DANISH MARITIME AUTHORITY

The Danish Maritime Authority´s Malaria Strategy -Guidelines on the Prevention and Treatment

3. Edition 2015

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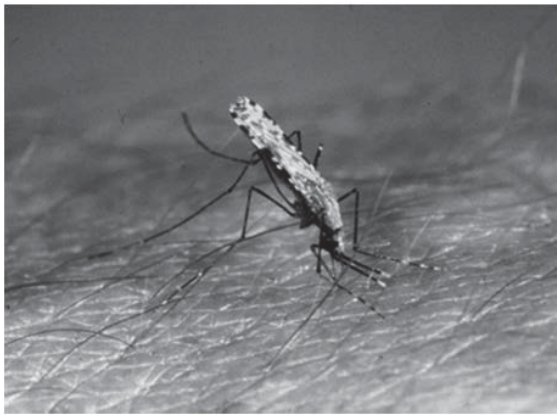
The Malaria Strategy for the crew on Danish ships

About the mosquito



Malaria is transmitted via the bites of infected mosquitoes called *Anopheles.* It is a small mosquito characterized by flying alone. When the mosquito bites it holds its body in a 45 degree angle to the base. The female mosquitoes need blood to produce eggs and bite from dusk till dawn.
Malaria mosquitoes breed in stagnant fresh water, e.g. swamp areas, rice fields, small ponds, rainwater gathered in hollow trees or tins, or in water gathered in places with no outlet on board ships. Malaria mosquitoes thrive best in humid and warm topical areas- especially in the rainy season. Malaria mosquitoes are seldom able to fly more

Virulent versus benign malaria

There are five forms of Plasmodia. Three are benign, one is virulent and one is in between. The benign are *P. vivax, P. ovale and P. malariae* and are hardly ever life threatening in their acute form. The virulent is called *P. falciparum. P. falciparum* is the most severe form of malaria and the main cause to deadly outcome. *P. Knowlesi* is not that well documented and it has not been determinated if *P. Knowlesi* is being naturally transmitted from human to human. For that reason further information will not show in this strategy.

The four forms of malaria

Falciparum (virulent malaria) occurs only in the acute form. Nearly all cases imported to Denmark stem from Africa.
The incubation period, the period between infection and the appearance of the first symptoms, is usually 7 to 10 days. In the following 2 to 4 days, the temperature will rise to approximately 39 - 40 °C. After 4-6 additional days the disease may take a fatal turn.

Vivax, ovale and malariae (benign malaria) occur in both an acute and in a chronic form. Benign malaria often occurs in Middle- and South America and in parts of Asia and has only rarely a fatal outcome.
The incubation period for vivax is usually 12 to 17 days, 15 - 18 days for ovale and 18-40 days for malariae. The first attack may however occur several years after infection.
After the first attack the malaria parasites *can* survive in the liver in a chronic form and cause new malaria attacks later in life. In between the attacks the disease shows no symptoms. There are cases of infected people suffering malaria attacks 30 years after having been to a malaria area. Chronic malaria may cause severe illness but is seldom fatal. Today medicaments can effectively eradicate chronic infections.

”The Strategy”

By applying the recommended strategy, The Maritime Health Service intends to create a sense of safety on board ships in malaria areas, to minimize the number of infected seamen and shed light on cases *(where and why)* where seamen are infected.
The Danish strategy deals with *prevention/treatment*, choice of medicaments, and the possibility for *diagnostics* on board.

Prevention and treatment
All crewmembers should be familiar with the guidelines on mechanical and medical prevention on board the ship. It is emphasized that one does not exclude the other. Mechanical prevention reduces the risk of mosquito bites and subsequent risk of infection by approximately 50 %.
For further information see section *prior to departure* p 2.
Medical prevention is recommended in high-risk areas, primarily in tropical Africa. In case of doubt please contact SSI for individual advice.
Treatment is in accordance with existing rules in Inventory, Control Document and User instruction - Categori A.

Diagnostics
Ships that navigate in malaria areas – no matter where in the world - must carry diagnostic rapid tests. The Danish Maritime Authority sets minimum standarts towards the rapid test, which underline that Plasmodium falciparum is the top priority according to test sensitivity. Rapid test are sometimes prepared to give results on other species of malaria, which is a good indicator for the upcomming treatment. After performance of the rapid test the results always has to be reported to Radio Medical Denmark for further counselation.

Guidelines prior to, during and after a stay in malaria areas.

Prior to
Prior to any journey in malaria areas the shipping company, the ship and seaman have a responsibility.
The shipping company and the ship are obligated to look at and predict the risks connected with the journey that lies ahead. They will make a risk assessment after considering the destination, the length of stay in the malaria area, at sea or in port, on rivers, in and out of the area, and time of the year.
It is the ship management´s responsibility to decide whether or not the crew members may go ashore, for how long and at which time of day. Malaria mosquitoes bite all day but are most active at dusk and at dawn.
If you have any questions, the Serum Institute can be of help.

General information

The purpose of the general information is to inform the crew of malaria and the best means of protection. The purpose is also to make everyone aware of the fact that they must report any cases of illness.
The general information could consist of a notice that is posted every time the ship approaches a malaria area. If the notice is posted only when there is an actual risk, it raises the crew´s awareness. Table 1 shows a notice containing the most important information.

Personal information

The purpose of the personal information in the form of a conversation with each member of the crew is to ensure a sufficient level of information.
The conversation will consist of the following:

- That the ship will call at ports in malaria areas
- The duties of each crew member in this connection
- How each crew member protects himself against malaria
- In case of immidiate illness you need to contact the medical-officer

Besides mechanical prevention of mosquito bites (mosquito nets, spray and air-conditioning), all crew members are recommended to take preventive malaria medicaments during stay in areas with a high risk of malaria.
The Maritime Health Service still recommends Malarone as a first choice but Malarone (atovaquone-proguanil) or Doxycyklin are equally effective as preventive medicaments, also when dealing with chlorochine resistant malaria.

GUIDELINES DURING STAY IN MALARIA AREAS

We are approaching an area with a high risk of malaria and we recommend the following precautions:
The air-conditioning must run at full speed
Your accommodation must be kept closed
Keep your accommodation mosquito free with mosquito repellant spray
Cover your skin as much as possible from dusk till dawn
? Avoid dark clothes
? Thin-haired people should wear hats
? Finely woven clothes do not offer protection

Use mosquito repellant every 6 hours on unprotected skin (avoid the eye area)
Start use of preventive medicaments 1-2 days prior to arrival
If you feel ill or are aware of others who are ill, you must contact the medical-officer immediately
If you have any questions about conduct, prevention or illness, contact the medical-officer

Table 1

Preventive medicaments:
Irrespective of whether you decide to use Malarone or Doxycyclin tablets, both medicaments must be taken daily 1-2 days prior to arrival in a malaria area (see Inventory, Control Document).

During

As general information the crew needs to be informed that action must be taken if illness occurs at sea. Not everyone defines the term illness in the same manner, and it is therefore stressed that **a slight headache, fever and flu like symptoms are reasons for contacting the medical-officer.**

Attention to malaria notice on board. (Table 1)

Malarone tablets must be taken at the same time every day and in connection with a meal.
Doxycyclin tablets must be taken with a generous amount of fluid at the same time every day (not with dairy products). (see Inventory, Control Document).

After

After stay in malaria areas, the restrictions mentioned above still apply. The incubation period differ from parasite to parasite but the virulent form of malaria can develope in a period of 7-14 days.
Follow-up medicaments depend on which medicament has been used during the stay in the malaria area.
You must continue use of Malarone for 7 days after departure from the malaria area whereas you must continue use of Doxycyclin for 4 weeks after departure from the malaria area.

In case of illness or doubt about malaria

Symptoms
Malaria is an infectious disease. As in all other cases of infectious diseases, the first symptoms are mild: You feel unwell, run a slight temperature, have a slight headache and maybe a slight pain in the muscles, joints or stomach. It is therefore not possible to distinguish malaria from other forms of infectious diseases like the common flu unless specific tests are run to diagnose the disease.

The general symptomss are as follows:

- Fever
- Headache
- Flu like state
- Tenderness of joints and muscles
- Stomach pain
- Blood in the urine

Virulent malaria (falciparum) can develop from what is perceived as harmless to a life threatening disease in a matter of days.
Therefore, one must pay attention to every case of disease no matter how trite it seems and contact the medical-officer.

Examination of the patient
Start by filling in a medical report. Use the Danish Maritime Authority´s Radio Medical Denmark Records that will guide you. It is important to enquire if the patient has been in a malaria area, perhaps before his engagement on this ship.
The most important examinations are (see The Danish Maritime Authority´s Medical Manual):

- Early testing with malaria **Rapid test** eventually repeat the **Rapid test** after 24 hours
- Temperature measurement every 8 to 12 hours.
- Recording changes in the patient´s general condition and level of consciousness.
- Recording breathing frequency, pulse, blood pressure and fluid balance (observe the colour of the urine).

Malaria screening of the patient´s blood

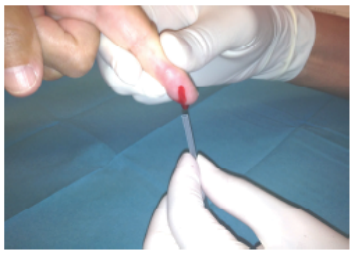
The **Rapid test** is able to detect a virulent form of malaria at an early stage when symptoms are mild and sometimes even before a microscope is able to show the presence of malaria. Follow the instructions from the leaflet/Rapid test. (Rapid test example on page 5)

Rapid Test example

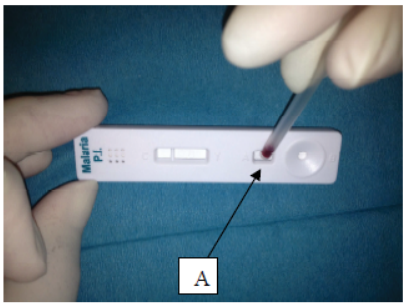
Disinfect the skin on the side of a finger, while holding pressure on the finger:

Prick a hole in the skin:

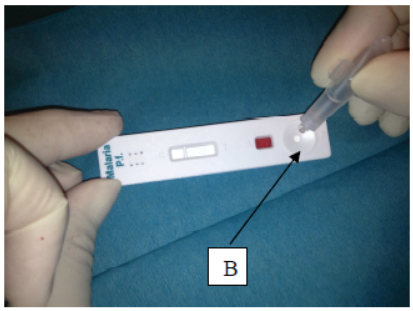
Let a drop of blood run in to the plastic tube:



Place the blood in to the area A:

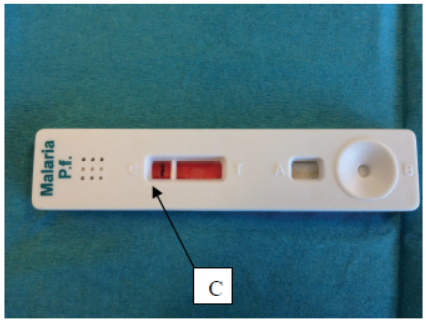


Place 6 drops of buffer fluid in to the area B:

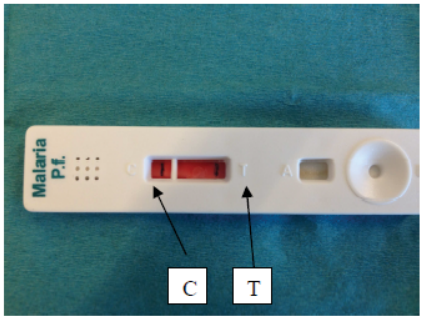


After 15 minutes you can read the test:

If there is only a line in the area C, the test is done correct, and the patient <u>does not</u> have falciparum malaria:



If there is a line in the areas C and T, the patient has got falciparum malaria:



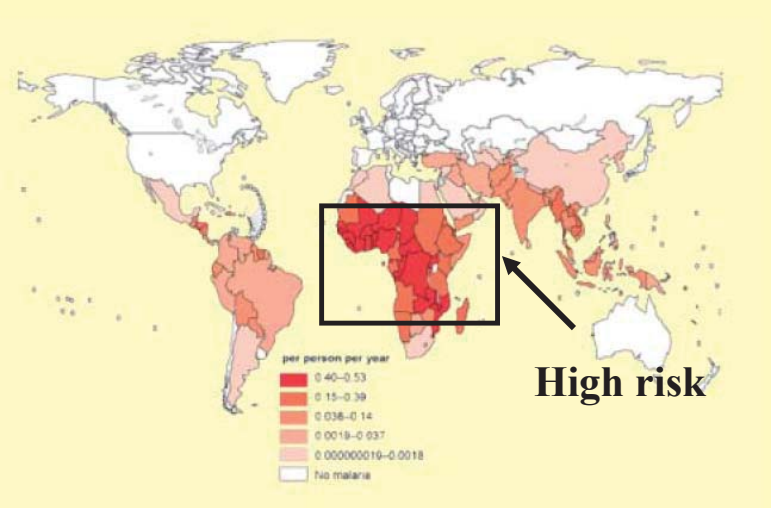
Tropical and subtropical areas divided according to relative risk

Malaria occur generally in all tropical and subtropical areas, but the occurrence of the virulent malaria can vary. Individual advice from the Danish Serum Institute should be arranged before the ship arrive to destination.

Africa is still defined **High risk area,** but the more precise definition is:
From Senegal to Angola in the west, from Port Sudan to Maputo in the east, Madagascar and the Comoro Islands.

The guideline state 3 definitions on malaria risk - No risk, low risk and high risk - which lead to 3 recommandations according to preventive measurements:

- No risk -> No recommandations
- Low risk -> Mechanical prevention
- High risk -> Mechanical and medical prevention



Interactive maps can be helpful to determine the level of risk:

Http://ssi.dk/rejser/ or Http://cdc-malaria.ncsa.uiuc.edu/index.php (Maps)

http://www.cdc.gov/malaria/travelers/country_table/a.html (Table for prevention)

Seek information before arriveing in malaria areas - follow the "*Risk form*" below

Risk Form	
Destination/area	Nigeria->High Risk Malaria
Duration/number of days **Season**	12 days October
Where is the ship placed	Along quay
Crew risk/ information mechanical prevention	On shore morning, midday and evenings
Initiated medical prevention in coop with SSI/RMD?	Tbl. Malarone 1-2 days before, during and after according to the malaria guideline/medicine chest

It is stressed that a negative test does not exclude infection with other forms of malaria. Therefore a more thorough examination is recommended, as other forms of malaria also require treatment. This is especially important if the patient has persistent symptoms, especially fever.

Screening of the patient´s urine

Follow the instructions given in The Danish Maritime Authority´s Medical Manual.
Ask the patient for a urine test (e.g. in a disposable cup).
Inspect the colour of the urine. If it is very dark, it may indicate dehydration.
Examine the urine for blood and protein with Multistixs® 5. (G.1, see the Control Document).

Treatment

Treatment must take place in concert with Radio Medical Denmark. If you are at port, you can use local doctors and hospitals. All previously mentioned procedures must be followed even though local doctors provide treatment.

The medical guidelines concerning treatment are in accordance with the Inventory, Control Document and User Instructions.

The patient must be placed under observation and regular contact with Radio Medical Denmark must be maintained during treatment. During the course of 2-3 days and nights, the patient must show considerable improvement. He must gain a better general condition and a normal body temperature.

The patient must consult a doctor when the ship arrive the destination port.

Doubt about the diagnosis

Doubt about the diagnosis arises if the test shows no reaction to falciparum in area T (when using the test shown above) or when the patient does not recover despite treatment. In both cases you must contact Radio Medical Denmark.

Evacuation

The decision to evacuate is made in concert with Radio Medical Denmark.

More good advice

How to keep your accommodation mosquito free

On board ships with air-conditioning and closed doors, windows and port-holes, it is possible to keep your accommodation mosquito free. Therefore no further precautions are needed. All ventilation ducts must be fitted with finely-meshed wire and the filters of the air-conditioning must be impenetrable to mosquitoes.

Mosquitoes are most active at night. During the day, they hide on vertical surfaces, preferably in dark places; e.g. behind curtains and lockers.

If there are mosquitoes in the accommodation, spray with a mosquito repellant. If it is not possible to keep the accommodation mosquito free, mosquito nets can be used as an alternative. Mosquito nets should be coated with synthetic pyrethroid, e.g. *Permethrin, Deltametrin or Lambda-cyhalothrin.*
During stay in hotel rooms with no air-conditioning or fully closed doors and windows, a mosquito net is recommended.

How to protect yourself from mosquito bites

Malaria mosquitoes are able to bite through thin or loose-woven fabric. Therefore, long-sleeved high-necked blouses or shirts, long trousers and closed shoes are recommended. The clothes should fit as tightly as possible around the neck, wrists and ankles. It is important to protect your ankles, e.g. in the form of long socks, as the mosquitoes fly close to the ground. Thin-haired people should wear hats.
In areas with a high risk of malaria it is advisable to coat your clothes with *permethrin*. Permethrin is mixed with water (see directions for use), the clothes are soaked in the mixture and hung to dry. Permethrin offers an effective protection for at least six weeks. Permethrin is considered non-poisonous to humans.

Mosquito repellant
We do not recommend one type of mosquito repellant, because there are several good ones on the marked. A general advise is that repellants are effective the first 4 hours after application, so repeat the application continously. Apply the repellant to the face, neck, hands and ankles. Avoid contact with eyes or on damaged skin.

Individual advise by Statens Serums Institut v/Lasse Vestergård, MD PhD:
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The Maritime Health Service, cms@dma.dk, February 2015