

Streptococcus Pneumoniae (Pneumococcus) Invasive Infections



Case Definition

Confirmed Case: Isolation of *Streptococcus pneumoniae* from a normally sterile site (e.g., blood; cerebrospinal, pleural, synovial, or peritoneal fluid; bone; **not** sputum, eye, or middle ear fluid.)

Reporting Requirements

- All positive cultures/tests for pneumococcal antigen from normally sterile sites as indicated above must be reported by laboratory. When penicillin resistance is identified in these specimens, this must be reported.
- All cases are reportable by attending health care professional.

Clinical Presentation/Natural History

In children, the most common pneumococcal infections include otitis media, bacteremia (often without a primary focus), sinusitis, pneumonia and meningitis. Forty to 50% of otitis media cases, in which an organism is cultured, are attributed to the pneumococcus. Some data indicate that it is the most common cause of meningitis in infants (except newborns) and young children. Invasive disease (variably defined, but usually excluding pneumonia) may be the first manifestation of HIV infection.

Rates of pneumococcal pneumonia have been estimated at 20/100,000 for young adults and 280/100,000 for the elderly. In Canada, 16% of all community-acquired pneumonia has been attributed to pneumococcal infections. It is estimated that about one in four cases of pneumonia are accompanied by bacteremia. Cases of bacteremia are more likely to have a primary focus in adults than in children. Other important infections in adults include sinusitis, meningitis, pleural empyema, septic arthritis, peritonitis and endocarditis.

Both children and adults may be asymptotically colonized for variable lengths of time.

The highest mortality rates occur in persons with bacteremia or meningitis. Pneumonia mortality ranges from five to 40%. In the Canadian Sentinel Health Unit Surveillance Study (SHUSS), the overall mortality rate for all invasive disease was 11%.

Etiology

Streptococcus pneumoniae; also known as pneumococcus. Canadian data on invasive isolates indicates that 7.4% show reduced susceptibility to penicillin, 3.8% reduced susceptibility to each of ceftriaxone and erythromycin, 4% to ofloxacin and 16.1% to trimethoprim/sulfamethoxazole. Two percent were resistant to three or more classes of antibiotics.

Epidemiology

Reservoir and Source: Humans. Pneumococci are commonly found in the upper respiratory tract of healthy people worldwide.

Transmission: By droplet spread, by direct oral contact, or indirectly through articles freshly soiled with respiratory discharges. Person-to-person transmission of the organisms is common, but illness among casual contacts and attendants is infrequent.

Occurrence:

General: Infection is of greater frequency and/or increased severity in the following groups:

- anatomical asplenia or functional asplenia (sickle cell disease) (highest risk of infection);
- extremes of age: less than two or 65 years and older (increased risk of infection for both);
- children less than two years of age in day care;
- chronic medical conditions: cardiovascular disease (congestive heart failure or

cardiomyopathy); pulmonary disease (COPD); chronic liver disease (cirrhosis); liver disease secondary to alcohol abuse; diabetes;

- immune compromising conditions: congenital or acquired IgG immune deficiencies; HIV infection; leukemia; lymphoma, Hodgkin's disease, multiple myeloma; generalized malignancy; transplant recipients; therapy with alkylating agents, high dose corticosteroids or antimetabolites; nephrotic syndrome; chronic renal failure;
- CSF leak (increased frequency of meningitis only);
- Black or Aboriginal (increased risk of infection for both).

Manitoba: Until 1999, only pneumococcal meningitis was reported. From 1995-1999, 22 cases were reported (five cases in 1995, zero cases in 1996, two cases in 1997, 10 cases in 1998, five cases in 1999). Between January and December 1999, there were 48 reported cases of invasive disease excluding meningitis.

Incubation Period: Not well determined; may be as short as one to three days.

Susceptibility and Resistance: Susceptibility to symptomatic pneumococcal infection increases with any process affecting the anatomic or physiologic integrity of the lower respiratory tract, including influenza, pulmonary edema of any cause, aspiration following alcoholic intoxication or other causes, chronic lung disease or exposure to irritants in the air. Immunity, specific for the infecting capsular serotype, usually follows an attack and may last for years.

Period of Communicability: Presumably until discharges of mouth and nose no longer contain virulent pneumococci in significant numbers. Penicillin will render persons with susceptible strains noninfectious within 24 to 48 hours.

Diagnosis

See **Case Definition**.

Key Investigations

- Determine risk factors for infection as well as immunization history.

Control

Management of Cases:

Treatment:

- Consult standard up-to date reference texts.

Public Health Measures:

- Manage hospitalized patients with routine infection control precautions.

Management of Contacts:

- No special management required unless in the setting of an institutional outbreak.

Management of Outbreaks:

- In outbreaks in institutions or other closed population groups, immunization with the 23-valent vaccine should be carried out unless it is known that the type causing disease is not included in the vaccine.

Preventive Measures:

- Provision of pneumococcal vaccine to at-risk groups.
- Avoid crowding in living quarters whenever practical, particularly in institutions and barracks.
- Oral penicillin V (125 mg, twice daily), administered to infants and young children with sickle-cell disease, has reduced the incidence of pneumococcal bacteremia by 84% compared with those receiving placebo. Therefore, daily penicillin prophylaxis for children with sickle cell hemoglobinopathy is recommended beginning before four months of age. Consensus on the age

at which prophylaxis should be discontinued has not been achieved. However, children with sickle-cell anemia, who had received prophylactic penicillin for prolonged intervals (but who had not had a prior severe pneumococcal infection or a splenectomy), have stopped prophylactic penicillin therapy at five years of age without increased incidence of pneumococcal bacteremia or meningitis.

- Antimicrobial prophylaxis against pneumococcal infection with oral penicillin V may be particularly useful for asplenic children not likely to respond to the polysaccharide vaccine (e.g., those less than two years of age or those receiving intensive chemotherapy or cytoreduction therapy). The age at which prophylaxis should be discontinued is not clear; some particularly high-risk persons have received prophylaxis into adulthood.
- Persons with sickle-cell disease or asplenia should be advised to seek medical attention early following the development of fever.