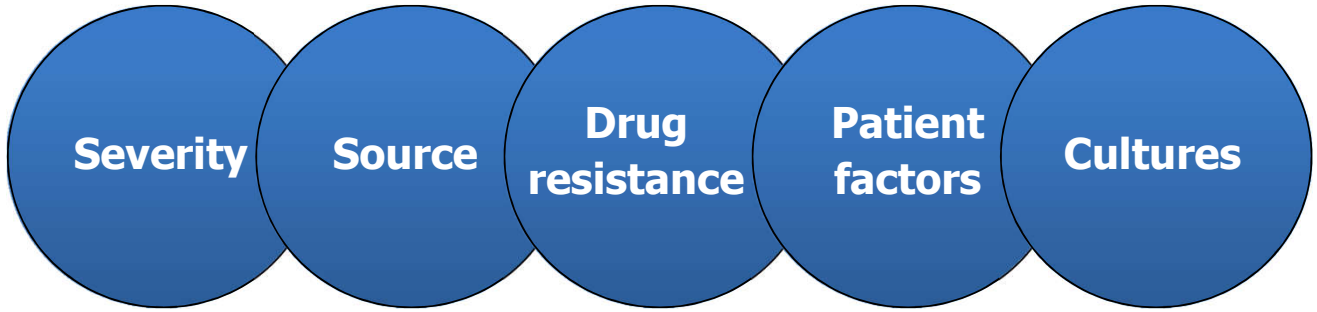
Case Scenario 1 Management Considerations …

Therapeutic Decision

- You decide against empiric antimicrobials and do not send further laboratory tests. The patient is scheduled for a follow-up appointment two days later and upon her re-evaluation she feels much improved, without fever and with resolution of her diarrhea.



Case Scenario 2

- A 66-year-old woman present with fever and reports a maximum temperature of 38.6°C, abdominal pain, and bloody diarrhea for 3 days. She has vomited but has been taking fluids without difficulty. She had multiple bloody bowel movements in the last 24 hours with some mucus and also reports tenesmus
- The patient had just returned from a lake retreat where she went for a family reunion. She did not go in the lake but instead spent time in the cabin with her grandchildren and prepared food for grilling. She has not been in contact with other family members but is not aware of illness in others. She has not recently taken antibiotics. Her physical examination is remarkable for evidence of moderate dehydration and diffuse abdominal tenderness. She declines a hospital admission.

Take 2 minutes to plan for the clinical management of this condition

Case Scenario 2 Management Considerations

- For patients with bloody diarrhea, decisions regarding empiric therapy must be individualized

- Empiric antimicrobials should not be given to all patients with bloody diarrhea due to the risk of harm associated with antimicrobial use in patients infected with Shiga-toxin producing *E. coli* - however, this is not the only pathogen that causes bloody diarrhea

Case Scenario 2 Management Considerations ...

- For immunocompetent children and adults with bloody diarrhoea, empiric antibiotic therapy is warranted for:
  - Infants less than 3 months
  - Ill immunocompetent patients with fever ,signs and symptoms to suggest an infection due to *Shigella*, including abdominal pain and bacillary dysentery, frequent scant and bloody stools, fever, abdominal cramps and tenesmus
  - People who have recently travelled internationally with fever and evidence of sepsis
- Consider use of antibiotic for immunocompromised individuals with fever, severe illness and bloody diarrhea

Case Scenario 2 Management Considerations …

Severity of patients condition

- In contrast to the young woman from case one, this patient has **moderate to severe** invasive disease evidenced by fever, dehydration and bloody mucoid stools.

Case Scenario 2 Management Considerations …

Cause of patients diarrhoea

- It is most likely that she acquired this infection while at the campsite. The possible infectious etiologies of acute bloody diarrhea with fever include enterohemorrhagic *E. coli*, *Shigella*, *Campylobacter*, non-typhoidal *Salmonella* species and *Entamoeba histolytica*.

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Case Scenario 2 Management Considerations …

Resistance to antibiotics

- Given the emergence of drug-resistant enteropathogens worldwide, infection with resistant organisms is possible but most likely reflects local resistance rates, given that this was a locally acquired infection and not the result of international travel.

Case Scenario 2 Management Considerations …

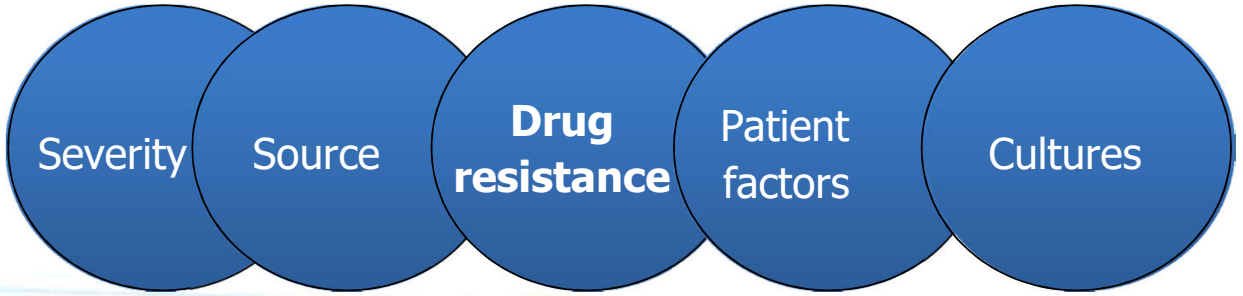
Cultures

- And finally, in this case you should obtain stool and blood cultures given the severity of her presentation.

Case Scenario 2 Management Considerations …

Therapeutic decision

- You decide that *empiric* antimicrobial therapy is warranted. She is immunocompetent but has fever, abdominal pain, frequent bloody stools and tenesmus and you consider shigellosis as her diagnosis. You reference your local guidelines and decide to prescribe ciprofloxacin as she is able to tolerate oral medications.



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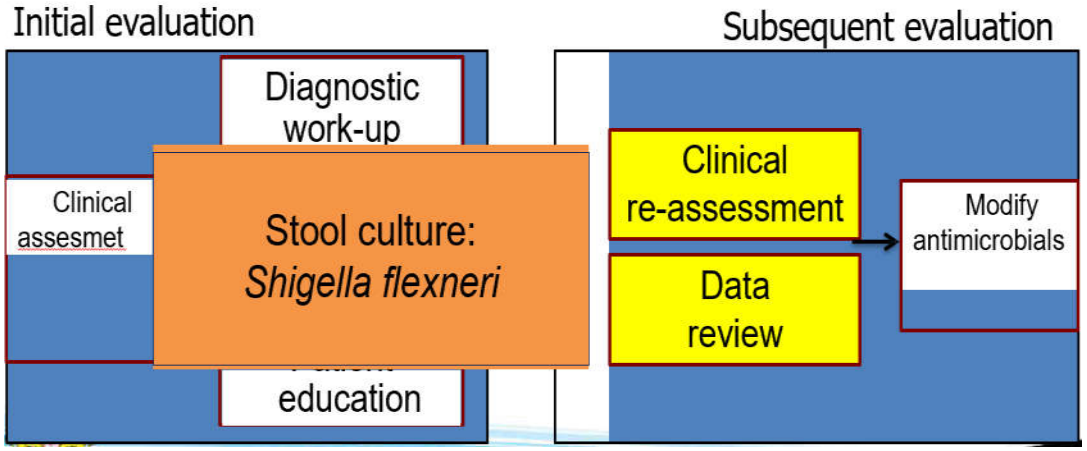
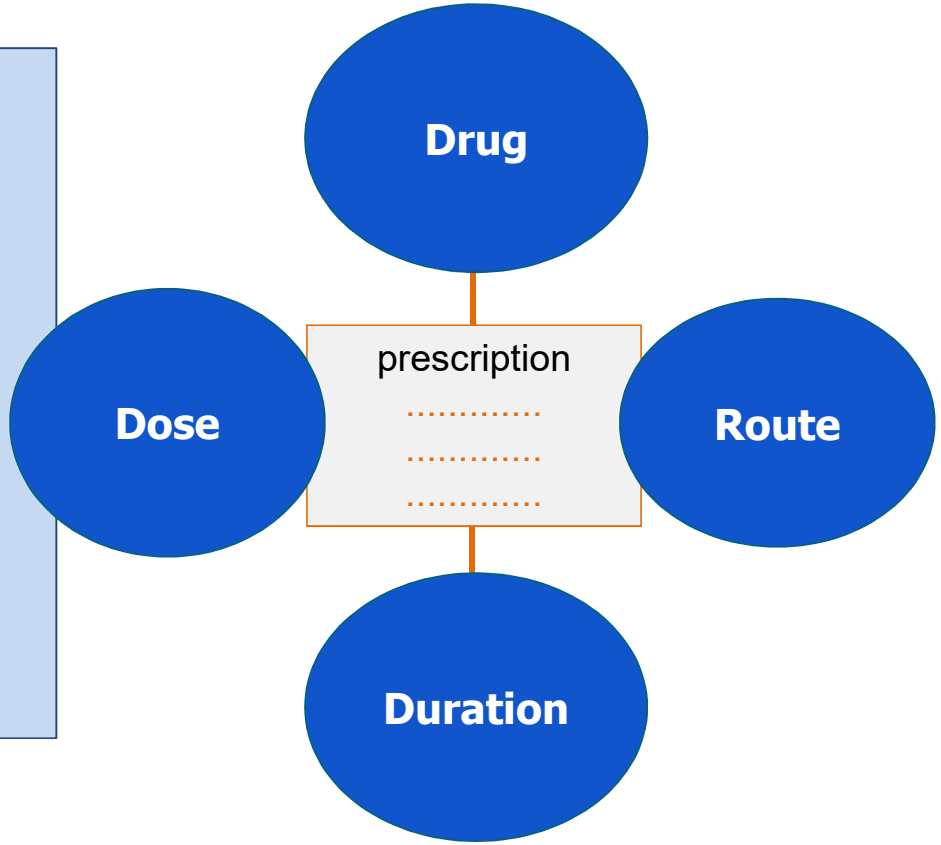
Case 2: Re-evaluation

- Re-evaluate her over the next 2 days while she convalesces at home. Her blood cultures did not grow a pathogen. However, stool culture grew *Shigella flexneri*. You reference local guidelines from your health ministry or health department and feel confident in your choice of a 5-day course of Ciprofloxacin.



Key Points

- Not all diarrheal illnesses require, or respond to, antimicrobial therapy.
- Antibiotics are not indicated for patients with mild, watery diarrhea.
- Antibiotics may be indicated for patients with **evidence** of invasive disease.
- Healthcare providers must educate patients to avoid self-treatment.



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The End

You have come to the end of this module. Kindly attempt module 9 quiz before proceeding to module 10