MEDICAL MANAGEMENT PLAN

MALARIA (Risk Group 2 *Plasmodium* species)

Below are instructions for care of patients presenting with symptoms of exposure to malaria.

POST-EXPOSURE CONTACTS

Contact UW Employee Health Center Nurse	206-685-1026 (M-F,8am-5pm)
If After-Hours, Go to UW Medical Center Emergency Room	206-598-4000
Contact UW Environmental Health & Safety Dept. for assistance	206-221-7770 (M-F, 8am-5pm)
Call 911 for a life-threatening emergency	911

Medical Protocol

First aid	Percutaneous or mucous membrane exposure: wash affected area with warm water and soap for 15 minutes and contact Employee Health Center. Remove yourself from the incident area and contact Employee Health Center. At the time of exposure, please identify species of *Plasmodium* and date of infection of NHP or other infected animals or insects.
Surveillance	EHC medical counseling recommended for persons who are pregnant or planning to become pregnant.
Reproductive risks	During pregnancy, individuals are at increased risk of having a severe illness if they develop malaria. Refer to the Biological Reproductive Hazards Focus Sheet.
Post exposure	Testing for malaria: • Blood smear microscopy (thick and thin)-gold standard per the CDC for laboratory confirmation of malaria • Rapid diagnostic testing (RDTs)-antigen detection • PCR testing-most useful for confirming the species of the malaria parasite after the diagnosis has been confirmed by blood smear microscopy
Treatment	Malaria is primarily treated with antimalarial drugs. However, the type of treatment depends on different factors, including: • Species of malaria parasite: Different species of malaria parasites can cause malaria, and the treatment can differ based on the specific parasite. • Severity of disease: Mild malaria cases can often be treated with oral medications, and early detection and treatment can lead to a full recovery. Severe cases of malaria can be life-threatening, requiring hospitalization and treatment via intravenous (IV) medications. • Individual's age and health: Treatment may vary for pregnant women, children, the elderly, and those with existing health issues requiring certain medications or dosages.

	• Refer to the biological agent table below. For the clinician managing treatment of exposure to malaria, please seek consultation with UW Infectious Disease team to determine duration of treatment-based species.
Reporting	Report all accidents, injuries and near miss events as soon as possible on the UW Online Accident Reporting System (OARS).

BACKGROUND INFORMATION

Mode of transmission

Malaria is transmitted through the bite of an *Anopheles* mosquito. Malaria can also spread through blood transfusion and contaminated needles.

Treatment of laboratory and animal care personnel

Transmission by either percutaneous or mucous membrane exposure or the bite from an infected *Anopheles* mosquito.

Infectious dose

Unknown

Incubation Period

7-30 days typically, relapsed for certain species months to years after infection

Vectors

More than 40 species of female *Anopheles* mosquitoes are malaria vectors, with *A. gambiae* being the dominant vector species. The sexual-stage form of *P. falciparum* develops into an infectious sporozoite in the mosquito. Infected mosquitoes transfer sporozoites to humans when taking a blood meal. *P. falciparum*-infected humans can transfer gametocytes to uninfected mosquitoes; however, less than 50% of mosquitoes that feed on an infected host become infected.

Vaccines

RTS,S/AS01e (Mosquirix) and r21/Matrix-M vaccine not available for use in the United States.

Characteristics

Malaria is a parasite of the genus Plasmodium. There are currently 5 human forms of malaria: *Plasmodium falciparum, P.ovale, P.malariae, P.vivax and P.knowlesi.* In addition*, P.cynomolgi* is an emerging zoonosis and is researched in some laboratories.

Signs and Symptoms

The symptoms of malaria can appear between 7 to 10 days after a bite from an infected mosquito, although some people feel symptoms as early as 7 days or as long as >1 year later.

Symptoms can vary but often include:

- Fever (most common)
- Headaches
- Chills and sweats
- Extreme fatigue
- Nausea and vomiting
- Body aches

Depending on the type of malaria parasite, severe cases can lead to complications, including:

- Impaired consciousness
- Severe anemia
- Respiratory distress
- Organ failure
- Convulsions
- Abnormal bleeding
- Neurobiological abnormalities
- Enlarged liver and spleen

Survival Outside the Host

The malaria parasite life cycle involves two hosts, mosquitoes and animals, including humans.

Prior Laboratory Acquired Illness

Fifteen laboratory-acquired cases of *Plasmodium falciparum* infection have been reported. Four of these were vector-borne cases involving *P. falciparum*-infected mosquitos. Four cases involved needlestick injuries. Two cases involved accidents with infectious material on glassware that resulted in puncture wounds. One individual developed a *P. falciparum* infection after he accidentally punctured his finger while performing an autopsy. The circumstances of the other cases were unknown.

BIOLOGICAL AGENTS TABLE

DISEASE AND AGENTS	LABORATORY TRANSMISSION	SIGNS AND SYMPTOMS	MEDICAL INFORMATION
Human malaria: • *Plasmodium falciparum* • *Plasmodium fragile* • *Plasmodium knowlesi* • *Plasmodium vivax* https://www.cdc.gov/malaria/	Transmission occurs via needlestick or cutaneous exposure from infected animals. Preventive measures include appropriate lab practices and PPE, safe sharps handling, laboratory worker safety education.	Symptoms of malaria include fever, chills and sweats, headache, muscle/ joint pain, vomiting, and diarrhea Malaria may be severe and life-threatening, particularly if caused by P. falciparum.	Treatment and evaluation for all human malaria exposures based on most severe form of malaria: *P.falciparum* Post exposure treatment: Malarone (treatment dose) 1000/400mg PO QD x 3 days with food.
Non-human primate malaria: • *Plasmodium cynomolgi* **Potential for human transmission	Transmission occurs via needlestick or cutaneous exposure from animals. or other sharp objects. Same preventive measures as above.	Same signs and symptoms as above.	Follow the post exposure protocol for *P. falciparum*
Rodent malaria: • *Plasmodium berghei* • *Plasmodium yoelii* • *Plasmodium chabaudi*	N/A	N/A	No medical treatment needed

REFERENCES

1. Centers for Disease Control and Prevention (CDC).
https://www.cdc.gov/parasites/malaria/index.html
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2. Canadian Centre for Occupational Health and Safety CCOHS.
https://www.ccohs.ca/oshanswers/biol_hazards/malaria.html#section-7-hdr
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3. Laboratory-Acquired Infections. *Clinical Infectious Diseases*, Volume 49, Issue 1, 1 July 2009, Pages 142–147, https://doi.org/10.1086/599104.
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4. Biosafety in Microbiological and Biomedical Laboratories, 6th Edition.
https://www.cdc.gov/labs/pdf/SF__19_308133-A_BMBL6_00-BOOK-WEB-final-3.pdf
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