

Malaria



Case Definition

Clinically compatible illness (see below) with positive peripheral blood smear for malaria parasites.

Note:

- A case is counted if it is the person's first attack of malaria in Canada, regardless of whether or not he/she has experienced previous attacks of malaria while outside Canada.
- A subsequent attack in the same person caused by a different plasmodium species is counted as an additional case.
- A repeat attack in the same person in Canada caused by the same species is not considered to be an additional case, unless the person has been to a malaria endemic area since the previous attack.

Reporting Requirements

- All positive laboratory tests for malaria are reportable by laboratory.
- All cases are reportable by attending health care professional.

Clinical Presentation/Natural History

Malaria is a parasitic disease caused by one of four malaria parasites. The four kinds of malaria can be sufficiently similar in their symptoms to make species differentiation generally impossible without laboratory studies. Furthermore, the fever pattern of the first few days of infection resembles that seen in early stages of many other illnesses (bacterial, viral and parasitic). The most serious malarial infection, falciparum malaria, may present a quite varied clinical picture, including fever, chills, sweats, cough, diarrhea, respiratory distress and headache, and may progress to icterus, coagulation defects, shock, renal and liver failure, acute encephalopathy, pulmonary and cerebral edema, coma and death. It

is a possible cause of coma and other CNS symptoms, such as disorientation and delirium, in any non-immune person recently returned from a tropical area. Prompt treatment is essential, even in mild cases, since irreversible complications may appear suddenly, and case-fatality rates are high.

The other human malarias, vivax, malariae and ovale, generally are not life-threatening except in the very young, the very old and in patients with concurrent disease or immunodeficiency. Illness may begin with malaise and a slowly rising fever of several days duration, followed by a shaking chill and rapidly rising temperature, usually accompanied by headache and nausea, and ending with profuse sweating. After an interval free of fever, the cycle of chills, fever and sweating is repeated: daily, every other day or every third day. Duration of an untreated primary attack varies from a week to a month or longer. True relapses following periods with no parasitemia (seen with vivax and ovale infections) may occur irregularly for up to five years; malariae infections may persist for as many as 50 years with recurrent febrile episodes. It should be remembered that vivax and ovale infections may appear many months after a person has returned from an endemic area.

Persons who are partially immune or have been taking prophylactic drugs may show an atypical clinical picture and wide variations in the incubation period.

Etiology

One of four sporozoan parasites: *Plasmodium vivax*, *P. malariae*, *P. ovale*, *P. falciparum*.

Epidemiology

Reservoir: Humans are the only important reservoir for mosquitoes that transmit human malaria.

Transmission: Infection is acquired by the bite of a female *Anopheles* mosquito infected with one or more of the four malarial parasites. The mosquito acquires the parasite by ingesting a meal of human blood containing the sexual stages of the parasite. The life cycle of the parasite within the mosquito is approximately eight to 35 days, after which the parasite is infective when injected into another person (through biting). Malaria is rarely acquired via blood transfusion, needlestick injuries or congenitally.

Occurrence:

General: Endemic malaria no longer occurs in many temperate-zone countries (including Canada) and in some areas of subtropical countries, but is still a major cause of ill health in many tropical and subtropical areas.

Frequent transmission occurs in large areas of South America, Southeast Asia and much of sub-Saharan Africa.

Chloroquine-resistant *P. falciparum*, which is refractory to the four-aminoquinolines (such as chloroquine) and to many other antimalarial drugs (such as sulfa-pyrimethamine combinations and mefloquine) occurs in most areas of the world where malaria is endemic.

P. vivax refractory to chloroquine is present in Papua New Guinea, is highly prevalent in Irian Jaya, Indonesia, and has been reported from Sumatra, Indonesia and the Solomon Islands. *Ovale* malaria occurs mainly in sub-Saharan Africa, where *vivax* malaria is much less frequent.

Manitoba: Fifty-nine cases were reported between 1995 and 1999. In 1999, eight cases were reported, an incidence rate of 0.7 cases per 100,000.

Incubation Period:

- *P. falciparum* 12 days
- *P. vivax & ovale* 14 days
- *P. malariae* 30 days

Susceptibility and Resistance: Susceptibility is universal. People with certain genetic traits such as sickle cell trait, may have reduced susceptibility. Tolerance or refractoriness (partial immunity) to disease is present in adults in highly endemic communities where exposure to infective anophelines is continuous over many years.

Period of Communicability: For cases to infect mosquitoes: as long as gametocytes are present in the blood of the case:

- *P. malariae* up to three years
- *P. vivax & ovale* one to three years
- *P. falciparum* less than one year

Infected mosquitoes are infectious for their lifespan.

Transmission by blood transfusion can occur as long as asexual forms of the parasite are present in the circulation of the donor (up to 40 years for *P. malariae*). Stored blood post-donation can remain infectious for up to two months. However, transmission through contaminated blood is extremely rare.

Diagnosis

Laboratory confirmation of the diagnosis is made by demonstration of malaria parasites in blood films. Repeated microscopic examinations every 12 to 24 hours may be necessary because the density of *P. falciparum* parasites in the peripheral blood varies, and parasites are often not demonstrable in films from patients currently or previously under treatment or prophylaxis.

Key Investigations

- History of travel to a malaria endemic area.
- Relevant laboratory testing.
- History of use of antimalarial medication.

Control

Management of Cases:

- Malaria should be considered a medical emergency, and prompt treatment with appropriate antimalarials should be instituted.
- Selection of the appropriate drugs for treatment will depend upon the *Plasmodium* species and the area where infection was acquired. Drugs to consider for chloroquine resistant malaria include quinine, doxycycline and malarone (atovaquone/proguanil). Consultation with an infectious disease or travel medicine specialist is strongly recommended.

Management of Contacts:

- No specific public health intervention is required.

Preventive Measures:

- Malaria chemoprophylaxis is recommended for persons travelling to malaria-endemic areas. Consultation with a travel medicine specialist is strongly recommended, as recommendations change frequently and depend upon the area of travel.
- Measures to minimize contact with *Anopheles* mosquitoes:
 - mosquito repellents
 - appropriate clothing, particularly in the evening and after dark (long-sleeved shirts, trousers, socks, etc.)
 - insecticide-treated mosquito nets
 - avoid outdoor activity from dusk to dawn
- Blood donors should be questioned for a history of malaria or possible exposure to the disease. Those with a history of malaria should be deferred.