

4.9 Pneumococcal Invasive Disease

Etiology

Invasive pneumococcal disease (IPD) is an acute bacterial disease caused by *Streptococcus (S.) pneumoniae*. *S. pneumoniae* is gram-positive encapsulated diplococci. Although the bacteria are typically observed in pairs (diplococci) they may also occur singularly or in short chains. There are approximately 90 known pneumococcal capsular serotypes.

Case Definition

Confirmed Case

Clinical evidence of invasive disease⁶ with laboratory confirmation of infection:

- isolation of *S. pneumoniae* from a normally sterile site (excluding the middle ear and pleural cavity)

OR

- demonstration of *S. pneumoniae* DNA from a normally sterile site (excluding the middle ear and pleural cavity)

Probable Case

Clinical evidence of invasive disease¹ with no other apparent cause and with non- confirmatory laboratory evidence:

- demonstration of isolation of *S. pneumoniae* antigen from a normally sterile site (excluding the middle ear and pleural cavity)

Clinical Presentation

Pneumococcal disease is caused by the bacteria, *S. pneumonia*, and there are about 90 strains. Two types of infection caused by pneumococci are local infections and invasive infections. Pneumococci are common inhabitants of the respiratory tract. The bacteria may be isolated from the nasopharynx. The rate of asymptomatic carriage varies with age and the presence of upper respiratory infections. The duration of carriage varies but is generally longer in adults than children.

The symptoms of IPD depend on the clinical presentation. Manifestations include pneumonia, meningitis, bacteremia (septicemia), endocarditis, arthritis, and peritonitis. Bacteremia without a focus is the most common manifestation in children less than five years (50–60% of all cases). Otitis media is frequently caused by *S. pneumoniae* but isolation of *S. pneumoniae* from the middle ear is not reportable.

⁶ Invasive disease manifests itself mainly as pneumonia with bacteremia, bacteremia without a known site of infection, and meningitis.

Pneumococcal pneumonia is the most common clinical presentation among older children and adults. Symptoms generally include a rapid onset of fever and shaking, chills or rigors. The individual may also experience chest pain, productive cough, dyspnea, tachypnea, hypoxia, tachycardia, malaise, and weakness. The case fatality rate is between 5 and 7% but is typically higher in elderly persons.

It may be very difficult to distinguish pneumococcal infections from other infections, as fever may be the only initial symptom, especially in children. Most often the colonization starts in the nose or throat. It is a common bacterial complication of influenza and measles.

Pneumococcal infections can be a cause of bacterial meningitis. Clinical symptoms may include headache, lethargy, vomiting, irritability, fever, seizures, and coma. The case fatality rate is about 30% and tends to be much higher in elderly persons. Neurologic sequelae are common among survivors.

Diagnosis

The diagnosis is made by the isolation of *S. pneumoniae* from a normally sterile site excluding the middle ear. Blood cultures should be obtained, and cultures of other appropriate fluids (e.g., CSF, pleural fluid) may also be indicated. For confirmation on laboratory specimens go to the public health laboratory web site www.publichealthlab.ca or call 709-777-6583.

Epidemiology

Occurrence

The rate of invasive pneumococcal disease in the Canadian population was 6.8 or 1295 cases seen in 2000. There were no cases reported in NL for that year. The cases of invasive pneumococcal diseases reported in NL for the years 2001 – 2010 is available on the web site

http://www.health.gov.nl.ca/health/publichealth/cdc/mdr/cdr_v28n2_sept2011_vpd.pdf

Reservoir

The reservoir is humans. This bacterium is frequently colonizing the upper respiratory tract of healthy people (carriers).

Transmission

Transmission is person to person via respiratory droplets and by autoinoculation in persons carrying the bacteria in their upper respiratory tract. It has been estimated that 40% of individuals become carriers of the bacteria by age one. The spread of disease most often involves carriers. Children who attend daycares or day homes have a higher carrier rate due to the increased frequency and level of contact with other children.

Incubation Period

The incubation period varies by the type of infection but may be as short as 1-3 days.

Communicability

The period of communicability is variable, but persists as long as the organism is present in the respiratory tract. Individuals are no longer infectious 24 hours following initiation of antibiotics.

Control measures

Management of Case

Investigations

- Determine immunization status
- Identify underlying medical conditions
- Identify outcome following infection

Treatment

- Routine practices for hospitalized individuals
- Treatment with antibiotics as per the recommendation of the attending physician
 - The route, dosage, schedule, and duration depend on the severity of the illness
- Antibiotic resistant pneumococci strains have become more common

Immunization

- Promote immunization with pneumococcal vaccine as per the current Newfoundland and Labrador Immunization Manual available at web site:
http://www.health.gov.nl.ca/health/publichealth/cdc/health_pro_info.html#immunization

Exclusion

- There is no exclusion from work, school or child care recommended for the case

Management of Contacts

- Follow up of contacts is not required.

Management of Outbreaks

In areas where outbreaks may take place such as in an institution, an outbreak management team should be established to address infection prevention and control measures.

Education and Preventive measures

Certain risk factors or chronic conditions put children and adults at an increased risk of acquiring invasive pneumococcal disease. Individuals with risk factors should be assessed for eligibility for both pneumococcal conjugate and/or pneumococcal polysaccharide vaccine as per the current Newfoundland and Labrador Immunization

Manual available at web site

http://www.health.gov.nl.ca/health/publichealth/cdc/health_pro_info.html#immunization

- Educate the public about the risks of disease transmission
 - Educate healthcare professionals about the risks of pneumococcal disease for individuals with specified underlying medical conditions and others identified as at risk
 - Promote good hygiene
- A fact sheet is available at the following web site:
<http://www.phac-aspc.gc.ca/im/vpd-mev/pneumococcal-pneumococcie/professionals-professionnels-eng.php>

Reporting Requirements and Procedures

- The laboratory (hospital or public health laboratory) report case/s to the attending physician, the Chief Medical Officer of Health and the Medical Officers of Health (MOH)
- MOH office will notify, as required, local physicians, nurse practitioners, community health nurses, communicable disease control nurses (CDCNs) and Infection control practitioners (ICP), in the particular region as required for follow-up and case investigation
- The CDCN in collaboration with the ICP (if necessary) will collect case details
- The CDCN will enter the case details into the electronic reporting system and utilize the Canadian Network of Public Health Intelligence (CNPHI) tool for alerts and/or outbreak summaries

Provincial Disease Control

- Reports the aggregate case data to Public Health Agency of Canada
- Provides an analysis of the case/s with reports in the Quarterly Communicable Disease Report (CDR), also posted on the Public Health website
<http://www.health.gov.nl.ca/health/publichealth/cdc/informationandsurveillance.html>
- Coordinates the response if an outbreak occurs across RHAs

References

Centers for Disease Control and Prevention. National Immunization Program. *Epidemiology and prevention of vaccine-preventable disease*. The Pink Book. 12th

Edition 2011. Retrieved May 24th, 2013, from
<http://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html>

Gold R. *Your child's best shot: A parent's guide to vaccination*. Canadian Pediatric Society. 2002. Retrieved May 24th, 2013, from
<https://bookstore.cps.ca/stock/details/your-childs-best-shot-a-parents-guide-to-vaccination-3rd-edition>

Pneumococcal infections. The Merck Manual Second Home Edition Online. Infections. 2004. retrieved May 24th, 2013 ,from
<http://www.merck.com/mmhe/sec17/ch190/ch190n.html>

Public Health Agency of Canada. *Canadian Immunization Guide*. Sixth Edition 2002. Retrieved May 24th, 2013, from <http://www.phac-aspc.gc.ca/publicat/cig-qci/>

Public Health Agency of Canada. Case Definitions for Communicable Diseases under National Surveillance. Public Health Agency of Canada 2009. Retrieved on May 24th, 2013, from <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Pneumoco-eng.php>