

# ***Streptococcus Pneumoniae***

(Invasive Pneumococcal Disease)

## **DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS**

Per N.J.A.C. 8:57, healthcare providers and administrators shall report by mail or by electronic reporting within 24 hours of diagnosis, confirmed cases of invasive pneumococcal disease to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. A directory of local health departments in New Jersey is available at <http://localhealth.nj.gov>.

If the health officer is unavailable, the healthcare provider or administrator shall make the report to the Department by telephone to 609.826.5964, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to 609.392.2020 during all other days and hours.



# 1 THE DISEASE AND ITS EPIDEMIOLOGY

## A. Etiologic Agent

Pneumococcal diseases are infections caused by the gram-positive bacteria *Streptococcus pneumoniae* (also known as pneumococcus). *S. pneumoniae* is the leading cause of bacterial pneumonia and meningitis in the United States. Other common types of infections caused by these bacteria include middle ear infections (otitis media), blood stream infections (bacteremia) and sinus infections. There are more than 90 known serotypes of *S. pneumoniae*. The ten most common serotypes are responsible for approximately 60% of all invasive disease cases worldwide. The prevalence of any one serotype varies by age group and geographic region.

## B. Clinical Description

*S. pneumoniae* is normally found in the nasopharynx of 5% to 10% of healthy adults and 20% to 60% of healthy children. It can be found in higher amounts in certain environments, especially those where people are spending a great deal of time in close and crowded conditions (e.g., army barracks, prisons, homeless shelters, daycare). Once the organism has colonized in an adult, it is likely to persist for two to four weeks but may persist for as long as six months without causing illness.

Invasive pneumococcal disease most commonly occurs in young children, the elderly, or people with serious underlying medical conditions, such as chronic lung, heart, or kidney disease. Others at risk include people with alcoholism, diabetes, sickle cell anemia, or other immunocompromising conditions (e.g., HIV/AIDS, asplenia). Symptoms may include fever, chills, headache, ear pain, cough, chest pain, disorientation, shortness of breath, and occasionally stiff neck.

### 1. Adults

Pneumococcal pneumonia is the most common clinical presentation of invasive pneumococcal disease among adults. Symptoms include fever, chills, productive cough, shortness of breath, rapid heart rate, rapid breathing, poor oxygenation, malaise, and weakness. Nausea, vomiting, and headache occur less frequently. Complications of

pneumococcal pneumonia include empyema, pericarditis and respiratory failure. Pneumococcal bacteremia occurs in about 25% to 30% of patients with pneumococcal pneumonia. Pneumococcal meningitis accounts for 13% to 19% of all cases of invasive *S. pneumoniae*. One quarter of these patients also have pneumonia. Symptoms include headache, lethargy, vomiting, irritability, fever, stiff neck, seizures, and coma. The mortality rate of pneumococcal meningitis is 8% among children and 22% among adults but may be as high as 80% in elderly persons. Neurologic sequelae are common among survivors.

## **2. Children**

Pneumococcal bacteremia without a known site of infection is the most common invasive clinical presentation among children younger than two years of age, accounting for approximately 70% of invasive disease in this age group. Pneumococcal pneumonia accounts for 12% to 16% of invasive pneumococcal disease among children two years of age and younger. *S. pneumoniae* is also a common cause of acute otitis media and is detected in 28% to 55% of middle ear aspirates. By age 12 months, more than 60% of children have had at least one episode of acute otitis media. Complications of pneumococcal otitis media may include mastoiditis and pneumococcal meningitis.

## **C. Reservoirs**

The reservoir for *S. pneumoniae* is the nasopharynx of asymptomatic human carriers.

## **D. Modes of Transmission**

The bacteria are spread through contact with persons who are ill or who carry the bacteria in their nasopharynx. Transmission is mostly through the spread of respiratory droplets from the nose or mouth of a person with a pneumococcal infection. It is common for people, especially children, to carry the bacteria in their throats without becoming ill from it. The spread of the organism within a family or household is influenced by such factors as crowding, season, and the presence of upper respiratory infection or pneumococcal infections.

## **E. Incubation Period**

The incubation period of pneumococcal infections can vary but is generally from one to three days.

## **F. Period of Communicability or Infectious Period**

The period of communicability for pneumococcal disease is unknown, but presumably transmission can occur as long as the organism appears in respiratory secretions.

## **G. Epidemiology**

Pneumococcal infections are more common during the winter and in early spring when respiratory diseases are more prevalent. The incidence of the pneumococcal bacteremia is

relatively high among infants up to two years of age and low among teenagers and young adults. Rates of disease begin to increase again around age 55. Certain populations such as Native Americans, Native Alaskans, and African Americans appear to be especially susceptible to invasive pneumococcal disease for reasons that are unclear.

Overall, invasive pneumococcal disease decreased from 100 cases per 100,000 people in 1998 to 9 cases per 100,000 in 2015. Invasive pneumococcal disease caused by the 13 serotypes covered by the PCV13 vaccine decreased from 91 cases per 100,000 people in 1998 to 2 cases per 100,000 people in 2015. Following the introduction of the older PCV7 vaccine in 2000, dramatic declines in invasive pneumococcal disease were reported among children aged <5 years as early as 2001. Before introduction of PCV7, rates of PC7-type invasive pneumococcal disease among children in this age group were around 80 cases per 100,000 population. After the introduction of PCV7, rates of disease due to these 7 serotypes dropped dramatically to less than 1 case per 100,000 by 2007. Current data show that *S. pneumoniae* bacteria are resistant to one or more antibiotics in 30% of cases. Initial treatment of invasive disease usually includes a broad-spectrum cephalosporin, and often vancomycin, until results of sensitivity testing are available.

## **2 CASE DEFINITION**

### **A. New Jersey Department of Health**

#### **CONFIRMED**

Clinically compatible case, AND

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

#### **PROBABLE**

In 2017, CDC changed the case definition to include ‘probable cases’ identified by culture-independent diagnostic tests (CIDT). A CIDT-positive but culture-negative (or with absent culture results) denotes a probable case.

#### **POSSIBLE**

Not used.

### **B. Difference from CDC Case Definition**

NJDOH uses the same case definition as the CDC.

## 3 LABORATORY TESTING AVAILABLE

A definitive diagnosis of infection with *S. pneumoniae* generally relies on isolation of the organism from blood, cerebrospinal fluid, or other normally sterile body sites. A gram stain revealing gram-positive lancet-shaped diplococci can be suggestive of pneumococcal infection. Most hospital and commercial-based laboratories can identify the presence of *S. pneumoniae*. In special situations, testing can be performed to determine the serotype of the organism. Serotyping of isolates of *S. pneumoniae* can be performed at CDC and will be requested for outbreak situations only. Serotype testing for individual cases is not conducted.

Resistance to penicillin and other antibiotics is common. Antibiotic sensitivity testing is often performed to determine if resistance has developed. Hospital and commercial laboratories have the capability to conduct testing on these specimens.

## 4 PURPOSE OF SURVEILLANCE AND REPORTING AND REPORTING REQUIREMENTS

### A. Purpose of Surveillance and Reporting

- To identify where invasive pneumococcal disease occurs in New Jersey.
- To recognize areas in New Jersey where invasive pneumococcal disease incidence has changed (increased or decreased).
- To identify potential outbreak situations.
- To focus preventive education.

### B. Laboratory Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57) stipulates that laboratories report by electronic reporting via the Internet using the Communicable Disease Reporting and Surveillance System (CDRSS), electronic laboratory reporting (ELR) or by mail, all cases of pneumococcal disease to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain, at a minimum, the reporting laboratory's name, address, and telephone number; the age, date of birth, gender, race, ethnicity, home address, and telephone number of the person tested; the test performed; the date of testing; the test results; and the healthcare provider's name and address.

### C. Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57) stipulates that healthcare providers report by mail or electronic reporting all cases of pneumococcal disease to the local health officer

having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain the name of the disease; date of illness onset; and name, age, date of birth, race, ethnicity, home address, and telephone number of the person they are reporting. Additionally, name, address, institution, telephone number of reporting official, and other information as may be required by NJDOH concerning a specific disease should be reported.

#### **D. Health Officer Reporting and Follow-Up Responsibilities**

The New Jersey Administrative Code (NJAC 8:57) stipulates that each local health officer must report the occurrence of any case of pneumococcal disease within 24 hours of receiving the report. A written or electronic copy should be sent to the NJDOH Infectious and Zoonotic Diseases Program (IZDP).

## **5 CASE INVESTIGATION**

### **A. Forms**

There is no paper form used to report streptococcus pneumoniae. It is requested that the local health department enter all relevant information into CDRSS as described in B below.

### **B. CDRSS**

1. The mandatory fields in CDRSS include: disease, name, county, municipality, gender, race, ethnicity, signs and symptoms, laboratory results, case status and report status.
2. As of March 2017, CDRSS began to automatically assign a report status of 'e-closed' to lab results received via ELR. Cases that are culture-confirmed will be designated confirmed/e closed and those cases that are CIDT-confirmed will be designated probable/e closed. E-closed cases do not need to be evaluated by the local health department unless the case is part of an outbreak situation, in which case an investigation would be conducted and the appropriate case/report status will be selected from the list of choices. See user reference document available here: <http://cdrs-train.doh.state.nj.us/manuals/trainingMain.html>

## **6 CONTROLLING FURTHER SPREAD**

### **A. Isolation and Quarantine Requirements (NJAC 8:57)**

None.

## **B. Protection of Contacts of a Case**

Although the pneumococcal bacterium is easy to transmit, contact with a person diagnosed with a pneumococcal infection does not require antibiotic prophylaxis.

## **C. Managing Special Situations**

### **1. Daycare**

Although the pneumococcal bacterium is easy to transmit, contact with a child with pneumococcal infection does not pose a higher risk of infection than does normal day-to-day contact with healthy children. Children who come in contact with a child diagnosed with a pneumococcal infection do not require antibiotic prophylaxis. The daycare facility should be provided with information regarding hand hygiene and environmental sanitation.

### **2. Long-Term Care Facility**

If the number of reported cases in a long-term care facility is higher than usual, please contact the NJDOH IZDP as soon as possible at 609.826.5964. This situation may warrant an investigation of clustered cases to determine a course of action to prevent further cases.

## **D. Preventive Measures**

### **1. Chemoprophylaxis**

Antibiotic chemoprophylaxis of contacts is not recommended.

### **2. Vaccination**

There are two different vaccines: one primarily for adults and one for children and adults. The vaccine for adults has been available since 1983 and is called the pneumococcal polysaccharide vaccine (PPSV23 or Pneumovax) and protects against 23 types of pneumococcal bacteria. This vaccine contains serotypes 1, 2, 3, 4, 5, 6B, 7F, 8, 9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19F, 19A, 20, 22F, 23F, and 33F, which account for 88% of bacteremic pneumococcal disease. The vaccine is recommended for all adults 65 years and older and children older than two years with underlying medical conditions (diabetes, heart or lung disease, asplenia, HIV, or other immunocompromising conditions). Pneumovax is also recommended for adults 19 through 64 years old who smoke cigarettes or who have asthma.

The other vaccine is called the pneumococcal conjugate vaccine (PCV13 or Prevnar 13) and protects against 13 types of pneumococcal bacteria. The vaccine contains serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, and 23F which account for 86% of bacteremia, 83% of meningitis, and 65% of otitis media among children younger than six years. This vaccine was licensed in 2010 and is recommended for use in infants and young children. Certain older children may also need a dose of Prevnar 13. It is also recommended for adults greater than 65 years old in conjunction with PPSV23.

Additional information can be found on the CDC website at <https://www.cdc.gov/pneumococcal/clinicians/streptococcus-pneumoniae.html>

## **References**

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