16-ID-08

Committee: Infectious Disease

Title: Revision of the Standardized Case Definition for Invasive Pneumococcal (*Streptococcus pneumoniae*) Disease or IPD

I. Statement of the Problem

Cases of invasive pneumococcal (*Streptococcus pneumoniae*) disease or IPD are currently reportable to the National Notifiable Disease Surveillance System (NNDSS). Surveillance is important in enabling an accurate assessment of IPD burden and for monitoring vaccination efforts, especially among children. As molecular techniques have improved, polymerase chain reaction (PCR) testing of IPD isolates has become more prevalent; however, results of PCR testing are not yet considered in case classification.

II. Background and Justification

Invasive pneumococcal disease is a notable cause of morbidity and mortality in the US, despite the availability of 7-valent pneumococcal conjugate vaccine (PCV7) and 13-valent pneumococcal conjugate vaccine (PCV13). After introduction of PCV7 in 2000, rates were reduced by 64-77% among adults and older children, and down to less than one case per 100,000 among children under 5 for the included serotypes. In 2010, PCV13 further lowered rates. However, in 2011 there were still more than 35,000 cases and 4,200 deaths from IPD, indicating a need for continued surveillance.

IPD has been under national surveillance since 2000, although the definition has changed several times. The most recent CSTE position statement on IPD was written in 2009, and recommended merging IPD in children under 5 years of age and drug-resistant *S. pneumoniae* surveillance into one IPD syndrome, which would be reported for all ages. It also recommended that CDC "collaborate with local, state, and territorial health departments to transfer the technology of PCR-based serotyping to state and territorial public health laboratories as soon as possible."

Since that time, the ability to test for *Streptococcus pneumoniae* using culture independent diagnostic tests (CIDTs) like PCR-based testing has become both more available and more common. The current NNDSS case definition defines a suspect case of IPD as "Any reported case lacking confirmation of isolation of *Streptococcus pneumoniae* from a normally sterile body site" and a confirmed case as "Isolation of *Streptococcus pneumoniae* from a normally sterile body site in a person of any age."

In some situations, an individual may test positive for IPD by PCR for example, but not have the bacteria isolated by culture. Particularly, previous antibiotic use makes isolation of *S. pneumoniae* much less likely. Such a case would be classified as "suspect" under the current definition; however, this designation lumps together patients with an identified agent causing their infection and those from whom the identity of the causative agent is not definitively known. Furthermore, PCR can be and is used for typing of *S. pneumoniae*, a key component of surveillance, and integrating CIDT identification into the case definition would increase overall coherence. Similar to the convention with other diseases, it is therefore suggested that a category of "probable" IPD cases be created, to classify CIDT positive but culture negative (or with absent culture results) individuals.

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

1. Utilize standard sources (e.g. reporting*) for case ascertainment for IPD. Surveillance for IPD should use the following recommended sources of data to the extent of coverage presented in Table III.

Table III. Recommended sources of data and extent of coverage for ascertainment of cases of IPD.

Source of data for case ascertainment	Coverage	
	Population-wide	Sentinel sites
Clinician reporting	X	
Laboratory reporting	X	
Reporting by other entities (e.g., hospitals, veterinarians, pharmacies, poison centers)	X	
Death certificates	X	
Hospital discharge or outpatient records	X	
Extracts from electronic medical records	X	
Telephone survey		
School-based survey		
Other _____		
2016 Template		

2. Utilize standardized criteria for case identification and classification (Sections VI and VII) for IPD and add IPD to the *Nationally Notifiable Condition List*

☐ 2a. Immediately notifiable, extremely urgent (within 4 hours)
☐ 2b. Immediately notifiable, urgent (within 24 hours)
☒ 2c. Routinely notifiable

CSTE recommends that all States and Territories enact laws (statue or rule/regulation as appropriate) to make this disease or condition reportable in their jurisdiction. Jurisdictions (e.g. States and Territories) conducting surveillance (according to these methods) should submit case notifications** to CDC.

Expectations for Message Mapping Guide (MMG) development for a newly notifiable condition: NNDSS is transitioning to HL7-based messages for case notifications; the specifications for these messages are presented in MMGs. When CSTE recommends that a new condition be made nationally notifiable, CDC must obtain OMB PRA approval prior to accepting case notifications for the new condition. Under anticipated timelines, notification using the Generic V2 MMG would support transmission of the basic demographic and epidemiologic information common to all cases and could begin with the new *MMWR* year following the CSTE annual conference. Input from CDC programs and CSTE would prioritize development of a disease-specific MMG for the new condition among other conditions waiting for MMGs.

3. CDC should publish data on IPD as appropriate in *MMWR* and other venues (see Section IX).

CSTE recommends that all jurisdictions (e.g. States or Territories) with legal authority to conduct public health surveillance follow the recommended methods as outlined above.

Terminology:
* Reporting: process of a healthcare provider or other entity submitting a report (case information) of a condition under public health surveillance TO local or state public health.
**Notification: process of a local or state public health authority submitting a report (case information) of a condition on the Nationally Notifiable Condition List TO CDC.

4. State and territorial health departments should attempt to capture the type(s) of testing performed for IPD cases. This could include surveys of laboratory testing practices, capture of LOINC and SNOMED codes from electronic laboratory reporting, or other methods.

IV. Goals of Surveillance

1. To recognize the role of molecular detection assays in classifying infectious diseases
2. To monitor the impact of immunization against IPD
3. To track progress toward Healthy People 2020 objectives
4. To assist public health jurisdictions in raising awareness of vaccine recommendations

V. Methods for Surveillance: Surveillance for IPD should use the recommended sources of data and the extent of coverage listed in Table III.

Data sources described in Table III are standard sources and will not change as a result of this position statement.

VI. Criteria for case identification

A. Narrative: A description of suggested criteria for case ascertainment of a specific condition.

Report any illness to public health authorities that meets *any* of the following criteria:

- Clinical presentation criteria

IPD causes many clinical syndromes, depending on the site of infection (e.g., bacteremia, meningitis.)

- Laboratory criteria

Laboratory identification of IPD ideally involves isolation of *S. pneumoniae* from a normally sterile body site (e.g., blood, cerebrospinal fluid, or less commonly joint, pleural or pericardial fluid). CIDT (e.g. PCR, antigen based tests) identification from a normally sterile body site may also be used. If possible, *S. pneumoniae* should be further characterized by serotyping.

- Criteria for epidemiologic linkage

No specific epidemiologic linkages are required.

Other recommended reporting procedures

- All cases of IPD should be reported.
- Reporting should be on-going and routine.
- Reporting should be done routinely using standard reporting timelines.

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

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

Criterion	Reporting Disease or Condition Subtype
Clinical Evidence	
Laboratory Evidence	
Isolation of *S. pneumoniae* from a normally sterile body site	S
Detection of *S. pneumoniae* by CIDT identification in a specimen collected from a normally sterile body site	S
Epidemiological Evidence	

Notes:
S = This criterion alone is Sufficient to report a case.
N = All "N" criteria in the same column are Necessary to report a case.
O = At least one of these "O" (One or more) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all "N" criteria in the same column—is required to report a case.
* A requisition or order for any of the "S" laboratory tests is sufficient to meet the reporting criteria.

C. Disease-specific data elements

Clinical information
Date of illness onset
Clinical syndrome (e.g., bacteremia, meningitis)

Laboratory information
Method(s) of laboratory testing (e.g., culture or CIDT)
Name of CIDT test and manufacturer
Qualitative and quantitative antimicrobial susceptibilities of isolate, if available
Serotype of isolate

Epidemiological risk factors
Underlying medical conditions
Pneumococcal vaccination history: vaccine types and dates

VII. Case Definition for Case Classification

A. Narrative: Description of criteria to determine how a case should be classified.

Clinical Criteria
IPD causes many clinical syndromes, depending on the site of infection (e.g., bacteremia, meningitis.)

Laboratory Criteria
Supportive: Identification of *S. pneumoniae* from a normally sterile body site by a CIDT without isolation of the bacteria.

Confirmatory: Isolation of *S. pneumoniae* from a normally sterile body site.

Epidemiologic Linkage
Not required.

Case Classification
Probable: a case that meets the supportive laboratory evidence.

Confirmed: a case that meets the confirmatory laboratory evidence.

Criteria to distinguish a new case of this disease or condition from reports or notifications which should not be enumerated as a new case for surveillance

A single case should be defined as a health event with a specimen collection date that occurs more than 30 days from the last known specimen with a positive lab finding.

Comment:
The use of CIDTs as stand-alone tests for the direct detection of *S. pneumoniae* from clinical specimens is increasing. Data regarding their performance indicate variability in the sensitivity, specificity, and positive predictive value of these assays depending on the manufacturer and validations methods used. It is therefore useful to collect information on the laboratory conducting the testing, and the type and manufacturer of the CIDT used to diagnose each IPD case. Culture confirmation of CIDT-positive specimens is still the ideal method of confirming a case of IPD.

B. Classification Tables

Table VII-B. Criteria for defining a case of IPD.

Criterion	Probable	Confirmed
Clinical Evidence		
Laboratory evidence		
Detection of *S. pneumoniae* from a normally sterile body site using a CIDT	N	
Isolation of *S. pneumoniae* from a normally sterile body site		N
Epidemiologic evidence		
Criteria to distinguish a new case:		
Not counted as a new case if specimen collection occurred within 30 days of the collection date of a prior case	N	N

Notes:
S = This criterion alone is Sufficient to classify a case.
N = All "N" criteria in the same column are Necessary to classify a case. A number following an "N" indicates that this criterion is only required for a specific disease/condition subtype (see below). If the absence of a criterion (i.e., criterion NOT present) is required for the case to meet the classification criteria, list the Absence of criterion as a Necessary component.
O = At least one of these "O" (One or more) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all "N" criteria in the same column—is required to classify a case. (These "O" criteria are alternatives, which means that a single column will have either no O criteria or multiple O criteria; no column should have only one O.) A number following an "O" indicates that this criterion is only required for a specific disease/condition subtype

VIII. Period of Surveillance
Surveillance is expected to be ongoing.

IX. Data sharing/release and print criteria
- Notification to CDC of confirmed and probable cases of IPD is recommended.
- Electronic reports of IPD cases in NNDSS will be summarized weekly in the MMWR tables and yearly in the Summary of Notifiable Diseases
- CDC will further analyze national IPD data periodically. These analyses could be published in the MMWR or peer-reviewed journals as appropriate.

X. Revision History

Position Statement ID	Section of Document	Revision Description
16-ID-08	Table VII-B – Probable/Confirmed	Edited lab evidence to include CIDT test results
09-ID-06	Section V – Methods for Surveillance	Added this section as per the 2016 template requirement

XI. References

1. Centers for Disease Control and Prevention. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Streptococcus pneumoniae*, 2014. Available via the Internet: http://www.cdc.gov/abcs/reports-findings/survreports/spneu14.html
2. Council of State and Territorial Epidemiologists. Enhancing local, state and territorial-based surveillance for invasive pneumococcal disease in children less than five years of age. Position Statement 2006-14, 2006.
3. Wu HM, Corderio SM, Harcourt BH, et al. Accuracy of real-time PCR, Gram stain and culture for Streptococcus pneumoniae, Neisseria meningitidis and Haemophilus influenzae meningitis diagnosis. BMC Infect Dis 2013;13-26.

XII. Coordination

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