09-ID-47

Committee: Infectious

Title: Public Health Reporting and National Notification for Malaria

I. Statement of the Problem

CSTE position statement 07-EC-02 recognized the need to develop an official list of nationally notifiable conditions and a standardized reporting definition for each condition on the official list. The position statement also specified that each definition had to comply with American Health Information Community recommended standards to support "automated case reporting from electronic health records or other clinical care information systems." In July 2008, CSTE identified sixty-eight conditions warranting inclusion on the official list, each of which now requires a standardized reporting definition.

II. Background and Justification

Background

Malaria is a mosquito-borne disease caused by a parasite; intraerythrocytic protozoa of the genus *Plasmodium* (e.g., *P. falciparum, P. vivax, P. ovale,* and *P. malariae* among other species).The first two species cause the most infections worldwide. *P. falciparum* is the agent that most commonly causes severe and potentially fatal malaria. There were an estimated 247 million clinical cases and 881,000 deaths in 2006, mostly in children under 5 years of age living in sub-Saharan Africa. *P. vivax* and *P. ovale* have dormant liver stage parasites, which can reactivate and cause malaria several months or years after the infecting mosquito bite. *P. malariae* can result in long-lasting infections and if untreated can persist asymptomatically in the human host for years, even a lifetime. About 1,200 to 1,500 cases of malaria are reported each year in the United States, most of which are imported, i.e., acquired in malaria-endemic countries.

The first symptoms of malaria (most often fever, chills, sweats, headaches, muscle pains, nausea and vomiting) are often not specific and are also found in other diseases (such as influenza and other common viral infections). Likewise, the physical findings are often not specific (elevated temperature, perspiration, tiredness). In severe malaria (caused by *P. falciparum*), clinical findings (confusion, coma, neurologic focal signs, severe anemia, respiratory difficulties) are more striking and may increase the suspicion index for malaria.

Justification

Malaria meets the following criteria for a nationally and **standard** notifiable condition, as specified in CSTE position statement 08-EC-02:

- A majority of state and territorial jurisdictions—or jurisdictions comprising a majority of the US population—have laws or regulations requiring **standard** reporting of malaria to public health authorities
- CDC requests **standard** notification of malaria to federal authorities
- CDC has condition-specific policies and practices concerning the agency's response to, and use of, notifications.

III. Statement of the desired action(s) to be taken

CSTE requests that CDC adopt this standardized reporting definition and classification for malaria to facilitate timely, complete, and standardized local and national reporting of this condition.

IV. Goals of Surveillance

To provide information on the temporal, geographic, and demographic occurrence of malaria to facilitate its prevention and control.

V. Methods for Surveillance

Surveillance for malaria should use the sources of data and the extent of coverage listed in table V below.

Table V. Recommended sources of data and extent of coverage for ascertaining cases of malaria.

	Coverage	
Source of data for case ascertainment	Population-wide	Sentinel sites
clinician reporting	x	
laboratory reporting	x	
reporting by other entities (e.g., hospitals, veterinarians, pharmacies)		
death certificates		
hospital discharge or outpatient records		
extracts from electronic medical records		
telephone survey		
school-based survey		
other _____		

VI. Criteria for Reporting

Reporting refers to the process of healthcare providers or institutions (e.g., clinicians, clinical laboratories, hospitals) submitting basic information to governmental public health agencies about cases of illness that meet certain reporting requirements or criteria. The purpose of this section is to provide those criteria that should be used by humans and machines to determine whether a specific illness should be reported.[1]

A. Narrative description of criteria to determine whether a case should be reported to public health authorities

Report any person (symptomatic or asymptomatic) with laboratory confirmed malaria parasitemia diagnosed in the United States, regardless of whether the person experienced previous episodes of malaria while outside the country.

Other recommended reporting procedures

- All confirmed cases of malaria should be reported.
- Reporting should be on-going and routine.
- Frequency of reporting should follow the state health department's weekly schedule.

[1] "Human-based" criteria (described below under "A. Narrative") can be applied by medical care providers and laboratory staff based on clinical judgment and clinical diagnosis. Machine-based criteria (described below under "B. Table") can be applied using computerized algorithms that operate in electronic health record systems, including computerized records of laboratory test orders and laboratory test results.

B. Table of criteria to determine whether a case should be reported to public health authorities

Table VI-B. Proposed Table of criteria to determine whether a case should be reported to public health authorities. Note: The following criteria are proposed for evaluation before general implementation. For purposes of currently implementing reporting the narrative description in VI-A, should be used.

Criterion	Reporting
Clinical Presentation	
fever	C
headache	C
weakness	C
sweats	C
chills	C
back pain	C
myalgia	C
diarrhea	C
Laboratory findings	
demonstration of malaria parasites in blood films	S
demonstration of malaria parasite by molecular testing (e.g. PCR)	S
demonstration of malaria parasite by antigen testing (e.g. RDT)	C
Epidemiological risk factors	
travel to a malaria endemic area within the previous three months	C
Received a blood transfusion form a donor with malaria	C
Was recently born to a mother with malaria	C

Notes:
S = This criterion alone is sufficient to report a case
C = This finding corroborates (i.e., supports) the diagnosis of—or is associated with—malaria, but is not included in the case definition and is not required for reporting.

C. Disease Specific Data Elements:

Disease-specific data elements to be included in the initial report are listed below.

Clinically compatible symptoms AND
Positive tests result

- Demonstration of malaria parasites in blood films OR
- Demonstration of malaria parasite by molecular testing (e.g. PCR)

Disease-specific data elements to be included in the follow-up report to CDC are listed below.

Was patient admitted to hospital?

- hospital name
- hospital address

Has the patient traveled or lived outside the U.S. during the past 4 years?

- country
- date returned to U.S. (mm/dd/yyyy)
- duration of stay in foreign country (days)

Did patient reside in U.S. prior to most recent travel?
Principal reason for travel from/to U.S. for most recent trip
Was malaria chemoprophylaxis taken?

- Chloroquine
- Mefloquine
- Doxycycline
- Primaquine
- Atovaquone/proguanil
- Other: _____

Were all pills taken as prescribed?
History of malaria in last 12 months (prior to this report)?

- date of previous illness
- species
- blood transfusion/organ transplant within last 12 months?
- clinical complications for this attack
- therapy for this attack

VII. Case Definition for Case Classification:

A. Narrative description of criteria to determine whether a case should be classified as confirmed.

Laboratory criteria for diagnosis:

Detection of circulating malaria-specific antigens using rapid diagnostic test (RDT)
OR

Detection of species specific parasite DNA in a sample of peripheral blood using a Polymerase Chain Reaction test[2].

OR

Detection of malaria parasites in thick or thin peripheral blood films.

Case classification

Confirmed case by:

1. Detection and specific identification of malaria parasites by microscopy on blood films in a laboratory with appropriate expertise in any person (symptomatic or asymptomatic) diagnosed in the United States, regardless of whether the person experienced previous episodes of malaria while outside the country.

OR

2. Detection of *Plasmodium* species by nucleic acid test[3] in any person (symptomatic or asymptomatic) diagnosed in the United States, regardless of whether the person experienced previous episodes of malaria while outside the country.

Suspected case by:

1. Detection of *Plasmodium* species by rapid diagnostic antigen testing without confirmation by microscopy or nucleic acid testing in any person (symptomatic or asymptomatic) diagnosed in the United States, regardless of whether the person experienced previous episodes of malaria while outside the country.

[2] Laboratory-developed malaria PCR tests must fulfill CLIA requirements, including validation studies

Comment

A subsequent attack experienced by the same person but caused by a different *Plasmodium* species is counted as an additional case. A subsequent attack experienced by the same person and caused by the same species in the United States may indicate a relapsing infection or treatment failure caused by drug resistance or a separate attack.

Blood smears from questionable cases should be referred to the CDC Division of Parasitic Diseases Diagnostic Laboratory for confirmation of the diagnosis.

Cases also are classified according to the following World Health Organization categories:

- Autochthonous:
  - Indigenous: malaria acquired by mosquito transmission in an area where malaria is a regular occurrence
  - Introduced: malaria acquired by mosquito transmission from an imported case in an area where malaria is not a regular occurrence
- Imported: malaria acquired outside a specific area (e.g., the United States and its territories)
- Induced: malaria acquired through artificial means (e.g., blood transfusion, common syringes, or malariotherapy)
- Relapsing: renewed manifestation (i.e., of clinical symptoms and/or parasitemia) of malarial infection that is separated from previous manifestations of the same infection by an interval greater than any interval resulting from the normal periodicity of the paroxysms
- Cryptic: an isolated case of malaria that cannot be epidemiologically linked to additional cases

B. Classification Tables

Table VII-B lists the criteria that must be met for a case to be classified as confirmed.

Table VII-B. Proposed table of criteria to determine whether a case is classified. Note: The following criteria are proposed for evaluation before general implementation. For purposes of current notification, the narrative description in VII-A, should be used.

	Case Definition
Criterion	Confirmed
Clinical Presentation	
fever	C
headache	C
weakness	C
sweats	C
chills	C
back pain	C
myalgia	C
diarrhea	C
Laboratory findings	
demonstration of malaria parasites in blood films	S
demonstration of malaria parasite by molecular testing (e.g. PCR)	S
demonstration of malaria parasite by antigen testing (e.g. RDT)	C
Epidemiological risk factors	
travel to a malaria endemic area within the previous three months	C
Received a blood transfusion form a donor with malaria	C
Was recently born to a mother with malaria	C

Notes:
S = This criterion alone is sufficient to classify a case
C = This finding corroborates (i.e., supports) the diagnosis of—or is associated with—malaria, but is not included in the case definition and is not required for reporting.

VIII. Period of Surveillance

Surveillance should be on-going.

IX. Data sharing/release and print criteria

Notification to CDC for confirmed and suspected cases of malaria is recommended.

- Malaria cases reported to Malaria Branch staff directly from the appropriate divisions within each state and electronic reports of confirmed malaria cases that are received via NNDSS are aggregated and summarized on an annual basis. The analysis of malaria case data is summarized annually in the National Malaria Surveillance Summary published in the MMWR.

- States and territories will be provided the results of the compiled malaria case data annually in National Malaria Surveillance Summary published in the MMWR.

- State-specific compiled data will continue to be published in the annual MMWR Surveillance Summaries. All cases are verified with the state (s) before publication. The report is readily available to the public and other organizations on the MMWR website.

- No formal re-release of the case data is provided. The National Malaria Surveillance Summary is readily available to the public and other organizations in the MMWR Surveillance Summary publication.

X. References

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