

WHAT IS MALARIA?

Malaria is a febrile illness caused by a mosquito-borne protozoan that parasitizes human red blood cells.

WHERE IS MALARIA FOUND?

Malaria is endemic in many parts of the world with **temperate or tropical climates**. (See map at www.cdc.gov/malaria/distribution_epi/distribution.htm). Veterans/Department of Defense (DoD) personnel may have contracted malaria while on overseas deployments in **certain parts of Asia, Africa, and Central and South America**. When presenting symptoms are suggestive, the diagnosis of malaria should be considered for individuals who have served in **Korea, Operation Enduring Freedom** (Afghanistan/Horn of Africa or surrounding countries), **Operation Iraqi Freedom** (rare occurrence), or any other malaria-endemic country **within the past decade**.

The types of malaria infections most likely to be seen in Veterans/DoD personnel returning from endemic areas are Plasmodium vivax and P. falciparum; P. ovale and P. malariae are seen less frequently. Malaria can be fatal if not treated promptly, especially if the infection is caused by P. falciparum. P. vivax and P. ovale can remain dormant in the liver (as hypnozoites) during a symptom-free interval that may last 2 to 4 years or longer.

SCREENING AND CLINICAL INFORMATION

The diagnosis of malaria should be considered in any febrile illness of unknown origin, regardless of recent travel status. However, any history of overseas service in an endemic area should prompt evaluation for malaria.

Patients who present with recurring fever or fever of unknown origin and other symptoms as outlined in this guide should be screened for malaria.

PRESENTATION AND EVALUATION

Symptoms may vary depending on the specific type of Plasmodium, but recurring fevers are common in all types of malaria. The fevers are often accompanied by the sudden onset of shivering, followed by high fever lasting for hours, and then concluding with generalized excessive sweating and resolution of the fever. In P. falciparum malaria, fever may be continuous with intermittent spikes in temperature. Other symptoms are less specific and may include malaise, weakness, gastrointestinal complaints (nausea, vomiting, and diarrhea), neurologic complaints (dizziness, confusion, disorientation, and coma), headache, and back pain. Anemia and jaundice can also occur.

The incubation period for clinical presentation of malaria may be 9 to 30 days after infection (shortest for P. falciparum), although some species of P. vivax and ovale may incubate for more than 12 months. Untreated or partially treated infection with P. vivax, or ovale may reappear with symptoms years after initial infection with the parasite. Recurrence of infections involving drug-resistant forms of P. falciparum may occur after a month or more of apparently successful initial treatment.

TAKING A PATIENT'S HISTORY

The patient should be asked for a history of:

- Any **overseas travel** on deployment or for leisure, especially during the last 5 years; record specifics regarding locations, time of year, and history of mosquito bites.
- **Febrile illness** while overseas or shortly after return.
- **Adherence to malaria prophylactic medications and treatments**, including post-exposure prophylaxis, and other preventive measures (permethrin-treated uniforms, bed netting, application of insect repellants).

IF YOU SUSPECT
YOUR PATIENT HAS MALARIA

- 1 Consult with your laboratory and draw the appropriate blood sample for thick and thin smears to be prepared by the Microbiology or Pathology section of your local laboratory service;
- 2 Immediately consult the local Infectious Diseases provider for additional support.

TREATMENT GUIDELINES

Once the diagnosis is confirmed, **antimalarial treatment should be initiated immediately**. Treatment should be guided by three important factors: **(1) the infecting species** (multiple species may be present); **(2) the clinical status of the patient**; and **(3) the likely drug susceptibility of the species** based on the geographic area of acquisition. Determination of species is important because *P. falciparum* may develop into rapidly progressive illness leading to death, or *P. vivax* and *P. ovale* hypnozoites may remain dormant in the liver and cause relapsing infection years later.

The clinical picture may range from uncomplicated to severe. The former can be treated with oral medication. Severe disease **should be treated aggressively** with parenteral antimalarial therapy, such as when patients manifest impaired consciousness/coma, severe normocytic anemia, renal failure, pulmonary edema,

acute respiratory distress syndrome, circulatory shock, disseminated intravascular coagulation, spontaneous bleeding, acidosis, hemoglobinuria, jaundice, repeated generalized convulsions, and/or parasitemia >5% .

Knowledge of the **geographic origin** of malaria infection is important because regional differences in drug resistance of the infecting species should guide selection of the appropriate medication. However, if a suspected diagnosis cannot be confirmed, or if the malarial species cannot be determined, immediately initiate treatment for *P. falciparum*.

Pregnant women infected with malaria are at an increased risk of maternal and perinatal morbidity and mortality. Pregnancy impairs the immune response, resulting in greater likelihood of severe disease. Aggressive diagnosis and treatment is required.

TAKE ACTION PROMPTLY

Patients with suspected malaria should be urgently evaluated. Laboratory diagnosis should include both thick and thin blood smears. The presence of parasites is easier to confirm on thick smears, but the species is more readily identified on thin smears. However, non-immune persons may be symptomatic when parasite counts are low, with early blood smears appearing negative. Smears should be repeated every 12-24 hours during febrile episodes for a total of 48-72 hours. *P. falciparum* is more difficult to --detect because few or no parasites may be seen on peripheral blood smears. In this case, polymerase chain reaction (PCR) testing may be helpful.

ADDITIONAL RAPID DIAGNOSTIC TESTS

New rapid methods, which include PCR testing, may be available in some locations, but are not universally accessible. Others include the antigen targeted (histidine rich protein 2, HRP-2) test and the parasite lactate dehydrogenase (LDH) test.

MEDICATION RECOMMENDATIONS

First line treatment for uncomplicated infection, regardless of species, is chloroquine phosphate: second line alternative for therapy is hydroxychloroquine (for *P. vivax* or *P. ovale* add primaquine phosphate). In the presence of chloroquine resistant species, quinine sulfate plus doxycycline, tetracycline, or clindamycin is recommended. Depending upon the region and species, other choices include mefloquine, primaquine, or atovaquone-proguanil. For dosing and selection see <http://www.cdc.gov/malaria/pdf/treatmenttable.pdf>.

REPORTING GUIDELINES

Malaria is a reportable infectious disease identified by the CDC's Nationally Notifiable Disease Surveillance System (NNDSS). All cases should be reported to your state health department in accordance with HIPAA guidelines. CDC clinicians can be reached on the Malaria Hotline 770-488-7788 Monday – Friday, 8:00 AM to 4:30 PM EST. Off hours and on federal holidays call 770-488-7100 and request the malaria on-call clinician to be paged.

FOR FURTHER INFORMATION

- Detailed Diagnosis and Treatment Guidelines from Centers for Disease Control and Prevention
http://www.cdc.gov/malaria/diagnosis_treatment/tx_clinicians.htm
- http://usachppm.apgea.army.mil/Documents/FACT/18-040-0107_Malaria.pdf
- http://www1.va.gov/vhi/docs/EID_final_www.pdf
- <http://wwwnehc.med.navy.mil/downloads/prevmed/MalariaPocketGuide2007.pdf>

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