CLINICAL APPROACH TO TROPICAL DISEASES

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SCBM346 Tropical infectious diseases and controls
- Prevalent in tropical and subtropical regions

- Atypical presentations confusing to the clinician

- Non-infectious disease e.g. autoimmune or malignant conditions should be excluded
Tropical and Subtropical Regions
History of Present Illness:

→ Ask about **MUSCATS**

**Mode of fever**: duration and fluctuation – severity

**Used** medication and investigation, vaccine, previous medication

**Symptom**: rash – jaundice – lymph nodes – pain – cough

**Contact with animals and sick people**

**Admission**

**Travel history**: include location, time since return, locale (e.g. in back country, only in cities), vaccinations received before travel and any use of prophylactic antimalarial drugs. All patients should be asked about possible exposure (e.g. via unsafe food or water, insect bites, animal contact or unprotected sex)

**Sex - Unprotected**
Common Tropical Infectious Diseases in Thailand

- Leptospirosis
- Rickettsioses:
  - *Scrub typhus*
  - *Murine typhus*
- Melioidosis
- Enteric fever
  - *Typhoid fever*
  - *Paratyphoid fever*
- Nontyphoidal salmonellosis
- Tuberculosis
- Malaria
- Dengue infection
- Helminthic infection
- Infective diarrhea
## Important modes and diseases transmitted

<table>
<thead>
<tr>
<th>Type of Exposure</th>
<th>Associated infections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bites</strong></td>
<td>Malaria, dengue, yellow fever, viral encephalitis, filariasis, many arbovirus infections</td>
</tr>
<tr>
<td>Mosquitoes</td>
<td>Borreliosis (Lyme disease, endemic relapsing fever), rickettsioses (tick bite fever, typhus, various spotted fevers); Congo-Crimean haemorrhagic fever, Q fever, tularaemia, tick-borne encephalitis, ehrlichiosis, babesiosis</td>
</tr>
<tr>
<td>Ticks</td>
<td>Hantavirus infection, Haverhill fever, Lassa fever, leptospirosis, monkeypox, pasteurellosis, campylobacteriosis, yersiniosis</td>
</tr>
<tr>
<td><strong>Exposure to rodents and their excreta</strong></td>
<td></td>
</tr>
<tr>
<td>Ingestion</td>
<td>Hepatitis A/E, cholera, noroviruses/calciviruses, salmonellosis, shigellosis, giardiasis, poliomyelitis, cryptococcosis, cyclosporiasis, dracunculiasis</td>
</tr>
<tr>
<td>Water (untreated)</td>
<td>Brucellosis, tuberculosis, listeriosis, Q fever, enteric bacterial infection (Salmonella spp., Shigella spp., Escherichia coli, Campylobacter jejuni, etc)</td>
</tr>
<tr>
<td>Dairy (unpasteurised)</td>
<td>Helminth infections (ascariasis, trichinellosis, taeniasis, trichuriasis; cysticercosis; gnathostomiasis, capillariasis, angiostrongyliaasis; lung, liver and intestinal flukes), protozoa (amoebiasis, toxoplasmosis); numerous foodborne viruses and bacteria</td>
</tr>
<tr>
<td>Raw or undercooked food (meat, fish, vegetables)</td>
<td>Freshwater skin &amp; mucous membrane contact</td>
</tr>
<tr>
<td>Freshwater skin &amp; mucous membrane contact</td>
<td>Leptospirosis, schistosomiasis, free-living amoebic infection (Acanthamoeba spp., Naegleria fowleri, Balamuthia mandrillaris); environmental mycobacterial infection (e.g. M. marinum)</td>
</tr>
<tr>
<td>Sand/dirt/mud skin contact</td>
<td>Hookworm, strongyloidiasis, cutaneous larva migrans, leptospirosis, tungiasis, melioidosis; environmental mycobacterial and fungal infections</td>
</tr>
<tr>
<td>Injections, tattoos &amp; body piercing, transfusions, acupuncture</td>
<td>Hepatitis B/C, HIV, malaria, mycobacteria (e.g. M. fortuitum, M. chelonei)</td>
</tr>
<tr>
<td>Sexual contact</td>
<td>HIV (including acute HIV seroconversion illness), hepatitis B/C, syphilis, salpingitis, perihepatitis, herpes, disseminated gonococcal infections; other sexually-transmitted infections are not usually associated with fever</td>
</tr>
</tbody>
</table>
Common Fever Syndromes

1. Fever
2. Neurologic
3. Abdominal
4. Pulmonary
5. Rash
6. Hemorrhage
7. Hepatorenal involvement
Fever

- Malaria
- Typhoid fever
- HIV
- Dengue
- Leptospirosis
- Rickettsia
- Relapsing fever
- Other viral illness
Fever

- Huge list of potential causes
- Vast majority caused by standard infection; UTI, LRTI etc.
- Malaria should always be considered
- Falcifarum rare > 3 months after leaving endemic area
- Vivax / ovale may persist for year
Incubation period < 21 days

- Malaria
- Enteric fever
- Arbovirus, e.g. dengue, chikungunya
- Gastroenteritis
- Typhus (louse born, flea born, scrub)
- American Thypansomiasis
- Leptospirosis
- Viral haemorrhagic fevers
Incubation period > 21 days

- Malaria
- TB
- Viral hepatitis
- HIV
- Schistosomiasis (Katayama fever)
- Amoebic liver abscess
- Leishmaniasis
- Filariosis
Usual incubation periods of some febrile infectious illnesses

<table>
<thead>
<tr>
<th>Short: ≤10 days</th>
<th>Intermediate: 7 – 28 days</th>
<th>Long: &gt; 4 weeks</th>
<th>Variable: Weeks to years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>Acute schistosomiasis</td>
<td>Brucellosis</td>
<td>Amoebiasis</td>
</tr>
<tr>
<td>Arbovirus</td>
<td>Bartonellosis</td>
<td>Hepatitis B (A, C, E)</td>
<td>Brucellosis</td>
</tr>
<tr>
<td>infections</td>
<td>Brucellosis</td>
<td>Leishmaniasis</td>
<td>Chronic schistosomiasis</td>
</tr>
<tr>
<td>Avian influenza</td>
<td>Ehrlichiosis</td>
<td>Malaria (malariae)</td>
<td>Chronic trypanosomiasis</td>
</tr>
<tr>
<td>Boutonneuse fever</td>
<td>Haemorrhagic fever with renal syndrome</td>
<td>Malaria (falciparum, ovale, vivax)</td>
<td>Filariasis</td>
</tr>
<tr>
<td>Crimean-Congo Haemorrhagic fever</td>
<td>Acute Human immunodeficiency virus (HIV) seroconversion</td>
<td>Poliomyelitis</td>
<td>HIV</td>
</tr>
<tr>
<td>Chikungunya</td>
<td>Lassa fever</td>
<td>Q fever</td>
<td>Melioidosis</td>
</tr>
<tr>
<td>Dengue</td>
<td>Leptospirosis</td>
<td>S. American Haemorrhagic fevers</td>
<td>Systemic fungal infections</td>
</tr>
<tr>
<td>Histoplasmosis</td>
<td>Malaria</td>
<td>Toxoplasmosis</td>
<td>Rabies</td>
</tr>
<tr>
<td>Legionellosis</td>
<td>(falciparum, ovale, vivax)</td>
<td>Acute trypanosomiasis</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>Marburg/Ebola</td>
<td>Poliomyelitis</td>
<td>(East African, American)</td>
<td></td>
</tr>
<tr>
<td>Haemorrhagic fever</td>
<td>Q fever</td>
<td>Typhoid and paratyphoid fever</td>
<td></td>
</tr>
<tr>
<td>Meningococcal disease</td>
<td>S. American Haemorrhagic fevers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plague</td>
<td></td>
<td>Toxoplasmosis</td>
<td></td>
</tr>
<tr>
<td>Psittacosis</td>
<td></td>
<td>Acute trypanosomiasis</td>
<td></td>
</tr>
<tr>
<td>Rat-bite fever</td>
<td></td>
<td>(East African, American)</td>
<td></td>
</tr>
<tr>
<td>Relapsing fever</td>
<td></td>
<td>Typhoid and paratyphoid fever</td>
<td></td>
</tr>
<tr>
<td>SARS</td>
<td></td>
<td>Typhus</td>
<td></td>
</tr>
<tr>
<td>Tularaemia</td>
<td></td>
<td></td>
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<tr>
<td>Yellow fever</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Yersinia</td>
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</tr>
</tbody>
</table>
Fever and localizing signs

- **Rash** – dengue, typhoid, HIV, syphilis, typhus
- **Jaundice** – malaria, hepatitis, leptospirosis
- **Lymphadenopathy** – HIV, TB, typhus
- **Hepatomegaly** – malaria, hepatitis, leptospirosis, amoebic liver abscess, typhoid
- **Splenomegaly** – malaria, typhoid
- **Eschar** – typhus, CCHF, tick-borne encephalitis
Differential diagnosis of physical findings for some infectious febrile diseases

<table>
<thead>
<tr>
<th>Physical finding</th>
<th>Differential diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphadenopathy</td>
<td>Plague, HIV, rickettsioses, brucellosis, leishmaniasis, dengue, Lassa fever, infectious mononucleosis, tuberculosis, toxoplasmosis, tularaemia, anthrax, cat scratch disease, melioidosis, West African trypanosomiasis, lymphatic filariasis</td>
</tr>
<tr>
<td>Hepatomegaly</td>
<td>Malaria, leishmaniasis, schistosomiasis, amoebic or pyogenic liver abscess, typhoid, hepatitis, leptospirosis, tuberculosis</td>
</tr>
<tr>
<td>Splenomegaly</td>
<td>Malaria, leishmaniasis, trypanosomiasis, typhoid, brucellosis, typhus, dengue, acute or chronic schistosomiasis, tuberculosis, toxoplasmosis, tularaemia, anthrax</td>
</tr>
<tr>
<td>Jaundice</td>
<td>Hepatitis, malaria, leptospirosis, relapsing fevers, cholelithiasis, pancreatitis, etc (see Table 9)</td>
</tr>
<tr>
<td>Wheezing</td>
<td>Löffler’s syndrome, Katayama fever, tropical pulmonary eosinophilia</td>
</tr>
</tbody>
</table>
Laboratory investigations

1) Date of onset of fever
   a. NS1 Ag in Dengue: 2-5 days
   b. Blood culture: 1st week in Salmonella
   c. IgM for: Scrub, Dengue, Leptospira, Typhi dot: 2nd week

2) Rapid diagnostic tests / bedside tests
   a. Malaria – Rapid diagnostic test (high negative predictive value)
   b. Dengue – NS1 Antigen 9 High positive predictive value
Investigations

• CBC, UA, LFT’s
• Malaria – EDTA sample – repeat if suspicious

• Blood cultures
• Save serum for serology
• Urine analysis and culture (+/-OCP)
• Stool for MC&S and OCP
  • Host stool – Amoebiasis
  • Fresh stool – Strongyloides

• CXR
• Check G6PD status before prescribing Primaquine
Common Fever Syndromes

1. Fever
2. Neurologic
3. Abdominal
4. Pulmonary
5. Rash
6. Hemorrhage
7. Hepatorenal involvement
Neurologic Syndromes: Encephalitis

Fever, headache, altered mental status, convulsions, coma

- Cerebral malaria
- Meningitis
- JE Encephalitis
- scrub typhus; typhoid encephalopathy
- Herpes simplex virus
- Trypanosomiasis (sleeping sickness)
- HIV
HIV

- Chronic Meningitis: TB, cryptococcal
- Toxoplasmosis
- HIV dementia
Malaria
What are malaria symptoms and signs?

Malaria Complications
- Cerebral Malaria
- Blackwater fever
- Pulmonary edema
- Very low blood of sugar
- Hemolysis
- Coagulopathy
Plasmodium falciparum: ring hemorrhage
Symptom of malaria

• Headache
• Pallor
  • Severe hemolytic anemia
  • Heart failure
• Cerebral malaria – impaired mental status, convulsion, coma
• Labored breathing
  • acidosis, heart failure
Common Fever Syndromes

1. Fever alone
2. Neurologic

3. Abdominal

4. Pulmonary
5. Rash
6. Hemorrhage
7. Hepatorenal involvement
Abdominal Syndromes

Fever, abdominal pain

- Typhoid
- Infectious colitis: shigella, E.coli, Salmonella, Campylobacter, ameba
- Amebic liver abscess
- Appendicitis, pyelonephritis
- HIV
Fever and Diarrhea

- Shigella and Entamoeba histolytica
- Salmonella, Campylobacter and Cryptosporidium are common worldwide
- Enteric fevers (Typhoid and paratyphoid)
- Typhoid vaccine, 50-70% efficacy
- Management: Stool sample +/- empirical antibiotics e.g. ciprofloxacin
- Persistent diarrhea is usually caused by protozoan parasites such as Cryptosporidium and Giardia
Typhoid

Rose spots

Salmonella Typhi

Symptoms:
- Fever
- Headache
- Eye Pain
- Back Pain
- Muscle Aches
- Joint Pain

Microscopic view of Salmonella Typhi bacteria.
Typhoid Fever

- Typhoid fever is a life-threatening illness caused by the bacterium Salmonella Typhi.
- Typhoid fever is also known as enteric fever, bilious fever.
- It is a gram-negative short bacillus that is motile due its flagellum.
  - Gram-negative bacteria are pathogenic, meaning they can cause disease in a host organism.
Typhoid

- Sustained high fever, headache
- Apathy, psychosis
- Constipation, abdominal pain
- Splenomegaly
Common Fever Syndromes

1. Fever alone
2. Neurologic
3. Abdominal
4. Pulmonary
5. Rash
6. Hemorrhage
7. Hepatorenal involvement
Pulmonary Syndromes

Fever, cough, dyspnea

- Pneumonia
- Tuberculosis
- HIV
- Scrub typhus; leptospirosis
- complicated malaria
Tuberculosis

- 1/3rd world TB infected
- 5%-10% will develop tuberculosis disease
- Risk greatest within the first five years
- Only Pulmonary TB is infectious esp. ‘smear positive’
- Extra-pulmonary TB (LN, GI) more common in migrants than UK born, 48% vs 27%
- Problems of multi-resistant TB organisms
- Test : PPD (Mantoux skin test)
- BCG vaccine
Tuberculosis - Clinicals

• Suspect if chronic fever, cough, weight loss and unexplained symptoms

• Investigations:
  • 3 x Early morning sputum
  • CXR
  • Other – CBC, LFT

• Referral to Infectious Diseases or Chest clinic
Common Fever Syndromes

1. Fever alone
2. Neurologic
3. Abdominal
4. Pulmonary
5. Rash
6. Hemorrhage
7. Hepatorenal involvement
Rash

Fever and skin rash

- Measles
- HIV
- Dengue
- Other viruses
- Leptospirosis
- Rickettsial infections, including scrub typhus
- Purpura fulminance in Meningococcal meningitis

Koplik spot
Tropical skin disease

- Fungal infections common in hot climates and with HIV
- Acute schistosomiasis
- Cutaneous lava migrans
- Larva currens – strongyloides
- Cutaneous leishmaniasis
- Myiasis
- Tungiasis
- Eschars
- HIV associated skin lesion
Skin lesions associated with febrile infections

<table>
<thead>
<tr>
<th>Skin lesion</th>
<th>Differential Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maculopapular rash</td>
<td>Arboviruses, acute HIV, rickettsiae, secondary syphilis, typhus, bartonellosis, typhoid, rubeola, rubella, scarlet fever, infected scabies, arthropod bites, disseminated gonococcal or meningococcal infections</td>
</tr>
<tr>
<td>Petechiae/ecchymoses</td>
<td>Rickettsioses, meningococcaemia, viral haemorrhagic fevers, yellow fever, dengue, leptospirosis, septicaemia and disseminated intravascular coagulopathy</td>
</tr>
<tr>
<td>Eschars</td>
<td>Tick bite fever, scrub typhus, anthrax, tularaemia, spider bites</td>
</tr>
</tbody>
</table>
# Differential diagnosis of fever with rash

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Pathogens or Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Maculopapular rash: central distribution</td>
<td><strong>VRS</strong> – Measles, rubella, roseola, erythema infectiosum, EBV, echovirus, HBV, HIV</td>
</tr>
<tr>
<td></td>
<td><strong>BACT</strong> – Erythema marginatum (rheumatic fever, scarlet fever), erysipelas, 2°syphilis, leptospirosis, Lyme dzs</td>
</tr>
<tr>
<td></td>
<td><strong>RICK</strong> – Rocky Mountain Spotted fever, Scrub typhus</td>
</tr>
<tr>
<td></td>
<td><strong>OTH</strong> – RA, Kawasaki dis, drug rxn</td>
</tr>
</tbody>
</table>
Rheumatic fever-dx

Erythematous patch with central clearing

Erythema marginatum
## Differential diagnosis of fever with rash

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Pathogens or Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Maculopapular rash: peripheral distribution – Erythema multiforme</td>
<td>VRS – HSV, EBV, echovirus</td>
</tr>
<tr>
<td></td>
<td>BACT – 2ºsyphilis, leptospirosis, Lyme dzs,</td>
</tr>
<tr>
<td></td>
<td>RICK – Rocky Mountain Spotted fever</td>
</tr>
<tr>
<td></td>
<td>OTH – Radiation Rx, drug rxn, Meningococcemia and dengue fever</td>
</tr>
</tbody>
</table>
b) Diffuse erythema with desquamation

→ Scarlet fever
→ Toxic shock syndrome and scalded skin syndrome

Strawberry tongue
<table>
<thead>
<tr>
<th>Lesion</th>
<th>Pathogens or Infection</th>
</tr>
</thead>
</table>
| d) vesicular, pustular, bullous | VRS – HSV, EBV, Coxsackie virus  
RICK – Rickettsial pox  
OTH – Toxic epidermal necrolysis, Steven-Johnson Syndrome |
| e) Petechial - purpuric     | VRS – Atypical measles, congenital rubella, CMV, enterovirus, HIV, HF viruses, Dengue virus  
BACT – Sepsis (meningococcal, gonococcal, pneumococcal, Hib), IE, weil syndrome (severe lepto)  
OTH – Vasculitis, thrombocytopenia, Henocj-Schonlein purpura, malaria Generalised bone narrow failure (e.g. leukaemia, aplastic anaemia, myeloma, marrow infiltration by solid tumours) |
f) Erythema Nodosum

VRS – EBV, HBV

BACT – Group A streptococcus, TB, yersinia, Cat-Scratch Dzs

Fungi-Sarcoidosis, Inf. Bowel dzs, OCP, SLE, Behcet dzs
## MEASLE

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causative agent</td>
<td>Measles virus (ssRNA paramyxovirus)</td>
</tr>
<tr>
<td>Host</td>
<td>Human</td>
</tr>
<tr>
<td>Invade</td>
<td>Upper respiratory tract, regional LN</td>
</tr>
<tr>
<td>Transmitted by</td>
<td>Large respiratory droplets with no fomites (close contact transm.)</td>
</tr>
<tr>
<td>Virus present</td>
<td>Respiratory secretion, blood, urine</td>
</tr>
<tr>
<td>Period of communicability</td>
<td>Contagious from 5 days before to 4 days after the appearance of rush.</td>
</tr>
</tbody>
</table>
CONJUNCTIVITIS

MACULAR RASH

KOPLIK SPOTS
Dengue Fever

**Symptoms of Dengue Fever**

**Mild**
- Headaches
- High Fever
- Rash
- Flu-like symptoms
- Nausea and vomiting
- Joint and Muscle Pain

**Severe**
- Shock
- Severe Bleeding
- Severe Vomiting
- Severe Pain in Stomach
- Blood Pressure Drops
- Difficulties affecting the heart, lungs, or liver
- Bruising under the skin and pooling of blood under the skin

[Images of symptoms and affected areas]
Dengue

- Asia, South America
- Marked myalgia, eye pain
Rickettsia

• Fever, headache, and myalgia
• Clue: tick exposure, painless eschar
• African tick-bite fever, scrub typhus
• Weil-Felix test for Rickettsial disease (nonspecific antibodies to Proteus strains)
Common Fever Syndromes

1. Fever alone
2. Neurologic
3. Abdominal
4. Pulmonary
5. Rash
6. Hemorrhage
7. Hepatorenal involvement
Hemorrhagic Syndromes

Hematemesis, melena, epistaxis, petechiae, purpura, puncture site bleeding

- Ebola, Lessa, Marburg
- Yellow fever
- Dengue
- Severe leptospirosis (Weil syndrome) – purpuric rash
Common Fever Syndromes

1. Fever alone
2. Neurologic
3. Abdominal
4. Pulmonary
5. Rash
6. Hemorrhage
7. Hepatorenal involvement
Fever with hepatorenal involvement

a. Rule out malaria; leptospirosis; scrub typhus, Enteric fever

b. Jaundice after fever : hepatitis A-E with FHF
Viral Hepatitis

• Hepatitis A or E rare, mainly from Indian subcontinent
• Chronic carriage of Hep B up to 20%
• Hep C carriage – UK 0.5%, Africa 5%, Asia 2.5%
• Value of routine screening
• Abnormal LFT can reflect a vast number of different diseases
• Detection allows vaccination of susceptible family member (Hep B)
Leptospirosis

**How you can get infected**

- **Reservoir host**
  - Rodents, especially rats
- **Bacteria**: Leptospira sp.
- **Urine**
  - Splashing contaminated water/urine into eyes
  - Swallowing contaminated water/food
- **Contains**: Contaminated water/soil/food
- **Infect**: Exposing open wounds (e.g., cuts) to contaminated water/soil

*Reservoir hosts are animals that harbors or nourishes a pathogen (a harmful organism) and serves as a source of infection.*

**Symptoms of Leptospirosis**

- High fever
- Headache
- Chills
- Muscle aches
- Vomiting
- Jaundice
- Red eyes
- Abdominal pain
- Diarrhea
- Rash
# Leptospirosis

<table>
<thead>
<tr>
<th>Cause</th>
<th><strong>Leptospira interrogans</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubation Period</td>
<td>7-14 Days</td>
</tr>
<tr>
<td>Host</td>
<td>Exposure to water contaminated with animal urine</td>
</tr>
<tr>
<td>Clinical Features</td>
<td></td>
</tr>
<tr>
<td>First Phase (3-10) Days</td>
<td>High grad fever</td>
</tr>
<tr>
<td></td>
<td>Severe Headache</td>
</tr>
<tr>
<td></td>
<td>Myalgia</td>
</tr>
<tr>
<td></td>
<td>Abdominal pain</td>
</tr>
<tr>
<td></td>
<td>Conjunctival suffusion</td>
</tr>
<tr>
<td></td>
<td>Maculopapular rash</td>
</tr>
<tr>
<td>Second Phase Meningitis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iridacyclitis</td>
</tr>
<tr>
<td>Severe Leptospirosis (Weil’s Syndrome)</td>
<td>Intense jaundice</td>
</tr>
<tr>
<td></td>
<td>Renal failure</td>
</tr>
<tr>
<td></td>
<td>Hypotension</td>
</tr>
<tr>
<td></td>
<td>Hemorrhage-Pulmonary, GI, ICH, Pericardium, Conjunctival</td>
</tr>
<tr>
<td></td>
<td>Purpuric Rash</td>
</tr>
</tbody>
</table>
Leptospirosis

- Rash
- Aseptic meningitis
- Conjunctivitis /suffusion
- Hepatomegaly
- Jaundice
- Lung involvement
Approach to the patients with tropical infections

**FLOW CHART**

1. **Assess and stabilize Airway, Breathing and Circulation**
   - Redflag features
     - SIRS (Pulse > 110/min, RR > 20/min, BP < 90/60)

2. **Focus of infection identified?**
   - Yes
     - (Pneumonia, pyelonephritis, Biliary source, Cellulitis etc.)
     - Appropriate investigations (including Blood cultures x 2)
     - Empiric Treatment as per the source
   - No
     - **Assess the clinical syndrome**
       - Consider Risk factors, geography, season and associated symptoms
     - **FEVER with Rash/ thrombocytopenia**
     - **Jaundice**
     - **ARDS**
     - **MODS**

3. **FEVER with ENCEPHALOPATHY**
   - (See Flow Chart 2)

**INVESTIGATIONS**

- Essential (to be performed in all)
  - Blood cultures x 2
  - CBC, Platelets, Electrolytes, CRP, Creatinine, LFT, Urine analysis, CXR
- Rapid diagnostic tests (to be performed at admission)
  - *Malaria card test (RDT) (kit must use HRP/LDH antigen) / Malarial smears x 3*
  - #Dengue card tests for NS1 antigen, IgM and IgG
  - †Typhidot
  - H1N1 (PCR)
Rapid tests suggest diagnosis

Yes

- Malaria
  - Inj. Artesunate 2.4 mg/kg at admission, then at 12 h and 24 hr, then once a day

- Dengue
  - Isotonic fluids
  - Supportive care for bleeding, electrolyte abnormalities

- Typhoid
  - Inj. Ceftriaxone 100mg/kg/day

No

Empirical treatment

- Inj. Ceftriaxone 100mg/kg/day + Tab. Doxycycline 5mg/kg/day
- Inj. Azithromycin 10mg/kg/day
- Further work up (as indicated)
  - Serology for Scrub typhus (Weil felix, IFA) Dengue (IgM, IgG), Leptospira (IgM, Dot ELISA) WIDAL
  - USG abdomen
  - Bone Marrow Examination and Cultures

Kit should use HRP/LDH antigens. Treat if RDT is positive. Malaria ruled out if two negative RDTs.

NS1 antigen – day 1-5 of illness; IgG titre > 1: 1280 is 90% sensitive and 98% specific.

Sensitivity 95 – 97%

Consider if fever already treated for > 1 week or very high clinical suspicion of marrow involvement, hemophagocytosis
Management strategy for tropical fever syndrome

<table>
<thead>
<tr>
<th>Condition</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever with thrombocytopenia</td>
<td>Antipyretics for control of fever, IV fluids, Avoid aspirin/anticoagulants (Level IV), Watch for bleeding, dyspnea, shock, Platelet transfusion if the platelet count &lt; 20,000 or clinical bleeding (Level IV), No role of steroids (Level IB). Specific therapy once the diagnosis is established.</td>
</tr>
<tr>
<td>Fever with jaundice</td>
<td>Antipyretics for control of fever, Injection ceftriaxone 2 g IV BD, Tablet doxycycline 100 mg BD, IV fluids, Watch for urine output, seizures, encephalopathy, bleeding, FFP/cryoprecipitate for bleeding (Level III), Specific therapy once the diagnosis is established.</td>
</tr>
<tr>
<td>Fever with renal failure</td>
<td>Antipyretics for control of fever, Injection ceftriaxone 2 g IV BD, Tablet doxycycline 100 mg BD, IV fluids according to CVP, Watch for encephalopathy, bleeding, seizures, ARDS, Renal replacement therapy (intermittent HD/CRRT), Specific therapy once the diagnosis is established.</td>
</tr>
<tr>
<td>Fever with encephalopathy</td>
<td>Antipyretics for control of fever, Injection ceftriaxone 2 g IV BD, IV acyclovir 10 mg/kg in adults (up to 20 mg/kg in children) intravenously every 8 h, IV fluids, IV mannitol for raised ICP, Watch for seizures, Specific therapy once the diagnosis is established.</td>
</tr>
<tr>
<td>Fever with respiratory distress</td>
<td>Antipyretics for control of fever, IV fluids, Oxygen by Venturi mask (level IV), Injection ceftriaxone 2 g IV BD, Injection azithromycin 500 mg IV OD, Tablet oseltamivir 150 mg BD, if H1N1 is a possibility (Level IA), Watch for impending respiratory failure, shock, renal failure, alveolar hemorrhage, Specific therapy once the diagnosis is established.</td>
</tr>
</tbody>
</table>

*Doxycycline is to be taken empty stomach 1 h before or after a meal. It is contraindicated in pregnant women and young children. *For possible typhoid, leptospirosis and scrub typhus. †For possible bacterial meningitis, typhoid and leptospirosis. FFP: Fresh frozen plasma; CVP: Central venous pressure, ARDS: Acute respiratory distress syndrome, HD: Hemodialysis, CRRT: Continuous renal replacement therapy, ICP: Intracranial pressure.
References


