

INVASIVE *STREPTOCOCCAL PNEUMONIAE* DISEASE SURVEILLANCE PROTOCOL

October 2007



Healthcare Provider Responsibilities

1. Report all cases of invasive *Streptococcus pneumoniae* disease within one week to the local health department.
2. Submit *Streptococcus pneumoniae* isolates from a sterile site to the Office of Laboratory Services (OLS) for serotyping. OLS may be accessed as follows:
 - a) Phone: 304-558-3530
 - b) Web:
<http://www.wvdhhr.org/labservices/shared/docs/Micro/Micro%20Request%20Form.pdf>
 - c) Mailing address: 167 11th Ave.
South Charleston, WV 25303
3. Submit paper copies of laboratory reports to the local health department via fax. This includes *S. pneumoniae* susceptibility test results.
4. Standard precautions for isolation of the hospitalized patient are recommended, including for patients with infections caused by drug-resistant *S. pneumoniae*.
5. Complete the provider (yellow) section of the WVEDSS form for invasive *S pneumoniae* disease:
<http://www.wvdhhr.org/idep/pdfs/WVEDSS/InvasiveBacterialDiseaseAllStrep.pdf>

Laboratory Responsibilities

1. Forward isolates of *S. pneumoniae* from normally sterile sites to WV OLS for serotyping. OLS may be accessed as follows:
 - a. Phone: 304-558-3530
 - b. Web:
<http://www.wvdhhr.org/labservices/shared/docs/Micro/Micro%20Request%20Form.pdf>
 - c. Mailing address: 167 11th Ave. South Charleston, WV 25303
2. Notify and fax a copy to your local health department a positive test result of *S. pneumoniae* within one week of diagnosis for public health investigation. For reference labs, please fax a copy of a lab report to West Virginia Infectious Disease Epidemiology Program (IDEP) at 304-558-8736.

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Public Health Responsibilities

1. Educate providers and the general public about the conjugate and polysaccharide pneumococcal vaccines.
2. Educate providers and the general public about appropriate use of antibiotics.
3. Inform providers and laboratories to notify their local health department within one week of diagnosis of **all** cases of invasive pneumococcal disease (*S. pneumoniae* isolated from a normally sterile site).
4. Educate laboratories to submit isolates to the West Virginia Office of Laboratory Services for typing.
5. For reported cases of invasive *S. pneumoniae*, investigate using the WVEDSS *Invasive Bacterial Disease – All Streptococcus pneumoniae* Case Report Form. Collect information from providers and laboratories and, if necessary, directly contact the patient. Results of antibiotic susceptibility testing and laboratory culture should be sent to WV Infectious Disease Epidemiology Program.
6. Report in WVEDSS as:
 - a. *Drug Resistant Streptococcus Pneumoniae* – For all reports of invasive pneumococcal disease (*S. pneumoniae* isolated from a normally sterile site), regardless of age, which are non-susceptible to antimicrobial agent/s currently approved for use in treating pneumococcal infection. For details, see 'Case Definition' below.
 - b. *Streptococcus pneumoniae in children less than age 5* – For reports of invasive pneumococcal disease (*S. pneumoniae* isolated from a normally sterile site) among children less than 5 years of age, of which the isolate is susceptible or for which susceptibilities are not available. For details, see 'Case Definition' below.
 - c. *Streptococcus pneumoniae, all other* - For reports of invasive pneumococcal disease (*S. pneumoniae* isolated from a normally sterile site) among individuals 5 years of age and older, of which the isolate is susceptible or for which susceptibilities are not available.

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Disease Prevention Objectives

1. To reduce the incidence of invasive *S. pneumoniae* (ISP) disease among children less than age five by effective use of the conjugate pneumococcal vaccine.
2. To reduce the incidence of ISP among persons age 65 and older by effective use of the polysaccharide vaccine.
3. To reduce the incidence of ISP among people with chronic diseases by effective use of pneumococcal vaccines.
4. To reduce the incidence of drug-resistant pneumococcal disease through education about appropriate antibiotic use.

Disease Control Objectives

To identify outbreaks of pneumococcal disease and institute appropriate control measures.

Disease Surveillance Objectives

1. To identify the demographic characteristics of persons with ISP.
2. To understand the risk factors for ISP in West Virginia.
3. To differentiate between pneumococcal vaccine failure and failure to receive appropriate vaccine, as risk factors for ISP.
4. To determine the antimicrobial resistance pattern of ISP isolates in the state of West Virginia.

Public Health Significance

Streptococcus pneumoniae infections are among the leading cause of illness and death worldwide among young children, persons with underlying debilitating conditions, and the elderly. In the United States, pneumococcal disease is estimated to account for 3,000 cases of meningitis; 50,000 cases of bacteremia; 500,000 cases of pneumonia; and 7,000,000 cases of otitis media annually. In the past, isolates of *S. pneumoniae* were

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susceptible to penicillin; however, penicillin-resistant and multidrug-resistant strains have begun to emerge in the United States and are widespread in some communities. The full impact of the problem is unknown.

Pneumococcal infections are most prevalent during winter months. Rates of infection are highest among infants, young children, the elderly, African-Americans, Alaskan Natives, and some American Indian populations. These infections are also more common and more severe among people with congenital or acquired humoral immunodeficiency, HIV infection, absent or deficient splenic function (e.g., sickle cell disease, congenital or surgical asplenia), or abnormal innate immune responses. Children with cochlear implants have higher rates of pneumococcal meningitis.

Since 2000 when PCV7 was recommended for routine use in infants, the incidence of all invasive pneumococcal infections has decreased by 80% among children younger than 2 years of age and by approximately 90% for infections caused by vaccine and vaccine-related serotypes. There has also been a decrease in the number of cases among older children and adults.

The proportion of invasive *S. pneumoniae* isolates not susceptible to penicillin has also decreased in some areas. In some areas, an increase in the frequency of acute otitis media and invasive disease caused by serotypes not contained via PCV7 (serotype replacement) has been noted. Continued surveillance of invasive pneumococcal infections is critical to determine whether, and how frequently, serotype replacement may be occurring.

The need for surveillance of invasive *Streptococcus pneumoniae* is several-fold:

1. To monitor incidence rates of ISP and DRSP.
2. To monitor the risk factors for ISP and DRSP in West Virginia.
3. To evaluate the effectiveness of immunization policies and programs in our state.
4. To guide the choice of empiric antibiotic therapy for meningitis, depending on the regional prevalence of DRSP.
5. To supply information to discourage inappropriate antibiotic use.

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Clinical Description

Pneumococcus is a common cause of pneumonia, otitis media, and sinusitis, particularly in infants and children. Patients with pneumococcal pneumonia may experience an abrupt onset of high fever and shaking chills, productive cough, pleuritic chest pain, respiratory distress, rapid heart rate, malaise, and weakness. When the bacteria invade the blood stream, bacteremia, meningitis, septic arthritis, peritonitis, and other conditions may result. Symptoms of pneumococcal meningitis include a stiff neck, photophobia, fever and headache.

Etiologic Agent

The pathogen is the bacteria *Streptococcus pneumoniae* (pneumococcus).

Reservoir

This bacteria is found only in humans. It is present in the upper respiratory tract of asymptomatic carriers.

Mode of transmission

S. pneumoniae is transmitted through person-to-person contact via droplet spread, or by direct oral contact or indirect contact with fresh respiratory discharges. Person-to-person transmission of organisms is common, but illness among casual contacts and attendants is rare.

Incubation Period

The incubation period is not well-determined for this disease, but may be as short as one to three days.

Infectious Period

Length of communicability is also unknown, but the disease may presumably be spread any time *S. pneumoniae* is present in respiratory secretions. Treatment with an antibiotic to which the agent is susceptible should render an individual non-infectious within 24-48

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hours.

Outbreak Recognition

Although it is possible for anyone to get pneumococcal disease at any time of the year, outbreaks are apt to occur in densely populated living communities, such as nursing homes and jails. Consider the possibility of an outbreak whenever **two or more cases** occur in a facility within a short period of time. Infections occur most frequently during the winter and early spring. In outbreaks within institutions or closed population groups, immunization with the 23-valent vaccine should be carried out unless it is known that the type causing the disease is not included in the vaccine or the population is fully immunized.

2007 Case Definition for Drug-Resistant *S. pneumoniae*

Clinical description

Streptococcus pneumoniae causes many clinical syndromes, depending on the site of infection (e.g., acute otitis media, pneumonia, bacteremia, or meningitis).

Laboratory criteria for diagnosis

- Isolation of *S. pneumoniae* from a normally sterile site (e.g., blood, cerebrospinal fluid, or, less commonly, joint, pleural, or pericardial fluid) and
- "Nonsusceptible" isolate (i.e., intermediate- or high-level resistance of the *S. pneumoniae* isolate to at least one antimicrobial agent currently approved for use in treating pneumococcal infection (12, 13)⁺

⁺Resistance defined by National Committee for Clinical Laboratory Standards (NCCLS)-approved methods and NCCLS-approved interpretive minimum inhibitory concentration (MIC) standards ($\mu\text{g/mL}$) for *S. pneumoniae*. NCCLS recommends that all invasive *S. pneumoniae* isolates found to be "possibly resistant" to beta-lactams (i.e., an oxacillin zone size of less than 20 mm) by oxacillin screening should undergo further susceptibility testing by using a quantitative MIC method acceptable for penicillin, extended-spectrum cephalosporins, and other drugs as clinically indicated (12).

Case classification

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Probable: a clinically compatible case caused by laboratory-confirmed culture of *S. pneumoniae* identified as "nonsusceptible" (*i.e.*, an oxacillin zone size of less than 20 mm) when oxacillin screening is the only method of antimicrobial susceptibility testing performed

Confirmed: a clinically compatible case that is laboratory confirmed

Case classifications for Drug Resistant *Streptococcus pneumoniae* (DRSP) and Invasive Pneumococcal Disease (IPD) are modified as listed below:

- Isolates causing IPD from children less than five years of age for which antibacterial susceptibilities are available and determined to be DRSP should be reported only as DRSP.
- Isolates causing IPD from children less than five years of age which are susceptible, or for which susceptibilities are not available should be reported ONLY as IPD in children less than five years of age.

Comment: The difference between this case definition and the previous case definition for this condition is the inclusion of new case classifications for reporting purposes.

2007 Case Definition for *Streptococcus pneumoniae*, Invasive Disease Non-Drug Resistant, in Children Less Than 5 Years of Age (Invasive Pneumococcal Disease)

Clinical description

Streptococcus pneumoniae causes many clinical syndromes, depending on the site of infection (*e.g.*, acute otitis media, pneumonia, bacteremia, or meningitis). Starting in 2000, a conjugate pneumococcal vaccine is recommended for prevention of pneumococcal disease in the pediatric population.

Laboratory criteria for diagnosis

Isolation of *S. pneumoniae* from a normally sterile site (*e.g.*, blood, cerebrospinal fluid, or, less commonly, joint, pleural, or pericardial fluid).

Case classification

Confirmed: a clinically compatible case in a child less than five years of age caused by laboratory-confirmed culture of *S. pneumoniae* from a normally sterile site

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Case classifications for Drug Resistant *Streptococcus pneumoniae* (DRSP) and Invasive Pneumococcal Disease (IPD) are modified as listed below:

- Isolates causing IPD from children less than five years of age for which antibacterial susceptibilities are available and determined to be DRSP should be reported only as DRSP.
- Isolates causing IPD from children less than five years of age which are susceptible, or for which susceptibilities are not available should be reported ONLY as IPD in children less than five years of age.

Comment: The difference between this case definition and the previous case definition for this condition is the inclusion of new case classifications for reporting purposes.

Preventive Interventions

Invasive pneumococcal disease typically affects the very young and the very old. Correspondingly, there are two vaccines, the first primarily for the elderly and adults with chronic disease, and the second for infants.

1. Out of 83 known capsular types of pneumococcal bacteria, 23 types account for approximately 90% of bloodstream infections in the United States. The 23-valent polysaccharide vaccine (PPV23) contains polysaccharide antigen from these 23 types. It is recommended for all adults ≥ 65 years of age and persons over age two with any of these underlying conditions: immunocompromised or HIV-positive; chronic cardiovascular or pulmonary disease; anatomic or functional asplenia; recent organ transplantation; alcoholism/cirrhosis of the liver; diabetes mellitus; sickle cell disease; nephrotic syndrome; leukemia; lymphoma; generalized malignancy; or CSF leaks.
2. According to the American Academy of Pediatrics (AAP), the newly licensed pneumococcal conjugate vaccine (PCV7) should be routinely administered to children <24 months of age. Children 24-59 months at highest risk for ISP should also receive vaccine. These are children who have anatomic or functional asplenia, sickle cell disease, or are immunocompromised or HIV-positive.

Refer to the current AAP or Advisory Committee on Immunization Practices (ACIP) recommendations for more complete immunization information.

Surveillance Indicators

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- Proportion of cases with complete demographic information.
- Proportion of cases with type of infection and specimen source reported.
- Proportion of cases with vaccine history reported.
- Proportion of cases with underlying medical conditions reported.
- Proportion of cases with antibiotic sensitivity profile reported.
- Median number of days between date of onset of clinical symptoms and date of report to public health authorities.
- Proportion of cases with known capsular type.

Reference

Red Book – 27th Edition – 2006 Report of the Committee on Infectious Diseases, American Academy of Pediatrics.

Centers for Disease Control and Prevention

<http://www.cdc.gov/epo/dphsi/casedef/Streptococcuscurrent.htm>