MENINGITIS; BACTERIAL

Does Not Include Meningococcal Disease

Background

This case definition was developed by the Armed Forces Health Surveillance Branch (AFHSB) for the purpose of epidemiological surveillance of bacterial meningitis.[1]

Clinical Description

Meningitis is a serious, potentially life-threatening, infection of the membranes (meninges) surrounding the brain and spinal cord.. The leading causes of bacterial meningitis in the United States are *Streptococcus pneumoniae*, group B *Streptococcus*, *Neisseria meningitidis, Haemophilus influenzae*, and *Listeria monocytogenes;* causes vary by age group. Symptoms include sudden onset of fever, headache and stiff neck, often accompanied by nausea, vomiting, photophobia, and altered mental status. Laboratory testing of blood and cerebrospinal fluid is required for diagnosis and bacteria identification followed by immediate treatment with antibiotics. For prevention, vaccines are available and recommended for three types of meningitis causing bacteria *Neisseria meningitidis*, *Streptococcus pneumoniae*, and *Haemophilus influenzae* type b (Hib).[2]

Case Definition and Incidence Rules

For surveillance purposes, a case of *bacterial* meningitis is defined as:

- *One hospitalization* with a case defining diagnosis of bacterial meningitis (see ICD9 and ICD10 code lists below) in the *primary* or *secondary* diagnostic position; or

- One record of a reportable medical event of bacterial meningitis.

Incidence rules:

For individuals who meet the case definition:

- The incidence date is considered the date of the first reportable medical event report or hospitalization that includes a defining diagnosis of bacterial meningitis.

- An individual may be considered an incident case only *once per surveillance period.*

Exclusions:

- None

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[1] Armed Forces Health Surveillance Center. Surveillance Snapshot: Bacterial Meningitis Among Beneficiaries of the Military Health System, 1998-2013. *Medical Surveillance Monthly Report (MSMR);* 2013 Nov; Vol 20(11): 15.
[2] Centers for Disease Control and Prevention (CDC). Bacterial Meningitis. See http://www.cdc.gov/meningitis/bacterial.html; Accessed May 2016

Codes

The following ICD9 and ICD10 codes are included in the case definition:

Condition	ICD-10-CM Codes	ICD-9-CM Codes
Bacterial meningitis	A02.21 (salmonella meningitis)	003.21 (salmonella meningitis)
	A17.0 (tuberculous meningitis)	013.0 (tuberculous meningitis…) - 013.00 (unspecified) - 013.01 (bacteriological or histological examination not done) - 013.02 (bacteriological or histological examination unknown, at present) - 013.03 (tubercle bacilli found in sputum by microscopy) - 013.04 (tubercle bacilli found in sputum by microscopy, but found by bacterial culture) - 013.05 (tubercle bacilli not found by bacteriological examination, but tuberculosis confirmed histologically - 013.06 (tubercle bacilli not found by bacteriological or histological examination, but tuberculosis confirmed by other methods; inoculation of animals)
	A27.81 (aseptic meningitis in leptospirosis)	100.81 (leptospiral meningitis; aseptic)
	A39.0 (meningococcal meningitis)	036.0 (meningococcal meningitis)
	A51.41 (secondary syphilitic meningitis)	091.81 (acute syphilitic meningitis; secondary)
	A52.13 (late syphilitic meningitis)	094.2 (syphilitic meningitis)
	A54.81 (gonococcal meningitis)	098.82 (gonococcal meningitis)
	G00 (bacterial meningitis, not elsewhere classified)	*320 (bacterial meningitis)*
	G00.0 (hemophilus meningitis)	320.0 (hemophilus meningitis)
	G00.1 (pneumococcal meningitis)	320.1 (pneumococcal meningitis)
	G00.2 (streptococcal meningitis)	320.2 (streptococcal meningitis)
	G00.3 (staphylococcal meningitis)	320.3 (staphylococcal meningitis)
	G00.8 (other bacterial meningitis)	320.8 (meningitis due to other specified bacteria) - 320.81 (anaerobic meningitis) *(continued on next page)*

		- 320.89 (meningitis due to other specified bacteria; *Bacillus pyocyaneus*)
	G00.9 (bacterial meningitis, unspecified)	- 320.82 (meningitis due to gram-negative bacteria)
	G01 (meningitis in bacterial diseases classified elsewhere)	320.7 (meningitis in other bacterial diseases classified elsewhere)
	G04.2 (bacterial meningoencephalitis and meningomyelitis, not elsewhere classified)	320.9 (meningitis due to unspecified bacteria)

Development and Revisions

- In June of 2016 the case definition was updated to include ICD10 codes.

- This case definition was developed in November 2013 by the *Medical Surveillance Monthly Report (MSMR)* staff for use in a *MSMR* article on bacterial meningitis.[1] The case definition was developed based on reviews of the ICD9 codes, the scientific literature, and previous AFHSC analyses.

Case Definition and Incidence Rule Rationale

- Case finding for this definition prioritizes reportable medical events over hospitalizations.

- The case finding criteria in this case definition are designed for use with administrative healthcare data contained in the Defense Medical Surveillance System. The data generated is primarily ICD9 and ICD10 code-based data used for population health surveillance purposes. Investigators wishing to study the public health aspects of specific pathogens may find it preferable to include all diagnoses of infections caused by the pathogen of interest, not just cases of meningitis. To improve case identification and validation, investigators may wish to consider additional data sources (e.g., Health Level-7 (HL7) laboratory data, Armed Forces Health Longitudinal Technology (AHLTA) data. Currently AFHSB is unable to ensure uniform access to, and accuracy of, HL7 data for meningitis surveillance.

- The code set for this case definition lists etiologies for all types of bacterial meningitis. As such, conducting surveillance using the entire code set will provide information about the burden of disease but limited actionable data about specific organisms in the population. Investigators may wish to analyze the data for specific organisms independently as was done for the 2013 *MSMR* report.[1]

- Several, but not all, types of bacterial meningitis are reportable medical events in the Armed Forces Reportable Events surveillance system. "Haemophilus Influenzae, Invasive Disease," "Leptospirosis," "Listeriosis," "Meningococcal Disease," and "Streptococcus, Group A, Invasive" are the reportable conditions and meningitis is just one of the manifestations of such infections that are specified in the guidelines. Reports of these infections would need to specify the presence of meningitis in order for the cases to be identified under this case definition. Other bacterial causes of meningitis do not specifically warrant reporting according to the Reportable Medical Events Guidelines and Case Definitions.[3] Investigators wishing to compare specific causes of bacterial meningitis may want to consider the implications of these case finding criteria on the individual conditions.

[3] Armed Forces Reportable Medical Events Guidelines and Case Definitions, March 2012. http://www.health.mil/Military-Health-Topics/Health-Readiness/Armed-Forces-Health-Surveillance-Branch/Reports-and-Publications

Code Set Determination and Rationale

- In 2016, codes ICD9 100.81 (leptospiral meningitis; aseptic) / ICD10 A27.81 (aseptic meningitis in leptospirosis) were added to the code set. This code was not used in the analyses for the 2013 *MSMR* snapshot.

Reports

AFHSB reports on bacterial meningitis the following reports:

- Monthly: AFHSB Reportable Events Monthly Report. Available on the Defense Health Agency website at: http://www.health.mil/Military-Health-Topics/Health-Readiness/Armed-Forces-Health-Surveillance-Branch/Reports-and-Publications.

Review

Jun 2016   Case definition reviewed and adopted by the AFHSB Surveillance Methods and Standards (SMS) working group.

Nov 2013   Case definition developed by AFHSC *MSMR* staff.

Comments

Meningococcal disease: To analyze cases of meningococcal disease, the following codes were used in the November 2013 *MSMR* article. These codes are not included in the code set for bacterial meningitis documented here because the diagnoses do not specifically include the diagnosis of meningitis.

Condition	ICD-10-CM Codes	ICD-9-CM Codes
Meningococcal disease	*A39 (meningococcal infection)*	*036 (meningococcal infection)*
	A39.1 (Waterhouse-Friderichsen syndrome)	036.3 (Waterhouse-Friderichsen syndrome, meningococcal)
	A39.2 (acute meningococcemia)	036.2 (meningococcemia)
	A39.3 (chronic meningococcemia)	
	A39.4 (meningococcemia, unspecified)	
	A39.5 (meningococcal heart disease)	*036.4 (meningococcal carditis)*
	- A39.50 (meningococcal carditis, unspecified)	- 036.40 (meningococcal carditis, unspecified)
	- A39.51 (meningococcal endocarditis)	- 036.42 (meningococcal endocarditis)
	- A39.52 (meningococcal myocarditis)	- 036.43 (meningococcal myocarditis)
	A39.8 (other meningococcal infections)	*036.8 (other specified meningococcal infections)*
	- A39.81 (meningococcal encephalitis)	- 036.1 (meningococcal encephalitis)
		(continued on next page)

	- A39.82 (meningococcal retrobulbar neuritis)	- 036.81 (meningococcal optic neuritis)
	- A39.83 (meningococcal arthritis)	- 036.82 (meningococcal arthropathy)
	- A39.84 (postmeningococcal arthritis)	
	- A39.89 (other meningococcal infection)	- 036.89 (other specified meningococcal infection)
	A39.9 (meningococcal infection, unspecified)	036.9 (meningococcal infection, unspecified)