MALARIA DIAGNOSIS, TREATMENT & PREVENTION: BRIEF GUIDELINE FOR UN MEDICAL STAFF

BACKGROUND

Malaria is a common and life-threatening disease in many tropical and subtropical areas where UN personnel travel to or reside in. This brief guideline provides technical guidance to United Nations medical staff on the clinical diagnosis, treatment and prevention of malaria amongst UN personnel. Technical input was provided by the World Health Organization (WHO). This document will be updated as new research and information emerge.

DIAGNOSING MALARIA

CLINICAL DIAGNOSIS

The initial symptoms of malaria (most often fever, chills, sweats, headaches, muscle pains, nausea and vomiting) are often non-specific and can also be found in other diseases (e.g. influenza and other common viral infections). Likewise, the physical findings are often non-specific (elevated temperature, sweating and tiredness).

However, in severe malaria (mostly caused by *P. falciparum*), the clinical findings of confusion, coma, convulsions, severe anaemia, respiratory difficulties are more specific and may increase the index of suspicion for malaria.

AFTER RETURN FROM TRAVEL

In all patients who recently returned from travel or residence in a malaria risk country/area, UN medical staff should always consider the possibility of falciparum malaria in all cases of unexplained fever starting at any time between 7 days after the first possible exposure to malaria and 3 months (or, rarely, later) after the last possible exposure.

LABORATORY DIAGNOSIS

For all cases of suspected malaria, the health-care provider should conduct an initial workup and arrange for a malaria parasitological test either via a quality assured Rapid Diagnostic Tests (RDT) or a microscopic examination of blood smear slide. Either test, or both, can be used as a primary diagnostic tool for the confirmation and management of suspect clinical malaria in all epidemiological situations, including areas of low transmission. For microscopy, thick blood smears are more sensitive to detecting the presence of malaria parasites while thin smears allow for better species identification. For RDTs, a list of those prequalified by WHO is available at https://www.who.int/diagnostics_laboratory/evaluations/pq-list/malaria/public_report/en/

In addition, UN medical staff should also conduct a complete blood count and a routine chemistry panel. In the event that the individual has a positive malaria test, these additional tests will be useful in determining whether

the patient has uncomplicated or severe manifestations of the malaria infection. Specifically, these tests can detect severe anaemia, hypoglycaemia, renal failure, hyperbilirubinemia, and acid-base disturbances.

TREATMENT OF MALARIA

Malaria can be a severe, potentially fatal disease (especially when caused by *P. falciparum*), and treatment should be initiated as soon as possible.

If you clinically suspect a diagnosis of malaria, and the lab result of the malaria test is not available for more than 2 hours, treatment of malaria should be started presumptively based on the probability that the illness is malaria, and reviewed later based on the test results.

Please note that if the patient has signs and symptoms of severe malaria, presumptive treatment should be initiated IMMEDIATELY regardless of laboratory test results.

UNCOMPLICATED *P. FALCIPARUM* MALARIA

Adults with uncomplicated *P. falciparum* malaria should be treated with one of the following recommended artemisinin-based combination therapies (ACT) for 3 days. The choice of ACT is based on the local parasite resistance profile:

- Artemether 80 mg + lumefantrine 480 mg, twice daily for 3 days
- Artesunate 200 mg + amodiaquine 540 mg (ASAQ), once daily for 3 days
- Artesunate 200 mg + mefloquine 440 mg, once daily for 3 days
- Dihydroartemisinin + piperaquine
  - If 60 - 80 kg: Dihydroartemisinin 160 mg + piperaquine 1280 mg, once daily for 3 days
  - If 80+ kg: Dihydroartemisinin 200 mg + piperaquine 1600 mg, once daily for 3 days

UNCOMPLICATED *P. VIVAX, P. OVALE, P. MALARIAE* OR *P. KNOWLESI* MALARIA

If the malaria species is not known, treat as uncomplicated *P. falciparum* malaria. In areas with chloroquine-susceptible infections, treat uncomplicated *P. vivax*, *P. ovale*, *P. malariae*, or *P. knowlesi* with either chloroquine or ACT. In areas with chloroquine-resistant infections, treat uncomplicated *P. vivax*, *P. ovale*, *P. malariae* or *P. knowlesi* malaria with ACT.

Prevent relapse in *P. vivax* or *P. ovale* malaria with a 14-day course of primaquine at 30 mg daily (except in pregnant women, women breastfeeding infants less than 6 months, and in G6PD deficient individuals). In people with G6PD deficiency, consider giving primaquine base at 45 mg once a week for 8 weeks, with close medical supervision for potential primaquine-induced haemolysis.

UNCOMPLICATED MALARIA IN PREGNANCY

Artemisinin combination treatments should be used to treat malaria in pregnant women. The combination artesunate + sulfadoxine/pyrimethamine (SP) should not be given in the first trimester because SP is contraindicated in this period of pregnancy.

To prevent relapse in pregnant and breastfeeding women with *P. vivax* or *P. ovale*, consider weekly prophylaxis with 300 mg chloroquine base followed by primaquine 30 mg daily for 14 days after pregnancy and breastfeeding is completed.

SEVERE MALARIA

Severe malaria is defined as confirmed malaria with at least one of the following: impaired consciousness, prostration, multiple convulsions, respiratory distress, shock, severe anaemia, significant bleeding, jaundice, hypoglycaemia, acute renal injury, or acidosis.

Treat patients with severe malaria with intravenous or intramuscular artesunate for at least 24 hours until they can tolerate oral medication. For adults, artesunate at 2.4mg/kg should be administered parenterally at the time of admission (0 h), then at 12 h and 24 h, and once a day afterwards until the patient is able to tolerate oral therapy. Parenteral treatment, once started, must be continued for at least 24 hours regardless of the ability of the patient to tolerate oral medication. Once patient has completed parenteral treatment of artesunate, complete malaria treatment with 3 days of ACT. If artesunate is not available, use artemether in preference to quinine for treating severe malaria.

In children, given the possibility of concomitant bacterial infection, parenteral antibiotics should be administered alongside antimalarials until bacterial infection has been ruled out.

PERSISTENT SYMPTOMS

For patients with recurrent fevers and symptoms of uncomplicated malaria developing within 4 weeks after laboratory confirmation of diagnosis of malaria, verify completion of effective antimalarial treatment course. If initial treatment was not properly completed, restart the same treatment. If the antimalarial treatment was completed, check blood film slide for persistent malaria. If blood smear remains positive or slide microscopy is not available, treat with second-line antimalarial treatment. If blood smear is negative, assess for other causes of fever.

PREVENTION OF MALARIA

TRAVELLERS AND WANING IMMUNITY

UN personnel from countries with NO malaria risk and who are travelling into countries/territories with ongoing local malaria transmission are non-immune and therefore at high risk of malaria infection.

However, even UN personnel who are originally from countries with malaria transmission but who had resided for 6 months or more in countries/areas with NO malaria risk may have lost or partially lost their immunity, and are similarly at high risk because of this absent or semi-waning immunity.

MOSQUITO BITE PREVENTION STRATEGIES

Prevention of mosquito bites by the female *Anopheles* mosquitoes, which bit mainly between dusk and dawn, is the first line of defence against malaria. UN personnel travelling or residing in malaria-endemic areas should be advised to sleep under long-lasting insecticidal nets and use protective clothing and insect repellents.

PROPHYLAXIS WITH ANTIMALARIA DRUGS

UN personnel may also need to take prophylaxis with antimalaria drugs prior to, during, and upon return from their travel to malaria endemic areas. Prior to their travel to such areas, UN medical staff can consult local health authorities or other institutions offering such advice, regarding the chemoprophylaxis that the individual should take.

The WHO's International Travel and Health guide available at https://www.who.int/ith/ith-country-list.pdf also provides information for each country including epidemiological details for all countries with malarious areas. The recommended types of prevention are also indicated. Depending on the type of malaria risk in the specific area of the country/area visited, the recommended prevention method may be mosquito-bite prevention only, or mosquito-bite prevention in combination with chemoprophylaxis and/or standby emergency treatment (SBET). This information is summarised in the "UN Medical Directors' Vaccination and Malaria Prophylaxis Recommendations" available at https://hr.un.org/page/travel-health-information.

In addition, the Centers for Disease Control and Prevention (CDC) website on malaria information and chemoprophylaxis by country available at https://www.cdc.gov/malaria/travelers/country_table/a.html is a further useful resource providing such advice.

HIGH RISK TRAVELLERS

Some groups of travellers, especially young children, pregnant women and individuals with a weakened immune system, are at risk of developing serious illness if they become infected with malaria. Pregnant women should avoid travelling to areas where malaria transmission occurs, and parents are advised not to take infants or young children to areas where there is risk of *P. falciparum* malaria.

When travel cannot be avoided, it is very important to take effective preventive measures against malaria, even when travelling to areas with *P. vivax* malaria transmission.

AFTER RETURN FROM TRAVEL

Any fever occurring in a traveller within 3 months of leaving a country with malaria risk is a potential medical emergency and should be investigated urgently to exclude malaria. Travellers should be reminded to seek urgent and immediate medical attention in such situations, and to inform their doctor of the possible exposure to malaria infection. Falciparum malaria may be fatal if the treatment is delayed beyond 24 hours after the onset of clinical symptoms.

STAND-BY EMERGENCY TREATMENT

For UN personnel travelling to or residing in remote locations where prompt access to medical care may be a problem, it is advisable to prescribe antimalarial drugs for self-administration known as stand-by emergency treatment (SBET). Clear and precise instructions should be provided including recognition of symptoms, when and how to take the treatment, possible side effects, and the possibility of inadequate response to treatment. It should be emphasized that self-treatment is a first-aid measure only and medical care should be sought as soon as possible.

The drug options for SBET are, in principle, the same as for treatment of uncomplicated malaria. The choice will depend on the type of malaria in the area visited and the chemoprophylaxis regimen taken. Do not treat suspected malaria with the same drugs as were used for prophylaxis.

FURTHER READING

- WHO: Guidelines for the Treatment of Malaria, Third Edition
- WHO: Management of Severe Malaria – A Practical Handbook, Third Edition
- WHO: International Travel and Health: Malaria 2017 update
- WHO: International Travel and Health's Country-Specific Recommendations
- CDC Malaria Information and Prophylaxis by Country

ACRONYMS AND ABBREVIATIONS

ACT	-	Artemisinin-based Combination Therapies
AS	-	Artesunate
G6PD	-	Glucose-6-Phosphate Dehydrogenase
RDT	-	Rapid Diagnostic Tests
SP	-	Sulfadoxine-Pyrimethamine
UN	-	United Nations
WHO	-	World Health Organization
SBET	-	Stand-By Emergency Treatment

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