

MALARIA

Responsibilities:

Hospital: Report by IDSS, facsimile, mail or phone

Lab: Report by IDSS, facsimile, mail or phone

Physician: Report by facsimile, mail or phone

Local Public Health Agency (LPHA): Report by IDSS, facsimile, mail or phone.

Follow-up required.

Iowa Department of Public Health

Disease Reporting Hotline: (800) 362-2736

Secure Fax: (515) 281-5698

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Agent

There are four *Plasmodium* species (sporozoan parasites) that cause malaria in humans. They are *Plasmodium vivax*, *P. malariae*, *P. ovale* and *P. falciparum*.

B. Clinical Description

Symptoms: The classic symptoms of malaria are high fever with chills, sweats, and headache, which may be paroxysmal (occurring at intervals or with remissions and intensification of symptoms). The fever and paroxysmal symptoms generally occur in cycles of 1 - 3 days depending on the species causing the infection. Other symptoms can include malaise, nausea, vomiting, diarrhea, cough, arthralgia (joint aches), respiratory distress and abdominal and back pain. Paleness and jaundice may also be present. Enlargement of the liver and spleen (hepatosplenomegaly) may occur and is more prominent in chronic infections. Infection with *P. falciparum* is potentially acutely fatal and most commonly manifests as a febrile illness with or without coagulation defects, shock, renal and liver failure, acute encephalopathy, pulmonary and cerebral edema, and coma. The case-fatality rate for *falciparum* malaria is 10–40% in the absence of prompt treatment.

Duration of an untreated primary attack can vary from a week to a month or longer. Relapses of *P. vivax* and *P. ovale* infections can occur at irregular intervals. Malaria infections may persist for life (chronic infections), with or without recurrent episodes of fever.

C. Reservoirs

Humans are the only important reservoir for human malaria. Non-human primates are naturally infected by many malarial species that can potentially infect humans, but natural transmission from non-human primates to humans is extremely rare.

D. Modes of Transmission

- Malaria is transmitted by the bite of an infected female *Anopheles* mosquito.
- Rarely congenital (from mother to fetus) transmission may occur as well as transmission through transfusions or the use of contaminated needles.

E. Incubation Period

- A. The time between the infective bite and the appearance of clinical symptoms is approximately 7–14 (9-14) days for *P. falciparum*, 8–14 (12-18) days for *P. vivax* and *P. ovale*, and 7–30 (18-40) days for *P. malariae*.
- B. With some strains of *P. vivax*, mostly from temperate areas, there may be a prolonged incubation period of 8 – 10 (6-12) months; even longer incubations may occur with *P. ovale*.

- C. With infections acquired by blood transfusion, the incubation period is dependant on the number of parasites infused; it is usually short, but may range up to 2 months.

F. Period of Communicability or Infectious Period

Malaria is not directly communicable from person-to-person except for congenital transmission; however, during parasitemia, the disease may be transmitted to other persons through blood transfusion or through shared contaminated needles. Infected human hosts remain infectious for *Anopheles* mosquitoes for prolonged periods of time (1 – 3 years, or longer, depending on the species) if they are not adequately treated.

G. Epidemiology

Malaria is endemic throughout the tropical areas of the world. About half of the world's population lives in areas where transmission occurs frequently. In 2010 an estimated 219 million cases of malaria occurred worldwide and 660,000 people died, with most (91%) in the African Region. Areas with the highest prevalence include sub-Saharan Africa, parts of Central and South America, India, and parts of Oceania and Southeast Asia. Transmission is also possible in more temperate climates such as in the United States, where *Anopheles* mosquitoes are present. Mosquitoes in airplanes flying from tropical climates have been the source of occasional cases in persons working or living near international airports ("airport malaria") and further transmission of imported cases by local mosquitoes has been documented. However, nearly all of the malaria cases reported annually in the United States (approximately 1500) are acquired abroad. *P. vivax* and *P. falciparum* are the most common species worldwide. The worldwide spread of strains of chloroquine-resistant *P. falciparum* and *P. vivax* is of increasing importance. Resistance to other antimalarial drugs is now occurring in many areas where the drugs are widely used. The only cases occurring in Iowa are imported.

H. Bioterrorism Potential

None.

2) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify imported cases of malaria.
- To ensure that cases are appropriately contained and treated to prevent the introduction of malarial parasites into American mosquito populations.
- To identify cases acquired in the United States, if they occur, so appropriate active surveillance and mosquito control interventions can be implemented.
- To provide travelers with appropriate preventive health information.

B. Laboratory and Healthcare Provider Reporting Requirements

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report. The preferred method of reporting is by utilizing the Iowa Disease Surveillance System (IDSS). However, if IDSS is not available, the reporting number for IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736; fax number (515), 281-5698, mailing address:

IDPH, CADE
Lucas State Office Building, 5th Floor
321 E. 12th Street
Des Moines, IA 50319-0075

Postage-paid disease reporting forms are available free of charge from the IDPH clearinghouse. Call (319) 398-5133 or visit the website:

healthclearhouse.drugfreeinfo.org/cart.php?target=category&category_id=295 to request a supply.

Laboratory Testing Services Available

The University of Iowa State Hygienic Laboratory (SHL) performs testing for malaria. Healthcare providers may send thick and thin blood smears to SHL. The CDC conducts testing for malaria by serologic tests only under special circumstances (*e.g.*, serum of a blood donor suspected of being a source of transfusion-related malaria or serum for laboratories conducting malaria-related studies) or with prior approval. For approval of serologic testing and further information contact SHL parasitology at (319) 335-4500. The SHL website is: www.shl.uiowa.edu/

C. Local Public Health Agency Follow-up Responsibilities

Case Investigation

It is the LPHA responsibility to complete a Malaria case investigation by interviewing the case and others who may be able to provide pertinent information. Much of the information required can be obtained from the case's healthcare provider or medical record.

1. Use the following guidelines to assist in completing the form:
 - a. Record the demographic information, date of symptom onset, pregnancy status, healthcare provider information, and whether hospitalized (including location and associated dates).
 - b. Record laboratory results, particularly the species of malaria, and the laboratory that performed the testing.
 - c. Record information about whether and where the case has spent time out of the country in the past four years, including duration of stay and date returned.
 - d. Indicate whether the case took malaria prophylaxis and, if so, what kind.
 - e. Record whether the case has had a history of malaria within the past 12 months.
 - f. Record whether the case has had a blood transfusion within the past 12 months. *Note:* If the patient is a recent blood donor, this information should be provided to CADE as soon as possible so CDC and other appropriate agencies can be notified.
 - g. Be sure to record all clinical complications and whether the illness was fatal.
 - h. Indicate which therapy was given for this illness.
2. There is a "notes" section in IDSS which can be used to document other relevant aspects of the investigation that are not captured elsewhere (*e.g.*, other risk information such as recent history of injection drug use or perinatal transmission, history of malaria prior to the last 12 months, any medical care received abroad.)
3. If several attempts have been made to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), contact IDPH and enter as much information as has been gathered. If using IDSS, select the appropriate reason under the Event tab in the Event Exception field.
4. After completing the investigation, enter into IDSS, or send FAX and attach lab report(s) and mail (in an envelope marked "confidential") to IDPH, Center for Acute Disease Epidemiology. The mailing address is:

IDPH, CADE
Lucas State Office Building, 5th Floor
321 E. 12th Street
Des Moines, IA 50319-0075
FAX: 515-281-5698

3) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements

Minimum Period of Isolation of Patient

No restrictions except for exclusion from blood donation.

Minimum Period of Quarantine of Contacts

No restrictions.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Locally Acquired Case

A case of malaria acquired in the United States is possible but such cases are rare. A case acquired in Iowa is even less likely. If it is determined during the course of an investigation that a case does not have a recent travel history to an endemic country, measures such as investigating areas visited by the case to locate the focus of infection and surveillance of other people for illness may be necessary. Contact the Center for Acute Disease Epidemiology at (800) 362-2736.

D. Preventive Measures

International Travel

- People traveling to malaria-endemic parts of the world should be notified of their risk of contracting the disease and control measures they can take to protect themselves from mosquitoes. Travelers can take prophylactic antimalarial drugs prescribed by their healthcare provider and use repellents, wear protective clothing and use mosquito nets when rooms are not screened.
- Detailed recommendations for preventing malaria are available 24 hours a day from the CDC Malaria Hotline, which can be accessed by telephone at (770) 488-7788, by fax at (888) CDC-FAXX or (888) 232-3299, or CDC's website: www.cdc.gov/malaria/
- Travelers and recent immigrants from malaria-endemic regions with symptoms suggestive of malaria should be referred to a healthcare provider for prompt testing and treatment. Failure to treat individuals with malaria could lead to their becoming a local source of malaria transmission to mosquitoes if bitten, then to other people bitten by those mosquitoes. This is unusual, but has occurred in the United States.

4) ADDITIONAL INFORMATION

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Malaria can be found at: www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm#top

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

References

- American Academy of Pediatrics. *2003 Red Book: Report of the Committee on Infectious Diseases, 26th Edition*. Illinois, American Academy of Pediatrics, 2003.
- CDC. Regional Malaria Information. Available at www.cdc.gov/travel/regionalmalaria
- Heymann, D.L., ed. *Control of Communicable Diseases Manual, 20th Edition*. Washington, DC, American Public Health Association, 2015.
- MDPH. *Regulation 105 CMR 300.000: Reportable Diseases and Isolation and Quarantine Requirements*. MDPH, Promulgated November 1998, (Printed July 1999).

Additional Resources:

www.cdc.gov/ncidod/dpd/parasites/malaria/malaria_form.pdf

www.cdc.gov/travel/diseases/malaria/index.htm
