Notification Timeline:

From Lab/Practitioner to Public Health: Within 48 hours.
From Public Health to Ministry of Health: Within 2 weeks.

Public Health Follow-up Timeline: Initiate within 72 hrs.

Public Health Purpose for Notification of Pneumococcal Disease - invasive (adapted from British Columbia Center for Disease Control [2017])

- To track epidemiology trends of invasive pneumococcal disease (IPD) in Saskatchewan including characteristics, risk factors and distribution;
- To monitor the effectiveness of prevention and control measures;
- To plan expansion or introduction of future immunization programs;
- To make timely and evidence informed actions on outbreaks; and
- To inform the public and medical community about IPD.

Surveillance Case Definition[1] (Public Health Agency of Canada, May 2008)

Confirmed Case	Clinical evidence of invasive disease[1] with laboratory confirmation of infection: • isolation of *Streptococcus 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 disease[1] with no other apparent cause and with nonconfirmatory laboratory evidence: • demonstration of *S. pneumoniae* antigen from a normally sterile site (excluding the middle ear and pleural cavity)
[1] Clinical illness associated with invasive disease manifests itself mainly as pneumonia with bacteremia, bacteremia without a known site of infection, and meningitis. Pneumonia without bacteremia is not notifiable.	

[1] Surveillance case definitions ensure uniform reporting to allow comparability of surveillance data. The definition is not intended to be used for clinical or laboratory diagnosis or management of cases.

Epidemiology and Occurrence

Under Development

Additional Background Information

Causative Agent

Streptococcus pneumoniae is a gram-positive coccus that replicates in chains. It has a capsule made up of polysaccharides, which lead to the differentiation of over 90 sero-types.

Reservoir/Source

Humans - can be colonized in the upper respiratory tract but not develop infection or disease in the host.

- When the bacterium migrates in the respiratory tract and is not cleared effectively because of cillia impairment or mechanical obstruction, it can replicate and cause disease.
- When bacteremia occurs it can be spread to a variety of sites where replication leads to disease outcomes.

Pathophysiology

Invasive pneumococcal disease (IPD) can present as meningitis, endocarditis, septic arthritis, and peritonitis.

- Meningitis
  - *Streptococcus pneumoniae* is the most common etiological agent of bacterial meningitis in adults. It may arise from direct extension of infection from the middle ear, sinuses, or from bacterial seeding to the choroid plexus in the brain following bacteremia.
  - Local extension to the meninges via the sinuses or dura mater defects or the pleura via the lungs can also lead to invasive disease development.
- Peritonitis in adults, endocarditis, pericarditis and septic arthritis can occur spontaneously or secondarily to a prosthesis or underlying rheumatoid illness.
- Osteomyelitis in adults tends to involve the vertebrae.
- Unusual pneumococcal infections may suggest underlying immunodeficiencies of some cause.

Streptococcus pneumoniae can colonize the upper respiratory tract and adhere to the cells lining the nasopharanx. Impairment of ciliary action plays an important role in the development of infection in the respiratory tract.

The organism causes disease through its ability to escape phagocytosis because of its capsular structure. It is therefore able to replicate in tissues and fluids and create an intense inflammatory response causing the various familiar clinical pictures to appear. The organism does not produce any clinically significant toxins.

Symptoms

Common symptoms of IPD (e.g., infections of the meninges, joints, etc.) are:

- fever;
- malaise;
- associated symptoms of severe systemic infection - symptoms vary depending on the site of infection (see Pathophysiology section above).

In non-invasive disease, direct spread in the respiratory tract can lead to the development of disease entities such as otitis media, sinusitis, and pneumonia.

Incubation Period

The incubation period is dependent on a number of factors including site of infection, bacterial load and underlying conditions that support the development of infection. In invasive disease the clinical picture usually starts developing within a few hours of infection ocurring and is a reflection of the intense inflamatory response to the organism.

- Meningitis – unknown; probably short, 1-4 days.
- Pneumonia – not well determined; may be as short as 1-3 days.

Period of Communicability

- Unknown.
- May be as long as the bacterium is present in the respiratory tract.
- May be prolonged especially in immunocompromised hosts.
- Probably less than 24-48 hours after effective antimicrobial therapy has begun.

Mode of Transmission

- Contact with respiratory secretions or direct oral contact.
- Person to person via droplet spread is thought to be the most prevalent form of transmission but infrequently leads to illness.

Risk Groups/Risk Factors (Fauci, et al., 2007)
Settings with increased risk of exposure:

- daycare centres;
- military training camps;
- prisons;
- homeless shelters;
- air pollution;
- over-crowded living conditions;
- poor socioeconomic status.

Host factors:

- respiratory infection, inflammation (viral respiratory illness such as influenza);
- chronic obstructive pulmonary disease (COPD);
- immunosuppression due to illness or therapy;
- asplenia;
- age (infancy or elderly);
- alcoholism;
- allergies;
- cigarette smoking;
- malnutrition;
- chronic disease (including HIV, liver/kidney disease, diabetes, etc.);
- fatigue, stress and/or exposure to cold.

Specimen Collection and Transport
Specimen type is dependent on the relevant clinical disease. Material can be obtained from the infectious focus, blood or CSF. Blood cultures should be done in all cases of suspected invasive disease. Recovery of pneumococci from an upper respiratory tract culture is not indicative of the etiologic diagnosis of pneumoccocal disease in the respiratory tract.

Where appropriate, material obtained can be gram stained and subsequently cultured using standard microbiological techniques. All isolates from a normally sterile site should be tested for antibiotic sensitivity as results from this will assist in case management and antibiotic therapy.

Isolates of *S. pneumoniae* from IPD cases should be referred to Roy Romanow Provincial Laboratory (RRPL) for serotyping.

Public Health Investigation

I. Case

History

Refer to Attachment – Pneumococcal Disease (invasive) Data Collection Worksheet to assist.

Key elements to inquire about include:

- Presentation of illness.
- Medical history including underlying medical conditions that may predispose the individual to invasive disease (see risk factors/risk groups).
- Settings with increased risk of exposure (see risk factors/risk groups).
- Immunization history of case.

Public Health Interventions

Education

- All cases should be provided disease information as well as information on prevention and control measures including period of communicability and avoiding contact with vulnerable individuals.

Immunization

- Immunization to be offered if incomplete.
- If case meets eligibility criteria, immunizations should be started as per Saskatchewan Immunization Manual[2].

Isolation

- Clients are no longer communicable once on effective antibiotic therapy for 24-48 hours.
- Clients may return to work or school/daycare settings when they have clinically recovered and are able to resume normal activities.

Referrals

Specialist care and long-term follow up may be indicated in certain circumstances.

Treatment/Supportive Therapy

Treatment for clinical management is under the direction of the primary care provider. The public health practitioner should direct any questions regarding the current treatment protocols to the physician or Medical Health Officer (MHO).

II. Contacts/Contact Investigation

No contact tracing is required.

[2]https://www.ehealthsask.ca/services/Manuals/Pages/SIM.aspx

III. Environment

Child Care Centres/Institutional Control Measures

- Standard precautions for hospitalized patients (refer to local infection control manual). No specific measures.

IV. Epidemic Measures

- No specific measures.
- Immunization may be indicated for use in outbreaks.
- Outbreaks should be reported immediately to Saskatchewan Ministry of Health.

Prevention Measures

Refer to the Respiratory and Direct Contact Introduction and General Considerations section of the manual that highlights topics for client education that should be considered as well as provides information on high-risk groups and activities.

Immunization

- Routine immunization of all children with the Pneu-C (conjugate pneumococcal vaccine) as per Saskatchewan Immunization Manual.[3]
- The reader is referred to both the Saskatchewan Immunization Manual,[1] the latest version of the Canadian Immunization Guide and the latest guidelines/memos indicating provincial policies for further information.

Prophylactic Antibiotic Therapy

- Individuals with certain risk conditions may be placed on long-term prophylactic antibiotic therapy by their physician.

[3] http://www.ehealthsask.ca/services/manuals/Pages/SIM.aspx.

Revisions

Date	Change
September 2018	• Clarified the purpose for notification of cases to public health. • Incorporated an Epidemiology and Occurrence section as a placeholder. • Rearranged and updated the style into the new format of the Manual.

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Pneumococcal Disease (invasive) Data Collection Worksheet

Panorama QA complete: ☐ **Yes** ☐ **No**
Initials:

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

A) CLIENT INFORMATION

LHN -> SUBJECT -> CLIENT DETAILS -> PERSONAL INFORMATION

Last Name:	First Name: and Middle Name:	Alternate Name (Goes by):
DOB: YYYY / MM / DD Age: _____	Health Card Province: _____ Health Card Number (PHN): _____	Preferred Communication Method: (specify - i.e. home phone, text): Email Address: ☐ Work ☐ Personal
Phone #: ☐ Primary Home: ☐ Mobile contact: ☐ Workplace:		
Place of Employment/School:	Gender: ☐ Male ☐ Female ☐ Other ☐ Unknown	
Alternate Contact: _____ Relationship: _____ Alt. Contact phone: _____	**Address Type:** ☐ No fixed ☐ Postal Address ☐ Primary Home ☐ Temporary ☐ Legal Land Description Mailing (Postal address): Street Address or FN Community (Primary Home): Address at time of infection if not the same:	

B) INVESTIGATION INFORMATION

SUBJECT SUMMARY-> RESPIRATORY & DIRECT CONTACT ENCOUNTER GROUP-> CREATE INVESTIGATION

Disease Summary Classification: CASE	**Date**			**LAB TEST INFORMATION:**
☐ Confirmed	YYYY / MM / DD	☐ Person Under Investigation	YYYY / MM / DD	Date specimen collected: YYYY / MM / DD
☐ Does Not Meet Case	YYYY / MM / DD	☐ Probable	YYYY / MM / DD	Specimen type: ☐ Blood ☐ CSF ☐ Other

Disposition:

FOLLOW UP:

☐ In progress	YYYY / MM / DD	☐ Complete	YYYY / MM / DD
☐ Incomplete - Declined	YYYY / MM / DD	☐ Not required	YYYY / MM / DD
☐ Incomplete – Lost contact	YYYY / MM / DD	☐ Referred – Out of province (specify where)	YYYY / MM / DD
☐ Incomplete – Unable to locate	YYYY / MM / DD		

REPORTING NOTIFICATION Name of Attending Physician or Nurse**:**	Location:
Physician/Nurse Phone number:	Date Received (Public Health): YYYY / MM / DD

Type of Reporting Source: ☐ Health Care Facility ☐ Lab Report ☐ Nurse Practitioner ☐ Physician ☐ Other_____

Pneumococcal Disease (invasive) Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

C) DISEASE EVENT HISTORY

INVESTIGATION->DISEASE SUMMARY (UPDATE)->DISEASE EVENT HISTORY

Site / Presentation: ☐ Sepsis ☐ Meningitis ☐ Pneumonia with bacteremia ☐ Other

D) SIGNS & SYMPTOMS *(Bold text = part of case definition)*

LHN-> INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Description	No	Yes - Date of onset
Arthritis - septic		YYYY / MM / DD	**Malaise**		YYYY / MMM / DD
Cardiac - endocarditis		YYYY / MM / DD	**Meningitis**		YYYY / MMM / DD
Cardiac - pericarditis		YYYY / MM / DD	**Peritonitis**		YYYY / MMM / DD
Fever		YYYY / MM / DD	**Pneumonia**		YYYY / MMM / DD
Osteomyelitis			**Sepsis (e.g. bactremia, septicemia, etc.)**		

E) RISK FACTORS (RF followed by + impact the Immunization Forecaster)

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes Start date	N, NA, U	Add'l Info
Chronic Medical Condition - Cardiac Disease+			
Chronic Medical Condition - Diabetes Mellitus+			
Chronic Medical Condition - Liver Disease+			
Chronic Medical Condition - Lung Disease+			
Chronic Medical Condition - Other (Add'l Info))			
Contact to a known case (Add'l Info)	YYYY / MM/DD		
Exposure - Second hand smoke			
Immunocompromised - Related to underlying disease or treatment			
Special Population - Attends childcare			
Special Population – Homeless +			
Special Population - Lives in a communal setting			
Substance Use - Alcohol			
Substance Use - Tobacco			

F) IMMUNIZATION HISTORY INTERPRETATION SUMMARY

LHN -> INVESTIGATION-> IMMUNIZATION HISTORY INTERPRETATION SUMMARY

Interpretation Date: YYYY / MM / DD

Interpretation of Disease Immunity: ☐ IOM - Fully immunized (for age) ☐ IOM - Partially immunized

☐ IOM – Unimmunized ☐ IOM - Unclear immunization history **Valid doses received**: _____ **Doses needed**: _____

Reason:

☐ IOM – Interpretation of history by investigator

G) TREATMENT

LHN -> INVESTIGATION-> MEDICATIONS-> MEDICATIONS SUMMARY

Medication *(Panorama = Other Meds) :* _____

Prescribed by:_____ Started on: YYYY / MM / DD

Pneumococcal Disease (invasive) Data Collection Worksheet

Please complete **all** sections**.**

Panorama Client ID: _____
Panorama Investigation ID: _____

H) INTERVENTION

LHN -> INVESTIGATION->TREATMENT & INTERVENTIONS->INTERVENTION SUMMARY

Intervention Type and Sub Type:

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD

Education/counselling: Investigator name
☐ Prevention/Control measures YYYY / MM / DD
☐ Disease information provided YYYY / MM / DD

Immunization:
☐ Eligible Immunization recommended YYYY / MM / DD
☐ Disease-specific immunization recommended YYYY / MM / DD
☐ Disease-specific immunization given YYYY / MM / DD
Investigator name

Other Investigation Findings:
☐ Investigator Notes ☐ See Document Management

Isolation:
☐ Facility isolation YYYY / MM / DD Investigator name
☐ Home isolation YYYY / MM / DD Investigator name

Date	Intervention subtype	Comments	Next follow-up Date	Initials
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	

I) OUTCOMES

LHN-> INVESTIGATION-> OUTCOMES

☐ Not yet recovered/recovering YYYY / MM / DD ☐ ICU/intensive medical care YYYY / MM / DD ☐ Hospitalization YYYY / MM / DD
☐ Recovered YYYY / MM / DD ☐ Intubation /ventilation YYYY / MM / DD ☐ Unknown YYYY / MM / DD
☐ Fatal YYYY / MM / DD ☐ Other _____ YYYY / MM / DD

Cause of Death: (if Fatal was selected) _____

Initial Report completed by:		Date initial report completed: YYYY / MM / DD