Alberta Public Health Disease Management Guidelines

Pneumococcal Disease, Invasive

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Health and Wellness Promotion Branch

Public Health and Compliance Branch

Alberta Health

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Contents

Case Definition **4**
Confirmed Case 4
Reporting Requirements **5**
Physicians, Health Practitioners and Others 5
Laboratories 5
Alberta Health Services and First Nations Inuit Health Branch Public Health 5
Epidemiology **6**
Etiology 6
Clinical Presentation 6
Diagnosis 6
Treatment 6
Transmission 6
Incubation Period 6
Period of Communicability 7
Host Susceptibility 7
Incidence 8
Public Health Management **9**
Key Investigation 9
Management of a Case 9
Management of Contacts 9
Preventative Measures 9
Appendix 1: Revision History **10**
References **11**

Case Definition

NOTE: Alberta Health will update this guideline as new information becomes available.

Confirmed Case

Clinical evidence of invasive disease[A] with laboratory confirmation of infection:

- Isolation of *Streptococcus pneumoniae* from a normally sterile site[B] (excluding the middle ear and pleural cavity),

  OR

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

NOTE: Individuals with detection of *S. pneumoniae* antigen from a normally sterile site (excluding the middle ear) are considered probable cases and are NOT reported to Alberta Health.

[A] Clinical illness associated with invasive disease presents mainly as pneumonia with bacteremia, bacteremia without a known site of infection, or meningitis. Pneumonia without bacteremia is not notifiable.

[B] Normally sterile site specimens are defined as:

- blood,
- cerebrospinal fluid (CSF),
- pleural fluid,
- peritoneal fluid,
- pericardial fluid,
- bone,
- joint fluid

NOTE: Sputum and bronchial lavage samples are not considered sterile specimens. A specimen taken from a non-sterile site (e.g., swab) during an otherwise sterile procedure is not considered a "normally sterile site".

Reporting Requirements

Physicians, Health Practitioners and Others

Physicians, health practitioners and others shall notify the Medical Officer of Health (MOH) (or designate) of the zone, of all confirmed cases in the prescribed form by mail, fax or electronic transfer within 48 hours (two business days).

Laboratories

All laboratories shall report all positive laboratory results by mail, fax or electronic transfer within 48 hours (two business days) to the:

- Chief Medical Officer of Health (CMOH) (or designate), and
- MOH (or designate) of the zone.

NOTE: Isolates collected from a normally sterile site (i.e., invasive) should be submitted to the National Center for Streptococcus via the Public Health Laboratories (ProvLab) for *S. pneumoniae* serotyping for purposes of passive surveillance and evaluation of immunization programs.

Alberta Health Services and First Nations Inuit Health Branch Public Health

- The MOH (or designate) of the zone where the case currently resides shall forward the initial Notifiable Disease Report (NDR) of all confirmed cases to the CMOH (or designate) within two weeks of notification and the final NDR (amendment) within four weeks of notification.
- For out-of-province and out-of-country reports, the following information should be forwarded to the CMOH (or designate) by phone, fax or electronic transfer within 48 hours (two business days):
  - name,
  - date of birth,
  - out-of-province health care number,
  - out-of-province address and phone number,
  - positive laboratory report, and
  - other relevant clinical/epidemiological information.

Epidemiology

Etiology

Streptococcus pneumoniae (pneumococcus) are gram-positive diplococci bacteria with more than 90 pneumococcal serotypes. Capsular polysaccharides make up the virulence factor of the bacteria.[1] *S. pneumoniae* is the most common cause of community-acquired pneumonia and invasive pneumococcal disease (IPD).[2]

Clinical Presentation

In healthy individuals, the mucosal surfaces of the upper respiratory tract and the nasopharynx are typically colonized by *S. pneumoniae*. Colonized individuals most commonly remain asymptomatic carriers.[3] However, certain pneumococcal serotypes may be more likely to invade sterile sites such as the bloodstream or meninges, resulting in an invasive infection in some carriers.[3] Prominent syndromes of IPD include bacteremia (septicemia), pneumonia with bacteremia, and meningitis.[1]

S. pneumoniae may also cause other invasive infections such as pleural empyema, mastoiditis, periorbital cellulitis, endocarditis, pericarditis, soft tissue infection, pyogenic arthritis, osteomyelitis, and peritonitis.[1,4–6] *Streptococcus pneumoniae* infections are a major cause of illness and death worldwide. The case fatality rate ranges from 5–7% for bacteremic pneumococcal infection, but is higher among the elderly.[2]

Diagnosis

Diagnosis is made by the isolation of *S. pneumoniae* from a normally sterile site or by detection of *S. pneumoniae* DNA from a normally sterile site. Detection of *S. pneumoniae* DNA does not provide or allow identification of the serotype. Isolates of *S. pneumoniae* are submitted to ProvLab for antibiotic sensitivities and serotyping. The testing of isolates for antibiotic resistance and serotype provides essential information for surveillance of IPD. Refer to the ProvLab Guide to Services for more information on specimen collection recommendations.

Pneumococcal pneumonia in adults can also be determined by detection of pneumococcal capsular antigen in urine. This test is not useful in the diagnosis of children, as positive results may be seen with asymptomatically colonized children.[5,6] Individuals with a positive urine antigen result are considered probable cases but are NOT reportable to Alberta Health.

Treatment

- Appropriate antibiotics.
- Treatment of invasive disease often requires hospitalization.

Transmission

Transmission is by direct person-to-person contact with respiratory droplets of an infected or colonized person or by indirect contact with respiratory secretions from an infected or colonized person (e.g. coughing, talking or sneezing).[1,3]

Incubation Period

The incubation period is not well determined but is thought to be as short as 1 to 3 days.[2]

Period of Communicability

The period of communicability is unknown and may persist as long as the organism is present in the respiratory tract of a colonized or infected person. Individuals are likely not contagious beyond 24 hours following the initiation of appropriate antibiotic treatment.[2,6]

Host Susceptibility

Infection confers serotype specific immunity that may last for years. Host risk factors for acquiring IPD include:

- Individuals younger than two years of age and individuals 65 years and older,
- Children attending a child care center,
- Malnourished children and low birth weight infants in developing countries.
- Other individuals with an increased risk for IPD (see Table 1) include those with:
  - conditions resulting in altered or impaired immune function,
  - certain chronic conditions, and/or
  - certain lifestyle factors.

Table 1: Individuals with Increased Risk for IPD[2]

Altered or Impaired Immune Function	Chronic Medical Conditions	Lifestyle Factors
• Immunosuppressive therapy for example the use of long term corticosteroids, chemotherapy, radiation therapy, post-organ transplant therapy (including candidates for solid organ or islet transplant and hematopoietic stem cell transplant recipients) • HIV infection • Congenital immunodeficiencies involving any part of the immune system including B-lymphocyte (humoral) immunity, T-lymphocyte (cell) mediated immunity, complement system (properdin or factor D deficiencies) or phagocytic functions • Anatomic or functional asplenia/hyposplenism • Sickle cell disease and other hemoglobinopathies • Malignant neoplasms including leukemia, lymphoma, Hodgkin's disease, and multiple myeloma	• Cardiac disease, • Pulmonary disease (excluding asthma unless treated with high dose oral corticosteroid therapy) • Liver disease (including hepatitis B and C and cirrhosis due to any cause) • Renal diseases • Congenital or acquired cerebrospinal fluid (CSF) leak • Cochlear implant • Neurological condition that affects clearance of oral secretions • Diabetes mellitus	• Residents of long-term care facilities • Smokers or persons exposed to tobacco smoke • Living in a chronically disadvantaged situation or homelessness • People who inject drugs (PWID) • Alcoholism

Incidence

In 1997, a 23-valent polysaccharide pneumococcal vaccine was introduced to the routine immunization program in Alberta for people over 65 years of age and those in high-risk groups. In 2002, a 7-valent conjugate vaccine was added to the universal infant immunization program. This was replaced by a 13-valent conjugate vaccine in 2010.[7] Surveillance data in Alberta has shown a significant reduction in the incidence of IPD caused by vaccine serotypes suggesting that immunization programs have been effective in reducing targeted IPD serotypes. However, serotype replacement has been observed in Alberta.[8]

Of the cases reported from 1998 to 2017, in all age groups, approximately:

- 20% were fully immunized,
- about 10% were not eligible for vaccine, and
- 34% were either not immunized or their immunization status is unknown.[8]

Annual case counts can be accessed through Alberta Health's Interactive Health Data Application (IHDA).

Public Health Management

Key Investigation

- Confirm diagnosis by reviewing laboratory results.
- Obtain a history of illness including symptoms and date of symptom onset.
- Determine immunization eligibility and history specific to pneumococcal disease, including:
  - number of doses,
  - date administered,
  - where the person was immunized (e.g. out of country),
  - type of immunization provider (e.g., public health, doctor's office, travel clinic),
  - if not immunized, determine reason why.
- Determine possible source of infection, taking into consideration the incubation period.
- Identify health and lifestyle risk factors for acquiring invasive disease.

Management of a Case

- Provide information on disease transmission and infection control measures to minimize transmission such as practicing proper hand hygiene and respiratory etiquette.
- Routine precautions are recommended for all hospitalized cases.
- Droplet precautions may be warranted when antibiotic resistance is suspected or confirmed.
- If the case is not up-to-date with immunizations and to protect from infection from other serotypes, an age-appropriate pneumococcal vaccine is recommended. Refer to the *Alberta Immunization Policy (AIP)* for current eligibility recommendations.

Management of Contacts

- Follow-up of contacts is not required.

Preventative Measures

- Promote pneumococcal immunization as per the *Alberta Immunization Policy (AIP).*
- Educate the public about the risks of disease transmission and the importance of good hand hygiene and respiratory etiquette.
- Educate physicians and other healthcare professionals about the risks of IPD for individuals with specified underlying medical conditions and lifestyle factors.

Appendix 1: Revision History

Revision Date	Document Section	Description of Revision
2021/09/08	General	• Updated Template • Diagnosis and Treatment section moved to Epidemiology • Updated web links

References

1. Centers for Disease Control and Prevention (CDC). Pinkbook | Epidemiology of Vaccine Preventable Diseases | Pneumococcal Disease [Internet]. 2021. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html

2. Government of Canada. Part 4 - Active Vaccines - Pneumococcal Vaccine [Internet]. Canada Immunization Guide. 2016 [cited 2019 Feb 7]. Available from: https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-16-pneumococcal-vaccine.html

3. Government of Canada. Invasive Pneumococcal Disease - For Health Professionals [Internet]. 2019. Available from: https://www.canada.ca/en/public-health/services/immunization/vaccine-preventable-diseases/invasive-pneumococcal-disease/health-professionals.html

4. D.L. Heymann, editor. Pneumonia. In: Control of Communicable Diseases Manual. 20th ed. Washington, DC: American Public Health Association; 2015. p. 465–9.

5. Gierke R, Mcgee L, Beall ; Bernard, Pilishivili T. Vaccine Preventable Diseases Surveillance Manual,Chapter 11 - Pneumococcal [Internet]. Available from: https://www.cdc.gov/vaccines/pubs/surv-manual/chpt11-pneumo.pdf

6. Kimberlin DW, Brady MT, Jackson MA LS, editor. Pneumococcal Infections. In: Red Book: 2018 Report of the Committee on Infectious Diseases American Academy of Pediatrics. 31st ed. Itasca, IL: American Academy of Physicians; 2018. p. 639–51.

7. Alberta Health. Alberta Immunization Policy [Internet]. Edmonton: Alberta Health; 2019. Available from: www.health.alberta.ca/professionals/immunization-policy.html

8. Alberta Health. Communicable Disease Reporting System (CDRS). Edmonton, AB; 2019.