Streptococcus Pneumoniae (Pneumococcal) Infections

Summary

Streptococcus pneumoniae organisms (pneumococci) are commonly found in the respiratory track of healthy people, especially children, and causes pneumococcal infections. More than 100 pneumococcal serotypes have been identified based on unique polysaccharide capsules. Most S. pneumoniae serotypes have been shown to cause serious disease, but only a few serotypes cause most pneumococcal infections. Asymptomatic carriage varies, and the duration of carriage is generally longer in children than adults. The relationship of carriage to the development of natural immunity is poorly understood. Pneumococci cause more than 50% of all cases of bacterial meningitis in the United States with approximately 2,000 cases of pneumococcal meningitis occurring each year. Risk factors for invasive pneumococcal disease include alcoholism, cerebrospinal fluid (CSF) leak, chronic heart lung liver, or renal disease, cigarette smoking, cochlear implant, decreased immune function from disease or drugs, diabetes, functional or anatomic asplenia. Invasive pneumococcal disease dramatically declined in both children and adults following the introduction of pneumococcal conjugate vaccines in 2000.

Agent

Streptococcus pneumoniae, α-hemolytic streptococci.

Transmission

Reservoir**:**

Humans are the only reservoir for *S. pneumoniae*.

Mode of transmission:

- Pneumococci are common inhabitants of the respiratory tract and bacteria may be isolated from the nasopharynx of 5-90% of health persons. *Streptococcus pneumoniae* occurs as a result of direct person-to-person contact via respiratory droplet contact or by autoinoculation in persons carrying the bacteria in their upper respiratory tract. The spread of the organism within a family or household is influenced by such factors as household crowding. Viral upper respiratory tract infections can predispose to pneumococcal infection and transmission.

Period of communicability:

- Communicability is unknown and may be as long as the organism is present in respiratory tract secretions but probably less than 24 hours after effective antimicrobial therapy is begun.

Clinical Disease

Incubation period:

The incubation period varies by type of infection but can be as short as 1 day.

Illness:

The major clinical syndromes of invasive pneumococcal disease are pneumonia, bacteremia, and meningitis. Pneumococcal pneumonia symptoms generally include an abrupt onset of

fever and chills, pleuritic chest pain, cough productive of mucopurulent, rusty sputum, dyspnea, tachypnea, hypoxia, tachycardia, malaise, and weakness. Pneumococcal bacteremia can occur with or without pneumonia and lead to arthritis, meningitis, and endocarditis. Some patients with pneumococcal meningitis also have pneumonia, which can cause headache, lethargy, vomiting, irritability, fever, nuchal rigidity, cranial nerve signs, seizures, and coma. Bacteremia without a known site of infection is the most common invasive clinical presentation of pneumococcal infection among children age 2 years or younger, and bacteremia pneumonia accounts for ¼ of invasive pneumococcal disease among children age 2 years or younger. Pneumococci are a common cause of acute otitis media.

Laboratory Diagnosis

A diagnosis of infection with *S. pneumoniae* generally relies on isolation of the organism from blood or other normally sterile body sites (e.g., CSF, middle ear fluid, joint fluid, and peritoneal fluid) OR pathogen specific nucleic acid must be detected in a specimen obtained from a normally sterile body site, using a polymerase chain reaction (PCR) assay.

Treatment

Pneumococcal bacteria are resistant to one or more antibiotics in more than 30% of cases. The emergence of drug resistant S. pneumoniae (DRSP) has made treatment of pneumococcal disease more difficult. All S. Pneumoniae isolates from normally sterile body fluids should be tested for antimicrobial susceptibility to determine the minimum inhibitory concentration (MIC) of penicillin, cefotaxime or ceftriaxone, and clindamycin. Antibiotic treatment for serious pneumococcal infections typically includes 'broad-spectrum' antibiotics until results of antibiotic sensitivity testing are available. Treatment varies by infection and antimicrobial resistance, and a consultation with an infectious disease specialist should be considered. (Refer to American Academy of Pediatrics. 2021-2024 Red Book: Report of the Committee on Infectious Diseases, 32nd Edition. Illinois, Academy of Pediatrics, 2021 for more information). Treatment decisions should ultimately be made by the patient's health care provider.

Surveillance

Case Definition:

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

Probable - Identification of *S. pneumoniae* from a normally sterile body site by a CIDT without isolation of the bacteria.

Reporting:

Report all suspected, probable or confirmed cases to the Epidemiology and Response Division (ERD) at 505-827-0006. Information needed includes: patient's name, age, sex, race, ethnicity, home address, home phone number, occupation, and health care provider.

Case Investigation:

Use the Bacterial Meningitis Invasive Respiratory Disease (BMIRD) Form to complete the investigation. Information should also be entered into NM-EDSS per established procedures.

Control Measures

The most important means of reducing infections of *S. pneumoniae* is active or passive immunization, or chemoprophylaxis in children with functional of anatomic asplenia.

1. Case management

    1.1. Isolation: Standard precautions are recommended, including for patients with infections caused by DRSP.

2. Contact management

    Prophylaxis:

    2.1. Other than children with functional or anatomic asplenia or sickle cell disease, routine chemoprophylaxis is not recommended for close contacts of index patients. Generally, people do not develop pneumococcal disease after exposure to someone with a pneumococcal infection.

Vaccination

Vaccines are the best way to prevent pneumococcal disease. There are two kinds of pneumococcal vaccines available in the United States: the 13-valent pneumococcal conjugate vaccine (PCV13) and the 23-valent pneumococcal polysaccharide vaccine (PPSV23). The Advisory Committee on Immunization Practices (ACIP) is a group of medical and public health experts that develop recommendations on use of vaccines in the US, recommendations for the use of pneumococcal vaccines in children and adults can be found at: https://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html

Management of Pneumococcal Disease in Child Care Centers

Antimicrobial chemoprophylaxis is not recommended for contacts of children with invasive pneumococcal disease, regardless of their vaccination status.

References

American Academy of Pediatrics. Kimberlin, DW ed. 2021-2024 Red Book: Report of the Committee on Infectious Diseases.32nd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2021.

Advisory Committee on Immunization Practices (ACIP). Epidemiology and Prevention of Vaccine-Preventable Diseases: Pneumococcal Disease. 14th ed. https://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html. (Accessed 9 May 2023).

Centers for Disease Control and Prevention. (2022). Pneumococcal Disease. https://www.cdc.gov/pneumococcal/index.html. (Accessed 9 May 2023).

See Invasive Group A *Streptococcus* Fact Sheet (English) (Spanish).