WORLD TRAVELERS

GREATER NUMBERS OF IMMUNOLOGICALLY NAÏVE TRAVELERS VENTRUE ABROAD EACH YEAR AND MANY VISIT TROPIC NATIONS WHERE ILLNESS BURDEN IS LARGELY DUE TO POVERY, CIVIL UNREST, POOR HYGIENE, MALNUTRITION AND TROPICAL ILLNESS

LIKELY CAUSES OF ACUTE SYMPTOMS ARE COMMON PROBLEMS ARE URTIs, DIARRHOEAL ILLNESSES OR REACTIONS TO STRESS

INITIAL EVALUATION OF THE RETURNING TRAVELER:

INDIVIDUALS AT RISK:

- 64% of travellers report one or more illnesses while abroad, 26% are illupon return and 56% of those ill upon return develop symptoms after arrival
- Travelers are at risk for certain infectious diseases based on the duration of travel, endemic exposure and pre-existing immunity → others at risk include nonvoluntary travellers (refugees and displaced persons)
- Western travellers have an increasing risk of tropical illnesses as a result of increasing exotic, adventure-type travel to remote locations

Table 156-1 Overall Risk of Exposure to Infectious Agents
High risk (1 in 10 travelers): diarrhea, upper respiratory illness, and noninfectious illnesses such as injuries and exacerbation of preexisting chronic diseases
Moderate risk (1 in 200): dengue fever, Chikungunya, enteroviral infection, gastroenteritis, giardiasis, hepatitis A, malaria, salmonellosis, sexually transmitted diseases, shigellosis
Low risk (1 in 1000): amebiasis, ascariasis, measles, mumps, enterobiasis, scabies, tuberculosis, typhoid, hepatitis B
Very low risk (1 in >1000): human immunodeficiency virus, anthrax, Chagas disease, hemorrhagic fevers, pertussis, plague, typhus, hookworm

HISTORY:

- Suspect imported disease in recent world traveller and DIRECT HISTORY ACCORDINGLY
- Note previous medical conditions → age <5, elderly, pregnancy or diabetes renders patient less tolerant of tropical infections
- KNOWING THE REGION OF TRAVEL CAN FOCUS THE DIFFERENTIAL DIAGNOSIS:

Table 156-3 Regional Tropical Illnesses
Africa: malaria, human immunodeficiency virus, TB, hookworm, tapeworm, roundworm, brucellosis, yellow fever (and other hemorrhagic fevers), relapsing fever, schistosomiasis, tick typhus, filariasis
Central and South America: malaria, relapsing fever, dengue fever, filariasis, TB, schistosomiasis, Chagas disease, typhus
Mexico and the Caribbean: dengue fever, hookworm, malaria, cysticercosis, amebiasis
Australia, New Zealand: dengue fever, Q fever, Murray Valley encephalitis, Japanese encephalitis
Middle East: hookworm, malaria, anthrax, brucellosis
Europe: giardiasis, Lyme disease, tickborne encephalitis, babesiosis
China and East Asia: dengue fever, hookworm, malaria, strongyloidiasis, hemorrhagic fever, Japanese encephalitis

- **FOCUSED HISTORY:**

Table 156-2 Travel-Specific Aspects of the Medical History
Pretravel information
Previous medical condition
Pediatric patient, diabetes, pregnancy, immunosuppression (especially human immunodeficiency virus/acquired immunodeficiency syndrome or steroid use)
Pretravel consultation and preparation (self-treatment medications, vaccination history, prophylaxis, etc.)
Type and compliance with chemoprophylaxis—particularly malaria
History of routine childhood immunization
Nation of birth and citizenship
Exact itinerary of departure and arrival (within the last 3–5 y may be relevant)
Season of travel (monsoon, dry season)
Destinations visited (including locations of transit or stopovers)
Urban or rural, altitude
Purpose of travel and activities in-country
General purpose of visit or travel (e.g., "adventure travel" with high exposure to remote, natural elements)
Contacts and their health
Habitat and location of lodging (bednets, window screens)
Crowded living or sleeping conditions
High-risk activities (e.g., medical care of displaced populations, spelunking in caves, cohabitation with indigenous, poor populations)
Opiate use or IV drug use
Sexual intercourse with any foreign national and very high-risk populations such as commercial sex-trade workers (dates and nature of sexual contact)
Exposure to environment (swimming, hiking, trekking, digging, or soil contact)
Consumption of high-risk foods (wild game or bush meat, raw or undercooked meats or fish, unpasteurized milk products, food from street vendors, natural sources of water, salads)
Exposure to dogs, birds, or rodents
Adverse incidents
Insect or animal bites
Saliva from animals to open wounds
Assault or trauma
Status and health of fellow travelers
Possible ill contacts
In-country medical consultations sought, remedies used, and procedures (injections, acupuncture, transfusions, dental procedures, body piercing, or tattooing)

- SPECIFIC EXPOSURES RAISES RISK OF CERTAIN CONDITIONS:

Table 156-4 Specific Exposures and Associated Tropical Infections	
Contact/Exposure	**Possible Infections**
Untreated water, unpasteurized dairy products	Salmonellosis, shigellosis, hepatitis, amebiasis, brucellosis, listeriosis, TB
Raw or undercooked shellfish	Clonorchiasis, paragonimiasis, vibrios, hepatitis A
Raw or undercooked animal flesh	Trichinosis (e.g., pig, horse, bear), salmonella, enterohemorrhagic *Escherichia coli*
Raw vegetables, water plants (e.g., watercress)	Fascioliasis
Animal contact (and animal products)	Rabies, Q fever, tularemia, brucellosis, echinococcosis, anthrax, plague, Nipah virus, toxoplasmosis, herpes B encephalitis
Rodent contact	Hantavirus, viral hemorrhagic fevers, murine (endemic) typhus, Lassa fever, plague, leptospirosis
Arthropod vectors	
Mosquitoes	Malaria, dengue fever, Chikungunya, filariasis, yellow fever, and other arboviral infections
Ticks or mites	Rickettsioses, tularemia, scrub typhus, Crimean-Congo hemorrhagic fever, African tick bite fever
Reduviid (kissing) bugs	American trypanosomiasis (Chagas disease)
Tsetse flies	African trypanosomiasis (African sleeping sickness)
Fleas	Typhus, plague
Sandflies	Leishmaniasis, sandfly fever
Freshwater exposure	Schistosomiasis, leptospirosis
Barefoot exposure	Strongyloidiasis, cutaneous larva migrans, hookworm
Sexual contacts	Human immunodeficiency virus, hepatitis B, syphilis, gonorrhea, chlamydia, herpes simplex
Infected persons contact	Viral hemorrhagic fever, enteric fever, meningococcal infection, TB

PHYSICAL EXAMINATION:

- Imported disease should be suspected in the presence of HIGH FEVER, SIGNS OF HAEMORRHAGE, PROFUSE DIARRHOEA, SHORTNESS OF BREATH, SKIN LESIONS AND NEUROLOGIC DISTURBANCE

Table 156-5 Physical Findings in Selected Tropical Infections	
Physical Finding	**Likely Infection or Disease**
Rash	Dengue fever, typhus, syphilis, gonorrhea, Ebola fever, brucellosis, Chikungunya, HIVseroconversion
Jaundice	Hepatitis, malaria, yellow fever, leptospirosis, relapsing fever
Lymphadenopathy	Rickettsial infections, brucellosis, HIV, Lassa fever, leishmaniasis, Epstein-Barr virus, cytomegalovirus, toxoplasmosis, trypanosomiasis
Hepatomegaly	Amebiasis, malaria, typhoid, hepatitis, leptospirosis
Splenomegaly	Malaria, relapsing fever, trypanosomiasis, typhoid, brucellosis, kala-azar, typhus, dengue fever, schistosomiasis
Eschar	Typhus, borreliosis, Crimean-Congo hemorrhagic fever, anthrax
Hemorrhage	Lassa, Marburg, or Ebola viruses; Crimean-Congo hemorrhagic fever; meningococcemia, epidemic louse-borne typhus

LABORATORY TESTING:

- Initial evaluation may include standard tests

- In a clinically well patient in whom malarias treatment is not begun but malaria is suspected, obtain blood every 12-24 hours for repeat smears

DISEASES COMMONLY ASSOCIATED WITH FEVER:

- **PATIENTS WITH A FEVER AFTER TROPICAL TRAVEL HAE MALARIA UNTIL PROVEN OTHERWISE**
- **Common causes of febrile illness post travel are listed below:**

Table 156-7 Most Common Causes of Fever after Travel to Tropical Regions
Malaria
Respiratory tract infections (upper respiratory tract infections, pneumonia, legionnaires disease, and influenza)
Diarrheal disease
Urinary tract infection
Dengue fever
Enteric fever (typhoid, paratyphoid fever)
Rickettsial infection
Infectious mononucleosis
Pharyngitis

INCUBATION PERIOD:

- The fever pattern is helpful because onset, pattern and duration can suggest a particular illness

Table 156-8 Typical Incubation Periods for Selected Tropical Infections	
Incubation Period	**Infections Likely**
<10 d (short incubation)	Traveler's diarrhea
	Dengue fever and arboviral infections
	Yellow fever
	Spotted fevers
	Anthrax
	Diphtheria
	Malaria
	Rabies
	Typhoid fever
	Meningococcal infections
	Plague
	Tularemia
	Typhus (louse- and flea-borne)
<21 d (intermediate incubation)	Leptospirosis
	Viral hemorrhagic fevers
	Malaria
	Enteric fevers (typhoid, paratyphoid)
	Typhus
	African trypanosomiasis
>21 d	Viral hepatitis (A, B, C, D, E)
	Malaria
	Acute HIV infection
	Amebic liver abscess
	Schistosomiasis (Katayama fever)
	Visceral leishmaniasis
	Filariasis
> Months	Tuberculosis
	Malaria
	Filariasis
	Viral hepatitis B, C
	HIV
	Visceral leishmaniasis
	Rabies
	Syphilis
	African and American (Chagas disease) trypanosomiasis

INCUBATION PERIODS SHOULD BE USED WITH CAUTION BECAUSE SOME DISEASE HAVE VARIABLE INCUBATION DEPENDING ON FACTORS SUCH AS HOST IMMUNITY AND THE USE OF CHEMOPROPHYLAXIS

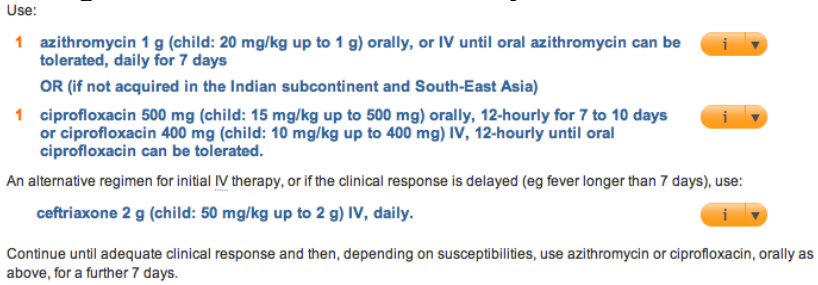
DENGUE FEVER:

- The most serious tropical febrile illness after malaria
- Suspect in those developing fever within 2 weeks of travel
- Can be contracted more than once as each of the four strains confers no cross-immunity
- Transmitted by **Aedes aegypti** mosquito
- Urban dengue in the Americas, Africa and Indian subcontinent → classic dengue presents with sudden onset (4-7 days) of high fever, headceh, N+V, myalgias and rash usually lasting days

- SE Asia → haemorrhagic dengue fever → petechial haemorrhage indistinguishable from meningococcaemia.
    - Preferentially occurs among infants of immune mothers, children >1
    - Begins as classic dengue with fever and myalgias → after 2-7 days after pyrexia improves, lassitude, fatigue and shock develop with ensuing mortality >10% → features include pleural effusions, purpura, epistaxis, petechiae and marked thrombocytopaenia
    - If dengue haemorrhagic fever is left untreated, it rapidly evolves into dengue septic shock, which is often fatal → abdominal pain, severe emesis, mental status changes and alternating hyperthermia and hypothermia
    - Diagnosis of dengue and its severe manifestations is based on clinical findings plus serology (ELISA for IgM), lab anomalies (leukopenia and thrombocytopaenia)
    - Treatment is supportive

TYPHOID FEVER:

- Also known as enteric fever → a serious infection diagnosed in 2% of febrile travellers and caused by SALMONELLA TYPHI → once malaria has been excluded, typhoid fever is commonly the cause of a febrile illness lasting more than 10 days
- Vaccination recommended prior to travel BUT IS ONLY 75% EFFECTIVE
- Transmitted in dose-related fashion after food contamination by faeces or urine
- After ingestion → bacteria adhere to small bowel mucosa, invading lymphoid tissues and disseminating by lymphatics to the bone marrow, gallbladder and spleen to reproduce in macrophages
- CLINICAL FEATURES:
    - Fever with headache which progresses to HIGH FEVER WITH CHILLS, HEADCHE, COUGH, ADBOMINAL PAIN AND PROSTRATION
    - Diarrhoea may occur, but so may constipation
    - BRADYCARDIA RELATIVE TO FEVER IS **CLASSIC**
    - After several days, a pale-red macular rash may appear ("rose spots")
    - Complications → small-bowel ulceration, anaemia, DIC, pneumonia, meningitis, myocarditis, cholecystitis and renal failure
- TREATMENT:
    - Diagnosis is clinical and confirmed by blood, urine or stool culture


Use:

1 azithromycin 1 g (child: 20 mg/kg up to 1 g) orally, or IV until oral azithromycin can be tolerated, daily for 7 days

OR (if not acquired in the Indian subcontinent and South-East Asia)

1 ciprofloxacin 500 mg (child: 15 mg/kg up to 500 mg) orally, 12-hourly for 7 to 10 days or ciprofloxacin 400 mg (child: 10 mg/kg up to 400 mg) IV, 12-hourly until oral ciprofloxacin can be tolerated.

An alternative regimen for initial IV therapy, or if the clinical response is delayed (eg fever longer than 7 days), use:

ceftriaxone 2 g (child: 50 mg/kg up to 2 g) IV, daily.

Continue until adequate clinical response and then, depending on susceptibilities, use azithromycin or ciprofloxacin, orally as above, for a further 7 days.

RICKETTSIAL SPOTTED FEVER:

- Transmitted by bite, body fluid or faeces of IXODID ARTHROPOD TICKS → widely distributed globally
- Great variation in severity

SCRUB TYPHUS:

- Caused by tick bite → rash may be absent but is characterised by a papule at the bite site that later become NECROTIC AND FORMS A CRUSTED BLACK ESCHAR

Australian spotted fevers and scrub typhus

To treat Australian spotted fevers (tick typhus: *Rickettsia australis*, *Rickettsia honei*) or scrub typhus (*Orientia tsutsugamushi*), use:

1 **doxycycline 100 mg (child more than 8 years: 2.5 mg/kg up to 100 mg) orally, 12-hourly for 7 to 10 days**

OR

2 **azithromycin 500 mg (child: 10 mg/kg up to 500 mg) orally, on day 1, then 250 mg (child: 5 mg/kg up to 250 mg) orally, daily for a further 4 days.**

In severe disease, seek expert advice.

LEPTOSPIROSIS:

- Aka Weil disease
- Follows mucous membrane or percutaneosu exposure to freshwater contaminated by LEPTOSPIRA INTERROGANS
- Outbreaks common after flooding
- CLINICAL FEATURES:
  - High fever after incubation period of 2-20 days
  - Associated with severe headache, chills myalgias and HEPATITIS (with or without jaundice)
  - Second phase → icteric or WEIL disease → lasts up to 4 weeks and is caused by circulating antibodies that lead to aseptic meningitis, renal failure, uveitis, rash and rarely → CIRCULATORY COLLAPSE
  - Isolation of leptospires form blood or CSF is diagnostic
- TREATMENT:
  - Oral antibiotics in mild disease within first three days, IV therapy for more severe disease

Mild cases of leptospirosis may not require treatment, and if the patient has defervesced by the time the diagnosis is confirmed, no antibiotics are required. Treatment for more severe forms of leptospirosis is recommended, and should be instituted early at the time of suspected rather than proven diagnosis. Use:

1 **doxycycline 100 mg (child more than 8 years: 2.5 mg/kg up to 100 mg) orally, 12-hourly for 5 to 7 days**

OR

2 **benzylpenicillin 1.2 g (child: 30 mg/kg up to 1.2 g) IV, 6-hourly for 5 to 7 days**

OR

3 **ceftriaxone 1 g (child: 25 mg/kg up to 1 g) IV, daily for 5 to 7 days.**

DISEASES COMMONLY ASSOCIATED WITH FEVER AND HAEMORRHAGE:

- Among most feared tropical diseases are THE VIRAL HAEMORRHAGIC FEVERS → rare when compared to other febrile haemorrhagic infections (malaria, dengue, meningococcaemia, leptospirosis, plague, bnacterial sepsis
- Meningococcus is the most common cause of acute haemorrhagic fever in temperate climates
- In event of suspected viral haemorrhagic fever, institute control measures, including isolation in a negative pressure room with the use of high-efficiency particulate-arresting respirators with use of gloves and gowns

CRIMEAN-CONGO HAEMORRHAGIC FEVER:

- Tickborne-viral disease
- Mortality ranges from 3-30%
- Haemorrhagic period is short (2-3 days)
- Thrombocytopaenia is common → patients may also have leukopenia, elevated liver enzymes, LDH and creatinine also ↑d
- TREATMENT IS SUPPORTIVE → including treatment of coagulopathy

YELLOW FEVER:

- An acute zoonotic FLAVIVIRUS
- Vasccination mandatory in endemic regions
- Ranges in severity → haemorrhagic fever fatal in 20% cases
    - Most patients recover → but among others, fever remissions lasts a few hours followed by renewed high fever, vomiting, headache, back pain and shock, MOF and bleeding diathesis
- CLASSIC PRESENTATION → triad of jaundice, black emesis and albuminuria → severe cases → hypotension, shock and metabolic acidosis with death within 7 days after onset
- Treatment generally supportive, with fluid replacement and management of haematologic complications

LASSA FEVER:

- Caused by an ARENAVIRUS → likelihood of travellers becoming infected is low because it is primarily a disease of rural communities where bush rats thrive

DISEASES COMMONLY ASSOCIATED WITH FEVER AND CNS INVOLVEMENT:

- Fever with acute mental status changes, headche, nuchal rigidity and focal neurological signs is associated with a number of serious infections

Table 156-9 Tropical Infectious Diseases Causing Severe Headache and Fever
Malaria
Rickettsial disease
Dengue fever
Typhoid fever
Human African trypanosomiasis

- CNS involvement with fever in travellers returning from malaria-endemic regions requires emergency presumptive treatment for both malaria and bacterial meningitis
- DDx includes → bacterial meningitis, TB, typhoid fever, rickettsial infection, rabies, viral encephalitides
- JAPANESE ENCEPHALITIS:
    - Flavivirus in Asia and western pacific
    - Vector breeds specifically in rural rice paddies
    - Sudden high fever, headache, nuchal rigidity, vomiting and seizures
    - Variety of pyramidal and extrapyramidal signs may develop after fever
    - Treatment → IV fluids, electrolyte management, anticonvulsants and neuropsychiatric consult
    - Recovery may take months
- CYSTICERCOSIS:
    - A systemic illness caused BY DISSEMINATION OF THE LARVAL FORM OF THE PORK TAPEWORM, **TAENIA SOLIUM**
    - Humans develop cysticercosis when they inadvertently ingest eggs from contaminated food or soil, or eat undercooked pork
    - CLINICAL FEATURES:
        - Infestation can occur in ALMOST ANY TISSUE but CNS involvement most important → seizures, obstructive hydrocephalus, meningoencephalitis, stroke, headache, visual changes
        - Non contrast CT → mass effect or hydrocephalus or calcification if inactive disease
    - TREATMENT:
        - ANTI-HELMINTIC AGENTS → PRAZIQUANTEL 50MG/KG/DAY
        - Steroids to avoid inflammation as cysts involute

DISEASES COMMONLY ASSOCIATED WITH CHRONIC FEVER:

- Patients with chronic or relapsing fever beyond three weeks should first be evaluated for non-travel related illnesses
- Tropical illnesses that cause chronic fever include protozoal infections (trypanosomiasis, leishmaniasis, amoebiasis and malaria), TB, typhoid and paratyphoid fever (see below):

Table 156-10 Selected Causes of Chronic and Relapsing Fevers	
Etiologic Organism	**Organism Species**
Bacterial	Bartonellosis
	Brucellosis
	Leptospirosis
	Q fever
	Relapsing fever
	Syphilis
	Tuberculosis
	Tularemia
	Typhoid fever
Fungal	Blastomycosis
	Coccidioidomycosis
	Cryptococcosis
	Histoplasmosis
Protozoan	Amebic liver disease
	Visceral leishmaniasis
	Malaria
	Human African and human American trypanosomiasis
Viral	Human immunodeficiency virus
Helminthic	Angiostrongyliasis
	Fascioliasis
	Schistosomiasis
	Toxocariasis
	Trichinosis

- HUMAN AFRICAN TRYPANOSOMIASIS (AFRICAN SLEEPING SICKNESS):
  - Transmitted by the aggressive TSETSE FLY
  - Malaise, rash, wasting and eventual CNS involvement occurs → behavioural and neurologic changes, encephalitis, coma and death
  - ERFLORNITHINE AND SURAMIN ARE TREATMENTS
- AMERICAN TRYPANOSOMIASIS (CHAGAS DISEASE):
  - Caused by T. cruzi
  - Rare among travellers
  - Casues an acute illness but can cause infection (asymptomatic) with complications years later involving heart and GI tract
    - Destroys ganglion cells depressing cardiac and GI function → myocarditis, dysrhythmias, cardiomyopathy and sudden death
    - GI complications → megacolon or megaoesophagus
  - Treatment → NIFURTIMOX
- VISCERAL LEISHMANIASIS:
  - Four clinical syndromes are recognised:

Table 156-11 Clinical Syndromes of Leishmaniasis
Visceral leishmaniasis (Kala-azar or Black fever): The most devastating and fatal form caused by *Leishmania donovani.* A progressive, chronic, and systemic disease with high mortality if untreated, but with a good prognosis if provided adequate care. Fatality is a result of secondary infections such as tuberculosis, pneumonia, and dysentery. It is typified by the pentad of fever, weight loss, hepatosplenomegaly, pancytopenia, and hypergammaglobulinemia.
Cutaneous leishmaniasis: Old world disease is the most common form, and found in most of the world, whereas new world disease is only found in the Americas.
Mucocutaneous leishmaniasis (espundia): Chronic and relentless disease affecting the mucous membranes of the nose and mouth.
Diffuse cutaneous leishmaniasis: Typically chronic diffuse plaques or nodules, difficult to treat, and with few resulting deaths.

DISEASES COMMONLY ASSOCIATED WITH ABDOMINAL OR URINARY COMPLAINTS:

- COMMON AMONG WORLD TRAVELLERS

SCHISTOSOMIASIS:

- Infection with a blood fluke that affects >200 million worldwide
- Short term travellers have low risk
- Larvae are released into freshwater by snails
- After inoculation → allergic and pruritic dermatitis that can last days → following 4-8 weeks fever occurs with diarrheoa, hypereosinophilia and worms mature into adults in the venous blood and deposit eggs in selected body tissues (GIT and urinary tract)
- Eggs stimulate vigorous immune response
- PRAZIQUANTEL IS TREATMENT (20MG/KG) → 70-85% CURE RATE

DISEASES COMMONLY ASSOCIATED WITH ABDOMINAL PAIN AND DIARRHOEA:

- Diarrhoea and gastroenteritis are the most common travel ailments → affect one-half of travellers → common causes listed below

Table 156-12 Common Infectious Diseases Causing Diarrhea among Travelers

Cause	Organism	Comments
Acute (duration <2 wk)		
Viral	Norwalk-like virus	Often not diagnosed; may account for 5%–10% of acute traveler's diarrhea
	Rotaviruses	
	Enteroviruses	
Bacterial	*Escherichia coli* (enterotoxigenic or enteroaggregative)	Most common identified cause of acute traveler's diarrhea; 50%–70%
	Campylobacter jejuni	
	Salmonella	
	Shigella	
	Vibrio	
	Clostridium difficile	
Parasitic	*Giardia lamblia*	Accounts for <1%–5% of acute traveler's diarrhea
	Cryptosporidium parvum	
	Entamoeba histolytica	
	Cyclospora cayetanensis	
	Isospora belli	
	Balantidium coli	
	Trichinella spiralis	
Chronic or persistent (duration >2–4 wk)		
Bacterial	See above	Rare cause of chronic diarrhea
Parasitic		
Microsporidial	*Enterocytozoon bieneusi*	Almost exclusively in immunocompromised
	Encephalitozoon intestinalis	
Protozoal	*G. lamblia*	Most commonly identified cause
	E. histolytica	
		Bloody diarrhea with fever; fecal white blood cells are rare
Helminthic	*Trichuris trichiura*	Rarely associated with chronic diarrhea; usually in persons with heavy parasite burdens
	Strongyloides stercoralis	
	Fasciolopsis buski	
	Schistosoma	

AMOEBIASIS:

- Caused by ENTAMOEBA HISTOLYTICA
- Disease is most severe among young children, elderly and pregnant women
- Incubation typically 1-3 weeks or longer for liver abscesses
- CLINICAL FEATURES:
  - Alternating constipation and diarrhoea over 1-3 weeks → abdominal pain, fever, dehydration and weight loss
  - Extraintestinal metastases can infect liver (and rarely pericardium, lung and the brain)
  - Serology for elevated antibody titres almost uniformly sensitive for extraintestinal disease

Invasive amoebiasis

For acute amoebic colitis (dysentery), use:

1 **tinidazole 2 g (child: 50 mg/kg up to 2 g) orally, daily for 3 days [Note 2]**

OR

2 **metronidazole 600 mg (child: 15 mg/kg up to 600 mg) orally, 8-hourly for 7 to 10 days.**

For amoebic liver abscess, tinidazole should be continued for 5 days or metronidazole for 14 days before commencing paromomycin, and expert advice should be sought. Percutaneous drainage is not usually required.

Treatment of invasive amoebiasis (colitis or liver abscess) should be followed by a luminal agent to eradicate cysts and prevent relapse. Use:

paromomycin 500 mg (child: 10 mg/kg up to 500 mg) orally, 8-hourly for 7 days [Note 1].

GIARDIASIS:

- Caused by Giardia lamblia → infects the small intestine and biliary tree
- Symptoms include abdominal cramping, flatulence and foul-smelling, watery diarrhoea without blood or mucous
- Chronic infections cause weight loss and anaemia with lactose intolerance being a common complication

For symptomatic patients, use:

1 **tinidazole 2 g (child: 50 mg/kg up to 2 g) orally, as a single dose [Note 1]**

OR

2 **metronidazole 2 g (child: 30 mg/kg up to 2 g) orally, daily for 3 days**
or metronidazole 400 mg (child: 10 mg/kg up to 400 mg) orally, 8-hourly for 5 to 7 days

OR

3 **nitazoxanide 500 mg (child 1 to 3 years: 100 mg; 4 to 11 years: 200 mg) orally, 12-hourly for 3 days [Note 2].**

For pregnant women, use paromomycin (see *Entamoeba histolytica* for dosage).

CHOLERA:

- An acute diarrhoea disease caused by VIBRIO CHOLERAE → epidemics occur after flooding with disruption of normal sanitation

- Incubation is 2-3 days → symptoms result form sodium pump inhibition in GI tract → can cause profuse and usually painless watery diarrhoea ("rice-water") and severe dehydration
- Rapid fluid loss (>15L daily leads to shock and death without aggressive rehydration
- Treatment is aggressive fluid resuscitation with PO rehydration solution or IV fluids and correction of metabolic acidosis and hypokalaemia

PARASITIC HELMINTIC INFECTIONS

SUMMARISED BELOW:

Table 156-14 Common Parasitic Helminth (Worm) Infestations

Name	Source of Contamination	Human Symptoms	Diagnosis	Treatment
Ascaris lumbricoides (roundworm)	Fecal–oral contamination or poorly cooked food	Minimal symptoms; or pneumonia, malnutrition, biliary or bowel obstruction, hepatic abscess, appendicitis, etc.	Stool examination, serology.	Mebendazole, 400 milligrams single dose *or* Albendazole, 100 milligrams twice a day for 3 d or 500 milligrams single dose *or* Ivermectin, 150–200 micrograms/kg single dose
Enterobiasis (pinworm, seatworm)	Fecal–oral and from contaminated objects	Intense perianal itching	Cellophane tape swab of anus.	Mebendazole, 400 milligrams single dose and repeat in 2 wk *or* Albendazole, 100 milligrams single dose and repeat in 2 wk *or* Pyrantel pamoate, 11 milligrams/kg (up to 1 gram) single dose and repeat in 2 wk
Trichuris trichiura (whipworm)	Fecal–oral contamination	Asymptomatic; or bloody diarrhea, rectal prolapse	Stool examination.	Albendazole, 400 milligrams daily for 3 d *or* Mebendazole, 100 milligrams daily for 3 d or 500 milligrams single dose
Ancylostoma duodenale and *Necator americanus* (hookworm)	Contaminated soil, larvae penetrate the skin	Severe anemia; cutaneous larva migrans	Stool examination, may need concentration techniques.	Mebendazole, 400 milligrams single dose *or* Albendazole, 500 milligrams single dose *or* Pyrantel pamoate, 11 milligrams/kg (maximum, 1 gram) daily for 3 d
Taenia solium (pork tapeworm) and *T. saginata* (beef tapeworm) and *Diphyllobothrium latum* (fish tapeworm)	Raw or undercooked pork or beef or fish	Diarrhea, abdominal pain, bowel obstruction; taenia cysts in skin, eye, brain, heart (see Cysticercosis above)	Stool examination or serology. Serology may be negative if cysts are calcified.	Praziquantel, 5–10 milligrams/kg single dose
Strongyloides stercoralis (threadworm)	Contaminated soil, larvae penetrate skin	Cough, pneumonia, and wheezing; abdominal pain, bloody diarrhea	Stool examination or stool concentration methods; or serology; or sputum examination.	Ivermectin, 100 micrograms/kg/d for 2 d *or* Albendazole, 400 milligrams twice a day for 7 d

To treat *Ascaris lumbricoides* (roundworm), use:

1. **albendazole 400 mg (child 10 kg or less: 200 mg) orally, as a single dose**

   OR

2. **mebendazole 100 mg (child 10 kg or less: 50 mg) orally, 12-hourly for 3 days**

   OR

3. **pyrantel (adult and child) 10 mg/kg up to 1 g orally, as a single dose (repeat after 7 days if heavy infection).**