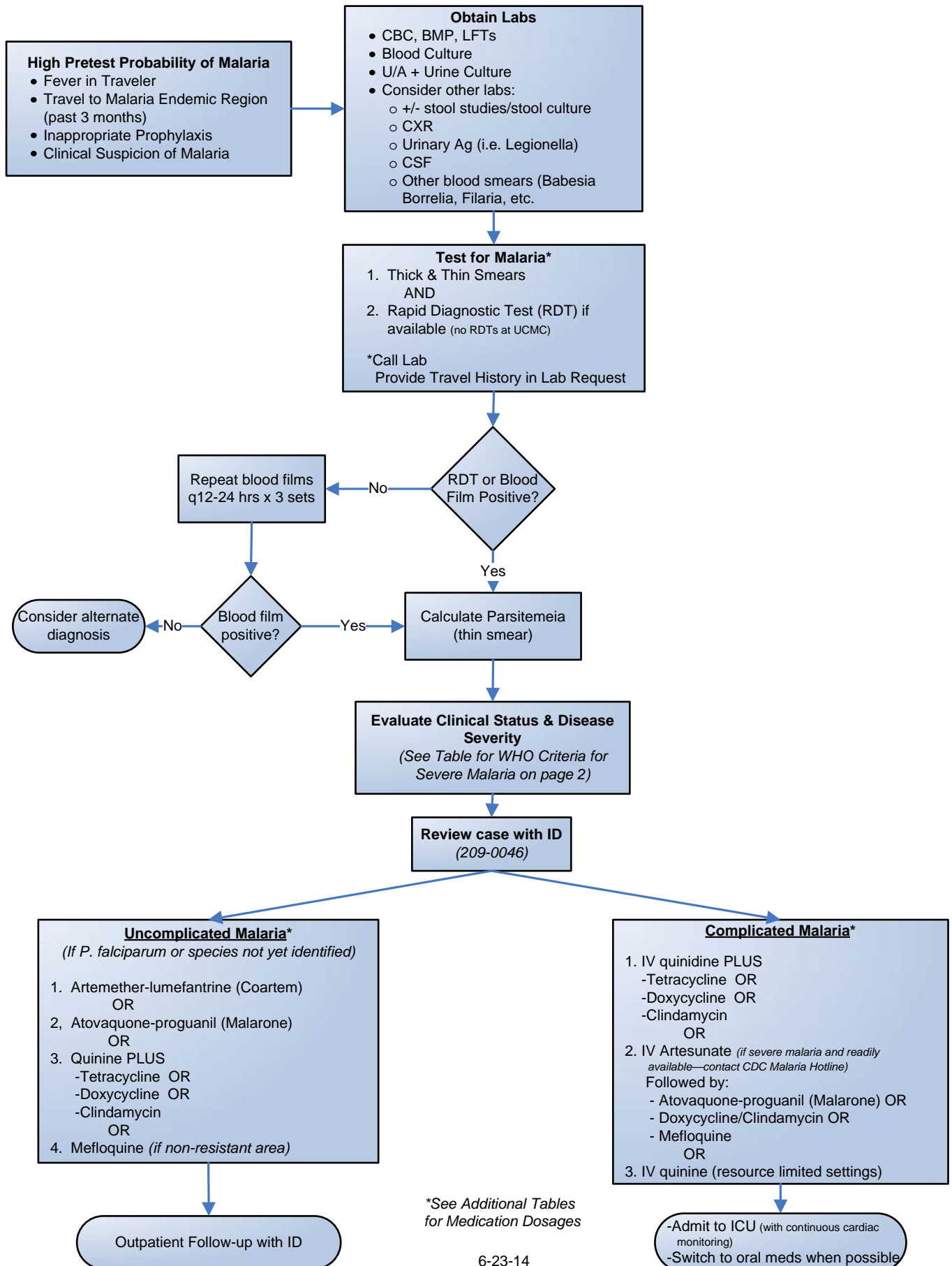


EmergencyKT: Malaria



*See Additional Tables for Medication Dosages

WHO Criteria for Severe Malaria

Indicators of severe malaria and poor prognosis

Manifestation	Features
Initial World Health Organization criteria from 1990 [11]	
Cerebral malaria	Unrousable coma not attributable to any other cause, with a Glasgow Coma Scale score ≤ 9 . Coma should persist for at least 30 min after a generalized convulsion
Severe anemia	Hematocrit $< 15\%$ or hemoglobin < 50 g/l in the presence of parasite count $> 10\,000/\mu\text{l}$
Renal failure	Urine output < 400 ml/24 hours in adults (< 12 ml/kg/24 hours in children) and a serum creatinine > 265 $\mu\text{mol/l}$ (> 3.0 mg/dl) despite adequate volume repletion
Pulmonary edema and acute respiratory distress syndrome	The acute lung injury score is calculated on the basis of radiographic densities, severity of hypoxemia, and positive end-expiratory pressure [26]
Hypoglycemia	Whole blood glucose concentration < 2.2 mmol/l (< 40 mg/dl)
Circulatory collapse (algid malaria)	Systolic blood pressure < 70 mmHg in patients > 5 years of age (< 50 mmHg in children aged 1–5 years), with cold clammy skin or a core-skin temperature difference $> 10^\circ\text{C}$
Abnormal bleeding and/or disseminated intravascular coagulation	Spontaneous bleeding from gums, nose, gastrointestinal tract, or laboratory evidence of disseminated intravascular coagulation
Repeated generalized convulsions	≥ 3 convulsions observed within 24 hours
Acidemia/acidosis	Arterial pH < 7.25 or acidosis (plasma bicarbonate < 15 mmol/l)
Macroscopic hemoglobinuria	Hemolysis not secondary to glucose-6-phosphate dehydrogenase deficiency
Added World Health Organization criteria from 2000 [12]	
Impaired consciousness	Rousable mental condition
Prostration or weakness	
Hyperparasitemia	$> 5\%$ parasitized erythrocytes or $> 250\,000$ parasites/ μl (in nonimmune individuals)
Hyperpyrexia	Core body temperature $> 40^\circ\text{C}$
Hyperbilirubinemia	Total bilirubin > 43 $\mu\text{mol/l}$ (> 2.5 mg/dl)

CDC Guidelines

Guidelines for Treatment of Malaria in the United States (Based on drugs currently available for use in the United States – updated July 1, 2013)

1

CDC Malaria Hotline: (770) 488-7788 or (855) 856-4713 toll-free Monday-Friday 9 am to 5 pm EST - (770) 488-7100 after hours, weekends and holidays

Clinical Diagnosis/ <i>Plasmodium</i> species	Region Infection Acquired	Recommended Drug and Adult Dose ¹	Recommended Drug and Pediatric Dose ¹ <i>Pediatric dose should NEVER exceed adult dose</i>
Uncomplicated malaria/ <i>P. falciparum</i> or Species not identified If "species not identified" is subsequently diagnosed as <i>P. vivax</i> or <i>P. ovale</i> : see <i>P. vivax</i> and <i>P. ovale</i> (below) re. treatment with primaquine	Chloroquine-resistant or unknown resistance ² (All malarious regions except those specified as chloroquine-sensitive listed in the box below.)	A. Atovaquone-proguanil (MalaroneTM)³ Adult tab = 250 mg atovaquone/ 100 mg proguanil 4 adult tabs po qd x 3 days	A. Atovaquone-proguanil (MalaroneTM)³ Adult tab = 250 mg atovaquone/ 100 mg proguanil Peds tab = 62.5 mg atovaquone/ 25 mg proguanil 5 - 8kg: 2 peds tabs po qd x 3 d 9-10kg: 3 peds tabs po qd x 3 d 11-20kg: 1 adult tab po qd x 3 d 21-30kg: 2 adult tabs po qd x 3d 31-40kg: 3 adult tabs po qd x 3d > 40 kg: 4 adult tabs po qd x 3d
		B. Artemether-lumefantrine (CoartemTM)³ 1 tablet = 20mg artemether and 120 mg lumefantrine A 3-day treatment schedule with a total of 6 oral doses is recommended for both adult and pediatric patients based on weight. The patient should receive the initial dose, followed by the second dose 8 hours later, then 1 dose po bid for the following 2 days. 5 - <15 kg: 1 tablet per dose 15 - <25 kg: 2 tablets per dose 25 - <35 kg: 3 tablets per dose ≥ 35 kg: 4 tablets per dose	
		C. Quinine sulfate plus one of the following: Doxycycline, Tetracycline, or Clindamycin Quinine sulfate: 542 mg base (=650 mg salt) ⁴ po tid x 3 or 7 days ⁵ Doxycycline: 100 mg po bid x 7 days Tetracycline: 250 mg po qid x 7 days Clindamycin: 20 mg base/kg/day po divided tid x 7 days	C. Quinine sulfate⁴ plus one of the following: Doxycycline⁶, Tetracycline⁶ or Clindamycin Quinine sulfate: 8.3 mg base/kg (=10 mg salt/kg) po tid x 3 or 7 days ⁵ Doxycycline: 2.2 mg/kg po every 12 hours x 7 days Tetracycline: 25 mg/kg/day po divided qid x 7 days Clindamycin: 20 mg base/kg/day po divided tid x 7 days
		D. Mefloquine (LariamTM and generics)⁷ 684 mg base (=750 mg salt) po as initial dose, followed by 456 mg base (=500 mg salt) po given 6-12 hours after initial dose Total dose= 1,250 mg salt	D. Mefloquine (LariamTM and generics)⁷ 13.7 mg base/kg (=15 mg salt/kg) po as initial dose, followed by 9.1 mg base/kg (=10 mg salt/kg) po given 6-12 hours after initial dose. Total dose= 25 mg salt/kg

Guidelines for Treatment of Malaria in the United States
(Based on drugs currently available for use in the United States – updated July 1, 2013)

2

CDC Malaria Hotline: (770) 488-7788 or (855) 856-4713 toll-free Monday-Friday 9 am to 5 pm EST - (770) 488-7100 after hours, weekends and holidays

Uncomplicated malaria/ <i>P. falciparum</i> or <i>Species not identified</i>	Chloroquine-sensitive (Central America west of Panama Canal; Haiti; the Dominican Republic; and most of the Middle East)	Chloroquine phosphate (Aralen™ and generics) ⁸ 600 mg base (=1,000 mg salt) po immediately, followed by 300 mg base (=500 mg salt) po at 6, 24, and 48 hours Total dose: 1,500 mg base (=2,500 mg salt) OR Hydroxychloroquine (Plaquenil™ and generics) 620 mg base (=800 mg salt) po immediately, followed by 310 mg base (=400 mg salt) po at 6, 24, and 48 hours Total dose: 1,550 mg base (=2,000 mg salt)	Chloroquine phosphate (Aralen™ and generics) ⁸ 10 mg base/kg po immediately, followed by 5 mg base/kg po at 6, 24, and 48 hours Total dose: 25 mg base/kg OR Hydroxychloroquine (Plaquenil™ and generics) 10 mg base/kg po immediately, followed by 5 mg base/kg po at 6, 24, and 48 hours Total dose: 25 mg base/kg
Uncomplicated malaria/ <i>P. malariae</i> or <i>P. knowlesi</i>	All regions	Chloroquine phosphate: ⁸ Treatment as above OR Hydroxychloroquine: Treatment as above	Chloroquine phosphate: ⁸ Treatment as above OR Hydroxychloroquine: Treatment as above
Uncomplicated malaria/ <i>P. vivax</i> or <i>P. ovale</i>	All regions Note: for suspected chloroquine-resistant <i>P. vivax</i> , see row below	Chloroquine phosphate ⁸ plus Primaquine phosphate ⁹ Chloroquine phosphate: Treatment as above Primaquine phosphate: 30 mg base po qd x 14 days OR Hydroxychloroquine plus Primaquine phosphate ⁹ Hydroxychloroquine: Treatment as above Primaquine phosphate: 30 mg base po qd x 14 days	Chloroquine phosphate ⁸ plus Primaquine phosphate ⁹ Chloroquine phosphate: Treatment as above Primaquine phosphate: 0.5mg base/kg po qd x 14 days OR Hydroxychloroquine plus Primaquine phosphate ⁹ Hydroxychloroquine: Treatment as above Primaquine phosphate: 0.5mg base/kg po qd x 14 days
Uncomplicated malaria/ <i>P. vivax</i>	Chloroquine-resistant ¹⁰ (Papua New Guinea and Indonesia)	A. Quinine sulfate plus either Doxycycline or Tetracycline plus Primaquine phosphate ⁹ Quinine sulfate: Treatment as above Doxycycline or Tetracycline: Treatment as above Primaquine phosphate: Treatment as above B. Atovaquone-proguanil plus Primaquine phosphate ⁹ Atovaquone-proguanil: Treatment as above Primaquine phosphate: Treatment as above C. Mefloquine plus Primaquine phosphate ⁹ Mefloquine: Treatment as above Primaquine phosphate: Treatment as above	A. Quinine sulfate plus either Doxycycline ⁹ or Tetracycline ⁹ plus Primaquine phosphate ⁹ Quinine sulfate: Treatment as above Doxycycline or Tetracycline: Treatment as above Primaquine phosphate: Treatment as above B. Atovaquone-proguanil plus Primaquine phosphate ⁹ Atovaquone-proguanil: Treatment as above Primaquine phosphate: Treatment as above C. Mefloquine plus Primaquine phosphate ⁹ Mefloquine: Treatment as above Primaquine phosphate: Treatment as above
Uncomplicated malaria: alternatives for pregnant women ^{11,12,13}	Chloroquine-sensitive (see uncomplicated malaria sections above for chloroquine-sensitive species by region)	Chloroquine phosphate: Treatment as above OR Hydroxychloroquine: Treatment as above	Not applicable
	Chloroquine-resistant (see sections above for regions with chloroquine resistant <i>P. falciparum</i> and <i>P. vivax</i>)	Quinine sulfate plus Clindamycin Quinine sulfate: Treatment as above Clindamycin: Treatment as above OR Mefloquine: Treatment as above	Not applicable

Guidelines for Treatment of Malaria in the United States
(Based on drugs currently available for use in the United States – updated July 1, 2013)

3

CDC Malaria Hotline: (770) 488-7788 or (855) 856-4713 toll-free Monday-Friday 9 am to 5 pm EST - (770) 488-7100 after hours, weekends and holidays

Severe malaria ^{14,15, 16}	All regions	Quinidine gluconate ¹⁴ plus one of the following: Doxycycline, Tetracycline, or Clindamycin Quinidine gluconate: 6.25 mg base/kg (=10 mg salt/kg) loading dose IV over 1-2 hrs, then 0.0125 mg base/kg/min (=0.02 mg salt/kg/min) continuous infusion for at least 24 hours. An alternative regimen is 15 mg base/kg (=24 mg salt/kg) loading dose IV infused over 4 hours, followed by 7.5 mg base/kg (=12 mg salt/kg) infused over 4 hours every 8 hours, starting 8 hours after the loading dose (see package insert). Once parasite density <1% and patient can take oral medication, complete treatment with oral quinine, dose as above. Quinidine/quinine course = 7 days in Southeast Asia; = 3 days in Africa or South America. Doxycycline: Treatment as above. If patient not able to take oral medication, give 100 mg IV every 12 hours and then switch to oral doxycycline (as above) as soon as patient can take oral medication. For IV use, avoid rapid administration. Treatment course = 7 days. Tetracycline: Treatment as above Clindamycin: Treatment as above. If patient not able to take oral medication, give 10 mg base/kg loading dose IV followed by 5 mg base/kg IV every 8 hours. Switch to oral clindamycin (oral dose as above) as soon as patient can take oral medication. For IV use, avoid rapid administration. Treatment course = 7 days. <i>Investigational new drug (contact CDC for information): Artesunate followed by one of the following: Atovaquone-proguanil (Malarone™), Doxycycline (Clindamycin in pregnant women), or Mefloquine</i>	Quinidine gluconate ¹⁴ plus one of the following: Doxycycline ⁹ , Tetracycline ⁹ , or Clindamycin Quinidine gluconate: Same mg/kg dosing and recommendations as for adults. Doxycycline: Treatment as above. If patient not able to take oral medication, may give IV. For children <45 kg, give 2.2 mg/kg IV every 12 hours and then switch to oral doxycycline (dose as above) as soon as patient can take oral medication. For children ≥45 kg, use same dosing as for adults. For IV use, avoid rapid administration. Treatment course = 7 days. Tetracycline: Treatment as above Clindamycin: Treatment as above. If patient not able to take oral medication, give 10 mg base/kg loading dose IV followed by 5 mg base/kg IV every 8 hours. Switch to oral clindamycin (oral dose as above) as soon as patient can take oral medication. For IV use, avoid rapid administration. Treatment course = 7 days. <i>Investigational new drug (contact CDC for information): Artesunate followed by one of the following: Atovaquone-proguanil (Malarone™), Clindamycin, or Mefloquine</i>
-------------------------------------	-------------	--	---