

INTRODUCTION

“Sudha Singh, who participated in the 3000m steeplechase at the Rio 2016 Olympics, has given blood samples for tests to check for the Zika virus.” “A blood sample tested at the virology lab at the National Institute of Mental Health and Neuro Sciences in Bengaluru has tested positive for the H1N1 virus while a blood sample sent to the National Institute for Virology in Pune has tested negative for the Zika virus.” - These were important recent news headlines. Travelling is increasing day by day in almost all parts of the world. The number of international tourist is going to rise from one billion recorded in 2012, to 1.8 billion by 2030 according to UNTWO.¹ There are usually 5 reasons for travel — tourism, business, research/education, missionary/volunteer and visiting friends and relatives (VFR). It is a charming experience for the traveller to visit different parts of the world or country, their natural beauties, the animal resources, different population groups with diverse social cultures. But, during their visit and stay, the traveller is always at risk of acquiring some illness which are prevalent in the areas and against which they may not be protected. Hence, travelling is an important factor in globalizing infections and introducing pathogens into new regions.² Many of such diseases present with fever after their return.

Post-travel evaluation

Health related problems are experienced by about 22%–64% of travelers to developing countries and about 15 to 37 percent of short-term travelers during an international trip. Up to 11% of returned travelers have a febrile illness.³ Although most of these illnesses are mild, up to 8% of travelers are ill enough to seek care from a health care provider. Most post-travel infections become apparent soon after travel, but because incubation periods vary, some syndromes can present months to years after initial infection.

DEMOGRAPHIC FACTORS

Male (32%) travelers are more likely to present with fever than females (24%). There was no age difference between travelers presenting with fever and those without that symptom.⁴ In children after international travels, malaria is the most common cause of systemic febrile diseases, followed by viral syndromes (28%), unspecified febrile illnesses (11%), dengue and enteric fever (6% each).⁵

Some important points in history for fever in a returned traveller

- Travel itinerary and duration of travel

- Timing of onset of illness in relation to international travel
- Severity of illness
- Past medical history and medications
- History of a pre-travel consultation
- Travel immunizations
- Adherence to malaria chemoprophylaxis
- Individual exposures
- Type of accommodations
- Insect precautions taken (such as repellent, bed nets)
- Source of drinking water
- Ingestion of raw meat / seafood / unpasteurized dairy products
- Insect or arthropod bites
- Freshwater exposure (e.g. swimming, rafting)
- Animal bites and scratches
- Body fluid exposure (such as tattoos, sexual activity)
- Medical care while overseas (such as injections, transfusions)

TRAVEL ITINERARY

Travelers VFRs who visited Sub-Saharan Africa, South-Central Asia, Indian Ocean Islands, Oceania and Latin America are more likely to report fever (malaria and enteric fever) after returning home than other groups of travelers.⁶ *P. falciparum* malaria was also more frequent in VFRs, while *P. vivax* malaria was more likely to be reported in missionary or expatriate travelers. Acute diarrhoea was more common among classic tourist travelers. Tuberculosis and human immunodeficiency virus (HIV) infection as a reason of fever were much more often diagnosed in VFR travelers and foreign visitors or migrants.⁷

Potential exposures differ depending on the region of travel and unnecessary testing can be avoided. Malaria is the most common cause of fever in travelers to sub-Saharan Africa, and dengue in febrile patients who travelled to Latin America or Southeast Asia. The duration of travel is also important, since the risk of a travel-related illness increases with the length of the trip.

Timing of Illness in Relation to Travel

Diseases with short incubation periods usually presents within 1 month of return from their destination. However, schistosomiasis, leishmaniasis, or tuberculosis can manifest months or even years later.

Table 1: Specific exposures for various infectious diseases

Exposure	Diseases
Undercooked food	Cholera, Nontyphoidal salmonellosis, Trichinosis, Typhoid fever
Untreated water	Cholera, Hepatitis A, Nontyphoidal salmonellosis, Typhoid fever
Unpasteurized dairy products	Brucellosis, Tuberculosis
Fresh water contact	Leptospirosis, Schistosomiasis
Sexual contact	Chancroid, Gonorrhoea, Hepatitis B, HIV, Syphilis
Animals	Brucellosis, Plague, Q fever, Rabies, Tularaemia
Insects	
Mosquitoes	Dengue, Malaria, Filaria, JE, YF and Chikungunya, Zika
Ticks	Rickettsial diseases, Tularaemia
Reduvid bug	American Trypanosomiasis
Tsetse flies	African Trypanosomiasis
Sick contacts	Meningococcal disease, Tuberculosis, Viral hemorrhagic fevers

Adapted from Suh KN, Kozarsky PE, Keystone JE. Evaluation of fever in the returned traveller. *Med Clin North Am* 1999; 83:1000.

SEVERITY OF ILLNESS

Some potentially life-threatening infections, such as malaria, severe respiratory syndrome or hemorrhagic fever, may necessitate prompt involvement of public health authorities.

UNDERLYING MEDICAL ILLNESS

Comorbidities and Immunocompromised state can affect the susceptibility to infection, as well as the clinical manifestations and severity of illness.

VACCINES RECEIVED AND PROPHYLAXIS USED

The history of vaccinations and adherence to malaria chemoprophylaxis are important. The most common vaccine-preventable diseases found in returned travelers included enteric fever (typhoid and paratyphoid), viral hepatitis, measles and influenza. More than half of these patients need hospitalization.

INDIVIDUAL EXPOSURE HISTORY

Type of the patient's exposures during travel, purpose of the patient's trip and the type of accommodations can also influence the risk for acquiring certain diseases. Infections can be acquired en route, so layovers and intermediate stops should be identified. The type of transportation also is relevant, because outbreaks of many types of infections have been linked specifically to airplanes, trains, and cruise ships. Travelers who stay in modern hotels in major urban centres generally have fewer exposures than backpackers or volunteer workers who spend significant time in rural settings with the local population.⁸ Persons who visit family and friends while abroad also are at increased risk of becoming ill because they often stay in homes away from usual tourist routes.⁹ The sexual history should include the number of partners, types of sexual activities, and protection used. A patient's awareness of illnesses among fellow travelers or exposures to sick contacts also may provide a diagnostic clue.⁸

DIFFERENTIAL DIAGNOSIS OF ACUTE FEVER WITH RASH OR ULCER:

Maculopapular

Arboviral infections (Dengue, Chikungunya), Measles,

Table 2: Common causes of fever, by geographic area

Geographic Area	Common Tropical Disease Causing Fever	Other Infections Causing Outbreaks in Travelers
Caribbean	Dengue, Malaria (Haiti)	Acute Histoplasmosis, Leptospirosis, Chikungunya
Central America	Dengue, Malaria (primarily <i>P. vivax</i>)	Leptospirosis, Histoplasmosis, Coccidioidomycosis
South America	Dengue, Malaria (primarily <i>P. vivax</i>)	Bartonellosis, Leptospirosis, Enteric fever, Histoplasmosis
South-central Asia	Dengue, Enteric fever, Malaria (primarily non-falciparum)	Chikungunya
Southeast Asia	Dengue, Malaria (primarily non-falciparum)	Chikungunya, Leptospirosis
Sub-Saharan Africa	Malaria (primarily <i>P. falciparum</i>), tick-borne Rickettsia (main cause of fever in southern Africa), acute Schistosomiasis, Filariasis	African trypanosomiasis, Chikungunya, Enteric fever, Filariasis

Table 3: Common infections, by incubation period

Disease	Usual Incubation Period (Range)	Distribution
Incubation <14 days		
Chikungunya	2–4 days (1–14 days)	Tropics, subtropics
Dengue	4–8 days (3–14 days)	Topics, subtropics
Encephalitis, arboviral (Japanese encephalitis, tick-borne encephalitis, West Nile virus, other)	3–14 days (1–20 days)	Specific agents vary by region
Enteric fever	7–18 days (3–60 days)	Especially in Indian subcontinent
Acute HIV	10–28 days (10 days to 6 weeks)	Worldwide
Influenza	1–3 days	Worldwide, can also be acquired while traveling
Legionellosis	5–6 days (2–10 days)	Widespread
Leptospirosis	7–12 days (2–26 days)	Widespread, most common in tropical areas
Malaria, <i>P. falciparum</i>	6–30 days (98% onset within 3 months of travel)	Tropics, subtropics
Malaria, <i>P. vivax</i>	8 days to 12 months (almost half have onset >30 days after completion of travel)	Widespread in tropics and subtropics
Spotted-fever Rickettsia	Few days to 2–3 weeks	Causative species vary by region
Incubation 2 to 6 Wks		
Amoebic liver abscess	Weeks to months	Most common in developing countries
Hepatitis A	28–30 days (15–50 days)	Most common in developing countries
Hepatitis E	26–42 days (2–9 weeks)	Widespread
Acute Schistosomiasis (Katayama syndrome)	4–8 weeks	Most common in sub-Saharan Africa
Incubation >6 wks		
Hepatitis B	90 days (60–150 days)	Widespread
Visceral Leishmaniasis	2–10 months (10 days to years)	Asia, Africa, Latin America, southern Europe and the Middle East
Tuberculosis	Primary: weeks; Reactivation: years	Global distribution, rates and levels of resistance vary widely

Rubella, Parvovirus, drug rash, fungal infections (Histoplasmosis, Penicilliosis), Rickettsial infections (Tick Typhus), viral haemorrhagic fever, syphilis, infectious mononucleosis Group (EBV, CMV), HIV seroconversion, lepra reaction.

Vesicular

Herpes simplex, Herpes zoster, Chicken pox, Monkey pox, Rickettsial pox

Purpuric

Dengue haemorrhagic fever, Viral haemorrhagic fevers (Lassa, Ebola, Crimean Congo haemorrhagic fever, rift valley fever), Meningococcal/Gonococcal infection, severe Rickettsial infection, Severe sepsis with DIC, Plague, Haemorrhagic herpes zoster.

Erythroderma

Early dengue, Kawasaki disease, toxic shock syndrome, Scarlet fever, sunburn.

Ulcer

Chancre: *Trypanosoma rhodesiense*, *Yersinia pestis* (bubonic plague)

Eschar: Tick typhus, Anthrax

Genital ulcer: Syphilis, Herpes simplex virus

Skin ulcer: Anthrax, Diphtheria, Fungal infection, Super-infected bacterial ulcer, Buruli's ulcer.

PRIMARY LABORATORY INVESTIGATIONS FOR RETURNED TRAVELLERS WITH FEVER

The febrile traveller to a malaria endemic area¹⁰ should be considered to have malaria until proven otherwise. Travel history should be cited on all laboratory requisitions.

Table 4: Physical Findings

Area of physical Examination	Diagnostic interpretation
Vital signs	A pulse rate that is slow for the degree of fever (pulse-temperature dissociation) may suggest typhoid fever or a Rickettsial disease.
Skin	Rash may be present in many travel-related infections. The type of rash, its distribution and time of appearance and disappearance are important in differentiating the cause of fever.
Eyes	The eyes should be examined for evidence of conjunctivitis (leptospirosis).
Lymph nodes	The presence of localized or generalized lymphadenopathy may be diagnostically helpful.
Sinuses, ears, teeth	Sinuses, ears, and teeth are common sites of occult infection (sinusitis, otitis media, tooth abscess); attention to these areas can help avoid unnecessary testing for travel-related causes of infections.
Heart, lungs	Auscultation of the lungs should focus on the detection of inspiratory crackles and wheezes, whereas auscultation of the heart should focus on detection of a murmur (Subacute bacterial endocarditis).
Abdomen	Splenomegaly is associated with mononucleosis, malaria, visceral leishmaniasis, typhoid fever, and brucellosis.
Neurologic system	Fever and altered mental status in the returned traveller represent a medical emergency.

Table 5: Fever with Lymphadenopathy

Localized Bacterial:	Bartonellosis (cat scratch disease), Plague, Staphylococcus, Streptococcus, Tuberculosis, Typhus, Tularaemia Parasitic: African Trypanosomiasis, American Trypanosomiasis, Filariasis and Toxoplasmosis
Generalized	Bacterial: Brucellosis, Leptospirosis, Melioidosis, Secondary Syphilis, Tuberculosis, Enteric fever Protozoal-Toxoplasmosis Viral: Epstein-Barr virus, Cytomegalovirus, Acute HIV, Rubella, Hepatitis B, Measles, Lassa fever, Dengue fever Fungal: Histoplasmosis, Blastomycosis, Coccidioidomycosis Parasitic: Visceral Leishmaniasis Non-infectious: Malignancy, SLE, Rheumatoid arthritis, Sarcoidosis, Drugs.

thrombocytopenia in dengue, malaria, typhoid, acute HIV and severe sepsis.

2. Liver enzymes; electrolytes; creatinine.
3. Malaria smears \pm antigen detection dipstick at least 3 times over 24-48 hours.
4. Blood cultures \times 2 (*S.typhi* or paratyphi; Meningococcus; common agents of bacteremia).
5. Urinalysis (\pm urine culture): proteinuria and haematuria in leptospirosis, haemoglobinuria in malaria.

SUPPLEMENTARY TESTS BASED ON HISTORY AND EPIDEMIOLOGY

6. Stool culture for enteropathogens \times 1 (*Salmonella*, *Shigella*, *Campylobacter*, *E. coli* O157: H7, *Yersinia*).
7. Stool for ova and parasites (*Cyclospora*, *Cryptosporidium*, *Entamoeba histolytica*, *Giardia*).
8. Chest x-ray.
9. Dengue serology if probable incubation period $<$ 2 weeks and traveller to South Asia, Southeast Asia, or Latin America.
10. EDTA sample for PCR if VHF/Arboviral disease is suspected.
11. Acute serology tube to be saved in lab and paired with convalescent sera if no diagnosis in 10-14 days. HIV, arboviral or *Brucella* serology may be done.

1. Complete blood count with differential: lymphopenia in viral infections and typhoid, eosinophilia indicates parasitic or fungal infections,

Table 6: Fever with jaundice

Hepatic	Leptospirosis, hepatitis A – E, Severe falciparum malaria, EBV, CMV, Relapsing fever, viral hemorrhagic fever, typhus, enteric fever, nontyphoid salmonellosis, septicaemia (pneumococcal)
Post-hepatic	Ascending cholangitis (including helminths)
Haemolytic	Bartonellosis, malaria, mycoplasma pneumoniae, sickle cell crisis with infective trigger, haemolytic-uremic syndrome (Shigella, E.coli).
Fever with hepato splenomegaly	Bacterial: brucellosis, enteric fever, leptospirosis, Q fever, relapsing fever, rickettsial fever (tick typhus) Flukes: Fascioliasis, Schistosomiasis (Katayama syndrome) Protozoal: Amoebic liver abscess, malaria, trypanosomiasis, visceral leishmaniasis. Viral: Dengue, acute hepatitis (A, B, E), HIV/CMV/EBV seroconversion. Non-infectious: CML, lymphoma, myelofibrosis, haemoglobinopathy.
Chronic fever >2wks	Bacterial: Brucellosis, infective endocarditis, enteric fever, Q fever, tuberculosis, pyogenic deep seated abscess. Fungal: Histoplasmosis, cryptococcosis, penicilliosis, coccidioidomycosis, para coccidioidomycosis Protozoal: Amoebic liver abscess, toxoplasmosis, malaria, visceral leishmaniasis. Viral: HIV plus opportunistic infections, EBV, CMV Helminth: strongyloidiasis hyperinfestation syndrome, schistosomiasis (acute Katayama syndrome) Others: Malignancy, autoimmune disease, drugs, vasculitis
Fever with any of the symptoms, which deserves Public health Importance	Skin rash Shortness of breath/persistent cough Decreased consciousness Bruising or unusual bleeding Persistent diarrhoea/ vomiting/ Jaundice Paralysis of recent onset

13. Others as per clinical situation

MANAGEMENT

Treatment of many of these infections will require specialist input from infectious diseases physicians and microbiologists. Drug-resistant malaria is widespread and up-to-date treatment guidelines or advice should be followed.

Where there is a strong suspicion of enteric fever, antibiotic treatment should be started without delay with either oral Azithromycin or intravenous Ceftriaxone until antibiotic sensitivities are known. However the clinical response to Ceftriaxone is slow and the symptoms may not resolve for 7–14 days. Most cases of enteric fever from Africa (not in Asia) are ciprofloxacin sensitive.

Rickettsial infections usually respond promptly to Doxycycline. For dengue the treatment is judicious fluid replacement and supportive care. Empirical treatment will often be indicated after all appropriate specimens have been collected, and sent.

Travel-related infections must be notified to public health services so that epidemiological data can be collected and where necessary infection prevention and control measures initiated.

Finally, we have a duty to our patients to educate them so that they take all available measures to prevent ill health on future travel. This should include advice on vaccine preventable infections, safe sex, food and drink hygiene, malaria prophylaxis and the importance of compliance and insect bite avoidance.

KEY POINTS

- Initial symptoms of life-threatening and self-limited infections can be identical.
- Fever in returned travelers is often caused by common, cosmopolitan infections, such as pneumonia and pyelonephritis
- Respiratory complaints are typically associated with common respiratory viruses. Influenza is among the most common vaccine-preventable diseases associated with international travel. Severe respiratory symptoms may be due to seasonal influenza, bacterial pneumonia, malaria but could also suggest more unusual entities, such as Legionnaires' disease, emerging respiratory infections such as Middle East respiratory syndrome (MERS) and H7N9 avian influenza if the travel history is appropriate and respiratory symptoms do not have a clear alternative diagnosis. Delayed onset and chronic cough after travel could be tuberculosis, especially in a long-term traveller or health care worker.
- Patients with malaria may be afebrile at the time of evaluation but typically give a history of fever or chills. Malaria is the most common cause of acute undifferentiated fever after travel to sub-Saharan Africa and to some other tropical areas. Patients with

12. Ultrasonography of abdomen (hepatosplenomegaly)

Table 7: Specific Laboratory tests	
Travel-acquired infection	Diagnostic test(s)
Malaria	<ol style="list-style-type: none"> 1. Thick and thin blood smears ± antigen-based dipstick assay; minimum 2-3 times over 24-48 hours 2. Blood for malaria polymerase chain reaction (PCR): if smears and/or dipstick negative but index of suspicion high
Acute travellers' diarrhoea / gastroenteritis (60-80% bacterial)	<ol style="list-style-type: none"> 1. Stool culture for enteropathogens x 1 (will detect <i>Salmonella</i>, <i>Shigella</i>, <i>Campylobacter</i>, <i>E. coli</i> O157:H7, and often <i>Yersinia</i>) 2. Stool for <i>Clostridium difficile</i> toxin 3. Stool for ova and parasites (O&P) x 3 (be aware that not all laboratories screen for all protozoa, including coccidia, routinely; check with local laboratory for special staining request requirements) 4. Amoebic serology ± stool <i>Entamoeba histolytica</i> ELISA if bloody stool
Respiratory tract infection	<ol style="list-style-type: none"> 1. Chest x-ray 2. Nasopharyngeal swab (NP) swab for viral antigen testing or PCR (influenza A/B, respiratory syncytial virus [RSV], adenovirus, parainfluenza virus 1-3, human metapneumovirus, corona virus) 3. Sputum for culture and susceptibility (C&S) and acid-fast bacilli (AFB) (as directed by index of suspicion) 4. <i>Legionella</i> urine antigen 5. Epstein-Barr virus (EBV) – EBV monospot unreliable in children ≤ 4 years of age; EBV viral capsule antigen (VCA) IgM/IgG, EBV nuclear antigen (EBNA) IgM/IgG 6. (Serology for Q-fever, <i>Histoplasma</i>, <i>Blastomyces</i>, <i>Coccidioides</i> as directed by index of suspicion and travel exposures; urinary antigen for <i>Histoplasma</i>)
Dengue	<ol style="list-style-type: none"> 1. Dengue NS1 antigen before 5 days and IgM/IgG antibody after 5 days (both by ELISA)
Enteric fever due to <i>Salmonella</i> typhi or paratyphi	<ol style="list-style-type: none"> 1. Blood culture x 2 (caution if the patient has received antibiotics as they may have negative blood cultures) 2. Stool culture 3. Bone marrow aspirate and culture
Skin and soft tissue infection	<ol style="list-style-type: none"> 1. Clinical diagnosis 2. Skin swab for methicillin-susceptible and methicillin-resistant <i>Staphylococcus aureus</i> (MSSA and MRSA) if exudative 3. If ulcerative: smears for Giemsa stain, biopsy or aspirate for <i>Leishmania</i> culture or PCR; consider skin swab to rule out ecthyma ulcer due to <i>Staphylococcus</i> or <i>Pseudomonas</i>
Rickettsioses	<ol style="list-style-type: none"> 1. Clinical diagnosis – presence of an eschar is diagnostic (but may not be present) 2. Acute and convalescent sera for Rickettsial serology
Acute UTI / STI	<ol style="list-style-type: none"> 1. Urinalysis and urine microscopy 2. Urine culture 3. Urine and/or endocervical swabs for CT/GC (<i>Chlamydia trachomatis</i> / <i>Neisseria gonorrhoea</i>) 4. Swab for viral PCR of genital vesicles 5. Blood for HIV, HBV, HCV and syphilis serology

Contd...

Table 7: Specific Laboratory tests

Travel-acquired infection	Diagnostic test(s)
Viral hepatitis	<ol style="list-style-type: none"> 1. HAV – HAV IgM, HAV IgG (unless history of previous vaccination) 2. HBV – HBsAg (surface antigen), HBsAb (surface antibody), HBcAb (core antibody), HBeAg (e antigen), HBeAb (e antibody); HBV DNA 3. HCV – HCV total antibody, PCR 4. Hepatitis D virus (HDV) – Anti-HDV antigen; serum HDV RNA reverse transcription PCR (RT-PCR) 5. Hepatitis E virus (HEV) – Anti-HEV IgM antibody; blood or stool for HEV PCR 6. EBV – EBV monospot unreliable in children ≤ 4 years of age; EBV VCA IgM/IgG, EBNA IgM/IgG 7. Cytomegalovirus (CMV) – IgM/IgG; CMV antigenemia; serum for CMV PCR
Other potentially travel-acquired infections diagnosed by serology	<ol style="list-style-type: none"> 1. Viral – Chikungunya, arboviruses 2. Bacterial – Q-fever, <i>Brucella</i> (can also be cultured from blood or bone marrow), <i>Leptospira</i> 3. Fungal – <i>Histoplasma</i>, <i>Blastomyces</i>, <i>Coccidioides</i>, <i>Cryptococcus</i> (can detect by serum or CSF or urinary antigen also) 4. Parasitic – <i>Strongyloides</i>, <i>Schistosoma</i>, Amoebiasis (can also detect in stool O&P and by stool ELISA)

Adapted from “Fever in the returning international traveler” by Dr. Anton Helman, Emergency Physician and Assistant Professor at the University of Toronto, Division of Emergency Medicine, March, 1st, 2016 with some modifications

malaria can have prominent respiratory (including ARDS), gastrointestinal, or central nervous system findings. H/o malaria chemoprophylaxis does not exclude the possibility of malaria. Malaria, especially *P. falciparum*, can progress rapidly and needs early diagnosis and prompt treatment.

- Dengue is the most common cause of febrile illness among people who seek medical care after travel to Latin America or Asia.
- Viral hemorrhagic fevers are important but are rare in travelers; bacterial infections, such as Leptospirosis, Meningococemia, and Rickettsial infections, can also cause fever and haemorrhage and needs early diagnosis and prompt specific treatment.
- Sexually transmitted diseases, including acute HIV, can cause acute febrile infections.
- Infection control, public health implications, and early reporting is important.

REFERENCES

1. World Tourism Organization. UNWTO Tourism Towards 2030- Global Overview, Republic of Korea.
2. Schlagenhauf P, Weld L, Goorhuis A et al. Travel-associated infection presenting in Europe (2008–2012): an analysis of EuroTravNet longitudinal, surveillance data, and evaluation of the effect of the pre-travel consultation. *Lancet Inf Dis* 2014; 15:55–64.
3. Bruni M, Steffen R. Impact of travel-related health impairments. *J Travel Med* 1997; 4:61–4.
4. Wilson ME, Weld LH, Boggild A et al. GeoSentinel Surveillance Network. Fever in returned travelers: results from GeoSentinel surveillance network. *Clin Infect Dis* 2007; 44:1560–1568.
5. Hagmann S, Neugebauer R, Schwartz E et al. Illness in children after international travel: Analysis from the GeoSentinel Surveillance Network 2009. *Pediatrics* 2010; 125:e1072–e1080.
6. Boggild AK, Geduld J, Libman M et al. Travel-acquired infections and illnesses in Canadians: surveillance report from CanTravNet surveillance data, 2009–2011. *Open Med* 2014; 8: e20–e32. www.intmarhealth.pl 83 Krzysztof Korzeniewski et al., Fever of unknown origin in returning travelers.
7. Bottieu E, Clerinx J, Schrooten W et al. Etiology and outcome of fever after a stay in the tropics. *Arch Intern Med* 2006; 166:1642–1648.
8. Saxe SE, Gardner P. The returning traveller with fever. *Infect Dis Clin North Am* 1992; 6:427–39.
9. Ryan ET, Wilson ME, Kain KC. Illness after international travel. *N Engl J Med*. 2002;347:505–16.
10. Committee to Advice on Tropical Medicine and Travel. Canadian Recommendations for the Prevention and Treatment of Malaria among International Travellers. *CCDR* 2009; 34:1-45.

TRAVEL ITINERARY: Reason for travel, Area of travel, Type of transportation, Area & type of stay, length of trip

Timing of onset of fever, Severity of illness, Underlying illness, Prophylactic measures & valid Vaccine taken before travel, Type of exposure: water, food, dairy product, animal, sick person, unprotected sex, insect bite

Incubation period: short (<14 days)- Malaria, Dengue, Chikungunya, AES, Influenza, Enteric fever, Typhus, Leptospirosis, Legionellosis, acute HIV seroconversion. **2- 6wks-** Amoebic liver abscess, Hepatitis A/E, Acute Schistosomiasis. **>6wks-** Hepatitis B, Visceral Leishmaniasis, Tuberculosis

Common clinical findings with fever and associated infections

Rash: Dengue, Chikungunya, Typhus, Enteric fever, Measles, acute HIV, Drug rash	CNS involve: AES, Malaria, Typhus, Meningitis, Rabies, Angiostrongyliasis Trypanosomiasis,	Resp. symptoms: Influenza, Viral & bact. Pneumonia, severe Malaria, severe Dengue, Q fever, Plague etc.	Jaundice: YF, Viral hepatitis A-E, CMV, EBV, Leptospirosis, severe Malaria, VHF, Rickettsial	Hepatosplenomegaly: Malaria, VL, Enteric fever, Brucellosis, Leptospirosis, Liver abscess, Flukes, Rickettsial
Bleeding: Dengue, other VHF, severe Malaria, Leptospirosis, Rickettsial infection, Meningococcal infection Septicaemia	Low WBC count: Dengue, Malaria, Rickettsial infection, Enteric fever, VL Chikungunya, Fever after 6wks Pv malaria, TB, Amoebic liver abscess, Acute hepatitis B,C,E	Pain abdomen: Enteric fever, Amoebic liver abscess, Dengue, Viral hepatitis Mononucleosis: EBV, CMV, HIV, Toxoplasmosis	Eosinophilia: Schistosomiasis Fascioliasis, TB drugs, Round worm, Hook worm Strongyloidiasis Hydatid, Filaria, Trichinosis, HIV HTLV-I, Toxoplasmosis, Fungal infection	Lymphadenopathy: Staph, Strepto, TB, Typhus, Brucellosis, Plague, Bartonellosis, Leptospirosis, EBV, CMV, Toxoplasmosis, Filariasis, Trypanosomiasis, Rubella, SS, Histoplasmosis, Acute HIV, Melioidosis,

Laboratory investigations for Returned travellers with fever

1. CBC
2. Liver enzymes; electrolytes; creatinine
3. Malaria smears ± antigen detection dipstick at least 3 times over 24-48 hours
4. Blood cultures x 2 (*S.typhi* or paratyphi; Meningococcus;)
5. Urinalysis (± urine culture):
6. Stool for ova and parasites & culture for Enteropathogens
7. Chest x-ray, USG
8. Serology for Dengue, HIV, Arboviral or Brucella
9. PCR for VHF/Arboviral disease

Management: 1. Drug-resistant malaria is widespread and up-to-date treatment guidelines to be followed
 2. Enteric fever: Start with oral Azithromycin or IV Ceftriaxone until antibiotic sensitivities are known
 3. Rickettsial infections: Doxycycline
 4. Dengue: treatment is judicious fluid replacement and supportive care.
 5. Other infections are treated according to standard treatment guidelines
 6. Travel-related infections must be notified to Public Health services
 7. Finally educate to take all available measures to prevent ill health on future travel including vaccine, safe sex, food and drink hygiene, malaria prophylaxis and the importance of compliance and insect bite avoidance.

Algorithm for Approach to Fever in a Returned Traveler