Malaria

Why should I worry about malaria?

Globally, malaria is one of the six major causes of deaths from communicable diseases. 90% of world’s approximately 600 000 annual malaria deaths occur in Africa. Currently South Africa has about 10 000 notified cases of malaria per year and the National Department of Health is planning to eliminate it (i.e. no local transmission) by 2018. However, there are increasing problems with importation of malaria cases, antimalarial drug resistance, vector insecticide resistance, a large HIV epidemic, and many health provision challenges that stand in the way of this objective.

Where does malaria occur in southern Africa?

The map below shows the malaria risk areas in South Africa. All our neighbouring countries (except Lesotho) have malaria.

What causes and spreads malaria?

Malaria is caused by protozoan (single-celled) parasites of the genus *Plasmodium* that are transmitted to humans by certain species of the *Anopheles* mosquito. There are 4 main species (the 5th, *Plasmodium knowlesi*, is restricted to a few areas in Southeast Asia and affects small numbers of people). *P. falciparum* is the most important species in southern Africa.
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<thead>
<tr>
<th>Parasite species</th>
<th>Modern disease name</th>
<th>Historic disease names</th>
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<tr>
<td>Plasmodium falciparum</td>
<td>falciparum malaria</td>
<td>Malignant tertian, pernicious malaria</td>
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<tr>
<td>Plasmodium vivax</td>
<td>vivax malaria</td>
<td>benign tertian, simple tertian malaria</td>
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<td>Plasmodium ovale</td>
<td>ovale malaria</td>
<td>ovale tertian malaria</td>
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<td>Plasmodium malariae</td>
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<td>quartan malaria</td>
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What are the symptoms and signs of malaria?

- The incubation period (time from an infected bite until illness starts) of malaria may be as short as 7 days after exposure but is on average 10 to 21 days in patients who are non-immune (not having grown up in high-transmission countries) and have not taken chemoprophylaxis.
- Incubation periods may be prolonged in patients who have taken prophylaxis or have taken certain antibiotics for other reasons.
- The first symptoms of malaria are non-specific and sudden in onset. Fever and influenza-like symptoms are particularly common presenting symptoms of malaria and influenza is the most common misdiagnosis of malaria.
- In adults, headache, rigors with cold shivers and sweating, and myalgia, are common. Some of the following may also occur: fatigue, abdominal discomfort, diarrhoea, loss of appetite, nausea and vomiting, sore throat, and cough.
- In young children, rigors, headache would be less common and malaria may present with fever and any of the following: lethargy, poor feeding, vomiting, diarrhea or cough.
- Presentation of *P. falciparum* malaria is very variable and may mimic many other diseases including influenza, viral hepatitis, meningitis, septicaemia, typhoid, tick bite fever, gastroenteritis, viral haemorrhagic fever, trypanosomiasis, HIV seroconversion illness, urinary tract infection and relapsing fever.
- In a feverish patient in South Africa where there is no other obvious cause of fever and there is no recent history of visiting or living in a malaria area, malaria should still be considered as infected mosquitoes can travel long distances by road, rail and air transport. This is particularly important in large urban areas with extensive migrant worker populations.

How is the diagnosis of malaria confirmed in the lab?

- Microscopic examination of blood smears stained with Giemsa (or similar stains) is the traditional laboratory method and is still the mainstay of diagnosis.
- It requires skill and experience that is not always readily available, and modern technology has provided rapid tests ('dipsticks') for detection of malaria antigens. Although simple in principle, they are not suitable for home use without proper training.

Principles of testing blood for malaria are:
- the diagnosis of malaria is urgent;
- laboratory testing for malaria is essential in any patient with a febrile illness who has been exposed;
• the diagnosis of malaria cannot be excluded on clinical grounds alone in febrile patients with a history of exposure;
• Laboratory testing for parasites should be done irrespective of the time of the year or whether the patient has or has not taken chemoprophylaxis;
• a negative test does not exclude the diagnosis and tests should be repeated until either a positive result is reported or an alternative diagnosis is made;
• if the patient is critically ill, presumptive treatment may be warranted, without waiting for a positive smear result;
• prophylaxis and antibiotic use may prolong incubation periods and suppress malaria parasite levels below detectable levels;
• rapid antigen tests (see below) may occasionally give false-positive or false-negative results; stained smear examination should be done as well when possible, especially if clinical suspicion is high.

How is malaria treated?

• Patients should receive prompt treatment with the most effective treatment regimen available. Ideally, treatment should be initiated in hospital.
• The choice of chemotherapy for malaria is dependent on the severity of disease, the known or suspected resistance pattern of the parasite in the area where the malaria infection was acquired, the species of parasite, patient characteristics (age, pregnancy, co-morbidity, allergies, other medications) and the presence or absence of vomiting.
• It is critically important to differentiate between uncomplicated and severe malaria. It is easy to underestimate severity of illness and better to err on the side of caution and over-treat rather than under-treat.
• Uncomplicated malaria is defined as symptomatic malaria without signs of severity or evidence of vital organ dysfunction. Typically a patient with uncomplicated malaria has mild symptoms, is ambulant and has no evidence of organ dysfunction, either clinically or on laboratory testing.
• Uncomplicated malaria may rapidly progress to severe malaria if the patient is not treated appropriately and promptly with effective drugs.
• The presence of jaundice, any change in mental status and an increased respiratory rate would place the patient in the category of complicated malaria.

How is malaria prevented?

Malaria is a life-threatening disease that is a major health risk for travellers to malaria endemic areas. Appropriate advice and use of drug and, most importantly, non-drug prophylactic measures can prevent most travellers from contracting the disease. Preventive measures may fail, usually because people forget to take prophylaxis or to be strict with antimosquito measures. If you get ill after visiting a malaria risk area, tell your doctor – he/she may not ask you directly.

A. Mosquito avoidance

Since no anti-malarial drug used for prophylaxis is 100% effective and compliance may be an issue, special emphasis should always be placed on the importance of preventing contact with mosquitoes. These measures have the advantage that they are less toxic than drugs. Malaria vector mosquitoes feed between dusk and dawn, both indoors and
outdoors. Mosquito contact can be significantly reduced by using personal protection measures, as follows:

- **Remain indoors between dusk and dawn.**
- **Wear long sleeved clothing**, preferably light coloured. Since mosquitoes tend to bite below the waist and especially below the knees, the wearing of long trousers and socks is recommended.
- **Mosquito repellents applied to the exposed skin are highly effective.** The most effective compounds are those containing DEET (N,N-diethyl-3-methylbenzamide). The optimal concentration is about 30% for adults. These should be applied sparingly to exposed skin surfaces and ideally repeated after 4-6 hours and after showering or bathing. Repellents should not be applied to the face or lips or eyelids and the dosage should not be exceeded, especially for small children. DEET-containing compounds should not be used in children under 3 months. NB Use repellents strictly according to manufacturers' instructions.
- **Mosquito repellents that do not contain DEET may be much less effective, shorter acting and require very frequent application.**
- **Knock-down insecticidal sprays, vaporization mats and mosquito coils** are also highly effective and may eliminate mosquitoes that have gained entry to a dwelling. Spray inside the dwelling with an aerosol insecticide (for flying insects) at dusk, especially the bedrooms, after closing the windows.
- **Use gauze on windows and doors**, particularly for residents of malaria areas.
- **Ceiling fans and air conditioners** are also effective in disturbing mosquito feeding.
- **Bednets** are useful in preventing mosquito bites. Those that have been impregnated with insecticide are significantly more effective and can also repel or kill mosquitoes, further reducing malaria risk. Nets should not be damaged and must be tucked in under the mattress. Baby cots and prams may be covered with mosquito netting for protection against mosquitoes.

**B. Chemoprophylaxis**

Before entering an endemic malaria area, the relative need for chemoprophylaxis in addition to personal protection measures against mosquito bites, needs to be determined. It is important to note that no prophylactic regimen is 100% effective.

Sensible use of malaria chemoprophylaxis is a balance between the risk of infection and death and the risk of the adverse reactions to the chemoprophylactic drugs, and several factors therefore need to be taken into consideration when making a decision regarding chemoprophylaxis:

- The risk of contracting malaria – this includes the area and type of accommodation, when the person will be in the area and for how long he or she will be there.
- Personal factors such as age, current medication and concomitant illness.
- Medication options, their availability, adverse effects and resistance.

Advice from a medical practitioner with travel medicine experience should be sought well in advance of travel. Other travel-related advice such as immunisations should obtained at the same time.

**Guidelines and resources**