

# MALARIA

## Disease Overview

Malaria is a serious and sometimes fatal disease caused one of four *Plasmodium* parasites – *P. falciparum*, *P. vivax*, *P. ovale* and *P. malariae*. *Plasmodium falciparum* and *vivax* are the more common species causing infections; all species are found worldwide in tropical and subtropical areas. Malaria is not endemic to Canada and infections are usually related to travel and immigration. Mixed species infections are not uncommon in endemic areas. *Plasmodium falciparum* is more likely to cause serious disease.

Malaria parasite development involves several stages and two types of hosts: humans and *Anopheles* mosquitoes. In humans, the parasites grow and multiply first in the liver cells and then invade red blood cells. Within the red blood cells, the parasites multiply and eventually destroy the cells releasing daughter parasites (merozoites) that continue the cycle by invading other red blood cells. The classical clinical presentation of periodic fever and chills occur because of parasites in the blood stage multiplying and destroying red blood cells at the same time.

Some merozoites develop into a sexual stage (gametocytes) that circulate in the blood without causing symptoms. Female *Anopheles* mosquitoes ingest these during feeding. A different cycle of growth and multiplication occurs in the mosquito host. Eventually the parasitic stage (sporozoites) can migrate to the mosquito salivary glands and the malaria cycle can start again when the infected mosquito bites another human.

## Symptoms

The first signs of infection are nonspecific and resemble many other febrile diseases. Symptoms may include fever, chills, muscle pain, joint pain, headache, and diarrhea. The classic symptom is the periodic nature of the attacks of fever - malaise and fever for several days, followed by chills and fever. After a fever free period, a cycle of chills and fever recurs daily or every few days and can last a month or longer.

Persons who grew up in endemic areas can have partial immunity and present atypically.

Complications are associated with high levels of parasites. The clinical course may be rapid. Prompt treatment is essential even in mild cases. A delay in treatment of *P. falciparum* malaria is associated with increased mortality.

## Reservoir

Humans are the most important reservoir of human malarialias.

## Modes of Transmission

Bites from infected female *Anopheles* mosquitoes (approximately 30-40 species).

There have also been rare transmissions through blood and organ donations, vertical transmission in utero or needle stick injury.

## Incubation period

Approximately 9-14 days for *P. falciparum*; 12-18 days for *P. vivax* and *P. ovale*; and 18-40 days for *P. malariae*. Some strains of *P. vivax* may have an incubation period of 6-12 months.

With infections through blood transfusions, incubation periods are usually short and depend on the number of parasites.

## Period of communicability

Humans may infect mosquitoes as long as infective gametocytes are in the blood. Mosquitoes remain infective for life. Stored blood can be infective for one month.

## Risk Factors

Increased risk for acquiring/severe illness:

- Non-immune, partially immune adults and children, and exposure in endemic areas.
- Non-use of prophylaxis and other mosquito bite prevention measures in endemic areas
- Pregnancy
- HIV
- Hemoglobinopathies

## Surveillance Case Definition

### Confirmed case

Laboratory confirmation of infection with or without clinical evidence of infection:

- demonstration of *Plasmodium* sp. in a blood smear/film (thick and thin)

### Probable case

Laboratory confirmation of infection with or without clinical evidence of infection:

- detection of *Plasmodium* sp. antigen in an appropriate clinical specimen

## Diagnosis and Laboratory Guidelines

Diagnosis is by demonstration of parasites in the peripheral blood (blood smears). Diagnosis must be considered in febrile patients who have travelled or lived in malaria endemic areas.

## Reporting

Per Policy 2.2 Disease and Event notification to OCMOH and Disease and Event Reporting section

- Routine surveillance (RDSS) for all confirmed cases.
- Notification may be necessary to Canadian Blood Services of positive malarial disease in donors.

## Case Management

### Education

Case or relevant caregiver should be informed about:

- Nature of infection, length of communicable period, mode of transmission and disease ecology
- Mosquito bite prevention
- Chemoprophylaxis generally taken 1 week before travel to an endemic area and for 6 weeks after return.
- Need for prompt diagnosis and treatment of a febrile illness during and after travel to an endemic area
- Nature of partial immunity

## **Investigation**

Obtain symptom history and onset, travel and immigration history and mosquito exposure within the last 12 months. Inquire about transfusions or injection use, needle sharing (including drugs). If necessary, investigate and treat contacts as appropriate.

## **Exclusion/Social Distancing**

Not applicable.

## **Treatment**

Drugs are available for treatment. See CCDC [Summary of recommendations for the prevention of malaria by the Committee to Advise on Tropical Medicine and Travel](#).

## **Immunization**

Not applicable.

## **Contact Management**

### **Education**

Family members probably travel together, may have similar environmental exposures, and so could benefit from prevention advice including need for rapid diagnosis and treatment if they become symptomatic. Consider group travel (for example missions and school groups).

### **Investigation**

Contacts of cases are not at risk as there is not person-to-person transmission, except in situations of possible blood transfusions or injections.

### **Exclusion/Social Distancing**

Not applicable.

### **Prophylaxis**

Not applicable.

## **Outbreak Management**

Activate the local outbreak plan when an outbreak is declared.