Guidelines for Malaria Prevention Onboard Merchant Ships

Content

1. Introduction
2. Tips for successful Implementation of Malaria Prevention
3. Malaria - the scale of the problem
4. Malaria - the disease
5. Malaria - signs and symptoms
6. Malaria - prevention
7. Malaria - Standby Emergency Treatment
8. Malaria - treatment onboard

ISWAN is happy to be supported by

ISWAN

SHIPOWNERS

SHIP Seafarers' Health Information Programme

iswan@iswan.org.uk
www.seafarershealth.org

1 Introduction

International Seafarers' Welfare and Assistance Network, aware of the importance of malaria prevention and treatment in the health of seafarers, launches “MALARIA” as one of the topics in the Seafarers’ Health Information Programme, sponsored by the Shipowners' Club.

The ship, where seafarers not only work but spend all their time during a voyage, is seen as the best place for health intervention.

Malaria is a preventable, life-threatening disease transmitted by the bite of the female Anopheles mosquito.

Malaria can kill very quickly. Prevention, recognizing its symptoms and acting accordingly is therefore essential knowledge for every seafarer.

Malaria is a maritime problem for the following reasons:

- unawareness of the fact that malaria is a serious and potentially fatal disease
- insufficient information regarding the clinical picture of malaria
- no or insufficient use of anti-mosquito measures and the classical protective medication
- increasing resistance of many new malaria strains to the medication
- the fluctuating frequency of malaria occurrence in the most dangerous areas, which leads to miscalculation of the real risk

It is the responsibility of every seafarer to prevent malaria, both for himself and his fellow crew members. The availability of malaria protection onboard supports a healthy workplace.

2 Tips for successful implementation of the "Malaria" campaign

Encourage and stimulate the crew members to protect against malaria. Pay attention to protection and prevention, at medical check-ups, meetings etc.

Use a varied approach to inform and motivate the seafarers onboard. Offer correct information and state of the art prevention and protection. Investment in health promotion has a high return.

The whole vessel has to be behind the programme: captain and officers have to show their commitment.

Take enough time to implement a malaria prevention programme onboard. Behavioural changes take several months and benefits may even take longer to become measurable.

Make a systematic plan of what you want to achieve in respect to malaria prevention onboard and over what period of time. Involve key persons like the captain, company pharmacist and ship chandler and link these efforts to a company policy on health.

Budget the programme, make sure the activities are evaluated and corrections are made accordingly.

Announce the planning, activities, results and changes. Organise a kick-off event like an information meeting or distribute protective and preventive tools and medication.

Display the schedule of prevention and protection when entering a malaria zone and inform the crew about the measures to be taken for a well defined period of time.

Provide information (posters or leaflets) on malaria prevention.

Ask crew members to do tests and fill out questionnaires. Give crew members the possibility to make suggestions to improve compliance of prevention and protection.

Keep track of the medication used for prevention and protection onboard and inform the crew about imbalances found.

Link MALARIA with SAFE TRAVEL and HIV / AIDS and STD's. Provide FIT ONBOARD and other SHIP health initiatives.

Make Malaria prevention available free of charge.

3 Malaria - The Scale of the Problem

Malaria, -- one of the world's most common and serious tropical diseases, causes at least 1 million deaths every year --, the majority of which occur in the most resource-poor countries. More than half of the world's population is at risk of acquiring malaria, and the proportion increases each year because of deteriorating health systems, growing drug and insecticide resistance, climate change, natural disasters and armed conflicts.

Malaria represents a major threat to world health

- Approximately 40% of the world's population live in countries where the disease is endemic and are at risk of malaria.
- 3.2 billion people around the world are at risk of malaria
- Up to and around 500 million clinical disease episodes each year

RBM/WHO 05, RBM/WHO BFM

As of 2004, 107 countries and territories reported that they had areas at risk of malaria transmission. Most of these are developing nations, and many have inadequate healthcare systems and poor economic conditions.

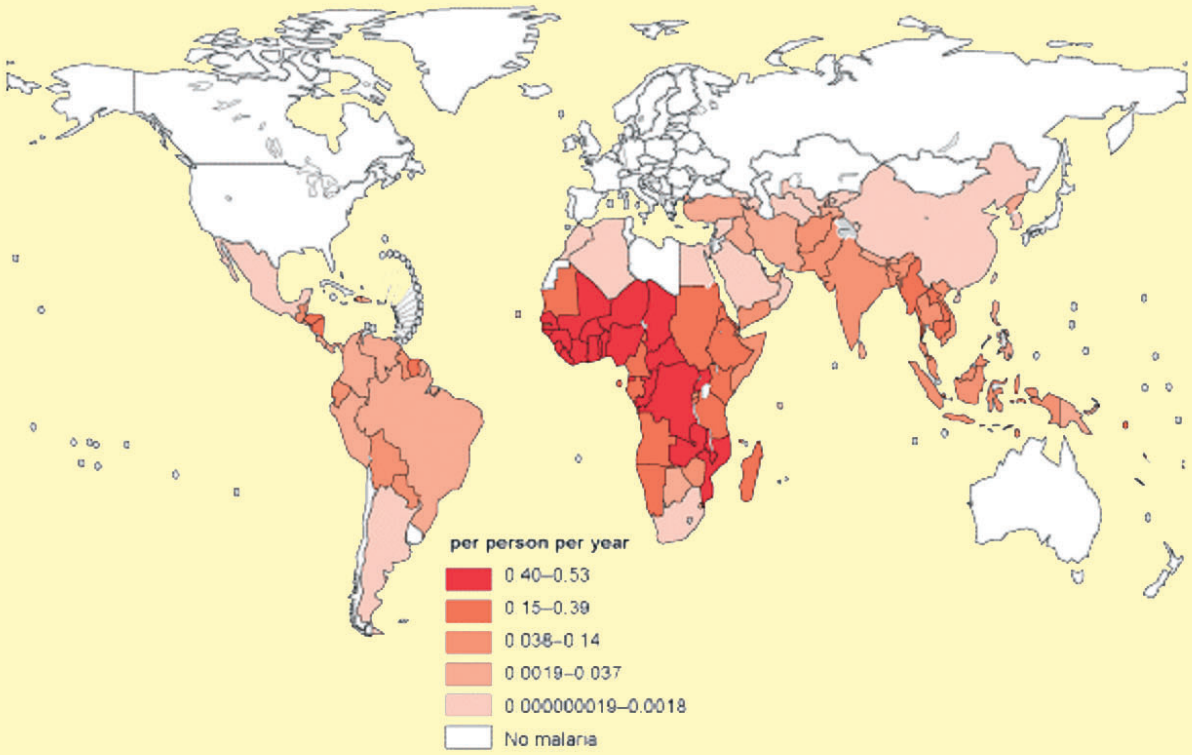
It is predominantly a disease affecting Africa, south and central America, Asia, and the middle east. The heaviest burden is in Africa, where around 90% of the approximately 1 million deaths from malaria worldwide occur each year.

Although Africa is hardest hit, it is estimated that more than 1/3 of clinical malaria cases occur in Asia and 3% occur in the Americas. The estimated cost to effectively control malaria is several billions in US dollars annually.

Climate greatly affects the feeding and breeding habits of the malaria mosquito. It is prevalent in tropical climates, but usually not higher than 1,500-2,000m above sea level. Mosquitoes breed in fresh water. World climate and global warming affect breeding and spread of malaria.

Non-immune travellers are at a substantial risk of acquiring "falciparum malaria". Each year as many as 30,000 travellers fall ill with the disease.

Malaria and HIV are 2 of the most devastating global health problems of our time. Together they cause more than 4 million deaths a year. To a considerable extent, both are concentrated in the same geographical regions. The resulting co-infection and interaction between the two diseases have major health implications. Where both diseases occur, more attention must be given to specific diagnosis for febrile patients.



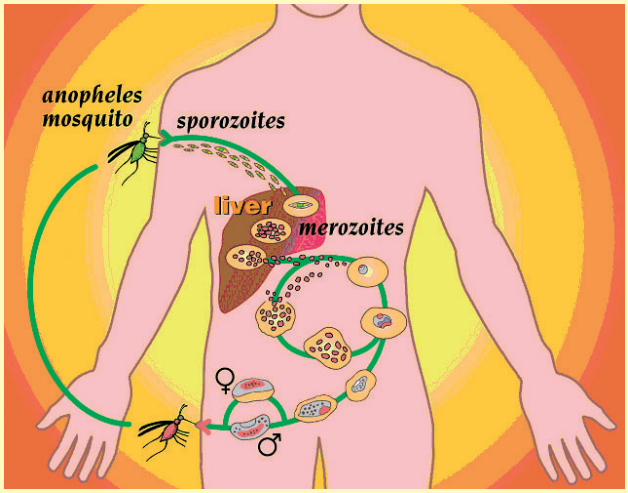
4 Malaria - The Disease

Malaria is an infectious disease caused by the Plasmodium parasite. There are 4 types of malaria that affect humans: Plasmodium falciparum is the most dangerous of those species, as it causes the most severe infections and accounts for nearly all malaria-related deaths.

P. vivax, P. ovale and P. malariae cause milder but nonetheless debilitating acute disease. P. vivax is the most widely distributed of the 4 species. Like P. ovale, which is mainly confined to Africa, it can remain as a dormant form in the human liver for months and even years. These forms are difficult to eradicate with existing antimalarials. P. malariae is also widespread, but does not cause severe infections.

Malaria is transmitted to humans by infected female Anopheles mosquitoes that feed on human blood. Anopheles mosquitoes feed between dusk and dawn.
The mosquitoes tend to respond to light in their feeding habits and are most active in low light hours after dusk and in the hours prior to dawn. Female mosquitoes will have a meal consisting of blood just before laying their eggs, which are laid at night.

The mosquito bite injects the malaria parasite into the blood, which then travels through the bloodstream to the liver. In the liver, the parasites grow and develop, until they are ready to leave the liver and enter the bloodstream again. Once the parasites re-enter the bloodstream they invade the red blood cells, finish growing, and begin to multiply quickly. The number of parasites increases until the red blood cells burst, releasing thousands of parasites into the bloodstream. The parasites then attack other red blood cells, and the cycle of infection continues, causing the common signs and symptoms of malaria



malaria lifecycle

5 Malaria - Signs and Symptoms

The symptoms of the most life-threatening type of malaria are usually experienced between 1 week and 2 months after infection. There are other, less severe types of malaria, which can cause symptoms more than a year later.

Even in its uncomplicated form, malaria is debilitating.

It clinically presents with a variety of non-specific, flu-like symptoms, including:

- fever (often exceeding 40°C)
- chills
- malaise
- nausea and vomiting
- fatigue
- myalgia (muscle pain)
- headaches
- sweating

A typical attack lasts 8-12 hours. It is necessary to take the temperature every 3 or 4 hours in order to discover the typical pattern in a patient with a possible malaria.

A classic malaria attack is characterised by sudden fever, which lasts several hours.
3 successive and clearly distinctive stages may be observed (but this is often not the case in P. falciparum malaria):

1. Cold stage (chills) rising fever, patient feels cold, ashen colour, temperature is increasing rapidly, seeks more covering with blankets on bed.

2. Hot stage, throws off all blankets, looks red and congestive, very warm, high temperature, splitting headache and severe neck pains.

3. Sweat stage, patient suddenly breaks out in perspiration, clothes and bed are wet with sweat, temperature is falling quickly, patient feels better, often gets appetite back and falls asleep.

A patient with severe P. falciparum malaria may present with confusion, or drowsiness with extreme weakness. In addition, the following may develop:

- cerebral malaria, defined as unrousable coma not attributable to any other cause in a patient with falciparum malaria
- generalized convulsions
- severe anaemia (lack of red blood cells necessary for oxygen transport in the blood)
- hypoglycaemia (low blood sugar)
- respiratory distress
- acute renal failure (no or very little urine production)
- acute pulmonary oedema and adult respiratory distress syndrome (ARDS)
- circulatory collapse, shock, septicaemia ('algid malaria')
- abnormal bleeding
- jaundice
- haemoglobinuria (found in the urine by a chemical stick)
- high fever

Important : These severe manifestations can occur singly or, more commonly, in combination in the same patient.

Cerebral malaria is the most serious manifestation of severe falciparum malaria. In non-immune patients, cerebral malaria can develop rapidly from uncomplicated disease. Cerebral malaria is characterised by bleeding, disturbance of consciousness, coma, and rapid death.

6 Malaria - prevention

The malaria problem is complicated, potentially serious, and present world-wide.

It is important to realise that at present a 100 % protection is not possible. Protective measures, such as appropriate clothing, repellents, impregnated bed nets, aerosolised insecticides, screens and air-conditioning (where available) significantly reduce the risk of transmission (from mosquito to human).

If transmission occurs despite protective measures, appropriate chemoprophylactic drugs will usually suppress and even eradicate the parasites. There is no method available to prevent malaria completely. All measures are aimed at reducing the risk of a malaria-attack to a minimum. Hence ALL MEASURES HAVE TO BE COMBINED, giving almost 100% risk elimination for severe malaria and malaria death.

4 components of malaria protection :

1 BE AWARE OF THE RISK

The ship management needs to review all the ports to be visited, and check the malaria risk. This cannot be done simply by looking at what country the port is in, as risk varies in different areas within each country and the risk on the coast has to be compared to the risk inland.

Will the seafarers be staying on board, at anchor, taking shore leave in the vicinity of the port, taking leave and travelling further inland, or will they be joining or leaving the ship at the port in question?

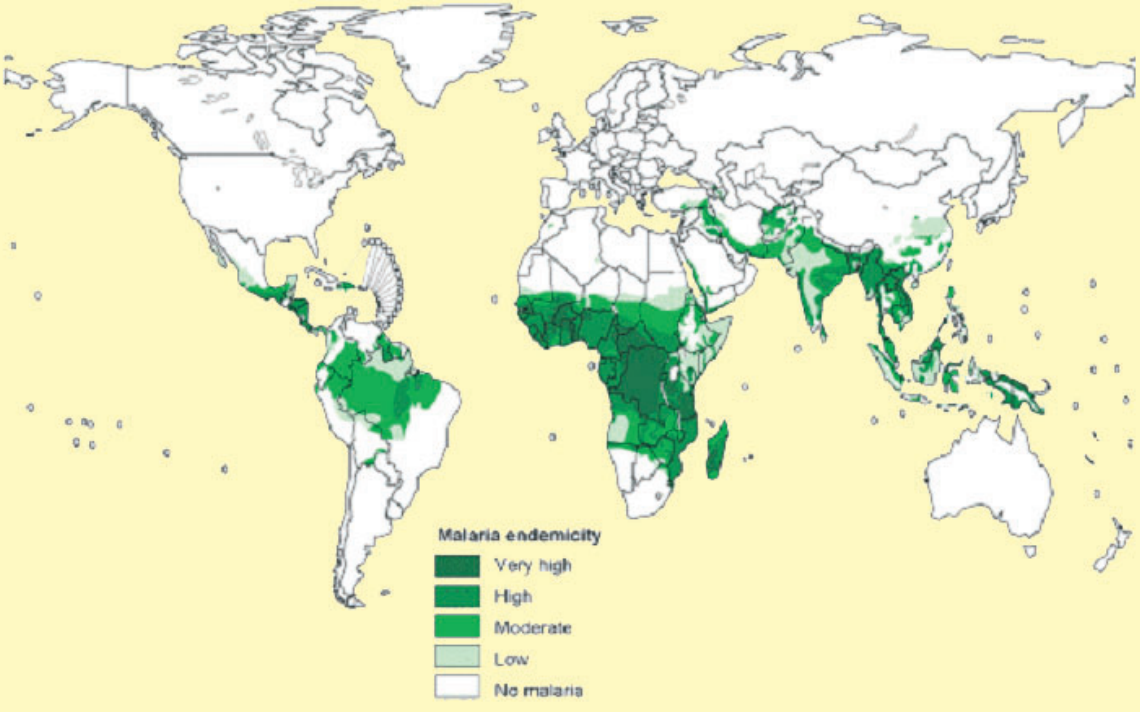
How long is the call, and are they in port at dusk, when the risk is highest, or just during the day, with lower risk? All of these factors make a difference to the risk incurred.

Malaria Risk Areas for Seaman (not going into the hinterlands) :

The risk is often considerably less in coastal regions and in the centre of urban areas. So the risk for seafarers is generally lower if they are not travelling inland. BUT THIS IS NOT TRUE IN SUB-SAHARAN AFRICA. And even in other regions the coast is never completely free of malaria and the wind can carry the mosquitoes far into sea to ships at anchor!

All **port areas** (ports and hinterland) of Africa, Asia, Central and South America situated **between 25° NB and 25° SB are potentially contaminated**.

Even if the risk seems small, a brief visit to a country where malaria is endemic may be sufficient to contract the disease. It is important to note that even frequent travel to endemic areas does not convey useful immunity against malaria.



“Malaria immunity”

Frequent or chronic exposure to infection with malaria parasites over prolonged periods produces varying degrees of immunity - from partial to full. Only people constantly living in an area where there is permanently high malaria transmission may build up a certain immunity, but only after many years.

People at greatest risk are those who have been exposed to malaria only infrequently and have developed little or no protective immunity.

Immunity reduces the risk of developing clinically significant disease compared with non-immune travellers and infants.

Although the population in areas with endemic malaria mostly acquires immunity during childhood and adolescence, this protection is partial and wanes when exposure has ceased.

When previously immune people move outside a malaria area for some years, they are at risk of severe malaria when they return.

Moreover, immune people are usually chronically infected and are therefore at risk of break-through attacks.

Apart from break-through attacks, immune people generally do not develop symptoms, despite being infected with malarial plasmodia. In areas with a lot of malaria, immune adults represent a large reservoir of infection, which threatens the non-immune. Parasite carriers can actually trigger small epidemics of malaria in communities of non-immune people.

2 AVOID BEING BITTEN

The best way to prevent malaria infection is to take measures to avoid being bitten. The advent of air conditioned ships has made a change but when within 2 miles of a malaria shore it remains important that:

- After dusk all doors are kept closed, windows shall only be left open when mosquito netting in place
- Any mosquitoes which enter compartments are killed. Just because mosquitoes can't be heard it doesn't mean that there aren't any : Anopheles mosquitoes don't buzz loudly!
- Use an insecticide spray. Spray in particular under tables, chairs and in dark corners
- Persons going on deck or ashore after dusk should wear long sleeved shirts and trousers to avoid exposing their arms and legs
- No receptacles, pools of stagnant water or collections of dew water or rain are allowed to develop on deck or in life boats, where mosquitoes might lay their eggs
- Refuse bags or drums have to be sealed properly: when this is done the mosquito plague often drops spectacularly, especially on ships lying a few meters off shore

Other traditional measures to protect against mosquitoes include:

- Placing fine wire mesh over portholes, sky lights, ventilators and other openings
- Screening lights to avoid attracting mosquitoes
- Sleeping spaces or cabins shall be kept closed and ventilated via ventilation holes covered up with mosquito netting
- The galley shall be well ventilated but doors and windows shall be covered up with mosquito netting

The mosquitoes tend to respond to light in their feeding habits and are most active in low light hours after dusk and in the hours prior to dawn. It is important that repellents are used between dusk and dawn to prevent being bitten.

Use a repellent that has DIETHYL-M-TOLUAMIDE (DEET), to be renewed every four/six hours. The optimal concentration of DEET is between 20 and 50 %, for children and pregnant women between 20 and 30 %. Try to avoid using products that are connected to homemade concoctions!

While clothing alone will not protect you against mosquito bites, it can help in preventing bites when used along with other careful prevention. Clothing that covers the body, such as long trousers and long sleeves; socks etc., worn after dark will lower the risk of being bitten. While mosquitoes are able to bite through many materials, canvas mosquito boots and thick denim jeans will make it more difficult.

Avoid being outside after sunset and especially avoid parties near pools and lakes.

Clothing that has been impregnated with permethrin or deltamethrin will also help repel mosquitoes. Research has suggested that mosquitoes are attracted to sweat and so keeping clothes clean, especially socks (!), might help. It has also been suggested that mosquitoes are attracted to dark colours, so wearing light colours or white clothing might help prevent being bitten.

While air conditioning does help to keep the mosquitoes away due to the lower temperature, it is important that it is left on all day and that windows are not left open at night!

Using an undamaged mosquito net in an area where malaria is present is a good idea. Ideally use previously impregnated mosquito nets, which can be washed. They keep their activity for up to 30 months instead of 6 -12 months with mosquito nets which are impregnated by oneself, they can be washed up to 20 times, and the cost is not extremely high. In the near future improved impregnated mosquito

nets will be available, whereby different treatments make the insecticide absorb into the fibres. The net has to be put under the mattress, fixed on the 4 corners of the bed.

3 Chemoprophylactic drugs - TAKE ANTIMALARIAL DRUGS

The fewer the bites, the smaller the risk of infection. But even when the greatest care is exercised it will seldom be possible to prevent mosquito bites either on shore or onboard entirely.

For this reason in all cases when a ship is bound for a malaria port, in addition to taking all possible measures to prevent mosquito bites, medication has to be given to the whole crew systematically.

The captain has to make sure that everybody onboard takes the prophylactic medication. Although many people are very reluctant to take medication when they do not feel sick, in case of malaria risk they will have to be persuaded to do so.

Preventative medication does not stop the malaria parasite from getting into the bloodstream but strongly reduces the chance of disease, if the medication is taken correctly. All persons, therefore, should be warned that they are exposed to the chance of malaria infection. If they fall ill at a later date, they should inform their doctor without delay that the fever from which they are then suffering may be due to malaria contracted abroad.

Resistance of the parasite against malaria medication exists and is high in several regions.

If you are visiting a malaria zone, see your company medical service, your doctor or travel clinic at least a month prior to travelling so that suitable medication can be arranged. If you suffer from any heart condition, allergy or other medical problem, this might influence the medication you are given.

Most medication is taken for a set period before going, this continues while you are in a malaria zone and for a set period after leaving the malaria zone.

The table gives an overview of the preventative treatment recommended per country.

Countries in **BOLD** have ports : instructions are specific for seafarers.
Other countries: general information for travellers

The numbers I, II, III and IV refer to the **type of prevention** :

MALARIA RISK		TYPE OF PREVENTION
Type I	Very limited risk of malaria transmission	Mosquito bite prevention only
Type II	Risk of P. vivax malaria or fully chloroquine-sensitive P. falciparum only	Mosquito bite prevention plus chloroquine chemoprophylaxis
Type III	Risk of malaria transmission and emerging chloro-quine resistance	Mosquito bite prevention plus chloroquine+proguanil chemoprophylaxis
Type IV	High risk of falciparum malaria plus drug resistance, or moderate/low risk falciparum malaria but high drug resistance	Mosquito bite prevention plus either atovaquone/pro-guanil, doxycycline or mefloquine, (take one that no resistance is reported for in the specific areas to be visited

( ) : Type of prevention between brackets = in many areas seafarers may drop their chemoprophylaxis after a detailed discussion of their itinerary with a specialist doctor and careful evaluation of the malaria risk in relation to shipping, on condition that strict anti-mosquito measures are taken from sunset to sunrise and that malaria emergency treatment and full instructions are on hand.

EUROPE

EAST EUROPE

Country	Type of prevention	
ARMENIA	I	risk-exclusively due to P. vivax-exists focally from June through October in some of the villages located in Ararat Valley, mainly in the Masis district.
AZERBAIJAN	none (I)	Limited malaria risk-exclusively due to P. vivax-exists from June through September in lowland areas, mainly in the area between the Kura and the Arax rivers.
GEORGIA	I	in the southeastern part of the country
KYRGYZSTAN	I	in some southern and western parts of the country, mainly in areas bordering Tajikistan and Uzbekistan - Batken, Osh and Jalal-Abad regions.
TAJIKISTAN	III	in southern border areas (Khatlon Region), and in some central (Dushanbe), western (Gorno-Badakhshan), and northern (Leninabad Region) areas.
TURKMENISTAN	none (I)	in some villages located in the southeastern part of the country, mainly in Mary district.
UZBEKISTAN	I	in some locations of Surkhanda-rinskaya Region.

AFRICA

NORTH AFRICA

No risk in places that can be reached by ships. Extremely low risk in some remote places in Algeria, Morocco and Egypt (El Faiyum region). *No chemoprophylaxis*.

Country	Type of prevention	
ALGERIA	none (I)	Small foci of local transmission (P.vivax) have been reported in the 6 southern and south-eastern wilayas (Adrar, El Oued, Ghardaia, Illizi, Ouargla, Tamanrasset). Isolated local P.falciparum transmission has been reported from the 2 southernmost wilayas in areas under influence of trans-Saharan migration. No malaria in the (major) ports nor in the whole coastal region.
EGYPT	none	
MOROCCO	none (I)	In certain rural areas of Chefchaouen Province. No malaria in the (major) ports nor in the whole coastal region.

EAST AFRICA

From Port Sudan to Richards Bay (SouthAfrica). However, the malaria risk on the Red Sea coast is limited.

*Chemoprophylaxis type IV + standby emergency treatment in case of a "probable malaria" * attack*

Country	Type of prevention	
BURUNDI	IV	-
COMOROS	IV	-
DJIBOUTI	IV	-
ERITREA	IV	No risk in Asmara
ETHIOPIA	IV	-
KENYA	IV	-
MADAGASCAR	IV	-
MALAWI	IV	-

Country	Type of prevention	
MAURITIUS	none	-
MAYOTTE (FRENCH TERRITORIAL COLLECTIVITY)	IV	-
MOZAMBIQUE	IV	-
RWANDA	IV	-
SOMALIA	IV	-
TANZANIA	IV	-
UGUNDA	IV	-

WEST AFRICA

From Nouakchott (Mauritania) to the Kunene river (at the border of Namibia with Angola).

Risk is particularly high, resistance is widespread and several fatalities occur annually.

There are seasonal variations in the north and the south, but in general risk exists throughout the whole year.

Chemoprophylaxis type IV + standby emergency treatment in case of a "probable malaria" attack*

Country	Type of prevention	
BENIN	IV	-
BURKINA FASO	IV	-
CAPE VERDE	none (I)	Limited risk in Sao Tiago Island
GAMBIA	IV	-
GHANA	IV	-
GUINEA	IV	-
GUINEA-BISSAU	IV	-
IVORY-COAST	IV	-
LIBERIA	IV	-
MALI	IV	-
MAURITANIA	IV	Malaria risk - predominantly due to P. falciparum—exists throughout the year in the whole country, except in the northern areas: Dakhlet-Nouadhibou and Tiris-Zemour. In Adrar and Inchiri there is malaria risk during the rainy season (July through October).
NIGER	IV	-
NIGERIA	IV	-
SAO TOME AND PRINCIPE	IV	-
SENEGAL	IV	-
SIERRA LEONE	IV	-
TOGO	IV	-

CENTRAL AFRICA

Country	Type of prevention	
ANGOLA	IV	-
CAMEROON	IV	-
CENTRAL AFRICAN REPUBLIC	IV	-
CHAD	IV	-
CONGO BRAZAVILLE	IV	-
DEMOCRATIC REPUBLIC OF THE CONGO	IV	-
EQUATORIAL GUINEA	IV	-
GABON	II	-
SUDAN	IV	Malaria risk—predominantly due to P. falciparum—exists throughout the year in the whole country. Risk is low and seasonal in the north. It is higher along the Nile south of Lake Nasser and in the central and southern part of the country. Malaria risk on the Red Sea coast is very limited.
ZAMBIA	IV	-

** "Probable malaria": a person with signs and/or symptoms of malaria.*

SOUTH AFRICA

Country	Type of prevention	
BOTSWANA	IV	in the northern parts of the country: Boteti, Chobe, Ngamiland, Okavango, Tutume districts/sub-districts.
NAMIBIA	(IV)	in the following regions: Oshana, Oshikoto, Omusati, Omaheke, Ohangwena and Otjozondjupa along the Kunene river and in Kavango and Caprivi regions.
SOUTH AFRICA	(IV)	in the low altitude areas of Mpumalanga Province (including the Kruger National Park), Northern Province and northeastern KwaZulu-Natal as far south as the Tugela River. No risk in the (major) ports, low risk in Richards Bay.
SWAZILAND	IV	-
ZIMBABWE	IV	in areas below 1200 m and throughout the year in the Zambezi valley. In Harare and Bulawayo, the risk is negligible.

NEAR AND MIDDLE EAST AND THE INDIAN SUBCONTINENT

- Yemen : chemoprophylaxis type IV, no risk in Sana'a city ; on Socotra Island chemoprophylaxis type I
- In the ports of Iran, Pakistan, Bangladesh : risk is present but variable and moderate.
- For India the situation is more complex and several areas, including on the coast require *chemoprophylaxis type IV* : in the north-eastern states, in Andaman and Nicobar Islands, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka (with exception of the city of Bangalore), Madhya Pradesh, Maharashtra (with the exception of the cities of Mumbai, Nagpur, Nasik and Pune), Orissa, and West Bengal (with the exception of the city of Kolkata).
- Colombo and Galle in Sri Lanka are malaria free.
- In many areas seafarers may drop their chemoprophylaxis after a detailed discussion of their itinerary with a specialist doctor and careful evaluation of the malaria risk.

MIDDLE EAST

Country	Type of prevention	
IRAN	none (II) (IV)	in P. vivax risk areas in Ardebil and East Azerbijan provinces north of the Zagros mountains; IV in P. falciparum risk areas in rural areas of the provinces of Hormozgan, Kerman (tropical part) and the southern part of Sistan-Baluchestan.
IRAQ	none (II)	in areas in the north below 1500 m (Duhok, Erbil and Sulaimaniya provinces) but also in Basrah Province.
OMAN	none	
SAUDI ARABIA	none (IV)	in most of the southwestern region (except in the high-altitude areas of Asir Province) and in certain rural areas of the western region. No risk in Mecca or Medina cities.
SYRIAN ARAB REPUBLIC	none (I)	in foci along the northern border, especially in rural areas of El Hasaka Governorate
TURKEY	none (II)	in the southeastern part of the country, and in Amikova and Çukurova Plain.
YEMEN	IV	no risk in Sana'a city ; (I) Socotra Island

INDIAN SUBCONTINENT

Country	Type of prevention	
AFGHANISTAN	IV	-
BANGLADESH	(IV)	Malaria risk exists throughout the year in the whole country excluding Dhaka city.
BHUTAN	IV	in the southern belt of the country comprising five districts: Chhukha, Samchi, Samdrup Jonkhar, Geyleg-phug and Shemgang.
INDIA	(III) (IV)	Malaria risk exists throughout the year in the whole country below 2000 m, with overall 40% to 50% of cases due to P. falciparum. There is no transmission in parts of the states of Himachal Pradesh, Jammu and Kashmir, and Sikkim. Risk of falciparum malaria and drug resistance are relatively higher in the northeastern states, in Andaman and Nicobar Islands, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka (with exception of the city of Bangalore), Madhya Pradesh, Maharashtra (with the exception of the cities of Mumbai, Nagpur, Nasik and Pune), Orissa and West Bengal (with the exception of the city of Kolkata) *Recommended prevention: III. In the listed higher risk areas: IV*
NEPAL	IV	in rural areas of the 20 Terai districts (including forested hills and forest areas) bordering with India, and in parts of the inner Terai valleys of Udaypur, Sindhupalchowk, Makwanpur, Chitwan and Dang.
PAKISTAN	(IV)	-
SRI LANKA	(IV)	except in the districts of Colombo, Galle, Gampaha, Kalutara, Matara and Nuwara Eliya.

SOUTH EAST ASIA

Country	Type of prevention	
CAMBODIA	(IV)	(including Angkor Wat area), except in the Phnom Penh area and close around Tonle Sap
EAST TIMOR	(IV)	-
INDONESIA	(IV)	Malaria risk exists throughout the year in the whole country except in Jakarta Municipality, big cities, and within the areas of the tourist resorts of Bali and Java. The risk is very low in the ports of Bali & Java.
LAOS	IV	-
MALAYSIA	none (IV)	only in limited foci in the deep hinterland. Urban and coastal areas are free from malaria. P. falciparum throughout the year.
MYANMAR, (FORMERLY BURMA)	(IV)	Malaria risk—predominantly due to P. falciparum—exists throughout the year at altitudes below 1000 m, excluding the main urban areas of Yangon and Mandalay. Risk is highest in remote rural, hilly and forest areas. P. falciparum resistant to chloroquine and sulfadoxine–pyrimethamine reported. Mefloquine resistance reported in Kayin state and the eastern part of Shan state.
PHILIPPINES	none (IV)	in areas below 600 m, except in the provinces of Aklan, Bilaran, Bohol, Camiguin, Capiz, Catanduanes, Cebu, Guimaras, Iloilo, Leyte, Masbate, northern Samar, Sequijor and metropolitan Manila. No risk is considered to exist in urban areas or in the plains
THAILAND	none (IV)	in rural, especially forested and hilly, areas of the whole country, mainly towards the international borders. There is no risk in cities and the main tourist resorts (e.g. Bangkok, Chiangmai, Pattaya, Phuket, Samui). However, there is risk in some other islands as well as resorts.
VIETNAM	(IV)	excluding urban centres, the Red River delta, and the coastal plain areas of central Vietnam. High-risk areas are the highland areas below 1500 m south of 181/2N, notably in the 4 central highland provinces Dak Lak, Dak Nong, Gia Lai and Kon Tum, Binh Phuoc province, and the western parts of the coastal provinces Quang Tri, Quang Nam, Ninh Thuan and Khanh Hoa.

- The risk is not existent to very low in the major ports of Indonesia, Malaysia, Thailand and also in Manila: *no chemoprophylaxis indicated*.
- The risk is also low in the main ports of Vietnam and Cambodia. *No chemoprophylaxis indicated*, but attention should always be paid to the other preventative measures

EAST ASIA

Country	Type of prevention	
CHINA	none (II) (IV)	Malaria risk—including P. falciparum malaria—occurs in Hainan and Yunnan. Chloroquine and sulfadoxine-pyrimethamine resistant P. falciparum reported. Limited risk of P. vivax malaria exists in southern and some central provinces, including Anhui, Henan, Hubei, and Jiangsu. The risk may be higher in areas of focal outbreaks. There is no malaria risk in urban areas nor in the densely populated plain areas. *Recommended prevention in risk areas: II; in Hainan and Yunnan, IV*
KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF	none (I)	risk limited to the demilitarized zone. Limited malaria risk—exclusively due to P. vivax—exists in some southern areas. *Recommended prevention: I*
KOREA, REPUBLIC OF	none (I)	Limited malaria risk—exclusively due to P. vivax—exists mainly in the northern areas of Kyunggi Do and Gangwon Do Provinces. *Recommended prevention: I*

OCEANIA

AUSTRALIA AND THE PACIFIC

Country	Type of prevention	
PAPUA NEW GUINEA	IV	-
SOLOMON ISLANDS	IV	-
VANUATU	III	Low to moderate malaria risk—predominantly due to P. falciparum—exists throughout the year in the whole country.

- The transmission of malaria is intense in all ports of Papua New Guinea (also in Irian Jaya) ; multiple drug resistance is a major problem in Papua New Guinea. *Chemoprophylaxis type IV*
- Solomon Islands (Honiara and other ports) *Chemoprophylaxis type IV*
- No malaria risk in Kiribati.

AMERICA

MEXICO AND CENTRAL AMERICA

- From Mexico to the Panama Canal: benign forms of malaria only, very low risk; *no chemoprophylaxis indicated*, but be alert !
- Panama: no malaria risk in the Panama Canal. High risk in some areas inland and in some areas on the east coast in South Panama. Chemoprophylaxis type IV in Darién and San Blas in the east provinces.

Country	Type of prevention	
BELIZE	none (II)	Malaria risk-almost exclusively due to P. vivax-exists in all districts but varies within regions. Risk is highest in Toledo and Stan Creek Districts; moderate in Corozal and Cayo; and low in Belize District and Orange Walk.
COSTA RICA	none (II)	in the provinces of Limón and Puntarenas, with highest risk in the cantons , Guacimo, Limón, Matina and Talamanca (Limón Province) and Garabito (Puntarenas Province)
EL SALVADOR	none (II)	in Santa Ana Province, in rural areas of migratory influence from Guatemala
GUATEMALA	none (II)	in the departments of Alta Verapaz, Baja Verapaz, Escuintla, Huehuetenango, Izabal, Petén, Quiché (Ixcan) and Retalhuleu
HONDURAS	none (II)	-
MEXICO	none (II)	high risk of transmission in some localities in the states of Chiapas and Oaxaca; moderate risk in the states of Chihuahua, Sinaloa and Tabasco; and low risk in Campeche, Durango, Guerrero, Michoacán, Jalisco, Nayarit, Quintana Roo, Sonora, Veracruz and Yucatan.
NICARAGUA	none (II)	in the department of RA Atlántico Sur and moderate risk in RA Atlántico Norte.
PANAMA	none (II) (IV)	in Bocas del Toro in the west ; IV in Darién and San Blas in the east provinces.

SOUTH AMERICA

- At the west coast malaria is present from South Panama to the north of Ecuador, plus at the border of Ecuador-Peru; The risk is very low on the coast of the remainder of Ecuador and again very low on the coast of Peru.
  There is also a low risk for seafarers in the port of Guayaquil and in the port of Buenaventura: *protection type I only*. But if a patient has fever, think of a possible malaria attack.
- Hence, there is no risk at all in the coastal areas south from Fortaleza on the east coast and south from the Ecuadorian-Peruvian Border on the west coast.
- In many areas seafarers may drop their chemoprophylaxis after a detailed discussion of their itinerary with a specialist doctor and careful evaluation of the malaria risk in relation to shipping, on condition that strict anti-mosquito measures are taken from sunset to sunrise and that malaria emergency treatment and full instructions are on hand.
- Colombia: *chemoprophylaxis type III* in regions of Orinoquía ; *chemoprophylaxis type IV* in Amazonia, Pacífico and Urabá-Bajo Cauca.

Country	Type of prevention	
ARGENTINA	none	risk-exclusively due to P. vivax-is low and is confined to rural areas along the borders with Bolivia (lowlands of Jujuy and Salta provinces) and with Paraguay (lowlands of Corrientes and Misiones provinces).
BOLIVIA	II	in Beni, Pando and Santa Cruz, IV.
BRAZIL	(IV)	no risk in major ports and coastal areas except in Amazone region between Fortaleza en French Guyana. In most forested areas below 900 m within the 9 states of the “Legal Amazonia” region (Acre, Amapá, Amazonas, Maranhão (western part), Mato Grosso (northern part), Pará (except Belém City), Rondônia, Roraima and Tocantins). Transmission intensity varies from municipality to municipality, but is higher in jungle areas of mining, lumbering and agricultural settlements less than 5 years old, than in the urban areas, including in large cities such as Pôrto Velho, Boa Vista, Macapá, Manaus, Santarém, Rio Branco and Maraba, where the transmission occurs on the periphery of these cities.
COLOMBIA	(III) (IV)	in regions of Orinoquía ; IV in Amazonia, Pacífico and Urabá-Bajo Cauca, Atlantic coast free.
ECUADOR	(IV)	in El Oro, Esmeraldas, Guayas, Los Rios, Manabi, Morona Santiago, Napo, Orellana, Pastaza, Pichincha and Sucumbios. There is no risk in Guayaquil or Quito.
FRENCH GUYANA	(IV)	in 9 municipalities of the territory bordering Brazil (Oiapoque river valley) and Suriname (Maroni river valley)
GUYANA	(IV)	in all parts of the interior. Sporadic cases of malaria have been reported from the densely populated coastal belt.
PARAGUAY	II	in the departments of Alto Paraná, Caaguazú and Canendiyú.
PERU	(II) (IV)	in Ayacucho, Cajamarca, Cerro de Pasco, Chachapoyas, Chanca-Andahuaylas, Cutervo, Cusco, Huancavelica, Jaen, Junín, La Libertad, Lambayeque, Loreto, Madre de Dios, Piura, San Martín, Tumbes and Ucayali ; IV in Jaen, Lambayeque, Loreto, Luciano Castillo, Piura, San Martín, Tumbes and Ucayali.
SURINAME	(IV)	in the interior of the country beyond the coastal savannah area, with highest risk along the eastern border and in gold mining areas. In Paramaribo city and the other 7 coastal districts, transmission risk is low or negligible.
VENEZUELA	(II) (IV)	in some rural areas of Apure, Amazonas, Barinas, Bolívar, Sucre and Táchira states ; IV is mostly restricted to municipalities in jungle areas of Amazonas (Alto Orinoco, Atabapo, Atures, Autana, Manapiare, Rio Negro), Bolívar (Cedeño, Gran Sabana, Piar, Raul Leoni, Sifontes and Sucre), Carabobo (Naguanagua) and Delta Amacuro (Antonia Diaz, Casacoima and Pedernales).

CARRIBEAN

Country	Type of prevention	
DOMINICAN REPUBLIC	(II)	in the western provinces and in La Altagracia province
HAITI	(II)	

NOTE :
There is also a risk for seamen travelling by air to join the ship or on repatriation when they make a stopover in infected malaria regions (especially when arriving at night in Sub-Saharan African airports).
As many different areas may be visited during a trip, the final advice about which malaria chemoprophylaxis to be taken for the whole route of travel need preferably to be decided in communication with an expert.

CHEMOPROPHYLAXIS TYPE IV (WHO)

Atovaquone + proguanil (MalaroneTM)

1 tablet (250 mg atovaquone + 100 mg proguanil) daily starting 1 day before travel to endemic area and continue for 7 days after leaving malarious area

OR

Doxycycline

1 tablet (100 mg) daily starting 1 day before travel to endemic area and continue for 4 weeks after leaving malarious area

OR

Mefloquine

1 tablet (250 mg) weekly starting trial dose for 3 weeks prior to departure if appropriate and continue for 4 weeks after leaving malarious area. Patients with a past history of psychiatric disturbances or convulsions should not be given mefloquine, neither those with cardiac arrhythmia.

OR

(Chloroquine + proguanil)

daily 1 tablet Chloroquine (100 mg) + 2 tablets Proguanil (2 x 100 mg) starting 1 week before arrival in the endemic area and continue for 4 weeks after leaving malarious area. 100 mg Chloroquine + 200 mg Proguanil) exists in 1 tablet (savarine® 1 tablet daily). Activity is low (below 50%) except in a few West African countries.

CHEMOPROPHYLAXIS TYPE III (WHO)

Chloroquine + proguanil

300 mg chloroquine (3 x 100 mg tablets or 2 tablets 150 mg) to be taken at 1 time in the course of a meal, once a week, on a fixed day for example Sunday. If tablets of 250 mg chloroquine, use 2 × 250 mg weekly.

+

200 mg proguanil (2 × 100 mg tablets) a day in 1 time, after breakfast.

CHEMOPROPHYLAXIS TYPE II (WHO)

Chloroquine

2 tablets (2 x 150mg) weekly

OR

Proguanil

2 tablets (2 x 100mg) daily

4 Early diagnosis and treatment for a febrile illness

In the event of a probable malaria attack at sea, it is really of paramount importance to give the appropriate treatment correctly and in time.

Immediate diagnosis of malaria is essential since complications arise within hours or days of the first symptom, and because falciparum malaria can rapidly progress to life-threatening disease.

If the diagnosis of malaria is suspected onboard, treat first, and then arrange for definitive diagnosis.

Fever occurring in a seafarer 1 week or more after entering a malaria risk area, and up to 3 months after departure, is a medical emergency that should be investigated urgently.

Malaria is usually diagnosed by the characteristic signs and symptoms, then treated empirically, without waiting for a definite diagnosis. However, this can lead to problems as the disease produces symptoms very similar to those caused by other infections.

Use of malaria chemoprophylaxis does not preclude malaria as the presenting cause of fever, especially if the prophylaxis used is inappropriate for the region visited.

A definitive diagnosis can usually be made by microscopy of stained blood films. However, other laboratory techniques are now available, including immune assay (ELISA) for parasitic antigen, which may be performed very quickly.

In most cases, a first attack occuring at night goes unnoticed as a persons temperature is not generally taken at night.

7 Malaria – Standby Emergency Treatment

SET [standby emergency treatment] has an important place in the prevention of death by malaria in seafarers. Problems with patient compliance and parasite resistance to chemoprophylaxis make it a vital element in ensuring the best possible malaria protection.
Standby emergency treatment is indicated for travellers in some occupational groups, such as seafarers, who make frequent short stops in endemic areas over a prolonged period of time. These travellers may choose to reserve chemoprophylactic drugs for high-risk areas only.

Malaria by P. Falciparum is life-threatening, especially for travellers coming from regions where malaria does not exist. Treatment of probable malaria onboard is focussed in the first place on falciparum malaria and because these treatments are usually effective against other forms of malaria.

Standby emergency treatment is started when fever and flu-like symptoms occur after being in an area with a malaria risk and where it is not possible to obtain medical attention within 24 hours.

Contact radio medical advise when standby emergency treatment is considered. If the patient has taken chemoprophylaxis, then the same medicine should not be used for treatment.

Combinations of antimalarials are now (2006) recommended by the WHO for treatment of P. Falciparum malaria. Artemisinin and its derivatives (artesunate, artemether, artemotil, dihydroartemisinin) produce rapid resolution of symptoms. Artemisinins are commonly used in free combination with other antimalarials. Given in combination with other antimalarials, short courses of treatment (3 days) are effective.

Examples of Artemisinin-based Combination Therapies (ACT)*

- **artemether/lumefantrine**
  (e.g. Riamet™, Coartem™)
  Artemether 20 mg and lumefantrine 120 mg - 4 tablets - twice daily - for 3 consecutive days. To be taken with high fat food or drinks, such as milk.
- **artesunate + amodiaquine (e.g. Larimal™)**
  artesunate 4 mg/kg bodyweight and amodiaquine 10 mg/kg bodyweight for 3 consecutive days. For example amodiaquine 150 mg 2 tablets twice daily and artesunate 50 mg 2 tablets twice daily for 3 days.
- **artesunate + mefloquine (e.g. Artequin™)**
  artesunate 200mg and mefloquine 250 mg 1 single dose – of 2 tablets – for 3 consecutive days. The dosage forms may differ per country.

• artesunate + sulfadoxine/pyrimethamine. (e.g. Artidox™)
artesunate 4mg/kg bodyweight daily for 3 days plus 1 single dose of sulphadoxine/pyrimethamine 25 / 1.25 mg/kg bodyweight. Adequate fluid intake must be maintained in order to prevent crystalluria and stone formation. If anorexia or vomiting occur during the therapy, these adverse effects may be minimized by taking the drug with meals.

* the list of artemisinin derivatives currently used, is too long but combination therapy is the key!

Partial treatments should not be given even when patients are considered to be semi-immune or the diagnosis is uncertain. A full course of effective treatment should always be given once a decision to give anti-malarial treatment has been reached.

Where ACT has been adopted as the first-line treatment for P. falciparum malaria, it may also be used for P. vivax malaria in combination with primaquine. Artesunate + sulfadoxine-pyrimethamine is the exception as it will not be effective against P. vivax in many places.

Severe malaria is a medical emergency, full doses of parenteral anti-malarial treatment should be started without delay with whichever effective anti-malarial is first available.

The risk of death from severe malaria is greatest in the first 24 h, yet many ships will not be near appropriate health facilities. Delaying the commencement of appropriate anti-malarial treatment may cause deterioration or even death of the patient.

It is recommended that patients are treated with the first dose of one of the recommended treatments by the parenteral route if possible or by the intra-rectal route before referral. This could be intramuscular artemether, artesunate or quinine, or a rectal formulation of artemisinin or artesunate.
Artesunate 2.4 mg/kg bodyweight i.v. or i.m., repeated after 12 h and 24 h, then once a day is the recommended choice.
Following initial parenteral treatment, once the patient can tolerate oral therapy, it is essential to continue and complete treatment with an effective oral antimalarial. Current practice is to continue the same medicine orally as given parenterally to complete a full treatment.

Examples of other Standby Emergency Treatments (SET) in Areas with Resistance (WHO)

1. Atovaquone + proguanil (Malarone™)
an adult should take 4 tablets (1 tablet = 250 mg atovaquone + 100 mg proguanil) daily in 1 intake, for 3 days, at the same time, with some food. Sometimes the intake of this medicine can cause vomiting.

2. Quinine + tetracycline OR doxycycline
Start with quinine (capsules of 500 mg quinine sulphate or tablets of 100 mg) every 8 hours. For an average adult 3 tablets of 500 mg quinine or 3 x 7 tablets of 100 mg Quinimax per day (1 tablet of 100 mg contains only 70 mg active quinine).
At the same time, start with either:
- tetracycline 20 mg per kg (maximum 3 x 500 mg per day) for 7 days.

Or
- doxycycline 2 tablets of 100 mg (= 3.5 mg per kg) the first day, followed by 1 tablet of 100 mg (= 2 mg per kg) per day during the next 6 days.

In case retching or vomiting are present, postpone this part of the treatment until the third day.
Taking tetracycline or doxycycline can cause hypersensitivity reactions in the skin when exposed to sunlight.

When the medication is vomited, quinine = Quinimax® can also be injected in the large muscle of the thigh every 8 hours: 3 injections a day during 4 days (severe malaria).

3. Quinine + sulphadoxine/pyrimathamine (Fansidar®)
Start with Quinine or Quinimax® for at least 4 days as in scheme 2.
On the 3rd day sulphadoxine/pyrimethamine (Fansidar®) has to be taken, 3 tablets at once
When the fever decreases slowly, it is recommendable to take quinine up to 7 days.

The areas where Fansidar®-resistance has been signalised are growing! Especially in South East Asia, where Fansidar should not be used.

4. Mefloquine (Lariam™)

Only if there is no alternative possible, because unsupervised intake of mefloquine for treatment of malaria is not advised. Taken in a dose of 25 mg/kg, spread over 3 intakes (every 8 hours). For average adult respectively 3 tablets of 250 mg - 2 tablets of 250 mg - 1 tablet of 250 mg, with intervals of 8 hours between. The maximum total dose amounts to 1500 mg (6 tablets of 250 mg). After intake of mefloquine the fever does not always disappear immediately, but can still continue for approximately 3 days.

The World Health Organisation advises for an adult who takes mefloquine as emergency treatment on his own initiative, the following dosage: 2 tablets of 250 mg, followed by 2 tablets of 250 mg after 8 hours. This dosage is smaller than the one mentioned above. This dosage is adjusted because mefloquine in treatment level dosage, often has unpleasant side effects (gastro-intestinal discomfort, dizziness, anxiety, heart palpitations, nightmares and insomnia), that sometimes are very pronounced and cause the already ill person to panic. These side effects should occur less frequently with a reduced dosage.

Examples of Standby Emergency Treatment (SET) in Areas with NO Resistance (WHO)

Chloroquine

For a stay in some regions in Central America and some Mediterranean regions): 25-mg/kg body weight in three days time, not shorter and not longer.

The use of some of these drugs is limited.

There are problems relating to tolerance and resistance has developed in some areas.

Good reference can be found in the “INTERNATIONAL MEDICAL GUIDE FOR SHIPS” by the World Health Organisation and on www.who.int

Beware of homeopathic drugs, which are not active and may be the cause of lethal evolution.

8 Malaria - treatment onboard

A person who is developing an attack of “probable malaria” * onboard, is best assisted and controlled by a colleague constantly. Contact radio medical advice immediately. When the temperature is rising the patient shall be covered and if necessary, in the second stage the blankets shall be removed, in the third stage pyjamas and sheets may have to be changed. When the patient is still able to swallow medication, most cases can be treated onboard.

Since fever is a prominent aspect of malaria, the use of antipyretic medication may help to control the disease. Paracetamol and ibuprofen are the preferred drugs to administer for fever caused by malaria.

The patient can be given cool drinks in small quantities and cold or preferably tepid water compresses can be applied on the forehead. At the same time the psychic condition should be observed. During an attack the patient may be confused and consequently require continued control, because in his confusion he can get overboard.

All seafarers who were treated on board for “probable malaria” * have to consult a doctor upon arrival (if possible with blood slides).

iswan@iswan.org.uk
www.seafarershealth.org

If you want to do more and get more information and material to improve the condition of seafarers onboard, go to www.seafarershealth.org where you can download guidelines, posters and leaflets on other health topics for seafarers : Food Safety, Fit onboard, Safe Travel, Healthy Food, Malaria, Overweight and HIV/AIDS.

* “probable malaria” : a person with signs and/or symptoms of malaria.