MALARIA

(Last updated 07/23/2019: Reviewed by: Rahul Kashyap, MBBS)

PRESENTING COMPLAINT: Fever, chills and sweats

FINDINGS

- **A** Check Airway
- **B** ↑RR
- **C** ↓BP, ↑HR
- **D** Variable altered (V,P,U,D)*
- **E** Fever, mild jaundice, pallor, petechiae
- **L<sub>PC</sub>** Thick and thin blood films, blood cultures, urine dipstick, Malaria Rapid antigen test
  ↓ Hb, ↓Platelet count, LFT (↑ transaminases, ↑bilirubin), renal function test- ↑BUN, ↑creatinine; hypoglycemia, ABG - ↓pH metabolic acidosis,
- **U<sub>PC</sub>** Splenomegaly, hepatomegaly

*V (verbal), P (pain), U (unconsciousness), D (delirious)

**U<sub>PC</sub>** (point of care ultrasound)  **L<sub>PC</sub>** (point of care labs)

OTHER HISTORY

- **Symptoms:** Fatigue, malaise, arthralgia, myalgia, headache, cough
- Less common symptoms include: Anorexia, lethargy, nausea, vomiting, diarrhea, jaundice

DIFFERENTIAL DIAGNOSIS

- Community-acquired Gram-positive and Gram-negative bacterial sepsis, enteric fever, severe rickettsia infections, leptospirosis, dengue fever, chikungunya, zika virus, viral hemorrhagic fevers

OTHER INVESTIGATIONS

- Malaria rapid antigen test, urine dipstick, chest radiograph, haptoglobin, lactic dehydrogenase, leucocyte count (suggestive of hemolysis)

THERAPEUTIC INTERVENTIONS

- **Medications:** Note that below are regimens intended for *P. falciparum* and empiric therapy for unknown malaria types; different treatment regimens may be indicated if a type other than *P. falciparum* is identified; treatment should be initiated in conjunction with an experienced provider, such as an infectious disease specialist
  - **Mild or moderate disease** (Presumed chloroquine resistant based on geography)
    - **Adult:** Atovaquone-proguanil: 5 tabs orally each day for 3 days, or Artemether-lumefantrine: 1 tab immediately, then at 8 hours, then twice daily for two days, or
Quinine: 650 mg TID for 7 days with doxycycline 100 mg PO BID for 7 days, or
Mefloquin: 750 mg PO once followed by 500 mg 12 hours later

- **Child:** Atovaquone-proguanil
  - Pediatric tabs are ¼ adult tabs (weight based)
    - 5 to 8 kg: 2 peds tabs orally every day for 3 days
    - 9 to 10 kg: 3 peds tabs orally every day for 3 days
    - 11 to 20 kg: 1 adult tab orally every day for 3 days
    - 21 to 30 kg: 2 adult tabs orally every day for 3 days
    - 31 to 40 kg: 3 adult tabs orally every day for 3 days
    - >40 kg: 4 adults tabs orally every day for 3 days

- **Artemether-lufenantrine**
  - First dose followed by a second dose 8 hours later, then an additional dose
    every 12 hours orally twice a day for 2 additional days
  - Dosing is weight based:
    - 5 to <15 kg: 1 tablet per dose
    - 15 to 25 kg: 2 tablets per dose
    - 25 to 35 kg: 3 tablets per dose
    - ≥35 kg: 4 tablets per dose

- Quinine sulfate: 10 mg/kg TID for 7 days with doxycycline 2.2 mg/kg BID for 7 days
- Mefloquine: 15 mg/kg once followed by 9.1 mg/kg 12 hours later
- Presumed Chloroquine sensitive based on geography
  - **Adult:** chloroquine phosphate 600 mg PO once, then 300 mg at 6, 24, and 48
    hours
  - **Child:** 10 mg/kg immediately, then 5 mg/kg orally at 2, 24, and 48 hours

- **Severe/Complicated**
  - **Adult:** Quinidine gluconate: 10 mg/kg loading over 1-2 hours, then 0.02 mg/kg/min
    for 24 hours PLUS either doxycycline (100 mg PO/IV BID) or clindamycin (10
    mg/kg IV once, followed by 5 mg/kg IV every 8 hours)
  - **Child:** Quinidine gluconate: 10 mg/kg loading over 1-2 hours, then 0.02 mg/kg/min
    for 24 hours PLUS either doxycycline (2.2 mg/kg PO/IV BID) or clindamycin (10
    mg/kg IV once followed by 5 mg/kg IV every 8 hours)

- Dosing may require adjustment or monitoring based on renal dysfunction
- **Consult:** Infectious disease or tropical disease

**MANAGEMENT AFTER STABILIZATION**
• **Follow-Up**: Routine care, Watch for high fever and dehydration

• **Further Treatment**: Contact infectious disease or tropical disease specialist: Treatment beyond empiric is dependant on species identified and clinical response

• **Manage Complications**: Organ specific management and consider infectious disease consult

**CAUTIONS**

• **Complications**: ARDS, cerebral malaria, AKI, hypoglycemia, anemia, coagulopathy

• **Resistance**: In parts of Cambodia, Laos, Myanmar, Thailand, Vietnam, and Yunnan Province, China (Greater Mekong sub-region), in the presence of a mutation (kelch13), there are reports of a slow-clearance phenotype: *Artemisinin-resistant falciparum malaria*

**TABLE**

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<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
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<tbody>
<tr>
<td>&lt;1% Parasitemia</td>
<td>&lt;5% parasitemia</td>
<td>&gt;5% Parasitemia</td>
</tr>
<tr>
<td>Mild</td>
<td>Mild</td>
<td>DIC</td>
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<tr>
<td>anemia/thrombocytopenia</td>
<td>anemia/thrombocytopenia</td>
<td>Organ failure (any organ or system)</td>
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<tr>
<td>Hemodynamically stable</td>
<td>Hemodynamically stable</td>
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<tr>
<td>Host from endemic area</td>
<td>Non-immune host</td>
<td>Lab abnormalities:</td>
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<tr>
<td>(presumed some degree of immunity)</td>
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<td>Hemoglobin &lt;7 g/dL</td>
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<td></td>
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<td>Creatinine &gt;3 mg/dL</td>
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<td></td>
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<td>Bilirubin &gt;3 mg/dL</td>
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<td>Bicarbonate &lt;5 mmol/L</td>
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<td>Infiltrates on chest radiography</td>
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<td></td>
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<td>Urine positive for hemoglobin</td>
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<td>Blood sugar &lt;40 mg/dL</td>
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**REFERENCES AND ACKNOWLEDGMENTS**

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http://www.thelancet.com/journals/laninf/article/PIIS1473-3099(02)00239-6/fulltext?_eventId=login


https://www.cdc.gov/malaria/travelers/country_table/a.html