Section 2

Respiratory and Direct Contact

Government of Saskatchewan

Respiratory and Direct Contact

Introduction and General Considerations

This section provides a general overview of the communicable diseases transmitted through respiratory and direct contact. The information in this introduction provides both general considerations and key concepts. Specific procedures and information are included within each disease chapter.

Objectives

1. Individuals infected with organisms that are transmitted through respiratory (droplet or aerosolization) and direct contact will be identified, investigated and managed in a timely manner.
2. The complications secondary to infection will be minimized in individuals through the timely identification, investigation and implementation of control measures.
3. Outbreaks will be contained through the timely identification of the source and contacts and through the implementation of prevention and control measures.
4. Health authorities will work to deliver immunization programs according to the provincially funded recommended immunization schedule. Immunization coverage rates are a useful indicator to evaluate programs and plan service delivery to provide the best protection to the population.
5. Information will be managed in a confidential manner and will be shared in accordance with Appendix B - Interjurisdictional Communication, *The Public Health Act, 1994* and *The Health Information Protection Act* and their respective regulations.
6. Information that is required for notification purposes will be extracted from the electronic case management system.

Background

As a group, acute respiratory diseases are one of the leading causes of death from any infectious disease (Heymann, 2008). It has been demonstrated that Canada's ability to fight an outbreak, such as Severe Acute Respiratory Syndrome (SARS), is more closely tied to specific strengths of the public health system than to the health system that provides individual health services. Key aspects of the public health system include the capacity to detect, prevent, understand, and manage outbreaks of significant infectious diseases.

An effective response to an outbreak of severe respiratory illness requires cooperation and collaboration among all jurisdictions – regional, First Nations, provincial, national, and international partners to ensure the timely mitigation of risk and prevention of further illness.

Reporting Requirements

See Reporting Requirements in General Information - Section 1 of the manual for guidelines. Refer to Appendix A – Reporting and Follow-up Timelines.

Methods of Control

Primary Prevention

Many of the organisms that cause respiratory diseases are spread via respiratory droplets generated by coughing and sneezing. These organisms are also spread from person to person when they are in close contact with one another or through touching something with organisms on it and then touching their mouth or nose. "In shelters and other homeless service programs large numbers of people may live together and regularly move in and out. People often share sleeping and bathroom facilities. This means people may have contact with others who have an infection" (Toronto Public Health, 2006).

Coughing and sneezing can also generate small airborne particles that can be inhaled causing infection in the recipient. In general, the following measures are the best way to avoid contact with respiratory droplets or secretions.

Hand Hygiene

"Proper handwashing with soap and water is an important barrier to many infectious diseases and promotes better health and well-being" and "handwashing is one of the most practical and effective ways of preventing the spread of disease" (World Health Organization as quoted by College of Registered Nurses of Manitoba, 2010).

This is especially important after touching surfaces or objects that might be contaminated with respiratory droplets, or after touching persons who are ill with respiratory symptoms. Alcohol hand gels are an adequate substitute when soap and clean water are not readily available and your hands are not visibly soiled. Alcohol gels are not effective if hands are soiled with protein material. Refer to Attachment – Handwashing.

Personal Protective Measures

Avoiding crowds and practicing respiratory hygiene and cough etiquette can help reduce the spread of respiratory illnesses:

- cover the nose and mouth when coughing or sneezing;
- tissues should be used to contain secretions and should be properly disposed of at the earliest opportunity;
- practice hand hygiene after handling items that may be contaminated with respiratory secretions.

Avoiding sharing of personal items (eating/drinking utensils, towels, toothbrushes, etc.) may reduce the risk of transmission of bacteria and viruses. Bacteria and viruses that cause respiratory illness may survive on hard non-porous surfaces and be transmitted to others, via hand contamination and self-inoculation. These surfaces should be cleaned and sanitized on a regular basis, especially when people are sick.

Immunization

A number of communicable diseases transmitted by respiratory contact and direct contact are preventable through vaccination. "Vaccination programs are considered to be the most cost-beneficial health intervention and one of the few that systematically demonstrate far more benefits than costs" (Health Canada, 2002, p. 2). Immunization history should be obtained from and reviewed with clients. Every effort should be made to update a client's immunizations as per the recommendations in the Saskatchewan Immunization Manual.[1]

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

Secondary Prevention
Asymptomatic carriage can serve as a source of infection to others. When a case occurs in a setting with susceptible individuals (i.e., long term care facilities), active screening of individuals may be an appropriate action so prevention and control measures can be implemented to interrupt the chain of infection.

The specific level of intervention and contact tracing varies according to the disease and should be individualized based on the guidelines in the specific agent.

General Guidelines for Investigation of Diseases Transmitted through Respiratory and Direct Contact

These guidelines aim to assist in the collection of information and define control measures for organisms that are transmitted through respiratory and direct contact. Refer to the General Information - Roles of Stakeholders section of the manual. Appendix C - Major Legislation identifies the significant Acts and Regulations that are applicable to Communicable Disease Control in Saskatchewan. The following questions/guidelines[2] can assist you to determine the approach you will need to follow to prevent and control the disease.

1. What is the source of the disease? Can it be identified? Communication with the case is important to determine the **risk factors**, **exposures** and **potential exposures of others** to the disease.
2. Who else may have been exposed to the disease? When determining the possible source and possible contacts exposed, the **incubation period, mode of transmission** and **period of communicability** are important considerations. Key considerations include:
    - Recent exposure to someone else who is sick with similar symptoms.
    - Travel history.
    - Attendance in childcare, school, daycare, healthcare settings.
3. Is an outbreak present?

[2] These questions were adapted from
http://www.health.gov.nl.ca/health/publications/diseasecontrol/dcresp.pdf

4. What is the potential impact of the disease for the individual? Their household/family? Their community?
5. Are there people who are more likely to develop symptoms or serious manifestations of the infection?
6. Is there a population who are more likely to be susceptible to the infection?
7. What interventions are available to prevent the transmission of the infection? Refer to disease specific measures and implement necessary activities.
8. Is there a high risk for transmission to others (e.g., highly communicable agent, common vehicle for transmission such as food or water, etc.)? Determine if this individual is in a situation where there is a high risk of transmission of the organism (childcare, health care worker, environmental conditions conducive to transmission, etc.). Who else may have been exposed to the disease? Conduct contact tracing to:
    - Determine if the contact is in a high-risk group.
    - Inform contacts of any prophylaxis and/or exclusion measures:
        - information that should be gathered from the contacts relates to their **level of risk**, **the need for testing**, the potential **benefit of prophylaxis** (as detailed in the disease sections specifically) and **immunization history**.
        - interventions such as **exclusion/isolation/quarantine** may be appropriate depending on the nature of the disease and the status of the contacts that have been identified.
9. Educate case and contacts regarding:
    - The nature of the disease including the incubation period, period of communicability, mode of transmission, etc.
    - Self-care measures.
    - Personal protective measures, which should always include hand washing, not sharing personal items (eating and drinking implements, towels, lip balms, etc.).
    - Disease control measures they must follow (treatment, exclusion, etc.).
    - Publicly funded treatment and chemoprophylaxis is indicated for certain diseases such as meningococcal disease, tuberculosis and *Haemophilus influenzae* type b invasive disease. Publicly funded control measures may be used in long-term care facilities in the event of an influenza outbreak.

10. Obtain an immunization history from case and appropriate contacts.
    - Immunizations should be offered to cases and contacts that are not up-to-date or who are eligible for vaccines as per the Saskatchewan Immunization Manual[3] – Chapter 5: Immunization Schedules and Chapter 7: Immunization of Special Populations.
    - Depending on the organism and other circumstances, it may be prudent to offer immunization for the disease for both the case and the contact(s). Refer to disease section for details.
11. Document case management and follow-up information on the electronic case management and surveillance system.
12. Communication with other stakeholders (physicians, acute and long term care, schools, daycares, etc.) is vital for a coordinated and efficient response to a single case or an outbreak of communicable disease. Maintaining **confidentiality** according to the corresponding legislation is important.

Special Considerations

Certain individuals and certain environments may be considered higher-risk. The following sections outline some circumstances that may need to be considered when doing your investigation.

Immunocompromised/Immunosuppression

The status of an individual's immune system may have an impact on the individual's response to the disease. When there are circumstances that have an impact on an individual's immune system, additional interventions may be required.

Elderly and Infants

Elderly people and infants may be more susceptible to some communicable diseases. Some organisms are also more virulent in these individuals.

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

Immigrants/Refugees

Depending on the diseases required to be screened for under immigration regulations and adherence with treatment regimes prior to emigrating, the immigrant or refugee may carry with them diseases specific to their country of origin. Additionally, these individuals may be more susceptible to certain diseases as immunization programs in their country of origin may be different from Saskatchewan or Canadian standards.

Individuals with Suboptimal Personal Hygiene Practices

Individuals with poor practices of personal hygiene (i.e., mentally or physically handicapped) may serve as a vehicle of transmission due to the lack of self-care measures that are useful in interrupting the chain of infection.

Child Care Centres

Young children have limited ability to implement the individual measures to reduce the risk of spread of diseases. This provides an increased opportunity for transmission. This also necessitates early identification and diligent infection control practices. Refer to the Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[4] This serves as an excellent resource for daycare settings to assist in minimizing the risk and spread of communicable diseases.

Health Care Facilities and Institutional Settings

Health care facilities present as a high-risk environment for two reasons:

1. Typically, the clients/patients within the facility are there because either they have a medical condition that puts them at greater risk for contracting an infection or they are already infected and experiencing complications of a communicable disease.
2. Health Care Workers serve as a vehicle for transmission of a communicable disease to a high-risk individual.

To avoid this, familiarity with and adherence to Infection Control Guidelines and Practices is of paramount importance.

Travel

[4] http://www.saskatchewan.ca/live/births-deaths-marriages-and-divorces/starting-a-family/early-learning-and-child-care/child-care .

Travel to destinations where one can be exposed to communicable diseases that are not common or endemic in Saskatchewan or Canada.

Environments Where Individuals are in Close Proximity to Others

This may be related to crowded living conditions such as multi-family homes and homeless shelters. It may also be related to environments where people are in close proximity to groups of people such as in schools, airport/bus terminals, public transportation vehicles, etc.

Public Health Agency of Canada (2007) states "Statistics Canada uses the measure of persons per room (PPR) to assess crowding in houses. PPR is calculated by dividing the number of persons living in a dwelling by the number of rooms." Rooms refers to all rooms within a dwelling excluding bathrooms, halls, vestibules and rooms used solely for business purposes. This statistic is not sensitive to the size of the house or the rooms, or to the composition of the household (age of occupants, etc.). For diseases transmitted through the respiratory route it is found that the higher the number of persons per room, the greater the risk for transmission within the household. Greater than one person per room puts the occupants at greater risk for these illnesses.

References

American Academy of Pediatrics. (2009). *Red book: 2009 Report of the Committee on Infectious Diseases* (28th ed.). Elk Grove Village, IL: Author.

British Columbia Centre for Disease Control. (2007). *BCCDC Communicable disease control manual.* Retrieved August, 2010 from http://www.bccdc.ca/dis-cond/comm-manual/default.htm.

College of Registered Nurses of Manitoba (2010). *Hand washing resource page*. Retrieved August, 2010 from http://www.crnm.mb.ca/news-publicawareness-handwashing.php.

Government of Newfoundland and Labrador. (2010). *Disease control manual: Diseases transmitted by respiratory routes.* Retrieved August, 2010 from http://www.health.gov.nl.ca/health/publications/diseasecontrol/dcresp.pdf.

Government of Saskatchewan. (2007). *The Public Health Act, 1994*. Regina, SK: Queens Printer Saskatchewan.

Government of Saskatchewan. (2008). *The Health Information Protection Act*. Regina, SK: Queens Printer Saskatchewan.

Health Canada. (2002). *Canadian immunization guide* (6th ed.). Ottawa, Canada: Canadian Medical Association.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

Mandell, G. L., Bennett, J. E., Dolin, R. (2000). *Mandell, Douglas, and Bennett's principles and practice of infectious diseases* (5th ed.). Philadelphia, PA: Churchill Livingstone.

Public Health Agency of Canada. (2003). *Health Canada's preparedness for and response to respiratory infections season and the possible re-emergence of SARS.* Retrieved August, 2010 http://www.phac-aspc.gc.ca/sars-sras/ris-sir/index-eng.php.

Public Health Agency of Canada. (2007). Housing conditions that serve as risk factors for tuberculosis infection and disease. *Canada Communicable Disease Report (CCDR), Vol. 33*, October 1 2007. Retrieved August, 2010 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/07vol33/acs-09/index-eng.php.

Toronto Public Health. (2006). *Breaking the chain – Infection control manual: Infection prevention and control for homeless and housing service providers.* Retrieved August, 2010 from www.toronto.ca/health/cdc/pdf/infectioncontrolmanual.pdf.

Notification Timeline:

From Lab to Public Health:

Novel Variant of Concern (VOC)[1] – Immediately[2];

Non-novel VOC - Within 24 hours

Practitioner/Institution to Public Health[3]:

Severe or Deceased: Within 24 hours.

From Public Health to Ministry of Health:

Individual case reporting of severe, novel VOC or deaths: Within 24 hours

Individual case reporting of non-severe or non-novel: Not required

Outbreaks: Initial report within 24 hours.

Updates as necessary.

Final report within 30 days of completing the investigation.

Public Health Follow-up Timeline:

Severe or Novel VOC: Within 24 hours.

Non-severe or non-novel: No follow-up required

Public Health Purposes for Notification of COVID-19

- To ensure timely detection of severe morbidity and mortality caused by COVID-19;
- To provide an early warning for changes in epidemiologic patterns that may signal a variant of concern with evidence of vaccine escape or increased severity or changing trends of severe COVID-19 including risk factors and distribution;
- To take timely and evidence informed actions on outbreaks in high-risk settings; and
- To inform the public and medical community about COVID-19.

[1] A novel VOC as defined by the WHO

[2] A phone call to the local MHO during regular business hours. Direct notification to Ministry of Health may be requested based on national or international signals.

[3] Local public health is encouraged to collaborate with their partners in ERs, long-term care facilities and hospitals to ensure all roles and responsibilities are well understood and agreed upon, specifically the timely reporting to public health of outbreaks, severe presentations of COVID-19 and deaths associated with COVID-19.

Table 1. Surveillance Case Definitions[4] (Public Health Agency of Canada, updated December 17, 2021)

Confirmed Case	A person with confirmation of infection with SARS-CoV-2 documented by: • The detection of at least one specific gene target by a **validated laboratory-based nucleic acid amplification test (NAAT) assay** (e.g. real-time PCR or nucleic acid sequencing) performed at a community, hospital, or reference laboratory (the National Microbiology Laboratory or a provincial public health laboratory) OR • The detection of at least one specific gene target by a **validated point-of-care (POC) nucleic acid amplification test (NAAT)**[a] that has been deemed acceptable to provide a final result (i.e. does not require confirmatory testing) OR • Seroconversion or diagnostic rise (at least four-fold or greater from baseline) in viral specific antibody titre in serum or plasma using a validated laboratory-based serological assay for SARS-CoV-2
Probable[5]	**A person who:** **I.** Has symptoms compatible with COVID-19 **AND** • Had a high-risk exposure with a confirmed COVID-19 case (i.e. close contact) OR was exposed to a known cluster or outbreak of COVID-19 **AND** ○ Has not had a **laboratory-based NAAT** assay for SARS-CoV-2 completed or the result is inconclusive [b] **OR** ○ Had SARS-CoV-2 antibodies detected in a single serum, plasma, or whole blood sample using a validated laboratory-based serological assay for SARS-CoV-2 collected within four weeks of symptom onset **II.** Had a POC antigen test for SARS-CoV-2 completed and the result is positive (Refer to Table 3B.)
Reinfection	**I. Laboratory-based reinfection** A confirmed case that was previously classified as resolved, that has a subsequent infection of SARS-CoV-2 where there is laboratory evidence supporting two different infections. Laboratory evidence includes: • Genome sequencing [c] or variant of concern (VOC) screening PCR testing indicates two distinct SARS-CoV-2 infections

[4] 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.
[5] The probable case definition should only be used when reporting severe case or death in an individual that did not have a PCR confirmatory test or declaring outbreaks in high-risk settings. For quality assurance purposes, the rapid antigen test should have been administered with oversight of a staff member or a health care provider.

	or • One of the infections was confirmed to be a variant of interest (VOI)/VOC or mutations associated with VOI/VOC based on genome sequencing [c] or VOC screening PCR testing **and** • The other infection occurred when the VOI/VOC was not circulating in Canada **II. Time-based Reinfection** [d] A confirmed case that was previously classified as resolved that has a subsequent confirmed infection of SARS-CoV-2 at least 90 days after the previous infection using episode date **AND** Does not meet the laboratory-based reinfection case definition.
Deceased	• A probable or confirmed COVID-19 case whose death resulted from a clinically compatible illness, unless there is a clear alternative cause of death identified (e.g., trauma, poisoning, drug overdose). • A Medical Officer of Health, relevant public health authority, or coroner may use their discretion when determining if a death was due to COVID-19, and their judgement will supersede the above-mentioned criteria. • A death can be attributed to COVID-19 when COVID-19 is the cause of death or is a contributing factor.

[a] As of February 1, 2021, the only POC test in Saskatchewan deemed acceptable to provide final results is the Abbott ID NOW.
[b] Inconclusive is defined as an indeterminate test on a single or multiple real-time PCR target(s) without sequencing confirmation or a positive test with an assay that has limited performance data availability
[c] Genome sequencing indicating two distinct SARS-CoV-2 infections (they belong to different lineages OR to the same lineage but contain sufficient single nucleotide variants to support two different infections)
[d] Public health or clinical judgement should be used to rule out situations where a possible reinfection has been attributed to prolonged viral shedding (i.e., consider if prolonged viral shedding is more likely than reinfection). If case is symptomatic, then episode date uses symptom onset date and if symptom onset date is unavailable or the case is asymptomatic, then the earliest of the following dates could be used as proxy for classification: laboratory specimen collection date, laboratory testing date or reported date

N*ote: laboratory tests are evolving for this emerging pathogen, and laboratory testing recommendations will change accordingly as new assays are developed and validated.*

Source: Public Health Agency of Canada. (December 17,2021). National case definition: Coronavirus Disease (COVID-19). Retrieved from: https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/national-case-definition.html#conf

Table 2. Presentation

Severe	Hospitalized Individuals for whom COVID-19 causes any one of the following: - pneumonia, - hypoxemic respiratory failure, - multiple organ dysfunction, or - septic shock

Epidemiology and Occurrence

Continues to evolve. We will continue to experience regular surges with some seasonal activity. Severe cases are more likely to occur in persons unimmunized or partially immunized and who are older, immunosuppressed or have co morbidities. Vulnerable populations within Canada are at increased risk of acquiring SARS-CoV-2, do not access the healthcare system in traditional ways and appear to be at risk of more severe COVID-19. Reporting of comprehensive COVID-19 data in relation to race and ethnicity is currently limited in Saskatchewan and Canada.

Variants of Concern (VOC)

SARS-CoV-2 VOCs have been reported globally since December 2020. The B.1.1.7 (Alpha) variant was first identified in the United Kingdom, B.1.351 (Beta) in South Africa, P.1 (Gamma) in Brazil, B.1.617.2 (Delta) in India and B.1.1.529 (Omicron) in multiple countries[6].

The dominant variant will continue to shift. The National Microbiology Laboratory (NML) and Public Health Agency of Canada (PHAC) have indicated that monitoring for variants with evidence of vaccine escape or increased severity is a priority.

The Saskatchewan Ministry of Health will provide information and may provide direction based on properties of a novel VOC, such as how easily it spreads, the associated disease severity, or the performance of vaccines, therapeutic medicines, diagnostic tools, or other public health and social measures such as case and contact management.

Refer to Saskatchewan.ca/coronavirus, Public Health Agency of Canada (PHAC) and World Health Organization (WHO) for information.

[6] https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/

Additional Background Information

Causative Agent

- COVID-19, caused by SARS-CoV-2, is the most recent of seven known strains of Coronavirus. Of the six others, four cause only minor respiratory symptoms similar to those of a cold, and two (severe acute respiratory syndrome [SARS CoV] and Middle East respiratory syndrome [MERS CoV]), have been associated with more serious and life-threatening diseases.
- Viruses such as SARS-CoV-2 naturally mutate over time. The majority of mutations do not change the characteristics of the virus.
- Some mutations, or combination of mutations, can impact disease characteristics in a meaningful way (e.g. increased transmissibility, increased severity of disease, or decreased effectiveness of therapeutics and vaccines), leading to designation as a VOC. Some types of mutations improve the "fitness" of the virus and over time, a VOC may become the dominant strain.

Symptoms (Government of Canada[7], 2022, July 18)
Symptoms can vary from person to person and by age group and can depend on the variant (e.g. approximately 30% of cases with Omicron were asymptomatic[8]).
Some of the more common symptoms include:

- Sore throat
- Rhinorrhea
- New or worsening cough
- Shortness of breath or difficulty breathing
- Fever – extremely variable
- Chills
- Fatigue and myalgia
- New loss of smell and/or taste
- Gastrointestinal symptoms (nausea, vomiting, diarrhea)

The Public Health Agency of Canada includes other details on signs and symptoms for health care professionals[8].

Symptoms among older adults (65 years of age and older) and those with underlying medical conditions may be atypical or subtle. Symptoms in older adults that may differ from typical are as follows:

[7] https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/symptoms.html#s
[8] https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/signs-symptoms-severity.html#a1

- Fever and other symptoms may take longer to present;
- Delirium, confusion, falls, functional decline;
- Decrease in blood pressure;
- Hypoxia without respiratory symptoms.

Children are under-represented in counts of symptomatic and severe disease and appear to have milder course when infected. More information is needed to understand frequency of mild infections and in transmission of illness.

Risk Factors for Severe Presentations

Severity can be mitigated if individuals are fully immunized. Risk factors associated with individual susceptibility to severe presentations include:

- Adults 65 years of age and older;
- Various co-morbidities have been reported among severe cases with varying frequencies. The top four include[9]:
  - Cardiac disease including hypertension;
  - Diabetes mellitus;
  - Lung disease (does not include asthma)
  - Obesity (BMI ≥30 kg/m^2)
- Pregnant women also are reported to experience severe COVID.
- Other medical conditions may also be associated with severe COVID (PHAC, June 2022):
  - Cancer;
  - Chronic kidney or liver disease;
  - Cystic fibrosis;
  - Disabilities such as down Syndrome, learning, intellectual or developmental disabilities, ADHD, cerebral palsy, congenital disabilities or spinal cord injuries;
  - HIV infection;
  - Mental health disorders (mood disorders including depression, schizophrenia spectrum disorders);
  - Smoking;
  - Solid organ or stem cell transplant;
  - TB; and
  - Use of corticosteroid or other immunosuppressive medications.

Post-COVID conditions

https://www.cdc.gov/coronavirus/2019-ncov/long-term-effects.html

People can experience a wide range of new, returning, or ongoing health problems more than four weeks after first being infected with the virus that causes COVID-19:

[9] https://nccid.ca/2019-novel-coronavirus-outbreak/#:~:text=The%20most%20common%20comorbidities%20found%20in%20people%20with%20COVID%2D19%20are%20shown%20in%20Table%202%3A

Multisystem inflammatory syndrome – Children (MIS-C) is a condition characterized by hyper-inflammation and multi-organ involvement. MIS-C can be serious, even deadly, but most children who were diagnosed with this condition have gotten better with medical care (US CDC, May 2020)[10]. Symptoms include:

- Kawasaki disease-like features: conjunctivitis, red eyes, red or swollen hands and feet; rash; red cracked lips, and swollen glands. In some children, coronary artery enlargement and/or aneurysms have been described. Some children presenting with Kawasaki disease-like syndrome have been noted to have a broader age range and presentation with more gastrointestinal (abdominal pain or diarrhea) and neurologic (headaches or meningitis) manifestations
- Gastrointestinal symptoms such as abdominal pain, diarrhea, nausea/vomiting (patients have presented with colitis, hepatitis, and questionable appendicitis)
- Toxic shock syndrome-like features with hemodynamic instability and poor heart function. Cytokine storm/macrophage activation or hyper-inflammatory features
- Thrombosis or acute kidney injury
- Shortness of breath

Multisystem Inflammatory Syndrome – Adults (MIS-A), similar in presentation among children.

Post COVID-19 condition (Long COVID) is a range of symptoms that can last weeks or months after first being infected with the virus that causes COVID-19 or can appear weeks after infection. Post COVID-19 condition is **not** COVID-19. Symptoms can be quite different from those during the initial infection. It refers to the longer-term effects some people experience after their COVID-19 illness. The World Health Organization is working to develop a diagnostic process for health care providers to follow to diagnose post COVID-19 condition (Government of Canada, 2021).

The World Health Organization (WHO) defines post COVID-19 condition as:
"[…] occurring in individuals with a history of probable or confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others and generally have an impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time." https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/post-covid-19-condition.html

[10] https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/children/mis-c.html

Reservoir/Source
The report from the WHO-China Joint Mission on COVID (WHO, 2020) indicates COVID-19 is a zoonotic virus. Phylogenetic analyses suggest bats are the reservoir but the intermediate host(s) has not yet been identified.

Incubation Period
The incubation period ranges from 1-14 days with a median of 5-6 days. 97.5% of people develop symptoms within 11.5 days of exposure. (PHAC, 2020a). Refer to **Figure 2**.
There is evidence the incubation of the Omicron VOC may be shorter (3-4 days versus 5-6 days) with a range of 0-8 days on one study and 2-6 in another study. (Public Health Agency of Canada, pre-publication Jan 14, 2022).

Period of Communicability
The period of communicability remains uncertain (PHAC, 2020a). The infectious period is likely affected by vaccination status and the variant causing the infection, leading to wide ranges and inconsistencies in the available evidence. Evidence generally indicates a person may be infectious for up to three days before showing symptoms (pre-symptomatic) with viral RNA levels appearing to be highest just before or after (2-3 days) symptom onset. Cessation of symptoms indicate that the period of communicability is ending; those with severe illness or those who are immunocompromised are considered communicable for longer. Refer to Table 4: Risk for Communicability.

Mode of Transmission
SARS-CoV-2, the virus that causes COVID-19, spreads from an infected person to others through respiratory ***droplets*** ranging in size from large (that fall to the ground near the infected person within seconds or minutes) to smaller (sometimes called ***aerosols***, which will remain suspended in the air for a period of time). These infectious droplets or aerosols are created when an infected person breathes, talks coughs, sneezes, sings or shouts.

- These droplets or aerosols may come into direct contact with the mucous membranes of another person's nose, mouth or eyes, or they may be inhaled into their nose, mouth, airways and lungs.
- Households are the most common acquisition settings; however various settings may pose an increased for transmission or severe presentations risk due to the proximity of individuals, types of interactions among individuals, or the vulnerability of individuals within those settings. High-risk settings are defined in Table 7.
- Poor ventilation may be a contributing factor. In closed environments, viral particles can accumulate in the air increasing the risk for transmission.

- Aerosol-generating medical procedures[11] pose higher levels of risk and require additional precautions.
- The virus may also spread when a person touches another person (i.e., a handshake) or a surface or an object that has the virus on it, and then touches their mouth, nose or eyes with unwashed hands.
- There is limited epidemiological evidence to support SARS-CoV-2 transmission via fomites, compared to transmission via droplets (National Collaborating Center of Environmental Health, 2021).
- Routes of transmission that are theoretically possible due to the detection of viral RNA, but have not been clearly demonstrated, are: 1) vertical transmission through breast milk; 2) fecal-oral transmission; 3) transmission from transplant of blood, blood products and organs; and 4) sexual transmission via semen and vaginal secretions (Public Health Ontario, 2021-06-30).
- Zoonotic transmission associated with the COVID-19 has occurred.
  - Although the virus likely originated from a wild animal host, it has adapted to efficiently spread from human-to-human. There is currently no evidence to suggest that animals, including companion animals or pets, are playing a role in the spread of COVID-19.

Lab Reports and Interpretation

Important considerations in interpreting test results are the type of the test, the sensitivity and specificity of the test and the timing of the test relative to the clinical presentation. Refer to **Figure 1** for a visual representation of timing of potential detection following exposure. Research and development of testing technologies is rapidly evolving. A high-level summary follows to provide context in interpretation of results (**Table 3**).

Specimen handling and transportation will depend on the location and type of testing platform used. The turn around time for results will also depend on where the test is being done.

The final interpretation of a test must take into account the testing platform, for example, conventional (lab developed, commercial, GeneXpert) versus point of care (POC, e.g. Abbott ID Now (PCR), Abbott Panbio (antigen) etc.), their performance parameters, the prevalence of infection, predictive values as well as the intended use of the test result. Highly sensitive tests are most appropriate for diagnosis and clinical management. A less sensitive test may support timely access to testing, especially when available at the point of care and may be most suitable

[11] High-risk Aerosol-Generating Medical Procedure (AGMPs) needing negative pressure room placement: Intubation, BIPAP, CPAP, bronchoscopy, CPR with bag valve and mask.
Lower risk AGMPs, negative pressure room if available, otherwise private room with hard walls and door closed: Optiflow (for infectious patients only), nebulized therapy, open airway suctioning, sputum induction. NOTE: Nasopharyngeal swab is not considered an (AGMP)

for screening (ie. high-risk congregate settings where testing can be repeated on the same individuals over time).

Molecular Tests (i.e. including nucleic acid amplification tests [NAAT]/reverse transcriptase polymerase chain reaction [RT-PCR]) are conducted using both laboratory-developed and commercial platforms on nasopharyngeal swabs, oral/throat swabs, and lower respiratory specimens (including bronchoalveolar lavage, bronchial wash, endotracheal tube suctions, and sputum). In-lab NAAT/RT-PCR tests are considered the gold standard for diagnosis, however, the overall clinical picture must be considered. Patient setting and clinical considerations will determine the most appropriate specimen type for this test. Point of care molecular tests are also now available, with variable accuracy compared to in-lab NAAT/RT-PCR diagnostics. Interpretation of their results will depend on both the instrument performance itself and the indication for testing.

Antigen Tests include self-administered rapid tests or Point of Care tests. As new antigen testing platforms become available, laboratory and clinical verification will be required to understand the performance characteristics of this technology and how these best fit into the overall testing and monitoring strategy[12] Interpretation requires information about the timing of the collection in comparison to symptom onset. **Figure 1** demonstrates that viral loads are generally high in early disease (and therefore more likely to be detected) with an expected decrease in sensitivity as viral loads drop.

Whole Genome Sequencing (WGS) is a genetic fingerprint that can be used to establish connections between cases, for example in cluster or outbreak investigations to determine if the cases are linked or from separate chains of transmission. WGS is also used as a tool to identify and monitor genetic mutations and variations, including VOC. The capacity for WGS within countries varies worldwide, and not all positive specimens undergo WGS, which may cause delays in identifying VOC. As the pandemic continues, we can expect the number of VOC and variants of interest (VOI) to grow.

WGS is currently the only method that will give a definitive result for VOCs, however, results of WGS can take up to 14 days. Saskatchewan has utilized a screening test called SNP (single nucleotide polymorphism) to identify mutations associated with VOCs as an early indication that the specimen may be a VOC. Previous SNP assays in Saskatchewan detected the N501Y, E484K, and L452R mutations in the spike gene of SARS-CoV-2 (COVID-19) to screen for Alpha, Beta, Gamma, Delta VOCs, and a SNP assay was implemented as a rapid screen for Omicron

[12] https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/use-rapid-antigen-detection-tests.html

(B.1.1.529). SNP testing may be discontinued once a threshold of samples representing the VOC are met (i.e. 90% was the threshold for Omicron).

Saskatchewan implemented in-house WGS in early March 2021. Additional samples continue to be sent to the NML in Winnipeg for WGS. Roy Romanow Provincial Laboratory (RRPL) prioritizes sequencing of cases who a) have history of international travel; b) unexpectedly severe cases; c) represent potential re-infections; d) outbreaks/clusters. In addition, samples are selected randomly to monitor what lineages are circulating in the province.

Over the course of the pandemic, the use of WGS has expanded as new VOCs have been identified and retracted once a particular VOC has been established as dominant. WGS continues to be conducted on the above listed high priority samples. Positive specimens must meet criteria for success[13] to be eligible for WGS .

Serologic tests detect antibodies that are produced in response to infection or vaccination; they do not detect the virus. These tests are not appropriate for routine diagnosis because antibodies are not produced until weeks after the onset of infection. Serologic testing is available in the province for appropriate indications as outlined in the compendium of tests: https://rrpl-testviewer.ehealthsask.ca/Home/Details?id=547. Additional indications continue to be assessed as knowledge about COVID-19 immunity evolves. Test requests must be approved by a Microbiologist in Regina or Saskatoon.

Table 3. Interpretation of Test Results
3A. Conventional (Lab-developed, commercial and GeneXpert) Test Interpretations

Results from NAAT/RT-PCR are reported as:	**Interpretation as per Case Definition**	**Test Details:**
Positive	Confirmed	COVID-19 virus detected.
Presumptive	Probable	Testing will be repeated at a reference lab (i.e. RRPL or NML).
Indeterminate	Probable	Virus is detected below the limit of detection of the assay. Recommend collection of new specimen for repeat testing.
Invalid	Does not meet case definition	Specimen failed Quality Control or exhibited non-specific amplification. Recommend recollection of new specimen for repeat testing.
Negative	Not a Case	No COVID-19 virus detected.

Source: RRPL April 2, 2020; Reaffirmed November 13, 2020.

[13] A quality check prior to WGS is performed to determine likelihood of success. If the concentration of virus in the sample is determined to be too low for successful sequencing, a report comment is added to the report stating: SARS-CoV-2 Variant of Concern Confirmation (Sequencing) could not be completed as upon review the concentration of virus in the sample was too low. For questions, call the Microbiologist on-call. WGS will not be attempted on these samples.

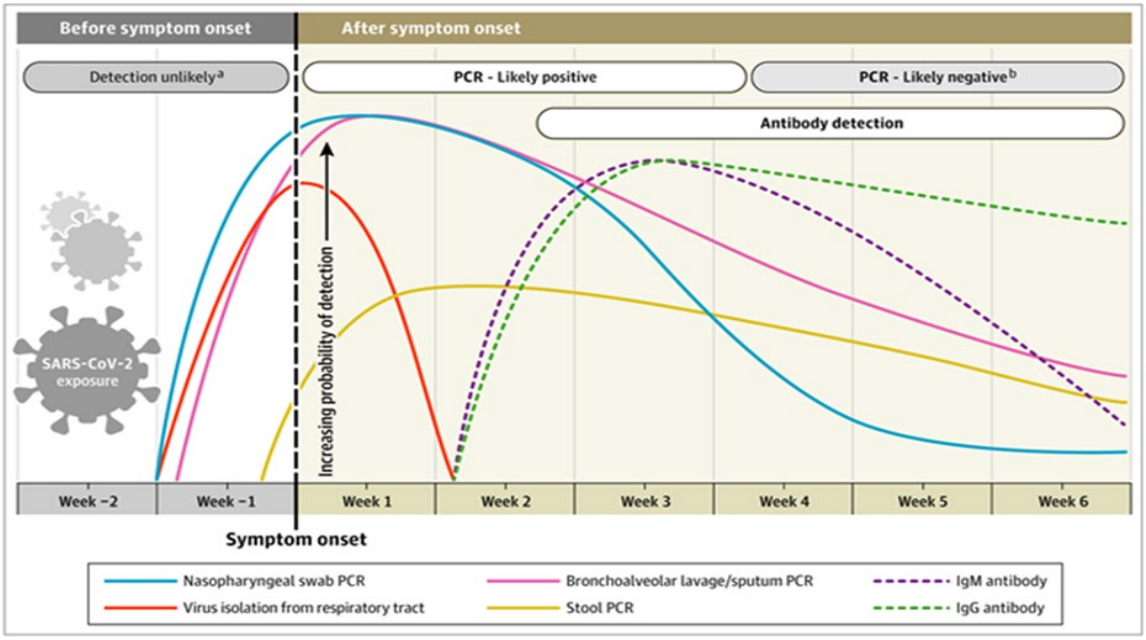
3B. Point of Care (POC) Test Interpretations

Results from POCT are reported as[14]:	**Interpretation as per Case Definition**	**Test Details:**
Positive (*Abbot ID Now- POC PCR*)	Confirmed	This is a validated test and confirmatory testing is not required.
Positive *(Other POCTs)[15]*	Probable	Testing may not be complete with a Conventional Test
Invalid	Not a Case, depending on test indication	Specimen failed Quality Control. Recommend re-test and/or recollection of new specimen for repeat testing.
Negative	Suspect or Not a Case, depending on test indication	No COVID-19 virus detected. Repeat testing may be indicated depending on indication for test.

Source: RRPL November 13, 2020; Updated February 3, 2021

The following provides a visual representation of the timing of test results following exposure:

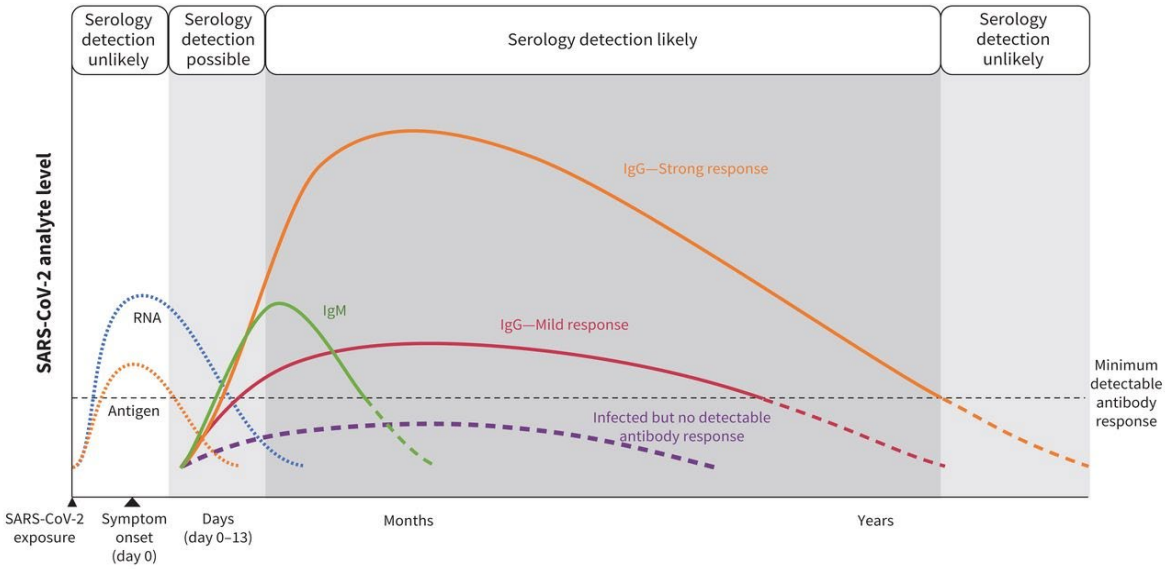
Figure 1. Timing of Laboratory Detection of SARS-CoV-2 Following Exposure



Source: JAMA

[14] https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/national-case-definition.html#labcomms

[15] Abbott Panbio [Ag], BD Veritor [Ag] or Rapid Antigen Test administered with oversight of health care provider



Repeat Testing for Individuals Previously Positive

There are numerous studies that demonstrate prolonged detection of SARS-CoV-2 RNA that extends beyond the resolution of COVID-19 symptoms and can persist for several weeks or months. https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/repeated-pcr-testing-individuals-previously-positive-covid-19.html

Antigen testing is not anticipated to remain positive for extended periods of time following infection.

Post-infection Immunity

- Cases of COVID-19 can recover and then be re-exposed to a case, sometimes a household member or through workplace exposures. Although there are no clear guidelines, there is evidence that recovery from COVID-19 infections provides some immunity, although it is still unclear how complete it is or how long it lasts.
- NAAT tests will remain positive after resolution of infection, commonly up to three months after infectivity has resolved. Re-testing during this time is generally not recommended. Antigen testing is not anticipated to remain positive for extended periods of time following infection.
- Prior infection does not guarantee immunity, particularly if exposure is to a different variant.
- Symptomatic individuals should be evaluated clinically and may be retested[16].

[16] Re-infection has been reported to occur within as little as 2 months

- Recovery from COVID-19 infection is not equivalent to being fully vaccinated against COVID-19 and does not replace a proof of vaccination where those policies are in place. All persons who are eligible but not fully vaccinated should get vaccinated once their mandatory self-isolation period has ended.
- Post-infection immunity may be unreliable in preventing re-infection when the circulating variant differs from the variant associated with past infection.
- Variants of concern may include genetic characteristics that can evade the immune system (immunity from past infection or from vaccination). For example, Public Health Agency of Canada (Jan 14, 2022) summary of evidence suggests that the risk of re-infection with Omicron variant after prior infection with a non-Omicron variant is higher than re-infection risk was for previous variants (including Delta).

Treatment/Supportive Therapy

Treatment for clinical management is at the discretion of the primary care provider.

As of January 2022, Paxlovid has been approved for use by Health Canada.

The following serves as a reference for the public health investigator:

- *Supportive care for symptoms is all that is indicated for most cases of COVID-19.*
- *Antibiotic therapy is not indicated unless bacterial complications arise.*
- *Because of the association with Reye's syndrome, salicylates (e.g., Aspirin) should be avoided in children with COVID-19. However, children comprise only a small percentage of cases of acute infection and generally show mild to moderate symptoms or no symptoms at all (Berard, et al 2020). Canadian guidance on the clinical management of patients with moderate to severe COVID-19 is available (Fowler et al., 2020).*

Public Health Investigation

I. Case

NOTE – Investigation and follow-up required of all **severe or deceased cases** and cases with a **novel VOC**. Severe and deceased cases of non-novel VOCs should focus on underlying risk factors associated with severity. Novel VOC investigations, at the direction of the Ministry, should involve a complete history to determine source and contact tracing.

History

A. Novel VOC - Refer to Attachment – Coronavirus Data Collection Worksheet (Novel VOC) to assist.

- Investigations of cases of novel VOCs, at the direction of the Ministry, determine source of exposure (within the past 14 days):
  - contact to a case;
  - exposure in an outbreak setting;
  - exposure in a high risk setting;
  - exposure in the workplace – if so, see Referrals
  - mass gatherings[17]
  - history of travel (international or domestic)
    - Refer to Attachment – Travel Protocol for details required in the notification to the Ministry of Health to facilitate reporting obligations under the *International Health Regulations*.
- For Novel VOCs, when the source is unknown, backward tracing[18] may be considered (Public Health Agency of Canada, December 2021):
  - Identify contacts in the incubation period, obtain history of exposures and offer testing to find the source or additional cases.
    - Priority should be given to close contacts those between Day -2 and Day -6 and extended to Day -11 (see Figure 2) based on capacity and resources.

[17] Mass gatherings may be public or private events. They occur in a range of places (e.g., spiritual and cultural settings, theatres, sports arenas, festivals, conference halls, individual homes, etc.) and result in a number of people being in close contact for extended periods of time. The gatherings may involve as few as 10 people or as many as 100s-1000s. Mass gatherings can contribute to the transmission of COVID-19.

[18] Backward contact tracing is considered to be most useful when localized outbreaks may be occurring in areas experiencing relatively low levels of transmission. It may also be considered for investigating outbreaks with an epidemiologic feature suggestive of change in transmission dynamics (e.g., where a novel VOC is implicated).

B. Severe or Deceased - Refer to Attachment – Coronavirus Data Collection Worksheet (Severe/Deceased)

- Investigations of severe or deceased cases involve communication with the primary care provider to determine that criteria of severity has been met or the association of their COVID infection with their fatal outcome.
  - For quality control, severe cases must include one of the following signs and symptoms that are associated with the severe criteria documented in Panorama.

Criteria of Severity	Available Options in Panorama
Pneumonia	- Pneumonia - Pneumonia – CXR/CT - Respiratory Failure – requiring mechanical ventilation - Respiratory compromise - Respiratory compromise – oxygen therapy required. - Renal Failure - Acute Respiratory Distress Syndrome - Sepsis (e.g bacteremia, septicemia, etc)
Hypoxemic respiratory failure	
Multiple organ dysfunction	
Septic shock	

- Individuals with severe presentations of fatal outcomes should be assessed for:
  - Underlying risk factors that predispose them to severe illness. Specimens from individuals without risk factors (i.e. individuals with severe illness who are under the age of 50 and do not have any co-morbidities) should be prioritized for WGS testing as part of VOC surveillance.
  - Vaccination status.

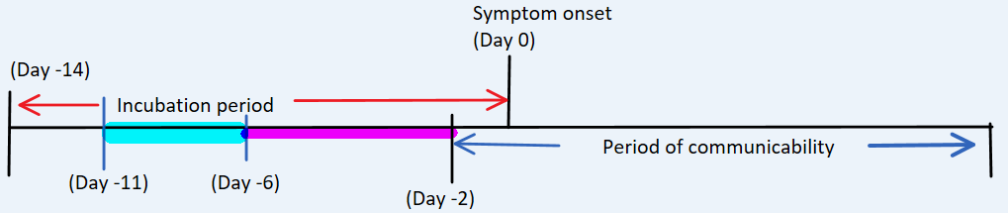
Public Health Interventions

Assessment

A. Cases with a Novel VOC (Refer to Attachment – Coronavirus Data Collection Worksheet (Novel VOC)

- Assessing for Contacts as per Table 5 from 48 hours before first recognition of symptoms until the individual has effectively isolated may be warranted for individual cases with a novel VOC.

Figure 2. Timeline for Investigation novel VOCs



Education

- All cases of COVID-19 should be provided information on self-isolation and self-monitoring and how to access medical care if needed.

- Symptom monitoring is recommended for cases. Generally, this includes the following:
  - *Self-monitoring* for new or worsening symptoms and knowing what to do if that occurs.
  - *Active daily monitoring* is not required by public health.
  - NOTE: If a person is determined to be at high risk of clinical decompensation and without necessary supports (e.g., elderly with comorbidities who lives alone), the case should arrange for family/friends/community organizations to provide daily check-ins.
- They should also be given instructions for isolating in the home or co-living setting as well as environmental cleaning of the home. Refer to Exclusion and Isolation for options.
- Educate about reducing exposures to others including distancing, wearing a mask, respiratory etiquette and hand hygiene and limiting contacts especially with people at high-risk for severe disease (older, immune compromised, etc.) and settings with people at high-risk such as visiting long term care until for entire period of communicability (Table 4**.** Risk for Communicability).

Exclusion and Isolation

- All cases should self-isolate in a suitable environment for at least five days and take additional precautions to reduce exposures for the duration of their communicable period (Table 4 –Risk for Communicability) (see Education above). Options for self-isolation in community include:
  1. At home (if lives alone, or with fully vaccinated household members; assess for access to medical care/psychosocial supports/safety plan);
  2. Self-contained units (if lives in a household where members are not fully vaccinated, or in a congregate living setting; assess for own room/washroom and ability to avoid close contact in shared spaces);
  3. Hotels, or Assisted or Voluntary Self-Isolation Sites, if available in community; or
  4. Cohorting cases together (if in a congregate living setting where self-contained units are unavailable).
- Special consideration is needed to support cases in congregate or co-living settings (e.g., those living in university dormitories, shelters, overcrowded housing) when self-isolating. If it is not possible to provide the case with a single room and a private bathroom, or to relocate the case outside of the home, efforts should be made to cohort ill persons together. If there are two cases who reside in a co-living setting and single rooms are not available, they could share a double room.
- In circumstances when a MHO issues an Order under Section 38 of *The Public Health Act* requiring residents of a shelter to isolate due to COVID-19 outbreak, the Ministry of Social Services may assist in identifying options for isolation of individuals in collaboration with the shelter, the health authority and the Saskatchewan Public Safety Agency.
- For travelers with symptoms entering Canada, who are subject to legal orders for the mandatory isolation and are not permitted to isolate in a place where they will have contact with vulnerable people, PHAC's Chief Public Health Officer will designate a facility for travelers who do not have a place to isolate.

Table 4. Risk of Communicability

Presentation of Illness	Risk of Communicability
Mild to moderate illness[19]	• The case is afebrile without the use of fever-reducing medications, other symptoms are improving for at least 48 hours AND • at least 10 days have passed since symptom onset (or specimen collection date if persistently asymptomatic).
Severe immune compromised[20]	• The case is afebrile without the use of fever-reducing medications, other symptoms are improving for at least 48 hours AND • at least 20 days have passed since symptom onset (or specimen collection date if persistently asymptomatic).
Severe illness[21] **(i.e. requiring hospital admission)**	• The case is afebrile without the use of fever-reducing medications, other symptoms are improving for at least 48 hours AND • at least 10 days have passed since symptom onset (or specimen collection date if asymptomatic).

Source: (Ontario Ministry of Health, November 2020)

Notes:

- Clinical presentation may require an extension of isolation based on the assessment of the attending physician, infection prevention and control practitioner or MHO.
- A COVID-19 case which is classified as recovered may still have ongoing clinical indications and symptoms, but should no longer require isolation measures or public health follow up.
- Absence of cough is not required for those known to have chronic cough or who are experiencing reactive airways post-infection.
- If required information for classifying as recovered is unavailable, the outcome can be set to recovered at least 20 days after the initial report.

- **Access to supplies and necessities.** The case should have access to food, running water, drinking water, and supplies (see Supplies for the home when self-isolating) for the duration of the period of self-isolation. Those residing in remote and isolated communities may wish to consider stockpiling the needed supplies, as well as food and medications usually taken, if it is likely that the supply chain may be interrupted or unreliable.

[19] **Mild to moderate illness** includes the majority of cases of COVID-19, and includes all those who do not meet the definition of severe illness or severe immune compromised

[20] **Severe Immune Compromised** – includes cancer chemotherapy, untreated HIV infection with a CD4 T lymphocyte count <200, combined primary immunodeficiency disorder, taking prednisone >20 mg/day for more than 14 days and taking other immune suppressive medications. NOTE: This DOES NOT include advanced age, diabetes and end stage renal disease.

[21] **Severe illness** is defined as hospitalized patients whom COVID-19 causes any one of the following: pneumonia, hypoxemic respiratory failure, multiple organ dysfunction, or septic shock.

- **Risk to others in the home.** Household members with conditions that put them at greater risk of complications of COVID-19 (e.g. underlying chronic or immunocompromising conditions, or the elderly) should not provide care for the case and alternative arrangements may be necessary. Follow recommended personal preventive practices. If living with others, avoid further exposure; if in a shared space (e.g., same room) with others, wear a well-constructed and well-fitting, non-medical mask and stay at least two meters apart.
- **For breastfeeding mothers:** considering the benefits of breastfeeding and the insignificant role of breast milk in transmission of other respiratory viruses, breastfeeding can continue. If the breastfeeding mother is a case, she should wear a surgical/procedure mask or if not available, a non-medical mask (e.g., homemade cloth mask or bandana) or cover the baby with a blanket or towel when near the baby, practice respiratory etiquette, and perform hand hygiene before and after close contact with the baby.
- **Limit contact with pets and other animals.** Due to the theoretical possibility that animals in the home could be infected by COVID-19 or transfer the virus from one person to another on their fur, as a precautionary measure, it is recommended that the case also refrain with contact with pets. If this is not possible, practice good hand hygiene before and after touching animals, and their food/supplies, as well as good respiratory etiquette. In addition,
  - do not visit farms or have contact with livestock;
  - if possible, have another member of the household care for the animals;
  - limit animal's contact with other people and animals outside the household until illness is resolved;
  - testing of household pets is generally not recommended but may be considered in consultation with the local MHO and the implementation of a coordinated plan with the Ministry of Health and the Office of the Chief Veterinary Officer.
- **Access to care.** While it is expected that the case convalescing at home will be able to provide self-care and follow the recommended preventative measures, some circumstances may require care from a household member (e.g., the case is a child). Ideally, the caregiver should be fully immunized and boosted and be willing and able to provide the necessary care and monitoring for the case.
- **Psychosocial Considerations:** PHAs should encourage individuals, families and communities to create a supportive environment for people who are self-isolating to minimize stress and hardship associated with self-isolation as the financial, social, and psychological impact can be substantial. Obtaining and maintaining public trust are key to successful implementation of these measures; clear messages about the criteria and justification for and the role and duration of quarantine and ways in which persons will be supported during the quarantine period will help generate public trust. Additional information on the psychological impacts of COVID-19 is available.

Referrals

- When a case of a notifiable disease is associated with an occupational exposure, Section 9 of The Disease Control Regulations stipulates that the medical health officer (MHO) shall notify the director (as defined in *The Occupational Health and Safety Act, 1993*). In order to fulfill this obligation, they must complete and send the form in Appendix L – Notification of Occupational Health and Safety within 14 days.

II. Contacts/Contact management

Contact tracing by public health is only required in the case of a new novel VOC. For these cases, the purpose of contact management is (PHAC, 2020d):

1. Facilitating rapid identification of secondary (or source cases of COVID-19);
2. Facilitating early implementation of public health measures as appropriate, depending on the contact's exposure risk and risk of infection;
3. Reducing ongoing transmission of the virus in the community; and
4. Gaining a better understanding of the epidemiology of COVID-19 (PHAC, 2020d).

Early identification and isolation of susceptible contacts and case finding through testing of contacts is a key component of rapid case identification and management to reduce transmission.

In situations where those exposed may be at greater risk due to social, economic, health or other vulnerabilities, a more sensitive definition of contacts may be useful to facilitate case finding.

Contact Self-Management Strategies

- Direct identification and notification of close contacts by the case can partially fulfill the purposes of contact management.
- Upon request by the case, this may be assisted by an employer, school administrator or event coordinator to support timely notification of contacts.

Table 5. Contacts Definition

Close Contact/ High Risk Exposure	• A HCW who provided direct physical care to a case, or a laboratory worker handling specimens **without** consistent and appropriate use of recommended personal protective equipment (PPE) and infection prevention and control practices[22]. • Anyone who lives with a case, has **direct** physical contact with a case, or is exposed to their infectious body fluids. This includes the case's caregiver, intimate partners, child receiving care from the case, etc.

[22] Refer to PHAC guidance documents for PPE recommendations: acute care; home care; long term care; handling specimens. Saskatchewan Health Authority HCW can also refer to Risk Classification for Asymptomatic SHA Health Care Workers With Potential Workplace Exposures to COVID-19 Cases in Healthcare Settings

	• Anyone who has shared an indoor space (same room) with a case for a prolonged period of time[23], including closed spaces, crowded places, or settings where close interactions may occur (e.g. social gatherings, workplaces, etc., **without** adhering to appropriate individual-level and setting-specific risk mitigation measures**[24].** • Anyone **who** has had a close-range conversation with a case or has been in settings where a case engaged in singing, shouting or heavy breathing (e.g. exercise), **without** adhering to appropriate individual-level and setting-specific risk mitigation measures[23].
Non-Close contact/ Low Risk Exposure	• HCW who provided direct physical care to a case, or a laboratory worker handling COVID-19 specimens, with consistent and appropriate use of recommended PPE and infection prevention and control practices[12]. • Anyone who has shared an indoor space (e.g., same room) with a case, including closed spaces and crowded places (e.g., social gatherings, workplaces, etc.), **with adherence to appropriate individual-level and setting-specific risk mitigation measures[23]**. • Anyone who has had a close-range conversation with a case or has been in settings where a case engaged in singing, shouting, or heavy breathing (e.g., exercise), **with adherence to appropriate individual-level and setting-specific risk mitigation measures[23].**

Source: Public Health Agency of Canada. (2020). Public health management of cases and contacts associated with novel coronavirus disease 2019 (COVID-19). Retrieved from: https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/interim-guidance-cases-contacts.html#ca

Assessment

- In the context of COVID-19 management in accordance with routine community respiratory infection, individuals should assess their risk (Table 5).
- Employees in high-risk settings (Table 7) should be familiar with their organizations policies for staff contact management.

Education

Public information on disease, transmission and infection prevention and control measures is necessary to help individuals self assess and manage their risk and exposures.

Modified Behaviours and Self-Monitoring

- As outlined in Table 6. Management of Contacts based on Risk and Attachment - Case and Close Contact Self-Management Recommendations.
- Close contacts should modify their behaviors for 10 days **from their last exposure.**
- Symptom monitoring - Contacts should monitor for symptoms for 10 days and if symptoms develop, stay home and self-test.

[23] 15 cumulative minutes over 24 hours is used to distinguish prolonged from brief exposures (this must be used in conjunction with the infectiousness of the case at time of exposure, likely route of transmission, risk factors, etc.)
[24] There is a spectrum of risk that adherence to appropriate individual-level and setting-specific risk mitigation measures help to mitigate.

- **Household exposures** pose a higher risk of transmission due to the risk of exposure before diagnosis or symptom onset and the inability to eliminate ongoing exposures in household settings.
  - It is difficult to avoid transmission within a household unless the case is isolated to **a self-contained suite with a separate entrance and no shared common spaces including kitchen or laundry room**. Therefore, individuals should strive to reduce exposures by:
    - avoiding shared air spaces;
    - eliminating direct contact with the case or with their infectious fluids;
    - eliminating close range conversations with the case;
    - avoiding use of shared spaces;
    - eliminating use of shared items; and
    - wearing masks when outside of room.

Testing

- Antigen testing of all close contacts is recommended immediately and after day five and again if symptoms develop.
- High-risk settings may have organizational policies for use of antigen testing among staff.

Table 6. Management of Contacts based on Risk

Risk Level	Modified Behaviors and Self Monitoring for Contacts
Close contacts = High Risk	• Follow recommended personal prevention practices to avoid further exposure to the case. • Self-monitor for the appearance of symptoms consistent with COVID-19 for 10 days following their last exposure to the case. • Isolate within the home setting as quickly as possible should symptoms develop and self-test. • Avoid close contact with those who are at risk for developing more severe disease or outcomes from COVID-19. • If needing to seek medical care, notify the clinic or acute care facility prior to arrival to ensure appropriate IPC measures are in place. • Contacts who are at risk for developing more severe disease or outcomes should not provide care for the case and should stay elsewhere if feasible. • If unvaccinated, make arrangements to get vaccinated as soon as possible.
Non-Close Contact = Low Risk	• **Self-monitor** for symptoms for 10 days following their last exposure to the case. • Self test if symptoms develop. • Self-isolate as quickly as possible should symptoms develop • Avoid close contact with individuals at higher risk for severe illness for 14 days following last exposure to the case. • Follow actions recommended for the entire population. • If not yet vaccinated, make arrangements as soon as possible.

Source: adapted from Ontario Public Health and Public Health Agency of Canada. (2020). Public health management of cases and contacts associated with novel coronavirus disease 2019 (COVID-19). Retrieved from: https: //www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/interim-guidance-cases-contacts.html#ca

Special Considerations for Children
In-person attendance of children in schools and daycares optimizes social, academic and physical development of children with fewer negative mental health implications. Generally speaking, parents/guardians and staff in the school/daycare should implement a heightened level of awareness and diligence in infection prevention and control measures. Individuals should not attend school or daycare when ill.

III. Environment

Routine Cleaning and disinfecting, particularly of frequently touched surfaces, can kill viruses. Using water and regular household cleaning products or a diluted bleach solution (0.5% sodium hypochlorite) is sufficient.

- **Cleaning the home and co-living setting:** Clean frequently touched areas such as toilets, bedside tables, light switches and door handles daily. Use the same solution or an alcohol prep wipe to clean frequently touched electronics such as phones, computers and other devices. Place all disposable contaminated items in a lined container before disposing of them with other household waste.
- **Workplaces and other similar community settings:** Clean highly touched surfaces (e.g., phones, elevator buttons, washrooms, tables) frequently. Items that cannot be easily cleaned (e.g., newspapers, magazines, stuffed toys) should be removed.
- **Child Care Centres and K-12 Schools:** Maintain cleaning and disinfecting policies.
- **Health Care Facilities**: Follow routine environmental cleaning procedures.

IV. Setting-Specific Control Measures

Core public health measures should be reinforced routinely. These include staying home when ill, practicing good hand hygiene and respiratory etiquette and promoting adequate ventilation.

Additional individual and community-based public health measures should be proportionate with the risk in the local community, balanced against the risk of unintended consequences of the intervention, and responsive to the local circumstance (e.g., enhancing measures during an outbreak and relaxing them when the outbreak is controlled). Reducing COVID-19 risk in community settings: A tool for operators can help business owners and community settings assess and identify strategies to help reduce the risk for COVID-19 transmission.

A. Workplaces

Employers have an obligation to protect the health and safety of their employees. *The Occupational Health and Safety Regulations, 2020* requires that employers conduct a hazard assessment and develop an exposure control plan: https://www.worksafesask.ca/covid-19/conducting-a-hazard-assessment-and-developing-an-exposure-control-plan/
Employers and Organizations may have setting-specific policies to reduce mitigate the risk of COVID on business continuity and to protect the clients that they serve.

B. Health Care settings

Special Considerations for Health Care Workers

- Health care workers exposed to COVID-19 patients in the health care setting will undergo a risk assessment based on appropriate use of PPE or assessment of breach of PPE as required by organizational policy. The risk assessment will determine any workplace restrictions, monitoring recommendations, and return to work guidance. Generally speaking, health care workers should implement a heightened level of awareness and diligence in infection prevention and control measures and should be under continuous symptom monitoring.
  - For Saskatchewan Health Authority HCWs with potential workplace exposure, refer to Risk Classification for Asymptomatic SHA Health Care Workers With Potential Workplace Exposures to COVID-19 Cases in Healthcare Settings

Assessing patient/resident exposed to HCW cases:

- Universal medical masking by HCWs as source control is expected to reduce the risk of exposure to their patients/residents. However, in circumstances of close, prolonged contact, source control masking does not eliminate risk of exposure. Follow-up of these residents/patients as close contacts is warranted. This is especially important to reduce the risk of ongoing nosocomial transmission when patients/residents remain within the health care/congregate living setting (Government of Ontario, 2021).
- For Saskatchewan Health Authority HCWs with potential workplace exposure, refer to Risk Classification for Asymptomatic SHA Health Care Workers With Potential Workplace Exposures to COVID-19 Cases in Healthcare Settings.
  - There is a fundamental difference between PPE use among health care versus non-health care workers in that prior to any patient interaction, all healthcare workers (HCWs) have a responsibility to assess the infectious risk posed to themselves and to other patients, visitors, and HCWs. This risk assessment is based on professional judgment about the clinical situation and up-to-date information on how the specific healthcare organization has designed and implemented engineering and administrative controls, along with the availability and use of PPE (Infection Prevention and Control Canada, 2021).
- Long Term Care Facilities (LTC) - refer to Response Guidance for Long Term Care Facilities.

C. Child care centres

- Refer to the Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.

D. Schools

- Refer to Attachment – Approaches in Schools and Daycares and Reducing COVID-19 risk in community settings: A tool for operators.

E. Mass gatherings and events

- Refer to Risk mitigation tool for gatherings and event operating during the COVID19 pandemic

V. Outbreak Measures

The overarching objective of outbreak management is to limit spread and reduce the severe outcomes among individuals in the settings. Priority is given to high-risk settings (which includes but are not limited to hospitals, long-term care and integrated facilities, personal care homes, correctional facilities, homeless shelters, group homes).

Table 7. COVID-19 Outbreak Definitions for High-Risk Settings (January 4, 2022)

Definition	Criteria
Confirmed Outbreak	• Two or more individuals with confirmed or probable COVID-19 for whom the MHO has determined that transmission likely occurred[25] within the setting.

Non-high-risk settings may experience increased disease activity and these situations may be reported to public health who may conduct an assessment and determine if additional control measures are necessary to control the spread. Generally, pubic health will reinforce the core and additional public health measures that are known to reduce the risk of COVID transmission. Most workplaces should have OH&S protocols for communicable disease control that are not individually notifiable.

Declaring an outbreak over

The MHO is the only designated Public Health Official legislated to declare and/or end an outbreak. Generally, outbreaks will be declared over when no new confirmed cases linked to the setting are detected following two incubation periods following the date of last known exposure in this setting. This will be based on the epidemiologic properties (incubation period/period of communicability) for the specific VOC identified during the outbreak. If the date of the last known exposure cannot be defined or is unknown, the period should be counted from the most recent case's date of onset of symptoms or date of specimen collection if asymptomatic.

[25] Reasonable evidence that transmission likely occurred within a common non-household setting include:

- Close contact is confirmed with COVID-19 from 2 to 14 days following exposure;
- Individual with exposure to a setting where confirmed case was present and onset of symptoms consistent with incubation period of COVID-19;
- The individual has been located within a closed setting (e.g. admitted to hospital, residing at a work camp, correctional facility) for ≥ 7days before symptom onset or date of specimen collection if asymptomatic;
- No obvious source of exposure other than at the setting.

Considerations that can inform the easing of outbreak control measures include the attack rates among staff and residents, vaccination status of the staff and residents, and the time lapsed since the onset of the most recent case in a resident. Sporadic cases of infectious respiratory illness occur frequently and at the conclusion of an outbreak these cases may need to be considered separately from the outbreak. In some instances, despite the presence of sporadic cases, the MHO will declare an outbreak over provided that other criteria have been met.

VI. Pandemic Measures

Local or provincial measures may be ordered for the purposes of preventing, reducing and controlling the transmission of SARS-CoV-2 – refer to Disease Control Regulations (Section 25.2).

Prevention Measures

Immunization

Saskatchewan's phased approach to delivering the COVID-19 vaccination to residents started in December 2020. Further information can be found in the Saskatchewan COVID-19 Immunization Manual https://www.ehealthsask.ca/services/Manuals/Pages/COVID-19.aspx.

Definitions:

- Primary vaccine series – receiving two doses of a two dose COVID-19 vaccine series (Pfizer, Moderna, Astra Zeneca) OR one dose of a single-dose COVID-19 immunization series (Janssen or Johnson and Johnson) administered in accordance with the approved minimum interval.
- Booster dose – an additional dose of vaccine that helps maintain and lengthen the protection against severe outcomes of COVID-19 as immunity decreases over time. It is given after completion of a primary series (Immunize BC, Feb 2022).

- Vaccine performance against emerging SARS-CoV-2 variants is an important consideration when evaluating the need for prevention measures in vaccinated people and will require continued monitoring. When evaluating risk, considering regional and local circulation of SARS-CoV-2 variants is also relevant (U.S. Centers for Disease Control and Prevention, 2021)

Education

- Educate the public about the disease: transmission, symptoms, and preventive measures including physical distancing, hand hygiene, cough etiquette and ventilation.
- Core public health measures are the foundation of public health practice to control respiratory viruses including COVID-19. These include staying home when ill, practicing good hand hygiene and respiratory etiquette and should be everyday practices. These measures should be reinforced routinely.

- Additional measures are related to physical distancing, wearing masks, avoiding non-essential travel. Individuals may choose to implement these measures based on their individual risk assessment.

Environmental Controls[26]

- Proper ventilation of indoor settings is key in limiting transmission of COVID-19. Ventilation, airflow, air filtration and access to fresh air are important in reducing COVID-19 transmission in indoor spaces.
- Routine cleaning and disinfection of common high touch surfaces may help to reduce the presence of SARS-CoV-2 on environmental surfaces and the possibility of transmission.

Prevention

- General guidance on personal preventive practices and community based measures can be found in the PHAC document Individual and community-based measures to mitigate the spread of COVID19 in Canada.

Surveillance

- Refer to the Community Respiratory Illness Surveillance Program (CRISP) Section 2-220

[26] https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/summary-evidence-supporting-covid-19-public-health-measures.html

Revisions

Date	Change
December 27, 2022	– Updated Surveillance section to remove outdated details and replaced with link to Section 2-220 Community Respiratory Illness Surveillance Program (CRISP) – Revised language in Table 3A, Invalid test result is interpreted as does not meet case definition.
August 31, 2022	- Updated Public Health Purpose for Notification to focus on signals of changing in epidemiology; - Updated Epidemiology and Occurrence and VOC; - Removed dated references and language within causative agent; - Updated signs and symptoms to include more generalized language; - Added other Risk Factors associated with severity; - Added statement from World Health Organization regarding post-COVID condition; - Contact Definition – removed reference to fully vaccinated; - Setting-Specific Control Measures – added general statement regarding core and additional individual and community-based public health measures; - Revised Attachment – Approaches in Schools and Daycares; - Updated the objective of outbreak measures to shift focus to reduce severe outcomes rather than identify all cases and contacts; - Provided specificity that outbreak definition relates to high-risk settings; - Removed full immunized, partially immunized and unimmunized definitions related to immunization under Prevention; - Added bullets related to core and additional measures under Education; - Added new heading of Environmental Controls; - Updated References
March 25, 2022	- Added footnote for Immediate Notification of Novel VOC for better clarity; - Updated Risk factors for severe presentations by adding “does not include asthma” by the RF of lung disease; - Updated the priority groups identified for WGS when lab capacity is limited; - Provided better clarity of the focus of severe, deceases and Novel VOC investigations under Public Health Investigations - Included reference to new data collection worksheets - Novel VOC and Severe or Deceased that are under development and being finalized; - Added a table to cross-reference the criteria of severity with Panorama documentation of s/s to support severity indicator in Panorama; - Updated exclusion to provide clarity of minimum of 5 days isolation with continued measures for the entire period of communicability;

	- Removed reference to ASIS and Voluntary self-isolation site; - Removed reference to document "recovered" in Panorama in Table 4; - Updated Testing timelines for close contacts. - Outbreaks – defined high-risk settings that was previously included and removed in error; included considerations for declaring an outbreak over.
February 4, 2022	Editorial updates (reference, etc) Updates to: – Timeline for Notification and Reporting with focus on investigation and notification of severe cases, Novel VOCs and deaths. – Public Health Purpose for Notification – Probable case definition to include POC Antigen test in accordance with PHAC case definition; incorporated PHAC Reinfection definition. – Definition of severe. – Epidemiology and Occurrence – VOC – Risk Factors associated with Severe Presentations (additions included); – Post COVID Conditions – Incubation Period; Period of communicability – Lab Reports and Interpretation – removed reference to suspect, updated Antigen test Significant changes to Public Health Management of Cases and Contact with a focus on severe cases, deceased cases and cases with a Novel VOC. Rearranged details related to health care workers and settings to Setting Specific Measures. Removed Suspect outbreak definition and outbreak definitions for non-household settings; updated confirmed outbreak definition. Removed details of vaccine effectiveness as the evidence is rapidly evolving.
December 30, 2021	Updated Epidemiology and Occurrence section (Variants of Concern) to include details of Omicron Variant Updates based on decreased isolation for cases who are fully vaccinated: • Period of Communicability based on vaccination status • Cases Management – assessment include vaccination status • Table 4 - Criteria for discontinuing isolation – incorporated immunization status and if five or 10 days isolation accordingly Updated Prevention Measures - Immunization to include information on Omicron vaccine effectiveness and details of the Saskatchewan COVID-19 vaccine booster program
December 8,	• Updated Lab Report and Interpretation section to include information on

2021	Omicron and introduction of a new SNP screen as an early indicator of this variant.

November 25, 2021	• Updated attachment – Approaches in Schools and Daycares 2021-22 School Year
	• Added references/links to the Attachment - approaches in Schools and Daycares where appropriate within the chapter itself
	• Operational immunity section – heading changed to Post-Infection Immunity and added statements regarding:
	  ○ antigen test results are not anticipated to remain positive for extended periods of time following infection.
	  ○ Post-infection immunity is not equivalent to immunity provided through immunization. Post-infection immunity does not replace a proof of vaccination where those policies are in place
	• II. Contacts/contact management
	  ○ Included new section "Special considerations for children ineligible for vaccination"
	• IV. Setting-Specific control measures
	  ○ Updated link to PHAC school guidance document "Planning for the 2021-2022 school year in the context of COVID-19 vaccination
	• V. Outbreak measures
	  ○ Updated outbreak criteria to include: An outbreak will be declared when three or more individuals are confirmed to be positive with COVID-19 in a classroom or cohort (e.g. sports team, bus route, club or other group) within 14 days and attended school while infectious
	• Attachment – Active Daily Monitoring Form for Contacts of a Case of COVID-19 removed as form no longer utilized

October 1, 2021	• Following template letters updated to reflect change to *Public Health Order Mandatory Isolation and Face Covering*, that unvaccinated pupils that are identified as a close contact of a household case will not be exempted from the requirement to isolate for 14 days.
	  ○ Letter Template COVID-19 Notification to School Administrator
	  ○ Letter Template Parents/Guardians ALERT in class
	  ○ Letter Template COVID-19 Notification to Daycare Administrator
	  ○ Letter Template Parents/Guardians ALERT of case in daycare

September 23, 2021	• Included new attachments (daycare template letters)
	  ○ Letter Template COVID-19 Notification to Daycare Administrator
	  ○ Letter Template Parents/Guardians ALERT in Daycare
	  ○ Letter Template General Parents/Guardians Alert of Case in Daycare

	○ Letter Template for COVID-19 Daycare Outbreak • Updated attachment – Approaches in Schools and Daycares 2021-22 School Year
September 17, 2021	• Updated attachment – Approaches in Schools and Daycares 2021-22 School Year • Removed COVID-19 Fact Sheet as this SHA document will be maintained by SHA and the link to this fact sheet has been added to the appropriate template letter • School template letters updated ○ COVID-19 Notification to School Administrator - Replaces the previous Notification to School Principal; references to "school principal" have been amended to the more broader term of "school administrator", recognizing that some areas are providing notification to an administrator at the school division; amendments to align with current Public Health Order; removed CC to CDC and OCMHO mailbox. ○ Parent alert – classroom - Added line to capture the date of last exposure "We have determined that the case was in attendance while communicable on <EXPOSURE DATES>"; amendments to align with current Public Health Order ○ Parent alert – school - Added line to capture the date of last exposure "We have determined that the case was in attendance while communicable on <EXPOSURE DATES>"; updated title of COVID fact sheet What you Need to Know About COVID-19 and included link to this SHA document ○ Outbreak declared - Added statement "When an outbreak has been declared, it is assumed that there is an ongoing risk of exposure within the school and a classroom notification may not be sent with each additional case in the school during the outbreak".
September 13, 2021	• Included new Attachment – Approaches in Schools and Daycares 2021-2022 School Year
September 2, 2021	• Alternative Contact Management Strategies section expanded to support direct identification and notification of close contacts by the case (pg 16) • Contact assessment of immunization history now includes statement regarding the approved minimal interval i.e. individuals that received two doses without adhering to the approved minimum interval would be considered partially immunized. • Testing recommendation for asymptomatic close contacts amended to advise testing after exposure, rather than "immediately and at day 10"

	• Testing recommendation for fully vaccinated HCW amended to test after exposure, rather than "immediately and at day 10"? • Table 6 removed statement "conduct a risk assessment for non-close contacts if feasible" • Suspect outbreak definition updated to remove schools and high risk workplaces from list of high-risk settings

August 3, 2021	• Notification timeline from Public Health to Ministry of Health has been updated to within 24 hours (page 1).
	• Table 3B clarity added to Positive results to make clearer distinction made between Abbot ID Now and other POCTs with addition of *"(Other POCTs)"* to second row (page 12).
	• Contact management
	  ○ Exclusion and self-isolation (page 23). Language amended that close contacts that have been advised to self-isolate should do so for 14 days from their last exposure.
	  ○ Testing (page 24). Clarity added for asymptomatic contacts.
	  ▪ Testing of asymptomatic non-close contacts is not routinely required.
	  ▪ Fully immunized individuals are not considered close contacts and should not routinely be tested if they are exposed.
	  – The exception is asymptomatic fully immunized HCW who should still be tested following exposure and at day 10 after exposure; antigen testing is acceptable.
	• Surveillance (page 31)
	  ○ Statement added: Surveillance of COVID-like illness (CLI) from Emergency departments (EDs) - Upward trends in the number of visitors to EDs with CLI can be indicator of increased COVID activity in the community, particularly among those without a personal health care provider or those without access to their personal health provider.
	• Template letters for case, close contacts, potential exposure to a group have been updated (attachments)
	  ○ Per legal advice, language that has been amended is that the individual "should" rather than "must" take all precautions as advised by Public Health and all reasonable measures to reduce significantly the risk of infecting others.
	  ○ Further detail has been added in regards to fully vaccinated visitors in the case and close contact letters

July 12, 2021	• Public Health Purposes for Notification of COVID-19 revised • Case definitions: ○ Suspect case definition removed

	○ Probable case definition revised and positive antigen test removed to align with other jurisdictions and to adapt to antigen tests being deregulated in Saskatchewan. • Symptoms updated and information on post COVID conditions added. • Case management: ○ Active Daily monitoring no longer recommended ○ Amended monitoring, education, exclusion and isolation sections ○ Added details in monitoring, education and case preventive measures • Contact management: ○ Contact definitions updated as PHAC definitions updated to include immunization information ○ Active daily monitoring no longer recommended ○ Amended assessment, monitoring, education, exclusion and isolation sections ○ Testing recommendations amended. Testing of non-close contacts no longer required unless symptomatic. ○ Amended Table 6 Public Health Management of Contacts based on Risk • New section IV. High Risk Setting-Specific Control Measures created to replace information in previous pandemic measures section • Outbreak definitions updated • New attachments: ○ Template letter to COVID-19 case ○ Template letter to COVID-19 close contact ○ Template letter to Group exposed to a COVID-19 case
June 15, 2021	• Updates to **Lab Reports and Interpretation** section (pages 8-12) ○ Molecular testing section amended to remove RRPL and RUH as only labs performing molecular testing ○ Added BD veritor antigen test to Table 3B ○ Included details of the new SNP assay used to identify the B.1.617 variant ▪ Whole genome sequencing (WGS) section amended to include updated SNP information and L452R mutation ▪ Table 3C updated with L452 mutation added • Information on vaccine effectiveness added to immunization section (page 20-21) • Updates to **Contacts/Contact management** section (pages 23-28) ○ Incorporated definitions and impacts of immunization with amendments to assessment, isolation and testing sections ○ Table 6 amended to added clarity of contact management based on

	unimmunized/partially immunized and fully immunized/symptomatic or /asymptomatic including assessment, isolation and testing • Re-opening roadmap steps added (page 35) • New attachment added for modified self isolation
April 30, 2021	• Updated information on screening for VOC in Saskatchewan, recognizing current SNP assay in Saskatchewan detects the N501Y and E484K mutations (page 9). Table 3C updated. • Provided better clarity into the Attachment - Exposure Risk Matrix reasons why PPE is only considered in work related exposures.
April 16, 2021	• Inserted reference to the Voluntary Self Isolation Support Program (VSISP) (page 17) • Amended link to SK Immunization Manual (page 20) • Inserted additional info to Assessment section for HCWs (page 22) • Clarification that all cases in SK are to be considered as VOC (page 23) and amended box on page 24 to reflect same • Additions to special considerations for HCW (page 26) • Revisions to workplace settings section (page 30)
April 6, 2021	• Removed Attachment - Risk Classification for HCWs with Potential Workplace Exposures to COVID-19 Cases in Healthcare Settings as this document updated and only applicable to Saskatchewan Health Authority (SHA) health care workers. SHA will house and maintain this document. o Removed links to Attachment in footnote 11 (pg. 21) and assessment section (pg. 22) and added links to PHAC guidance documents and SHA HCW risk classification.
March 30, 2021	• Updated information on whole genome sequencing and screening for VOC in Saskatchewan (pg. 10) • Updated Table 3C Table of SNP and WGS Result Possibilities and Comments (pg. 12) to provide further clarify on SNP per RRPL update March 29, 2021. Specifically, amended SNP (N501Y) report result of "N501Y: Potential Variant of Concern Identified" to "VOC, undetermined lineage" and included statement that positive results are considered final. • Amended section on exclusion and isolation of the case (pg. 16) to note increased transmissibility of the VOC and need for an appropriate mitigation plan. Added link to isolation considerations for household member of a VOC case. • Added link to the SIM in immunization section for further information (pg. 20) • Updated isolation/exclusion section of the contact and included isolation

	considerations for household members of a VOC positive case (pg. 23)
March 12, 2021	• Added additional information on variants of concern into additional background information – causative agent (page 4) • Added additional information on WGS and SNP (page 10) • Added new Table 3C - Table of SNP and WGS Result Possibilities and Comments (pg. 12) • Added details to Public Health Investigation – case regarding assessing for contacts and when backward tracing should be considered (pg. 15) • Included clarification under exclusion and isolation of the case that exposures in households cannot be eliminated but measures can reduce the extent of ongoing exposures (pg. 16) • Included clarification under exclusion and isolation of the contact that all household members of a case are considered close contacts due to the risk of exposure before diagnosis or symptom onset and the inability to eliminate ongoing exposures in household settings (pg. 23) • Added **new testing recommendations for contacts** (pg. 23 and Table 6): o Test all asymptomatic close contacts as soon as possible following exposure and at day 10 after exposure o Immediately test all non-close contacts; repeat testing if symptoms develop
February 11, 2021	• Updated the **Case Definitions** based on PHAC updated definitions. Added definition of Deceased. • Updated the symptoms information. • Added contextual information about impact of COVID in children from CPS (Treatment pg. 11) Included reference to Assisted Self-Isolation Sites (pg. 13) • Added reference to persistent symptoms • Updated incubation period reference • Updated period of communicability with new reference; provided explicit clarity on contact tracing periods for symptomatic and asymptomatic cases • Updated Mode of transmission with more scientific details. • Included reference to the COVID Alert App • Updated Risk Factors to include settings that are considered higher risk • Incorporated information on variants of concern and the surveillance plan within WGS. • Updated Table 3B to reflect confirmed classification via Abbott ID now test. • Reformatted history under Public Health Investigation pg. 17) • Added details to symptom monitoring (pg. 18)

	• Added referral to primary care provider • Added reference to ASIS and SIS • Refine purpose of contact managements (pg. 23) • Added information on alternative strategies for contact management • Updated Contact Definitions (Table 5) to align with updated PHAC guidance. • Included link to Exposure Risk Matrix as a new attachment • Provided reference to testing timeframe for symptomatic and asymptomatic contacts (pg. 27 and Table 6) • Updated Table 6 to align with PHAC contact management guideline • Added details for outbreak management including reporting suspect outbreaks and when suspect outbreaks are deemed not to be outbreaks. • Added details of outbreaks in school settings including the communication protocol • Added section on outbreaks in workplace settings (pg. 36) • Added Link to immunization information (pg. 39) • Updated references • Included criteria for when a suspect outbreak investigation can be considered closed (Table 7)
January 7, 2021	• Removed reference to the initial notification via e-mail template by 10am. • Updated **Lab Reports and Interpretation** section to include reference to point of care testing and antigen testing and interpretation of those test results. • Updated number of tables and figures and associated references throughout the chapter. • Updated the **Criteria for Discontinuing case Isolation** to include details of mild to moderate infection, severe immune compromised and severe illness and associated notes. • Included reference to acknowledge immunization for COVID-19 has begun in Saskatchewan and does not impact contact investigations at this time.
December 16, 2020	• Updated the Criteria for Discontinuing Case Isolation to 10 days from 14 days.
September 10, 2020	• Added new outbreak definitions **Table 5** • Included reference to School Exposure Risk Matrix in **Contact investigation** • Included new attachments - template letters for cases/outbreaks in schools and School Exposure Risk Matrix
June 22, 2020	• Changed reference from multisystem inflammatory syndrome in children to Pediatric inflammatory multisystem syndrome (PIMS) (pg. 5) • Updated Daily Active Monitoring Attachment to align with symptoms update and included Attachments for Contact tracing (initial assessment and Contact

	tracing DCW) that align with the Go.data contact tracing application.
June 9, 2020	• Added loss of taste or smell to list of **symptoms** (pg. 4) • Added Multi-system inflammatory syndrome in children under signs and symptoms (pg. 4-5) • Introduced serologic testing to the **Lab Reports and Interpretation** (pg. 7) • Added graphic that displays timing of laboratory findings following exposure to COVID-19 (pg. 8) • Added section entitled **Operational Immunity** to provide context around the decision for managing re-exposure of recovered cases in the 3 months following recovery (pg. 8) • Added detail about investigating cases for acquisition attributed to a workplace exposure under **History** (pg. 10) and the requirement as per the Disease Control Regulations to report these instances to the Ministry of Labor under **Referrals** (pg. 11) • Added reference to reporting obligations under the International Health Regulations (pg. Provided explicit detail of **contact tracing period for asymptomatic contacts** with no known exposure (i.e. 2 days before specimen collection date) (pg. 11) • Added clarity to the meaning of diagnosis date in the **Criteria for Discontinuing Isolation** for asymptomatic cases by adding specimen collection date (pg. 12) • Added bullet under **Assessment of Contact Investigation** about COVID-19 cases that have recovered <u>in the past 3 months</u> do not require public health follow-up if named as a contact (pg. 15). • Updated Flight Protocol to include details to send to PHAC for international cases or contacts. • Updated Contact tracing algorithm to include response to test results.
May 14, 2020	• Updated timeline for reporting into Panorama to 11 a.m. (pg. 1) • Added atypical **signs and symptoms** that may present in children, older adults and persons with developmental disabilities (pg. 4) • Added details to **incubation period** based on unpublished PHAC data (pg. 5). • Added details about source investigation when no known source can be found under section I. "**Case Investigation – History**" (pg. 8). • Updated the Incubation and communicability graphic with additional details (**Figure 1)** • Updated to align with PHAC guidance re**: active daily monitoring of cases** (pg. 9) • Added a bullet regarding **Education** for cases about self-isolating in the home and in co-living settings as well as environmental cleaning in the home (pg. 9).

	• Added reference to Health Care Worker Risk Assessment in Table 3). New addition **"Attachment – Health Care Worker Risk Assessment."** • Added a section specific to **Health Care Workers** (pg. 15) • Added **Outbreak Definitions** (Table 5)
April 17, 2020	• Added a visual to represent incubation and communicability (pg. 8) • Added information about limiting contact with pets (pg. 11) • Corrected reference from Table 4 to Table 3 in Assess for Contacts. • Updated Close Contact definition in Table 3 to include "up to 48 hours prior to symptom onset"
April 15, 2020	• Added reference to Canadian Clinical Management guidelines. • Updated period of communicability to address asymptomatic and pre-symptomatic transmission. • Included further details related to self-isolation. • Included importance of recognizing and mitigating outbreaks in Long Term Care facilities and added reference to the LTC Guidelines. • Added definition of prolonged in contact definition. • Clarified self-isolation for non-close contacts following a negative test result • Incorporated contact tracing timelines for asymptomatic cases that have been lab confirmed. • Included Assessment under contact management to assess for level of risk. • Included a link to the Public Health Order that identifies exemptions for mandatory self-isolation following return to Canada.
April 3, 2020	• Case Definition - removed person under investigation, added suspect, updated probable to include epi-linked, changed lab criteria for confirmed case. • Updated transmission details based on updated scientific knowledge. • Removed reference to person under investigation throughout. • Updated contact-tracing period to up to 48 hours before symptom onset. • Updated definition of mass gathering to include public and private events of large and small sizes. • Updated the IPAC lifting criteria for hospitalized and residents in Long-term care.
March 21, 2020	• Updated process for notification to Ministry of Health. • Added RRPL to confirmed case definition as their testing now meets criteria. • Updated period of communicability based on mild symptoms and isolation requirements. • Added lab report interpretation in accordance with case classifications. • Updated exclusion based on Sask decision for 14 days post-onset of symptoms for mild cases. • Updated close contact by removing flight crew and lab exposures.

	• Updated public health measures. • Removed requirement for daily public health follow-up of contacts on self-isolation and self-monitoring.
March 2020	• NEW

References

Berard,R.A., Scuccimarri,R., Haddad, E.M., Morin, M.P., Chan, K., Dahdah, N.S., McCrindle, B.W., Price, V.E., Yeung, R.S., Laxer, R.M. (July 6, 2020). Paediatric inflammatory multisystem syndrome temporally associated with COVID-19. Canadian Pediatric Society. Retrieved January 2021 from: https://www.cps.ca/en/documents/position/pims

European Center for Disease Prevention and Control, (March 31, 2020). Contact tracing: Public health management of persons, including healthcare workers, having had contact with COVID-19 cases in the European Union – second update). Stockholm: ECDC; 2020.

European Center for Disease Prevention and Control, (Jan 21, 2021). Risk related to the spread of new SARS-CoV-2 variants of concern in the EU/EEA – first update. Retrieved Feb 2, 2021 from https://www.ecdc.europa.eu/en/publications-data/covid-19-risk-assessment-spread-new-variants-concern-eueea-first-update

Fowler,R., Hatchette, T., Salvadori, M., Ofner, M., Poliquin, G., Yeung T. & Brooks, J. (2020). Clinical Management of Patients with Moderate to Severe COVID-19 – Interim Guidance. Retrieved from http://www.ammi.ca/Content/Clinical%20Care%20COVID-19%20Guidance%20FINAL%20April2%20ENGLISH%281%29.pdf

Government of Canada (2020). COVID-19 signs, symptoms and severity of disease: A clinician guide. Retrieved February 2021 from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/signs-symptoms-severity.html

Government of Ontario (2021). Management of cases and contacts of COVID-19 in Ontario. Retrieved April, 2021 from https://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/docs/contact_mngmt/management_cases_contacts.pdf

Health Canada. (1999). Infection control guidelines – Routine practices and additional precautions for preventing the transmission if infection in health care. *Canada Communicable Disease Report (CCDR), 25S4*, July 1999. Retrieved August 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf.

Health Canada. (2002). Infection control guidelines – Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR), 28S1*, March 2002. Retrieved August 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Infection Prevention and Control Canada. (n.d.). Information about Coronavirus. Retrieved from https://ipac-canada.org/coronavirus-resources.php

Public Health Agency of Canada. (2008). Influenza*: Understanding pandemic influenza*. Retrieved August 2011 from http://www.phac-aspc.gc.ca/influenza/pdf/lang/english_understanding_fact_sheet.pdf.

Public Health Agency of Canada. (2011). *Influenza*. Retrieved August 2011 from http://www.phac-aspc.gc.ca/influenza/index-eng.php.

Public Health Agency of Canada. (2020a). Coronavirus disease (COVID-19): For health professionals. Retrieved from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals.html#w

Public Health Agency of Canada. (2020b). Coronavirus disease (COVID-19): Summary of assumptions. Retrieved from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/assumptions.html#a4

Public Health Agency of Canada. (2020c). Coronavirus disease (COVID-19): Symptoms and treatment. Retrieved from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/symptoms.html

Public Health Agency of Canada. (2020d). Public health management of cases and contacts associated with novel coronavirus disease 2019 (COVID-19). Retrieved from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/interim-guidance-cases-contacts.html#ca

Public Health Agency of Canada. (2021 Dec). Public health management of cases and contacts associated with novel coronavirus disease 2019 (COVID-19). Retrieved from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/interim-guidance-cases-contacts.html

Public Health Agency of Canada (2022 Jun). COVID-19 signs, symptoms and severity of disease: A clinician guide. Retrieved Aug 2022 from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/signs-symptoms-severity.html#a1

US Center for Disease Control and Prevention (2021). Science brief: COVID-19 vaccines and vaccination. Retrieved June 9, 2021 from https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/fully-vaccinated-people.html.

World Health Organization. (2020a). Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). Retrieved from https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf)

World Health Organization. (2020b). Q&A on coronaviruses (COVID-19). Accessed Feb. 26, 2020. Retrieved from: https://www.who.int/news-room/q-a-detail/q-a-coronaviruses

World Health Organization (2022). Public health surveillance for COVID-19. Interim guidance. Accessed Aug 22, 2022. Retrieved from: https://www.who.int/publications/i/item/WHO-2019-nCoV-SurveillanceGuidance-2022.2

Coronavirus Data Collection Worksheet (e.g. COVID-19, SARS)

Please complete **all** sections.

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

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

LHN-> SUBJECT SUMMARY-> RESPIRATORY AND DIRECT CONTACT ENCOUNTER GROUP->CREATE INVESTIGATION

Disease Summary Classification: CASE	**Date**	***Classification: CONTACT***	***Date***	***LAB TEST INFORMATION:***
☐ Confirmed	YYYY / MM / DD	☐ *Contact*	*YYYY / MM / DD*	*Date specimen collected:*
☐ Does Not Meet Case	YYYY / MM / DD	☐ *Not a Contact*	*YYYY / MM / DD*	*YYYY / MM / DD*
☐ Person Under Investigation	YYYY / MM / DD	☐ *Person Under Investigation*	*YYYY / MM / DD*	*Specimen type:*
☐ Probable	YYYY / MM / DD			☐ *Throat*
☐ Suspect	YYYY / MM / DD			☐ *Nasopharyngeal*

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	YYYY / MM / DD
☐ Incomplete – Unable to locate	YYYY / MM / DD	(specify where)	

Responsible Organization

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_____

Coronavirus Data Collection Worksheet (e.g. SARS,MERS-CoV and COVID-19)

Please complete **all** sections.

C) DISEASE EVENT HISTORY

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

Site / Presentation: ☐ Severe ☐ Other

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

INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Onset Symptom (√)	Description	No	Yes - Date of onset	Onset Symptom (√)
Asymptomatic*				Gastrointestinal symptoms		YYYY / MMM / DD	
Acute respiratory distress syndrome (ARDS)		YYYY / MMM / DD		Myalgia (muscle pain)		YYYY / MMM / DD	
Acute respiratory distress syndrome (ARDS) - autopsy finding		YYYY / MMM / DD		Other		YYYY / MMM / DD	
Altered sense of taste or smell		YYYY / MMM / DD		Pharyngitis (sore throat)		YYYY / MMM / DD	
Arthralgia		YYYY / MMM / DD		**Pneumonia**		YYYY / MMM / DD	
Cardiac - myocarditis		YYYY / MMM / DD		**Pneumonia - CXR/CT**		YYYY / MMM / DD	
Cough		YYYY / MMM / DD		Prostration		YYYY / MMM / DD	
Dyspnea (shortness of breath)		YYYY / MMM / DD		Respiratory failure - requiring mechanical ventilation		YYYY / MMM / DD	
Encephalitis		YYYY / MMM / DD					
Fever		YYYY / MMM / DD					

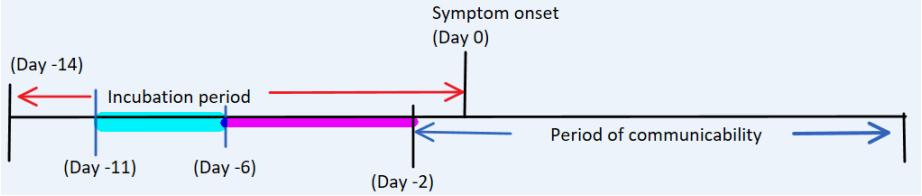
*If asymptomatic at time of testing, select the onset date as specimen collection date and set as the onset symptom.

D) INCUBATION AND COMMUNICABILITY (manually calculate based on identified organism)

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case (period for acquisition): COVID-19 = 14 days
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date**: YYYY / MM / DD
Exposure Calculation details:

Communicability for Case (period for transmission): COVID-19 = 2 days prior to onset of symptoms
Earliest Possible Transmission Date: YYYY / MM / DD **Latest Possible Transmission Date**: YYYY / MM / DD
Exposure Calculation details:



E) RISK FACTORS

INVESTIGATION-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes	N, NA, U	DESCRIPTION	Yes	N, NA, U
Chronic Medical Condition - Cardiac Disease			**Setting –** Crowded living conditions (>1 per room)		
Chronic Medical Condition - Diabetes Mellitus			**Special Population** - Pregnancy		
Chronic Medical Condition - Hypertension			**Special Population** - Homeless +		
Chronic Medical Condition - Lung Disease			**Unknown Source**		
Chronic Medical Condition – Morbid Obesity			**Behaviour** – Lack of personal protective measures		
Chronic Medical Condition - Other (Add'l Info)			**Behaviour** – Sharing personal items		
Immunocompromised - Related to disease or treat't					

Coronavirus Data Collection Worksheet (e.g. SARS,MERS-CoV and COVID-19)

Panorama Client ID: _____
Panorama Investigation ID: _____

Please complete **all** sections.

DESCRIPTION	Yes	N, NA, U	START DATE	END DATE	ADD'L INFO
Contact - Contact to a known case (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Create an AE with details
Contact - Contact with a person with similar symptoms			YYYY / MM/DD	YYYY / MM/DD	Create an AE with details
Exposure - Mass gathering (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Create an AE or TE based on dates
Lives in a communal setting					Enter Colony of residence in add'l info
Occupation – Teacher (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include facility name, town Create AE or TE based on when worked if applicable
Occupation – Other school personnel (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include facility name, town Create AE or TE based on when attended if applicable
Occupation - Health Care Worker – IOM Risk Factors			YYYY / MM/DD	YYYY / MM/DD	Include facility name Create AE or TE based on when worked if applicable
Occupation – Long Term Care Staff +					
Occupation – Personal Care Home Staff +					
Occupation – Food handler (Add'l Info) (restaurant, cafeteria, mobile canteen, bakery, etc)			YYYY / MM/DD	YYYY / MM/DD	Create AE or TE based on when worked if applicable
Occupation – Service and Sales (Add'l Info) (Personal service worker, service industry worker, transit worker, retail)			YYYY / MM/DD	YYYY / MM/DD	Include type of worker. Create AE or TE based on when worked if applicable
Occupation – Corrections and Policing (Add'l Info) (RCMP, police services, corrections worker)			YYYY / MM/DD	YYYY / MM/DD	Include type of worker. Create AE or TE based on when worked if applicable
Occupation – Mining and Natural Resources Worker (Add'l Info) (mine site)			YYYY / MM/DD	YYYY / MM/DD	Include type of worker. Create AE or TE based on when worked if applicable
Occupation – Food processing facility worker (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include type of worker. Create AE or TE based on when worked if applicable
Occupation – Manufacturing (Add'l Info) (assembly plant, warehouse)			YYYY / MM/DD	YYYY / MM/DD	Include type of worker. Create AE or TE based on when worked if applicable
Occupation – Office and Administration (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	
☐ **Occupation – Veterinarian or related worker OR** ☐ **Occupation – Animal control/wildlife officer**			YYYY / MM/DD	YYYY / MM/DD	Create AE or TE based on when worked if applicable
Other (add'l Info)					Include Outbreak number if investigation associated with an OB
Special Population – Attends Preschool (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include childcare name & town. Create AE or TE based on when attended if applicable
Special Population – Attends School (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include school name, town Create AE or TE based on when attended if applicable
Special population – Long Term Care facility Resident			YYYY / MM/DD	YYYY / MM/DD	Include the name of the facility
Special population – Personal Care Home Resident					Include the name of the facility

Special Population – Post Secondary Institution (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	Include institution name, town Create AE or TE based on when attended if applicable
Special Population – Correctional facility resident (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	Include institution name, town. Create AE or TE based as applicable
Travel - Outside of Canada (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	If no other AE, include details in AE
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	If no other AE, include details in AE
Travel – Within Saskatchewan (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	

F) INTERVENTIONS

INVESTIGATION->TREATMENT & INTERVENTIONS->INTERVENTION SUMMARY

Intervention Type and Sub Type:

Assessment:
☐ Assessed for contacts YYYY / MM / DD
Investigator name

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

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Communication:
☐ Letter- e.g. school outbreak (specify) YYYY / MM / DD
Investigator name
☐ Other communication (specify) YYYY / MM / DD
Investigator name

Exclusion: Investigator name
☐ Work YYYY / MM / DD ☐ Preschool YYYY / MM / DD
☐ School YYYY / MM / DD ☐ Daycare YYYY / MM / DD

Symptom Monitoring: Investigator name
☐ Symptom Monitoring, indirect active YYYY / MM / DD
☐ Symptom Monitoring, indirect passive YYYY / MM / DD

Education/counselling: Investigator name
☐ Prevention/Control measures YYYY / MM / DD
☐ COVID Alert App – OTK offered/accepted YYYY / MM / DD
☐ COVID Alert App – OTK offered/declined YYYY / MM / DD

Other Investigation Findings
☐ Investigator Notes YYYY/ MM /DD
☐ See Document Management YYYY/ MM /DD

Testing:
☐ Lab testing recommended YYYY / MM / DD
Investigator name

Immunization:
☐ Eligible Immunization recommended YYYY / MM / DD
Investigator name

Referral:
☐ Infectious Disease Specialist YYYY / MM / DD
☐ Primary Care Provider YYYY / MM / DD
☐ Consultation with MHO YYYY / MM / DD
☐ Employee Health Services /OH&S
☐ Saskatchewan Occupational Health and Safety 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	
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	

G) OUTCOMES (if applicable)

INVESTIGATION->OUTCOMES

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

Cause of Death: (if Fatal was selected) _____

H) EXPOSURES - CONSIDER THE USE OF PROTECTIVE MEASURES (EG. PHYSICAL DISTANCING, LENGTH OF TIME, SHARING OF ITEMS, USE OF MASK IN DETERMING IF THE LOCATION MEETS THE CRITERIA OF A POTENTIAL EXPOUSURE)

Acquisition Event

LHN-> INVESTIGATION-> EXPOSURE SUMMARY-> ACQUISITION QUICK ENTRY

Exposure Name (use the most appropriate and most specific Key Descriptor check box as the name)	**Location City/Town**	**Setting type** (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	**Start/End Date**	**Most likely source**
☐ Contact to a case ☐ Contact to a person with similar symptoms		☐ Household ☐	YYYY / MM / DD to YYYY / MM / DD	☐
☐ LTC Facility ☐ Primary Care Center ☐ Doctor's office ☐ Dentist ☐ Acute Care ☐ Therapy services ☐ Laboratory	City, name of facility	☐ Health care setting	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Provincial Corrections ☐ federal corrections, ☐ remand centers, ☐ police lock-up		☐ Corrections Facility	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Dormitory ☐ Group Home ☐ Shelter (e.g. lighthouse) ☐ Military Base ☐ Personal Care home ☐ Hutterite Colony ☐ Residence for Education ☐ Rooming house/Residential hotel ☐ Short term residential facility ☐ Residence assoc with educational facility		☐ Congregate/Communal Living settings	YYYY / MM / DD to YYYY / MM / DD	☐
Name of School		☐ Educational institution	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Shopping center/retail (incl pharmacy, convenience store, corner store) ☐ Truck Stop/Gas station		☐ Public Facilities	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Daycare/day home		☐ Public Facilities	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Hotel/Motel ☐ Nightclub ☐ Place of Worship		☐ Public Facilities	YYYY / MM / DD to YYYY / MM / DD	☐
☐ theatre (movie or concert) ☐ Conference hall, ☐ Bingo hall ☐ Casino		☐ Public Facilities		☐
☐ Extracurricular activity ☐ School (a school associated contact, not classroom)		☐ Type of Community Contact	YYYY / MM / DD to YYYY / MM / DD	☐
☐ In home health care provider (e.g. Home Care or PHN)		☐ Type of Community Contact	YYYY / MM / DD to YYYY / MM / DD	☐

Coronavirus Data Collection Worksheet (e.g. SARS,MERS-CoV and COVID-19)

Panorama Client ID: _____
Panorama Investigation ID: _____

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

Exposure Name (use the most appropriate and most specific Key Descriptor check box as the name)	**Location City/Town**	**Setting type** (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	**Start/End Date**	**Most likely source**
☐ Close non-household ☐ Visiting friends and relatives		☐ Type of Community Contact	YYYY / MM / DD to YYYY / MM / DD	☐
☐ massage		☐ Personal Service	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Esthetician services (includes spas) ☐ Hair salon (includes barber) ☐ Tattooist		☐ Personal Service	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Chiropractor, acupuncture		☐ Personal Service	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Fitness Center(dance, gymnastics, yoga and gyms); ☐ Campground; ☐ Exhibition ground ☐ Park; ☐ Street festival; ☐ Bowling alley ☐ Curling/Skating rink ☐ Aquatic center/swimming pool; ☐ Multi-use facility (use specific if includes skating/curling rink or swimming pool) ☐ Sports ground (outdoor baseball, football, soccer fields)		☐ Recreational Facility	YYYY / MM / DD to YYYY / MM / DD	☐
□ Bar/tavern/lounge □ Cafeteria (short order) □ Grocery/retail (Costco) □ mobile canteen □ Pastry/bakery shop □ Restaurant □ Vending machine □ outdoor access (food truck)		☐ Food service establishment		☐
Name of workplace		☐ Workplace	YYYY / MM / DD to YYYY / MM / DD	☐
City, Province OR City, Country		☐ Travel	YYYY / MM / DD to YYYY / MM / DD	☐
□ Car Pool □ Taxi □ Bus □ Medical taxi		☐ Transportation	YYYY / MM / DD to YYYY / MM / DD	☐

Transmission Events

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

IN THE CONTEXT OF HIGH CASE NUMBERS AND KNOWN OUTBREAKS/HIGH TRANSMISSION IN COMMUNITY SETTINGS, ONLY ENTER INTO PANORAMA EXPOSURES THAT HAVE NOT BEEN PREVIOUSLY IDENTIFED (E.G. A NEW WORKPLACE)

Exposure Name (use the most appropriate Key Descriptor as per the RF/AE Quick Reference as the name)	**Location City/Town**	**Setting type** (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	**Date/Time**
Use key descriptor or the name of the setting		☐ Congregate/Communal Living settings ☐ Health care setting ☐ Corrections Facility ☐ Household ☐ Workplace ☐ Educational institution ☐ Travel ☐ Type of Community Contact ☐ Public Facilities ☐ Personal Service ☐ Transportation ☐ Recreational Facility ☐ Private Function	YYYY / MM / DD to YYYY / MM / DD

		☐ Congregate/Communal Living settings ☐ Health care setting ☐ Corrections Facility ☐ Household ☐ Workplace ☐ Educational institution ☐ Travel ☐ Type of Community Contact ☐ Public Facilities ☐ Personal Service ☐ Transportation ☐ Recreational Facility ☐ Private Function	YYYY / MM / DD to YYYY / MM / DD
		☐ Congregate/Communal Living settings ☐ Health care setting ☐ Corrections Facility ☐ Household ☐ Workplace ☐ Educational institution ☐ Travel ☐ Type of Community Contact ☐ Public Facilities ☐ Personal Service ☐ Transportation ☐ Recreational Facility ☐ Private Function	YYYY / MM / DD to YYYY / MM / DD
		☐ Congregate/Communal Living settings ☐ Health care setting ☐ Corrections Facility ☐ Household ☐ Workplace ☐ Educational institution ☐ Travel ☐ Type of Community Contact ☐ Public Facilities ☐ Personal Service ☐ Transportation ☐ Recreational Facility ☐ Private Function	YYYY / MM / DD to YYYY / MM / DD
		☐ Congregate/Communal Living settings ☐ Health care setting ☐ Corrections Facility ☐ Household ☐ Workplace ☐ Educational institution ☐ Travel ☐ Type of Community Contact ☐ Public Facilities ☐ Personal Service ☐ Transportation ☐ Recreational Facility ☐ Private Function	YYYY / MM / DD to YYYY / MM / DD
		☐ Congregate/Communal Living settings ☐ Health care setting ☐ Corrections Facility ☐ Household ☐ Workplace ☐ Educational institution ☐ Travel ☐ Type of Community Contact ☐ Public Facilities ☐ Personal Service ☐ Transportation ☐ Recreational Facility ☐ Private Function	YYYY / MM / DD to YYYY / MM / DD

Initial Report completed by:		**Date initial report completed:** YYYY / MMM / DD

Revisions

Date	Change
January 22, 2021	• Updated RF to align with the Panorama Configuration changes • Added Referral to Saskatchewan Occupational Health and Safety (to prompt the reporting to Ministry of Labor Relations and Workplace Safety)
November 25, 2020	• Added Special Population – LTC facility to Risk Factors • Added casino to public facilities; • Added dance, gym, yoga and gymnastics within fitness facilities. • Added more lines for Transmission events
November 19, 2020	• Added Responsible Organization to the Investigation Information section • Revised form to align with the RF and AE Quick Reference Guide to promote consistent categorization of exposures into setting types (e.g. nightclubs, place of worship) and a standard naming convention and support data entry by non-public health staff. • Added new occupations to help identify high-risk occupations (configuration changes pending). • Added recreational facility and workplace as exposure setting type to assist in documenting exposures in alignment of Panorama drop-down options) • Added a column to indicate if the symptom was the onset symptom – to support data entry by a support person
October 28, 2020	• Added Intervention subtype of "COVID Alert App – OTK issued – accepted; issued – declined • Added Other to Risk Factor to support the inclusion of outbreak number as per work standard.
September 10, 2020	• Added Intervention "General – Assessed for Contacts/Info Provided, …" • Removed reference to Use of Antipyretics under medications
July 28, 2020	• Added "Altered sense of taste or smell" to signs/symptoms • Added details to AE • Added reminder to consider use of protective measures such as physical distancing, and PPE in AE • Added Behaviour RF – sharing personal items and lack of personal protective measures • Added RF – Lives in a communal setting to DCW (pre-set added) • – select from All in Panorama • Added RFs – Special population – attends school, attends preschool and Post secondary institution (pre-set added) • Added RFs – Occupation teacher and Other school personnel – this has been added • Removed total number of contacts (Contact indicators are utilized from Go.data) • Added educational institution as exposure setting types – this has been added • Added Personal Service as an exposures setting type – this has been added

Severe COVID-19 Data Collection Worksheet (or fatal outcomes)

Please complete **all** sections.

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

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

LHN-> SUBJECT SUMMARY-> RESPIRATORY AND DIRECT CONTACT ENCOUNTER GROUP->CREATE INVESTIGATION

Disease Summary Classification: CASE	**Date**
☐ Confirmed	YYYY / MM / DD
☐ Does Not Meet Case	YYYY / MM / DD
☐ Probable	YYYY / MM / DD

LAB TEST INFORMATION:

Test type:

☐ PCR **Date specimen collected:** YYYY / MM / DD

☐ Antigen **Date specimen collected:** YYYY / MM / DD

Specimen type:

☐ Nasopharyngeal ☐ Nasal ☐ Throat

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		

Responsible Organization

REPORTING NOTIFICATION Name of Attending/Primary 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_____

C) DISEASE EVENT HISTORY

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

Site / Presentation: ☐ Severe

"Severe" must be selected for hospitalized individuals that meet one or more of the criteria of severity (pneumonia, hypoxemic respiratory failure, multiple organ dysfunction, or septic shock). Signs & symptoms must be documented in Panorama.

Panorama Client ID: _____
Panorama Investigation ID: _____

Severe COVID-19 Data Collection Worksheet (or fatal outcomes)

Please complete **all** sections.

SIGNS & SYMPTOMS (please select the appropriate s/s to corroborate the criteria of severity) INVESTIGATION->SIGNS & SYMPTOMS

Description	Yes – Date of onset	Description	Yes - Date of onset
Acute respiratory distress syndrome (ARDS)	YYYY / MMM / DD	Respiratory compromise – oxygen therapy required.	YYYY / MMM / DD
Pneumonia	YYYY / MMM / DD	Respiratory failure - requiring mechanical ventilation	YYYY / MMM / DD
Pneumonia - CXR/CT	YYYY / MMM / DD	Renal Failure	YYYY / MMM / DD
Respiratory compromise	YYYY / MMM / DD	Sepsis (e.g bacteremia, septicemia, etc)	YYYY / MMM / DD

D) RISK FACTORS INVESTIGATION-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes	N, NA, U	DESCRIPTION	Yes	N, NA, U
Chronic Medical Condition - Cardiac Disease			**Chronic Medical Condition** – Morbid Obesity		
Chronic Medical Condition - Diabetes Mellitus			**Chronic Medical Condition** - Other (Add'l Info)		
Chronic Medical Condition - Hypertension			**Immunocompromised** - Related to disease or treat't		
Chronic Medical Condition - Lung Disease + (does not include asthma)			**Special Population -** Pregnancy		

DESCRIPTION	Yes	N, NA, U	START DATE	END DATE	ADD'L INFO
Special Population –Long Term Care Facility Resident (**required for investigations with fatal outcome)**					Include the name of the facility
Special Population – Personal Care Home Resident **(required for investigations with fatal outcome)**					Include the name of the facility
Other Risk Factor (only for documenting outbreak number)					Enter only the outbreak number in the approved format
Travel - Outside of Canada (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include details in AE
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include details in AE
Travel – Within Saskatchewan (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	

E) INTERVENTIONS INVESTIGATION->TREATMENT & INTERVENTIONS->INTERVENTION SUMMARY

Intervention Type and Sub Type:

Other Investigation Findings
☐ Investigator Notes YYYY/ MM /DD
☐ See Document Management YYYY/ MM /DD

Testing:
☐ Lab testing recommended YYYY / MM / DD
Investigator name

Immunization:
☐ Eligible Immunization recommended YYYY / MM / DD
Investigator name

F) OUTCOMES (For hospitalization and ICU, please include admission date; for intubation/ventilation, please use date initiated) INVESTIGATION->OUTCOMES

☐ Hospitalization YYYY / MM / DD ☐ ICU/intensive medical care YYYY / MM / DD ☐ Intubation /ventilation YYYY / MM / DD

☐ Fatal YYYY / MM / DD How was COVID-19 Related to Cause of Death: (if Fatal was selected) _____

☐ Other _____YYYY / MM / DD

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

COVID-19 Case and Close Contact Self-Management Recommendations – March 25, 2022

Cases

Positive COVID-19 Test (PCR or Antigen)

YES

Recommended to Self Isolate for the longer of:

- 5 days from the onset of symptoms;
- 5 days from the date the positive COVID-19 test was administered if the individual did not have or display symptoms when tested and has not shown symptoms since the test was administered; or
- 24 hours since the individual's fever has resolved, without the aid of fever-reducing medications

It is recommended that symptoms should be improving for 48 hours.
It is recommended that cases self-monitor[1] for an additional 5 days.

AND

Notify close contacts of the exposure

Close Contacts

Close contact to a Positive COVID-19 Case

Recommend Self test[2] immediately

NEGATIVE Test or No Test

Self -Monitor[1] for 10 days. Recommend Self-test at Day 5

Develop Symptoms within 10 day self-monitoring

YES → **Isolate immediately and Self-test[2]**

POSITIVE → **Refer to positive COVID-19 Test (CASE graphic)**

NEGATIVE or No Test → **Continue isolation until symptoms improving for 48 hours.**

NO → **Complete**

If at any time a SELF-TEST[2] is POSITIVE, Refer to positive COVID-19 Test (CASE graphic) Self Isolate immediately.

[1] Self-monitor- in addition to symptom monitoring, includes self-modified behaviors to reduce risk of transmission for the entire risk period (10 days) even though isolation is shortened . This includes isolating immediately if symptoms are present or develop; continuously masking when outside of their household, and avoiding high risk individuals and high risk settings.

[2] Self-test – all close contacts should self-test immediately and after day 5 and again if symptoms develop.

The SARS-CoV-2 exposure risk matrix (the risk matrix) is an assessment tool based on what is current information about the virus and transmission to assist in establishing level of risk for individuals in workplace, school or other community settings that are non-household or non-residential. The risk matrix can also be applied to assessing exposures at events (e.g. conferences, sporting events, etc.). Risk assessment of case/contact interactions requires integration of the factors included in the matrix based on the information received from the case (and contact, as applicable), and the judgment of the case investigator. As more evidence becomes available, the risk matrix may require updates.

Prior to utilizing the risk matrix, refer to the Contact Definitions to determine if high or low risk exposure occurred.

- **Table 1** provides considerations for the adequacy of personal protective equipment (PPE) when there has been direct contact or interactions in close proximity during work-related exposures.
- **Table 2** incorporates the elements of **adherence to appropriate individual-level and setting-specific risk mitigation measures** as referred to in the contact definition**.** Physical interactions between the case and each contact must be assessed against the contact definition.
- **Table 3** provides further explanation of key terms used within the matrix.

When assessing the risk of exposure, consider the level of effectiveness of the measures in place to lower risk of exposure that are not impacted by individual compliance (e.g. physical barriers that prevent physical interactions), versus measures where the effectiveness may vary by individual compliance (e.g. correct use of PPE and adhering to physical distancing requirements).

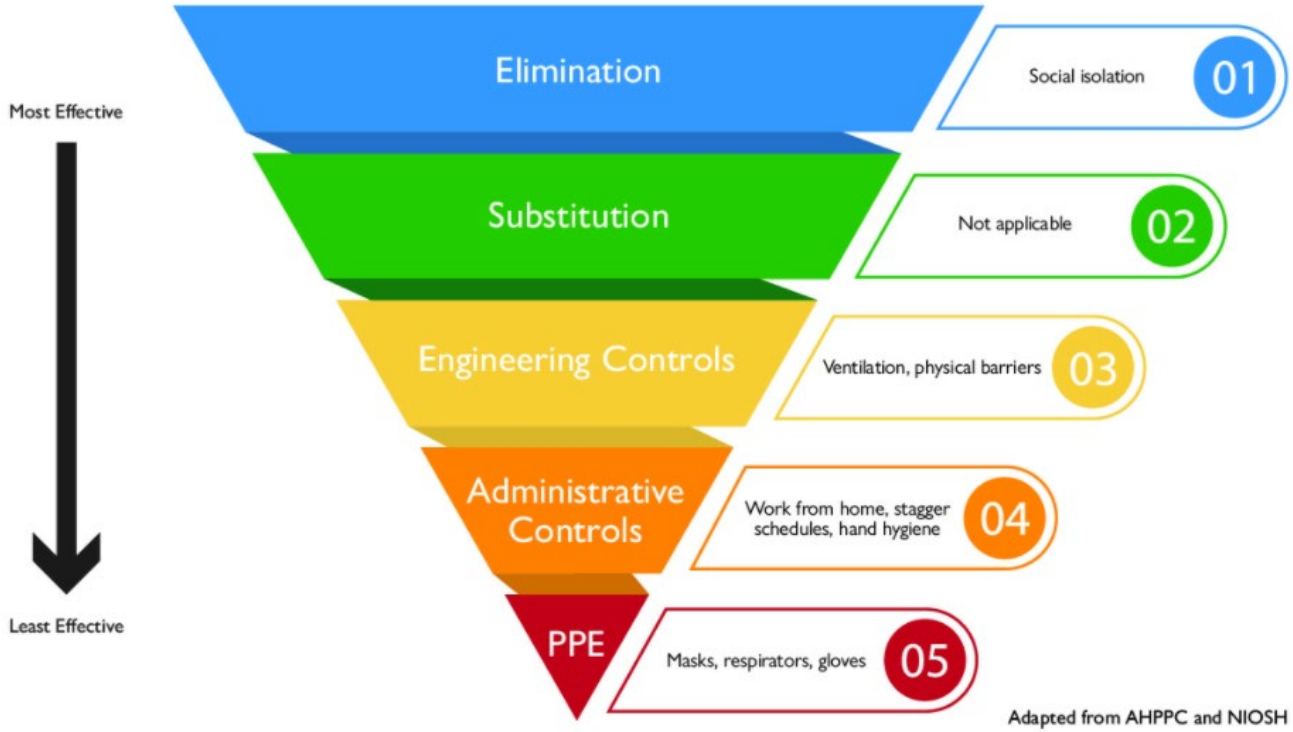
Considering PPE in an exposure assessment requires that there are standards and assurances that the mask is Health Canada approved as a medical grade mask, that individuals understand and ensure that it fits properly, is put on and taken off correctly, was used appropriately and was accompanied by hand hygiene. As such, use of PPE is only considered in exposure risk assessments in work-related exposures where the PPE was provided by the employer who provides the assurances of adequate PPE.

PPE is considered the least effective measure as it is the last line of defense when other controls are not feasible or are inadequate and is highly user-dependent (See **Figure 1**). Refer to **Table 3** for details of adequate PPE. Masking can lead to additional contact with the face due to discomfort and may increase the risk of infection highlighting the need for meticulous hand hygiene and the need for training on appropriate donning, use and doffing.

The use of PPE should not be confused with source control. A medical mask or respirator used as PPE protects the individual who is wearing it and serves as source control. Non-medical masks or face coverings serve as source control only.

Figure 1 provides a visual representation of the relative effectiveness of various mitigation measures in alignment with the Hierarchy of Controls for Occupational Health and Safety.

Figure 1. Applying the Hierarchy of Controls for COVID-19



When adherence to specific risk mitigation measures in the setting where the case and contact interacted cannot be verified, further public health investigation and consultation with the MHO may be required and a more conservative approach may be taken.

The risk matrix assumes that basic hygiene policies are supported in these settings and include access to hand sanitizer, cleaning and disinfecting between use of common items and spaces, etc. If the assessment in the initial stages of the investigation indicate that required public health measures have not been adequate, the MHO should be consulted on how to assess contacts and if further enforcement measures are needed. In the event of deficiencies being identified, expected prevention measures for that setting should be addressed and implementation of additional mitigation measures may also be required.

Considerations that were discussed in the development of this matrix:

- Symptoms of case at the time of interaction are not included in the risk assessment; the matrix applies to the time period during which the case was determined to be infectious. High respiratory effort of the case (including coughing and sneezing, singing, yelling, loud talking, and increased respiratory effort associated with physical activity) may generate more respiratory droplets and aerosols and propel droplets further than normal speaking, thereby increasing the risk for those nearby. When these respiratory activities have occurred, the minimum physical distance is increased.
- Indoor/outdoor environment – outdoor activities are being promoted; this does not mean physical distancing is not required; rather, it often provides extra space to enable sufficient physical distancing between individuals that may not be achieved indoors. Outdoor environments generally reduce risk given the improved circulation of fresh air.

Table 1. Assessment of Work-Related Exposures in the Context of Adequate PPE[1]

		Employer-provided PPE – training received and OH&S oversight	Employer provided PPE - no training received or no OH&S oversight
A	**Contact Wearing A Medical Mask AND Eye protection (Direct or indirect contact – within 2 meters)**		
CASE	With source control		
	Without source control		
B	**Contact Wearing A Medical Mask but NO EYE PROTECTION (Direct or indirect contact – within 2 meters)**		
CASE	Low Respiratory Effort **with** source control		
	Low Respiratory Effort **without** source control		
	High Respiratory Effort **with** source control		
	High Respiratory Effort **without** source control		
C	**Contact NOT WEARING MEDICAL MASK OR EYE PROTECTION (Direct contact. For indirect contact, refer to Table 2.)**		
CASE	Low Respiratory Effort **with** source control		
	Low Respiratory Effort **without** source control		
	High Respiratory Effort **with** source control		
	High Respiratory Effort **without** source control		

Work related interactions with adequate distance and PPE = no exposure; Work-related exposures, adequate distance but inadequate PPE, refer to Table 2.

[1] For health care workers, refer to **Special Considerations for Health Care Workers** for further information

Table 2. Assessment of Individual-Level and Setting-Specific Risk Mitigation Measures (PPE is not applicable)

	Type and level of activity	Able to maintain adequate distance				Unable to maintain adequate distance		
		Outdoors	Indoors well ventilated	Poor/ Unknown ventilation		Outdoors	Indoors well ventilated	Poor/ Unknown ventilation
A	**Contact - short time (< 15 minutes)**							
CASE	Low Respiratory effort **with** source control							
	Low Respiratory Effort **without** source control							
	High Respiratory Effort **with** source control							
	High Respiratory Effort **without** source control							
B	**Contact - prolonged time (≥15 minutes)**							
CASE	Low respiratory effort **with** source control							
	Low Respiratory Effort **without** source control							
	High Respiratory Effort **with** source control							
	High Respiratory Effort **without** source control							

Adapted from Jones et al (2020) and incorporates elements from Public Health Ontario (2020a) (https://www.publichealthontario.ca/-/media/documents/ncov/main/2020/09/covid-19-contact-tracing-risk-assessment.pdf?la=en)

Table 3. Legend and Definitions

Green	No exposure
Yellow	Lower risk exposure (consider as non-close contact)
Red	Higher risk exposure (consider as close contact)
Adequate PPE	- Masks provided by the employer that are licenced by Health Canada as a Class 1 Medical devise (medical grade); the mask must have been intact (meaning clean and dry) at the time of the exposure;

	- Appropriate eye protection[2] - Eyewear is intended to protect the eyes from droplet exposure (eyes are protected from small particles by fitting closely to face at top/brow area and both sides) (Alberta Health Services, 2021). Examples include full face respirator, half face visor, safety glasses that enclose eye area, or any similar type of eye protection where the eye area is fully covered; and - Individuals have been **trained on appropriate use in donning, wearing and doffing without contamination**; training includes assessing the integrity of the PPE. The employer[3] must have a quality assurance process to monitor for adherence to appropriate PPE use and other mitigation measures. Workplaces that provide PPE will have a respiratory protection plan in place with OH&S oversight (i.e. a written exposure control plan[4]).
Ability to maintain adequate distance	In general, 2m is considered adequate distance but activities with high respiratory effort require a minimum of 3m distance. Assess whether individuals were stationary or involved in activities where physical distancing was not maintained as appropriate to the respiratory effort (sports drills, games that involve frequent close interaction with higher respiratory effort). Consider the capacity of the room and the number of individuals in the space.
Source Control (Public Health Ontario [2020b] and [2020c])	Masks for source control reduce transmission of infection *from the wearer* to those around them. Source control provides one layer of protection to potentially reduce the amount of the wearer's respiratory droplets expelled to the environment. It does not eliminate risk of spread and if the case is wearing a mask, identification and follow up of close contacts is still warranted. Source control is offered by covering the nose and mouth and when it has been observed to be consistently and appropriately used and can include: - Non-medical masks (e.g. made of cloth or other masks not certified by Health Canada as medical grade) - Medical masks

[2] **Unacceptable eye protection** includes prescription and non-prescription glasses and sunglasses (unless meeting the enclosed criteria as above)

[3] Workplaces must be compliant with *Occupational Health and Safety Regulations* and supported by Occupational Health and Safety programs that have necessary expertise to do risk assessment and provide support for risk management of hazards in the workplace.

[4] The WorkSafe Saskatchewan resource - Conducting a hazard assessment and developing an exposure control plan (https://www.worksafesask.ca/wp-content/uploads/2021/04/21.03.16.CR5433.PRV_.Conducting-a-hazard-assessment-and-developing-an-exp...-1.pdf)

	The following are inadequate source control and the assessment should be considered as NO source control: - There is **an exhalation valve**. Exhalation valves allow the exhaled air to escape into the environment rendering them ineffective in source control. - Inconsistent or inappropriate use (not covering the mouth and nose for the duration of the interaction)
High Respiratory Effort	Represents the respiratory effort of the case. In cases of high respiratory effort, the virus is projected further in and includes such activities as coughing, sneezing, shouting, singing, playing wind instruments, sports activities, etc. Amount of physical distancing is a continuum and generally, increased distance is lower risk. For practical application, distances of >= 2 meters and >=3 meters are a guide.
Prolonged Time	Time is one element of an exposure. There is no definitive description of prolonged time. To provide a guide for investigations, prolonged can be defined as greater than 15 minutes **cumulative** within a 24 hour period, recognizing that high risk exposures may occur in less than 15 minutes based on the type of interaction with a case.
Short Time	Less than 15 minutes **cumulative** within a 24 hour period
Ventilation (Government of Canada [2021])	For the purpose of the matrix, a formal assessment of ventilation including air exchange rate and HVAC specification are not required. General considerations include volume of the space (square meters and ceiling height), access to fresh air through open windows/doors, free flow of air unrestricted by walls, partitions and barriers. Basements are generally more difficult to ventilate and would be considered to have poor ventilation.

References

Alberta Health Services PPE Task Force (2020). Bringing my own PPE to work. Retrieved April 2021 from: https://www.albertahealthservices.ca/assets/info/ppih/if-ppih-ppe-bring-my-own-guidance.pdf

Government of Canada (2021). COVID-19: Guidance on indoor ventilation during the pandemic. Retrieved January 2021 from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-indoor-ventilation-covid-19-pandemic.html#a6

Infection Prevention and Control Canada (2021). Coronavirus (COVID-19) SARS-CoV-2. Retrieved April 2021 from https://ipac-canada.org/coronavirus-resources.php

Jones Nicholas R, Qureshi Zeshan U, Temple Robert J, Larwood Jessica P J, Greenhalgh Trisha, Bourouiba Lydia et al. (2020). Two metres or one: what is the evidence for physical distancing in covid-19? BMJ 2020; 370 :m3223BMJ. Retrieved January 2021 from https://www.bmj.com/content/370/bmj.m3223

Public Health Ontario (2020a). Focus on risk assessment approach for COVID-19 contact tracing. Retrieved January 2021 from https://www.publichealthontario.ca/-/media/documents/ncov/main/2020/09/covid-19-contact-tracing-risk-assessment.pdf?la=en

Public Health Ontario (2020b). Focus on: Masking for source control of COVID-19: Considerations for workers in non-healthcare settings. Retrieved January 2021 from https://www.publichealthontario.ca/-/media/documents/ncov/factsheet/2020/05/factsheet-covid-19-masks-not-healthcare.pdf?la=en

Public Health Ontario (2020c). Q and A: Non-medical masks. Retrieved January 2120 from https://www.publichealthontario.ca/-/media/documents/ncov/factsheet/2020/11/covid-19-non-medical-masks-qa.pdf?la=en

Students have experienced multiple, prolonged periods without inperson learning during the COVID-19 pandemic, and there is evidence demonstrating related harms (Public Health Ontario, Aug 2022). Given the importance of in-person schooling for the learning and overall well-being of children, it is important to balance the harms of losing in-person learning with reducing transmission in kids especially now that broad societal measures to prevent health system collapse are no longer required. Efforts to reduce transmission utilizes multiple layers of prevention in schools, which may include a stronger recommendation for masking especially when community transmission higher, to mitigate the harms of disruption to in-person learning is advisable.

We are in a better state; we know more about COVID-19 and given the reduction in severe infection across communities, availability of vaccinations that prevent severe infections broadly across the population, and a lower risk of severe disease overall in children our recommendations this year encourage a less stringent approach to school-based COVID-19 mitigation. The aim is to optimize in-person classroom time and participation in extracurricular activities, and minimize attendance disruptions.

Expectations

- As more people are vaccinated and there are more recoveries from infection, a level of population immunity is developing and the level of immunity in the population will play a crucial role in disease control.
- Current evidence indicates that eradication of SARS-CoV-2 does not appear feasible (Public Health Ontario, Feb 2022).
- Population immunity should be considered as something that is “continuous” and dynamic (i.e. level of immunity in the population is proportional to decreases in incidence of infection and may vary across regions or sub-populations) and we can anticipate peaks of infection due to seasonality, new variants and/or the unclear effects of waning of immunity and long-term durability of protection with resulting disease not necessarily being mild.
- Communities throughout the country including Saskatchewan continue to experience cycles of high COVID-19 transmission as new variants are associated with a higher risk of infection or reinfection in both vaccinated and unvaccinated individuals.
- We could anticipate a winter season with higher case incidence.
- Public health guidance may vary from community to community, with some health departments enacting targeted recommendations to protect high-risk individuals and others choosing to retain broader mitigation strategies.

Our strategies will focus on the following recommendations:

- **Stay home when ill –** School administrators should ensure that staff, other adults entering the school, parents, caregivers, and students are aware that they should not come to school if they are sick and unable to participate fully in routine activities. School administrators can support this practice by communicating the importance of everyone doing a health check (BCCDC, 2022).

- **Hand Hygiene and Respiratory Etiquette –** these are standard individual healthy practices that can help reduce illness and disease spread.
- **Environmental Cleaning –** Cleaning and disinfection of the physical environment is important. It reduces the numbers of microorganisms that may potentially be transmitted to other individuals.
- **Ventilation** – We have learned the value of improving ventilation to reduce the transmission risk for COVID-19 and other respiratory illness during the fall and winter. We encourage to continue making wise investments in ventilatory improvements and, when possible, flexing to outdoor or less-crowded indoor locations during periods of high seasonal transmission, so long as such practices do not impose major challenges to normal program operations and safety.
- **Symptom Monitoring –** Isolation of contacts (also referred to a quarantine) is no longer required by public health for close contacts of COVID, however it is good health practice to pay attention to early signs of illness an to take steps to reduce the risk of spreading to others including self-testing, masking and self-isolation when ill. This is particularly important for Individuals who are aware of an exposure to COVID – these individuals should isolate if they develop symptoms.
- **Self-Testing –** At home tests are expected to be available for the foreseeable furture. Individuals experiencing mild cold-like symptoms including cough, sore throat, sneezing without fever, it is recommended that you stay home, use rapid antigen testing and self-isolate.
  - Anyone who tests positive for COVID-19 should self-isolate immediately at home or in another suitable environment, regardless of their vaccination status.
    - It is recommended that individual self-isolate for five days from the date of test or 24 hours after any fever has resolved without the aid of fever-reducing medications and all other symptoms are improving for at least 48 hours, whichever is later.
  - Individuals with a negative test should follow the general self-isolation guidelines (as outlined below).
- **Self-Isolation –** The strongest mitigation practice for reducing school outbreaks of any seasonal respiratory illness remains the expectation that students who are ill (particularly those with cough, muscle aches and fever) stay home to recuperate. Individuals should remain home until fever-free for at least 24 hours, and until symptoms are improving. Individuals with a positive test should follow the guidelined outlined under testing above.
- **Masking –** Schools no longer need to enact masking requirements within school settings. However, we should continue to communicate to families any updates/recommendations for masking when indoors during periods of high community transmission. Such communications can inform the voluntary decisions of students and staff of whether to mask during these periods. Schools must be supportive of individual students and staff who choose to continue to mask.
- **Vaccination** – Students and staff should complete at least the primary series of COVID-19 vaccinations given the strong protection they provide against severe infections. Akin to seasonal influenza vaccination, which we perform each year to prevent reinfection, we would encourage schools and early childhood programs to inform staff and student families of recommendations for COVID-19 booster vaccinations when appropriate.

- **Outbreaks –** To avoid lengthy periods of learning loss and school closure, schools might adopt practical strategies, in consultation with local public health, when confronted by large outbreaks.
  - **Communication -** Schools should first and foremost communicate to families when a large outbreak occurs. These communications can inform voluntary decisions among staff and students of whether to mask when a large outbreak occurs within the school.
  - **Masking -** During an outbreak within a classroom or school, school leadership might ask affected classrooms (or if large enough, the school) to do a "mask sprint" for a week to limit the extent of the outbreak (Children's Hospital of Philidelphia, Aug 2022).
  - **Testing -** If testing is available, they might offer voluntary outbreak testing to quickly identify individuals who are positive and must isolate at home.

The Public Health Agency of Canada, Reducing COVID-19 risk in community settings: A tool for operators [1] may help administrators to identify different strategies that may help to lower the risk of COVID-19 spread in their specific setting.

[1] https://health.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/reducing-covid-19-risk-community-settings-tool-operators.html

References

British Columbia Center for Disease Control (2022, Aug 25). *Public health communicable disease guidance for K-12 schools*. Retrieved Aug 29, 2022 from http://www.bccdc.ca/Health-Info-Site/Documents/COVID_public_guidance/Guidance-k-12-schools.pdf

Children's Hospital of Philidelphia (2022, Aug). *Guidance for updated COVID-19 school mitigation plans for academic year 2022-23*. Retrieved Aug 29, 2022 from https://policylab.chop.edu/sites/default/files/pdf/publications/PolicyLab-CHOP-Guidance-for-Updated-COVID-19-School-Mitigation-Plans-2022-23.pdf

Government of British Columbia (2022, Aug 25. *Provincial communicable disease guidelines for K-12 school settings.* Retrieved Aug 29, 2022 from https://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/safe-caring-orderly/k-12-covid-19-health-safety-guidelines.pdf

Government of Canada (2022). *Reducing COVID-19 risk in community settings: A tool for operators.* Retrieved Aug 29, 2022 from https://health.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/reducing-covid-19-risk-community-settings-tool-operators.html

Massetti GM, Jackson BR, Brooks JT, et al. (2022). Summary of Guidance for Minimizing the Impact of COVID-19 on Individual Persons, Communities, and Health Care Systems — United States, August 2022. MMWR Morb Mortal Wkly Rep 2022;71:1057-1064. Retrieved Aug 29, 2022 from http://dx.doi.org/10.15585/mmwr.mm7133e1

Ontario COVID-19 Science Advisotry Table (2022, Aug 25). *Science Briefs: Infection Prevention and Control Considerations for Schools during the 2022-2023 Academic Year*. Retrieved Aug 29, 2022 from https://covid19-sciencetable.ca/wp-content/uploads/2022/08/Infection-Prevention-and-Control-Considerations-for-Schools-During-the-2022-2023-Academic-Year_20220825_published.pdf

Public Health Ontario (2022, Aug). *Environmental Scan: School-based Public Health Measures in Select Jurisdictions and Guidance from Public Health Organizations.* Retrieved Aug 29, 2022 from https://www.publichealthontario.ca/-/media/Documents/nCoV/phm/2022/08/school-public-health-measures-pho-guidance.pdf?sc_lang=en

Public Health Ontario (2022, Feb). *Focus on: Consideratioh for population immunitiy and endemicity.* Retrieved Aug 29, 2022 from https://www.publichealthontario.ca/-/media/Documents/nCoV/Vaccines/2022/02/considerations-population-immunity-endemicity.pdf?sc_lang=en

United States Centers for Disease Control and Prevention (2022, Aug 11). Operational guidance for K-12 school and early care and education programs to support safe in-person learning. Retrieved Aug 29, 2022 from https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/k-12-childcare-guidance.html

United States Centers for Disease Control and Prevention (2022, Aug 19). Summary of guidance for minimizing the impact of COVID-19 on individual persons, communities and health care systems – United States, August 2022.

Revisions

August 31, 2022	• Updated the document to align with the general approaches for COVID-19 that focuses on a self-management approach. • Added references and 2022-23 resources.
January 7, 2022	• Case isolation period updated to 5 days for fully vaccinated individuals • Contact isolation period updated to 10 days for all individuals • Amendments to reflect change in process that positive COVID-19 test results for school-based students or daycare attendees, from either rapid antigen or PCR tests, are to be reported to the local school office or daycare by parents or guardians. The school or daycare will then send a notification to parents/guardians of the class and/or bus cohort that may be considered close contacts.
November 29, 2021	• Removed reference to enhanced precautions applying to the whole school in the outbreak table and replaced it with a footnote that clarifies that enhanced precautions are based on the local context and the scope of the outbreak; measures may be applicable to a class, a cohort (as defined in outbreak criteria), a grade or the whole school/facility • Removed details of self-isolation exemption as Public Health Order updated October 1, 2021 to specify that unvaccinated pupils that are identified as a close contact of a household case will not be exempted from the requirement to isolate for 14 days. Inserted references to the current Public Health Order posted at Saskatchewan.ca to seek most up to date details on current exemptions for self-isolation • Updated outbreak criteria to include: ➢ An outbreak will be declared when three or more individuals are confirmed to be positive with COVID-19 in a classroom or cohort within 14 days and attended school while infectious ➢ Examples provided for cohort (sports team, bus route, club or other group)
September 23, 2021	• Added definition of daycare and removed reference from preschool in the table as these exposures are not recognized in the Public Health Order.
September 17, 2021	• Amendments to align with current Public Health Order.
September 13, 2021	• Attachment posted.

Respiratory and Direct Contact

Diphtheria

Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.
From Public Health to Ministry of Health: Immediate.

Public Health Follow-up Timeline: Initiate within 24-48 hrs.

Information

Case Definition (Public Health Agency of Canada, 2008)

Confirmed Case	Clinical illness* or systemic manifestations compatible with diphtheria in a person with an upper respiratory tract infection or infection at another site (e.g., wound, cutaneous) PLUS at least one of the following: • Laboratory confirmation of infection: ▪ isolation of *Corynebacterium diphtheriae* with confirmation of toxin from an appropriate clinical specimen,[1] including the exudative membrane **OR** ▪ isolation of other toxigenic Corynebacterium species (*C. ulcerans* or *C. pseudotuberculosis*) from an appropriate clinical specimen, including the exudative membrane **OR** ▪ histopathologic diagnosis of diphtheria. **OR** • Epidemiologic link (contact within two weeks prior to onset of symptoms) to a laboratory-confirmed case.
Probable Case	Clinical illness* in the absence of laboratory confirmation or epidemiologic link to a laboratory-confirmed case.
Suspected Case	Upper respiratory tract infection (nasopharyngitis, laryngitis or tonsillitis) with or without a nasal, tonsillar, pharyngeal and/or laryngeal membrane.
*Clinical illness is characterized as an upper respiratory tract infection (nasopharyngitis, laryngitis or tonsillitis) with or without an adherent nasal, tonsillar, pharyngeal and/or laryngeal membrane, plus at least one of the following: • gradually increasing stridor; • cardiac (myocarditis) and/or neurologic involvement (motor and/or sensory palsies) one to six weeks after onset; • death, with no known cause.	

[1]Refer to Specimen Collection and Transport for details on appropriate clinical specimens.

Causative Agent
Corynebacterium diphtheriae (C. diphtheriae), a gram positive bacillus. Diphtheria is caused by toxigenic strains of the bacteria *C. diphtheriae* of gravis, mitis or intermedius biotypes.

Symptoms
The various clinical forms of diphtheria are caused by an exotoxin produced by toxigenic strains of the bacteria; all toxigenic strains produce an identical toxin. Toxin production occurs following infection of a *C. diphtheriae* strain by a corynebacteriophage containing the tox gene.

Non-toxigenic strains can also produce a mild, localized disease resembling that caused by toxigenic strains.

- Infections that are not apparent tend to outnumber clinical cases, and both toxigenic and non-toxigenic strains of *C. diphtheriae* may be harboured in the nasopharynx, skin, and other sites of asymptomatic carriers.
- Pharyngeal diphtheria is a febrile illness beginning with a low-grade fever, a sore throat, and a yellow-white discharge over the tonsils, uvula, and throat. This discharge becomes grey, patchy, and membranous and may involve the larynx, where it can present an airway obstruction, particularly in infants and young children. There may be marked edema of the neck (classic bull neck appearance).
- Nasal diphtheria is often a mild form of the disease and is characterized by one-sided nasal secretions.
- Diphtheria may also present as a cutaneous, vaginal, or conjunctival infection.
- Cutaneous or mucous membrane diphtheria is usually found in warmer climates or among the homeless and will present as a shallow ulcer coated with a pseudomembrane.

Complications

- Affects distant tissues and organs after 2 to 6 weeks, in particular cranial and peripheral motor and sensory palsies, and myocarditis.
- A case-fatality rate of 5% to 10% is reported for non-cutaneous diphtheria, with the highest rates among the very young and the elderly (Manitoba Health, 2001).

Incubation Period
Usually 2-5 days, sometimes as long as 10 days.

Reservoir/Source
Humans are the only reservoir - harboured in the nasopharynx, skin, and other sites.

Mode of Transmission

- Direct transmission of toxigenic strains or indirect transmission by transfer of the bacteriophage from a person infected with a toxigenic strain to a non-toxigenic strain in a carrier.
- Contact with nasopharyngeal secretions of a case or carrier.
- Rarely, contact with articles soiled with discharges from infected skin lesions.
- Raw milk has also served as a vehicle for transmission.

Period of Communicability

- Variable, until virulent bacilli have disappeared from discharges and lesions. For example:
  - effective antibiotic therapy promptly ends shedding within 4 days;
  - without treatment, infectivity usually last 2 weeks or less (seldom more than 4 weeks);
  - the rare chronic carrier may shed organisms for 6 months or more.

Specimen Collection and Transport
The diagnostic specimen is a throat swab in reduced charcoal transport medium.

Material for culture should be obtained by collecting throat swabs and placing them in Amies transport medium. Swabs should be taken from the inflamed areas of the throat and nasopharynx in symptomatic patients. Swabs should be taken for culture before antibiotic therapy is initiated. Confirmatory diagnosis requires isolation and identification of the organism, and toxigenicity testing, and may take several days.

If cutaneous diphtheria is suspected, swabs should be collected from the base of the lesion. Specimens should be transported as soon as possible.

Do not wait for laboratory results before initiating treatment.

Methods of Control/Role of Investigator

Prevention and Education
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 and as well as provides information on high-risk groups and activities. As diphtheria is a vaccine-preventable illness, attention should be placed on immunization.

Immunization
Immunize infants, children and adults according to the recommended schedule. Refer to Saskatchewan Immunization Manual.[1]

Education

- Education should be provided regarding respiratory etiquette and measures to prevent transmission.
- Educate the public about the disease and the need for active immunization. Immunization information fact sheets can be used to guide discussion.

Management
See Attachment – Recommendations for the Management of Diphtheria Cases and Contacts Algorithm.

I. Case
Collaborate with the primary care provider to determine respective roles and responsibilities (e.g., contact tracing, education, and follow-up).

History

- Determine case status including a review of the immunization history. Do not wait for laboratory results before initiating treatment.
- Obtain travel history or history of immigration within the past week.
- Identify contacts (refer to Contact Definition).
- Refer to Attachment - Diphtheria Case Investigation Worksheet to guide follow-up.

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

Treatment/Supportive Therapy

- **Diphtheria Antitoxin** - For pharyngeal diphtheria, early administration of diphtheria antitoxin is recommended to neutralize the circulating diphtheria toxin. It should be given in the early stages if diphtheria is suspected. "The site and size of the diphtheria membrane, the degree of toxic effects, and the duration of illness are guides for estimating the dose of antitoxin" (American Academy of Pediatrics, 2009, p. 281). Dosage should be coordinated by the clinician, infectious disease (ID) specialist and Medical Health Officer (MHO). Diphtheria antitoxin can be obtained from Population Health Branch, Saskatchewan Ministry Health. See Appendix D - Publicly Funded Medications for Chemoprophylaxis/Treatment.
- Antimicrobial therapy is not a substitute for antitoxin treatment.
- Likewise, antitoxin treatment is not a substitute for antibiotic therapy (Health Canada, 1998).
- **Antimicrobial Therapy** - Treatment choices are governed by the most recent guidelines. The public health practitioner should direct any questions regarding the current treatment protocols to the physician or MHO. Refer to Heymann, other texts and clinical treatment guidelines for specific treatment details. See Appendix H - Sources for Clinical Treatment Guidelines. Heymann (2008) indicates the following:
  - Procaine penicillin G IM or parenteral erythromycin is recommended until the patient can swallow comfortably, at which point the treatment may be given orally. A total of 14 days treatment is recommended.
  - Supportive treatment, in hospital or home is advised under strict isolation involving routine contact precautions for cutaneous and droplet precautions in instances of pharyngeal until 2 consecutive throat cultures are negative for diphtheria bacilli. These cultures should be taken not less than 24 hours apart and not less than 24 hours after the completion of a 14-day course of antibiotics.
- For cutaneous diphtheria, the skin lesions should be cleaned with soap and water, and a course of oral antibiotics should be given for a 10-day period. Antitoxin may be of some use in cutaneous disease, because of toxic sequelae (American Academy of Pediatrics, 2009).

Immunization
Immunization against diphtheria should begin during convalescence because there is no guarantee that immunity to diphtheria is conferred by natural infection.

Exclusion
Exclude and isolate **all** cases from work, school, daycare, and other public environments using precautions appropriate to the site of infection until two cultures (nasal and pharyngeal) taken 24 hours apart and at least 24 hours after completion of a 14-day course of appropriate antibiotics, are negative.

Referrals
To the appropriate specialist(s) including an ID specialist.

II. Contacts/Contact Investigation

Refer to Attachment – Diphtheria Contact Investigation Worksheet to guide follow-up.

Contact Definition

- Close contacts are defined as:
  - household members;
  - friends, relatives, and caretakers who regularly visit the home;
  - kissing and/or sexual contacts;
  - those who share the same room at school or work;
  - healthcare staff exposed to oropharyngeal secretions of the infected person (staff who have taken appropriate isolation precautions need not be considered contacts).

Follow up of contacts involves:

Education

- All contacts (or their parents if children are contacts) should be provided with information on the disease, risk factors, prevention and necessary follow-up tests, treatments, and exclusion requirements.

Testing/Prophylaxis

- Collect appropriate screening and case-finding specimens (see Specimen Collection). Samples for culturing should be taken from nasal and pharyngeal swabs **before** antibiotic treatment is started (Health Canada, 1998).
  - A single intramuscular dose of benzethine penicillin G or a 7 to 10 day course of oral erythromycin is recommended for all close contacts exposed to diphtheria regardless of their immunization status (Heymann, 2008).
    - If carrier status is determined, refer to Carrier Management.
  - Follow-up surveillance should continue for 7 days. "All close contacts should be kept under daily surveillance for 7 days from the date of last contact with the case and assessed clinically for signs and symptoms of diphtheria" (Health Canada, 1998).

Immunization

- Assess the immunization status of all contacts.
- Previously immunized contacts who have not received a booster dose within 10 years should receive a booster dose of diphtheria toxoid.
- Under-immunized contacts should have a primary series initiated.

Exclusion

- Exclude under-immunized contacts from school, daycare, health care, and food handling until 2 cultures taken 24 hours apart and at least 24 hours after completion of a 14 day course of appropriate antibiotics, are negative.
- Exclude adult contacts from the workplace until bacteriologic examination proves them not to be carriers for those occupations that involve handling food (especially milk) or close association with under-immunized adults or children (Heymann, 2008).
- Keep all close contacts under active daily surveillance for signs and symptoms for 7 days. Refer to Attachment – Diphtheria Contact Investigation Worksheet. Exclude anyone who becomes symptomatic or whose cultures return positive (Heymann, 2008).

III. Carrier Management

Carrier Definition

One who harbours, and may disseminate, the bacterium without discernable clinical disease.

Testing

- Follow-up pharyngeal cultures should be obtained from contacts proven to be carriers at a minimum of 2 weeks after completion of therapy.
- If cultures are positive, an additional 10-day course of erythromycin should be given.

Treating

- For carriers, a single intramuscular dose of benzathine penicillin G (600,000 units for persons < 6 years of age, and 1.2 million units for persons ≥ 6 years of age), or 7 to 10 day course of oral erythromycin (40 mg/kg/day to a maximum of 1 g/day for children, and 1 g/day) divided in 4 doses for adults has been recommended (Heymann, 2008).

Immunization

- Ensure appropriate immunizations are up-to-date.

Exclusion

- Standard and droplet precautions should be observed for hospitalized carriers with cutaneous diphtheria until 2 negative cultures are obtained from lesions at least 2 weeks after completion of antibiotics.
- Carriers should be excluded from food handling and working with children who are under-immunized until 2 negative cultures have been obtained after completion of antibiotics.
- Carriers should pay strict attention to personal hygiene, particularly:
  - respiratory etiquette;
  - hand hygiene;
  - keeping infected wounds covered.

IV. Environment

Child Care Centre Control Measures

Although an outbreak of diphtheria would be rare, if it occurs the following should be implemented:

- Provide information (not personal information) to the parents of the children in the daycare or school. See Attachment – Diphtheria Template Letter to Parents.
- An immunization information sheet containing diphtheria can be provided and used as a guide.

Children who have not completed the primary series of immunization against diphtheria should begin, or finish the series. These children should be referred to their local public health office.

Institutional Control Measures

- Consultation between Public Health/MHO and infection control staff is important.
- Strict isolation of cases in hospital until two consecutive negative cultures are obtained from throat and nasopharyngeal swabs are obtained at least 24 hours apart and at least 2 weeks after completion of antibiotic therapy. If cultures are difficult to obtain, isolation should be not be discontinued until 14 days after the beginning of antibiotic therapy.
  - Droplet precautions should be used for pharyngeal diphtheria.
  - Contact precautions should be used for cutaneous diphtheria.

Epidemic Measures

Immunize the largest possible proportion of the population group involved especially infants and preschool children.

If unimmunized adults are affected, immunize the groups most affected and individuals at high risk of exposure to cases. Provide a second dose of vaccine one month later to ensure two doses are received.

Travellers to countries where epidemics occur should have their diphtheria status reviewed and updated when necessary (American Academy of Pediatrics, 2009).

References

American Academy of Pediatrics. (2009). *Red book: 2009 Report of the Committee on Infectious Diseases* (28th ed.). Elk Grove Village, IL: Author.

Centers for Disease Control and Prevention. (2008). *Manual for the surveillance of vaccine-preventable diseases* (4th ed.). Atlanta, GA: Author. Retrieved October, 2010 from www.cdc.gov/**vaccines**/pubs/surv-**manual**/front-portion.pdf.

Government of Newfoundland and Labrador. (2010). *Disease control manual.* Retrieved October, 2010 from http://www.health.gov.nl.ca/health/publications/diseasecontrol/vpd_2010.pdf.

Health Canada. (1998). Guidelines for the control of diphtheria in Canada. *Canada Communicable Disease Report (CCDR), 24S3,* July 1998. Retrieved October, 2010 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/98vol24/24s3/index.html.

Health Canada. (1999). Infection control guidelines: Routine practices and additional precautions for preventing the transmission of infection in health care. *Canada Communicable Disease Report (CCDR), 25S4,* July 1999. Retrieved October, 2010 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf.

Health Canada. (2002). Infection control guidelines: Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR), 28S1,* March 2002. Retrieved October, 2010 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

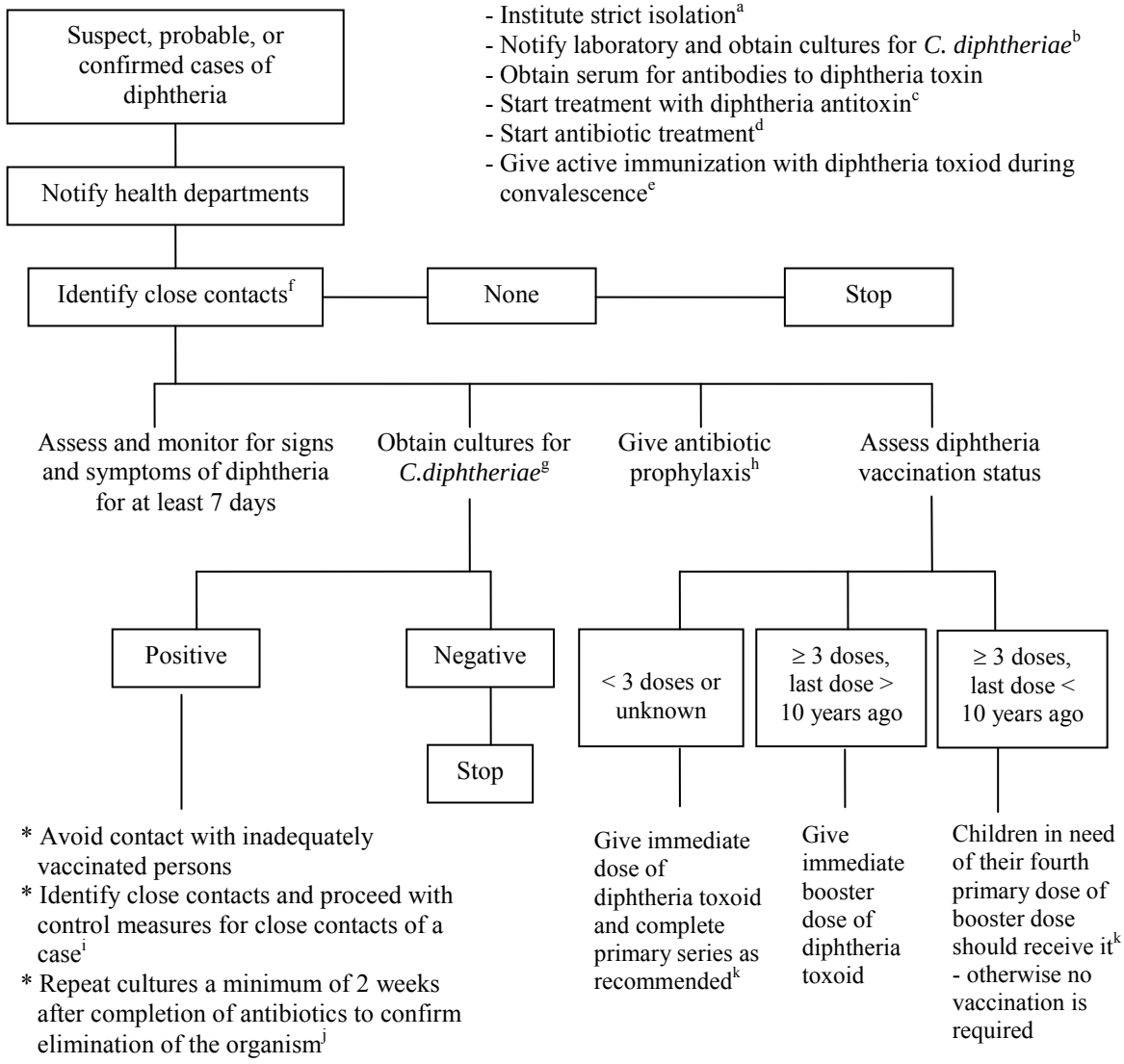
Manitoba Health. (2001). *Communicable disease management protocols: Diphtheria.* Retrieved October, 2010 from http://www.gov.mb.ca/health/publichealth/cdc/protocol/index.html.

Public Health Agency of Canada. (2006). *Canadian immunization guide* (7th ed.). Ottawa, Canada: Public Works and Government Services Canada.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR), 35S2*, November 2009. Retrieved October, 2010 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Diphter-eng.php.

Diphtheria

Attachment – Recommendations for the Management of Diphtheria Cases and Contacts Algorithm



Adapted from CDC Diphtheria Worksheet which was based on Farizo et al. (24), Clinical Infectious Diseases 1993, 16:59-68.

a. Strict isolation with contact and droplet precautions for all potentially infectious cases, as well as a private room and the use of masks, gowns, and gloves for all persons entering the room. Maintain isolation until elimination of the organism is demonstrated by negative cultures of two samples obtained at least 24 hours apart after completion of antimicrobial therapy.
b. Both nasal and pharyngeal swabs should be obtained for culture.
c. The recommended dosage and route of administration of antitoxin depends on the extent and duration of disease. **Refer to Guidelines for the Control of Diphtheria in Canada at** http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/98vol24/24s3/24s3e_e.html **for detailed dosage recommendations for equine diphtheria antitoxin**.
d. Antibiotic therapy is not a substitute for antitoxin treatment. **Refer to Guidelines for the Control of Diphtheria in Canada for detailed antibiotic dosage recommendations for cases.** Eliminations of *C. diphtheriae* should be confirmed by two negative cultures of throat and nasopharyngeal swabs taken at least 24 hours apart, a minimum of 2 weeks after antibiotics are completed. Persistent carriage of the organism should be treated with an additional 10-day oral course of erythromycin with follow-up cultures.
e. Vaccination is required because clinical diphtheria does not necessarily confer immunity.
f. Close contacts include household members and other persons with a history of direct contact with a case (e.g., caretakers, relatives, or friends who regularly visit the home) as well as health-care personnel exposed to oral or respiratory secretions of a case.
g. Both nasal and pharyngeal swabs should be obtained for culture. Swabs should also be taken from any wounds or skin lesions.
h. Antibiotic therapy is not a substitute for antitoxin treatment. **Refer to Guidelines for the Control of Diphtheria in Canada for detailed antibiotic dosage recommendations for contacts and carriers.**
i. Control measures for contacts of a case should be given a higher priority than control measures for contacts of a carrier.
j. Eliminations of *C. diphtheriae* should be confirmed by two negative cultures of throat and nasopharyngeal swabs taken at least 24 hours apart, a minimum of 2 weeks after antibiotics are completed. Persistent carriage of the organism should be treated with an additional 10-day oral course of erythromycin with follow-up cultures.
k. Refer to the Saskatchewan Immunization Manual at http://www.ehealthsask.ca/services/manuals/Pages/SIM.aspx or NACI for recommendations for schedule of vaccination.

Diphtheria
Attachment – Diphtheria Case Investigation Worksheet

Please see the following pages for the Diphtheria Case Investigation Worksheet.

Diphtheria Case Investigation Worksheet

Shaded areas are mandatory for reporting to Saskatchewan Ministry of Health [Indicates field in iPHIS]

Please use YYYY/MM/DD for all dates

PATIENT INFORMATION

Date Reported	Name (Last, First)	HSN

Birth Date	Age	Sex	Pregnant	Ethnicity
		☐ Male ☐ Female ☐ Unknown	☐ Yes ☐ No ☐ Unknown	☐ Arab/West Asian ☐ Asian ☐ Black ☐ Inuit ☐ Latin-American ☐ Métis ☐ North American Indian ☐ South Asian ☐ White ☐ Unknown ☐ Other: _____

Address (Street and No.)	City	Province	Postal Code	Phone

If residential facility or daycare please indicate name:

Date Symptom Onset	Date First Diagnosis (clinical or lab diagnosis)	Date Hospitalized	History of immunization against diphtheria			
			Childhood primary series? ☐ Yes ☐ No ☐ Unknown	If < 18 years old, number of doses?	Boosters as adult? ☐ Yes ☐ No ☐ Unknown	Date of last dose _____ or ☐ Unknown

Description of Clinical Picture	Outcome	Diphtheria as cause of death:
	☐ Recovered, no residual effects ☐ Recovered, residual effects ☐ Unknown ☐ Died – Date: _____	☐ Primary ☐ Contributing ☐ Incidental

Symptoms

- ☐ Fever
- ☐ Sore throat
- ☐ Difficulty swallowing
- ☐ Change in voice
- ☐ Shortness of breath
- ☐ Weakness
- ☐ Fatigue
- ☐ Other

Signs

☐ Fever
If yes Temp ____ F/C

Membrane present
☐ Yes ☐ No
If yes, Sites
- ☐ Tonsils
- ☐ Soft palate
- ☐ Hard palate
- ☐ Larynx
- ☐ Nares
- ☐ Nasopharynx
- ☐ Conjunctive
- ☐ Skin

☐ Soft tissue swelling (around membrane)
Neck edema?
If yes
- ☐ Bilateral
- ☐ Left side only
- ☐ Right side only

If yes, Extent
- ☐ Submandibular only
- ☐ Midway to clavicle
- ☐ To clavicle
- ☐ Below clavicle

- ☐ Stridor
- ☐ Wheezing
- ☐ Palatal weakness
- ☐ Tachycardia
- ☐ EKG abnormalities

Complications

☐ Airway obstruction
Date of onset:
_____
☐ Intubation/traech required

☐ Myocarditis
Date of onset:
_____

☐ (Poly)neuritis
Date of onset:
_____

☐ Other
Describe:

LABORATORY

Specimen culture for diphtheria?	If Yes, date specimen obtained:	Culture result?	Name of lab performing culture:	If culture positive, biotype?
☐ Yes or ☐ No ☐ Unknown	_____ ☐ Unknown	☐ Positive ☐ Negative ☐ Unknown		☐ Mitis ☐ Gravis ☐ Intermedious ☐ Belfanti

If culture positive, results of toxigenicity testing?	Type of specimen? (check all that apply)	PCR result?
☐ Positive ☐ Negative ☐ Unknown ☐ Not done	☐ Clinical swab ☐ Piece of membrane ☐ *C. diphtheriae* isolate	☐ Positive ☐ Negative ☐ Unknown ☐ Not done

(please turn over)

ANTIBIOTICS

Treated with Antibiotics? ☐ Yes ☐ No ☐ Unknown

As an Outpatient? If yes, Date Initiated:	Name of Antibiotic:	Number of Days of Therapy:	Antibiotic Therapy in Hospital? ☐ Yes ☐ No	As an Inpatient? If yes, Date Initiated:	Name of Antibiotic:	Number of Days of Therapy:
_____	_____	_____		_____	_____ ___	_____

Were Antibiotics given in the 24 Hours before Culture?
☐ Yes ☐ No ☐ Unknown

ANTITOXIN INFO

To access Diphtheria Antitoxin, Special Access Program Form A* must be completed and returned to Saskatchewan Ministry of Health.

Date Requested: _____

Date Administered: _____

Amount of DAT administered:

_____ units

EXPOSURE

Country of Residence
☐ Canada
☐ Other

If Other, Country Name: _____

Date of Arrival to Canada _____ or ☐ Unknown

History of International Travel? (2 weeks Prior to Onset)
☐ Yes
☐ No
☐ Unknown

Country(s) Visited:	Dates	
_____	To: _____	From: _____
_____	To: _____	From: _____
_____	To: _____	From: _____

History of Interprovincial Travel? (2 weeks Prior to Onset)
☐ Yes
☐ No
☐ Unknown

Province(s) Visited:	Dates	
_____	To: _____	From: _____
_____	To: _____	From: _____
_____	To: _____	From: _____

Known Exposure to Diphtheria Case or Carrier?
☐ Yes
☐ No
☐ Unknown

Known Exposure to International Travelers?
☐ Yes
☐ No
☐ Unknown

Known Exposure to Immigrants?
☐ Yes
☐ No
☐ Unknown

CONFIRMATION & REPORTING

Has this Suspected Case been reported to the Saskatchewan Ministry of Health? If Yes, Date Reported: _____
☐ Yes
☐ No
☐ Unknown

Person Informed:	Phone:	Fax:
Reporting Physician:	Phone:	Fax:

Final Diagnosis	How was the Final Diagnosis Confirmed?	Final Case Status or Classification: ☐ Confirmed ☐ Probable ☐ Not a case

*http://www.hc-sc.gc.ca/dhp-mps/acces/drugs-drogues/index-eng.php

Signature: _____ Title: _____ Date: _____

Diphtheria
Attachment – Diphtheria Contact Investigation Worksheet

Please see the following pages for the Diphtheria Contact Investigation Worksheet.

Diphtheria Contact Investigation Worksheet

***Close Contact = household members; friends; relatives and caretakers who regularly visit the home; kissing and/or sexual contacts; those who share the same room at school or work; health-care staff exposed to oropharyngeal secretions of the infected person (staff who have taken appropriate isolation precautions need not be considered contacts).**

Close contacts that develop signs/ symptoms should be followed as a case – refer to Diphtheria Case Investigation Worksheet.

CONTACT INFORMATION

Name **Age** **Relation to case**

Contact Phone #

Active Surveillance for S/S	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Indicate Yes or No if S/S is present							

Vaccinated? ☐ Yes ☐ No ☐ Unknown
If vaccinated # of doses: ☐ ≤ 3 ☐ Unknown
Time since last dose: ☐ < 10 yrs ☐ > 10 yrs

Culture taken	Yes	No	Unknown	Culture Results	Positive	Negative	Date of Culture
Nasopharyngeal							
Oropharyngeal							

Antibiotic Prophylaxis: ☐ Yes ☐ No **Medication:**

Name **Age** **Relation to case**

Contact Phone #

Active Surveillance for S/S	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Indicate Yes or No if S/S is present							

Vaccinated? ☐ Yes ☐ No ☐ Unknown
If vaccinated # of doses: ☐ ≤ 3 ☐ Unknown
Time since last dose: ☐ < 10 yrs ☐ > 10 yrs

Culture taken	Yes	No	Unknown	Culture Results	Positive	Negative	Date of Culture
Nasopharyngeal							
Oropharyngeal							

Antibiotic Prophylaxis: ☐ Yes ☐ No **Medication:**

Name **Age** **Relation to case**

Contact Phone #

Active Surveillance for S/S	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Indicate Yes or No if S/S is present							

Vaccinated? ☐ Yes ☐ No ☐ Unknown
If vaccinated # of doses: ☐ ≤ 3 ☐ Unknown
Time since last dose: ☐ < 10 yrs ☐ > 10 yrs

Culture taken	Yes	No	Unknown	Culture Results	Positive	Negative	Date of Culture
Nasopharyngeal							
Oropharyngeal							

Antibiotic Prophylaxis: ☐ Yes ☐ No **Medication:**

Name **Age** **Relation to case**

Contact Phone #

Active Surveillance for S/S	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Indicate Yes or No if S/S is present							

Vaccinated? ☐ Yes ☐ No ☐ Unknown
If vaccinated # of doses: ☐ ≤ 3 ☐ Unknown
Time since last dose: ☐ < 10 yrs ☐ > 10 yrs

Culture taken	Yes	No	Unknown	Culture Results	Positive	Negative	Date of Culture
Nasopharyngeal							
Oropharyngeal							

Antibiotic Prophylaxis: ☐ Yes ☐ No **Medication:**

Name **Age** **Relation to case**

Contact Phone #

Active Surveillance for S/S	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Indicate Yes or No if S/S is present							

Vaccinated? ☐ Yes ☐ No ☐ Unknown
If vaccinated # of doses: ☐ ≤ 3 ☐ Unknown
Time since last dose: ☐ < 10 yrs ☐ > 10 yrs

Culture taken	Yes	No	Unknown	Culture Results	Positive	Negative	Date of Culture
Nasopharyngeal							
Oropharyngeal							

Antibiotic Prophylaxis: ☐ Yes ☐ No **Medication:**

Diphtheria
Attachment – Diphtheria Template Letter to Parents

Date

Dear Parent,

There has been a case of diphtheria diagnosed in the daycare/school that your child attends. Diphtheria is a rare disease which may cause fever, sore throat, and a yellow-white discharge over the back of the throat. An information sheet about diphtheria is included with this letter.

Public health will be reviewing immunization records for all the children and providing immunizations to any child who requires further immunization.

All children who have been in contact with diphtheria should have a throat swab and nasal swab collected and then should be started on preventive medication. Contact your family doctor to have swabs taken and antibiotics started.

If the lab tests indicate that your child is infected with diphtheria your physician will be providing advice about further treatment and testing.

If you have any questions or concerns contact the local Public Health office, your family physician, or the HealthLine at 1-877-800-0002.

Sincerely,

_____
Medical Health Officer

Phone: _____

Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.

From Public Health to Ministry of Health: Immediate.

Public Health Follow-up Timeline: Immediate.

Public Health Purpose for Notification of invasive Group A Streptococcal (iGAS) Disease (adapted from Health Protection Surveillance Center

- To measure the burden of iGAS, identify populations at increased risk and provide a basis for epidemiologic studies;
- To ensure early detection of clusters/outbreaks of iGAS so effective control measures can be implemented;
- To prevent mortality and serious morbidity from iGAS through contact tracing and initiation of chemoprophylaxis;
- To monitor trends in iGAS;
- To monitor the effectiveness of prevention and control measures;
- To inform health care planning; to support ongoing research into sources, transmission, risk factors, pathogenesis and control of iGAS; and
- To inform the public and medical community about iGAS.

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

Confirmed case	Laboratory confirmation of infection with or without clinical evidence of invasive disease:* • isolation of group A streptococcus (*Streptococcus pyogenes*) from a normally sterile site (blood, cerebrospinal fluid (CSF), pleural fluid, pericardial fluid, peritoneal fluid, deep tissue specimen taken during surgery [e.g., muscle collected during debridement for necrotizing fasciitis], bone or joint fluid excluding the middle ear and superficial wound aspirates [e.g., skin and soft tissue abscesses^]).

[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.

Probable case	Clinical evidence of invasive disease* in the absence of another identified etiology and with non-confirmatory laboratory evidence of infection: • isolation of group A streptococcus from a non-sterile site **OR** • positive group A streptococcus antigen detection.
*****Clinical evidence of invasive disease may be manifested as one or more of several conditions. These include: a) Streptococcal Toxic Shock Syndrome (STSS), which is characterized by hypotension (systolic blood pressure ≤ 90 mmHg in adults or < 5th percentile for age for children) and at least two of the following signs: i. Renal impairment (creatinine level ≥ 177 µmol/L for adults). ii. Coagulopathy (platelet count ≤ 100,000/mm3 or disseminated intravascular coagulation). iii. Liver function abnormality (SGOT [AST], SGPT [ALT], or total bilirubin ≥ 2x upper limit of normal). iv. Adult respiratory distress syndrome (ARDS). v. Generalized erythematous macular rash that may desquamate. b) Soft-tissue necrosis, including necrotizing fasciitis, myositis or gangrene. c) Meningitis.	
^ Wounds are not considered a sterile site with the exception of isolation of group A streptococcus (GAS) and the presence of necrotizing fasciitis and/or STSS.	

Pneumonia with isolation of GAS from a sterile site, or from a bronchoalveolar lavage (BAL) when no other cause has been identified, should be regarded as a form of invasive disease for the purposes of public health management; however, as BAL does not provide a sterile site specimen, the latter would not meet the national case definition and would not be nationally notifiable.

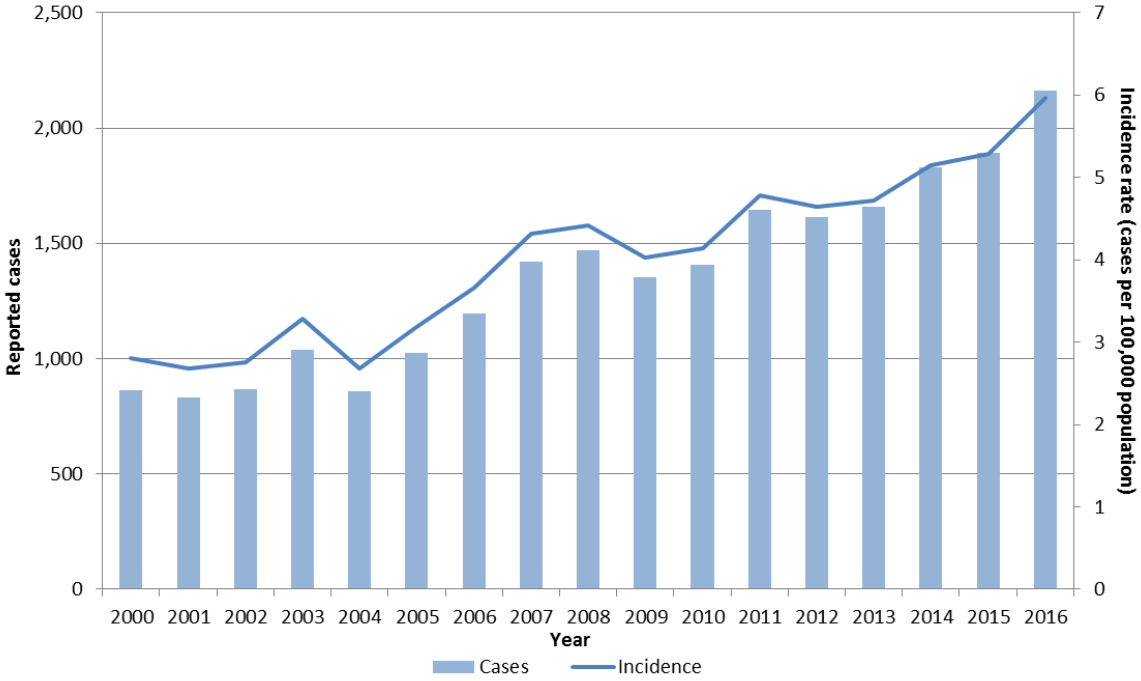
Epidemiology and Occurrence

iGAS in Canada[2]

Figure 1 shows the number of cases and incidence rates of iGAS reported to the Canadian Notifiable Disease Surveillance System from 2000 to 2016. The graph shows the steady increase in the incidence rate of iGAS; doubling between 2004 (2.7/100 000) and 2016 (6.0/100,000).

[2] National Epidemiologic Summary as of February 28, 2018

Figure 1. Number of cases and incidence rates of iGAS in Canada by year, 2000-2016



iGAS in Saskatchewan[3]

Figure 2 shows the number of cases and incidence rates of iGAS in Saskatchewan between 2004-2017. The upsurge in 2008, which was seen across the most westerly provinces and was related to Indigenous people, was not sustained over the following years.

Starting in 2013, a gradual increase in the iGAS trend was noted in Saskatchewan with a doubling of cases by 2017. No definitive reason has been established for this upward trend other than it reflects an upward trend reported in other Canadian provinces.

[3] Saskatchewan Ministry of Health (2018)

Figure 2. Number of cases and incidence rates of iGAS in Saskatchewan, 2004-2017

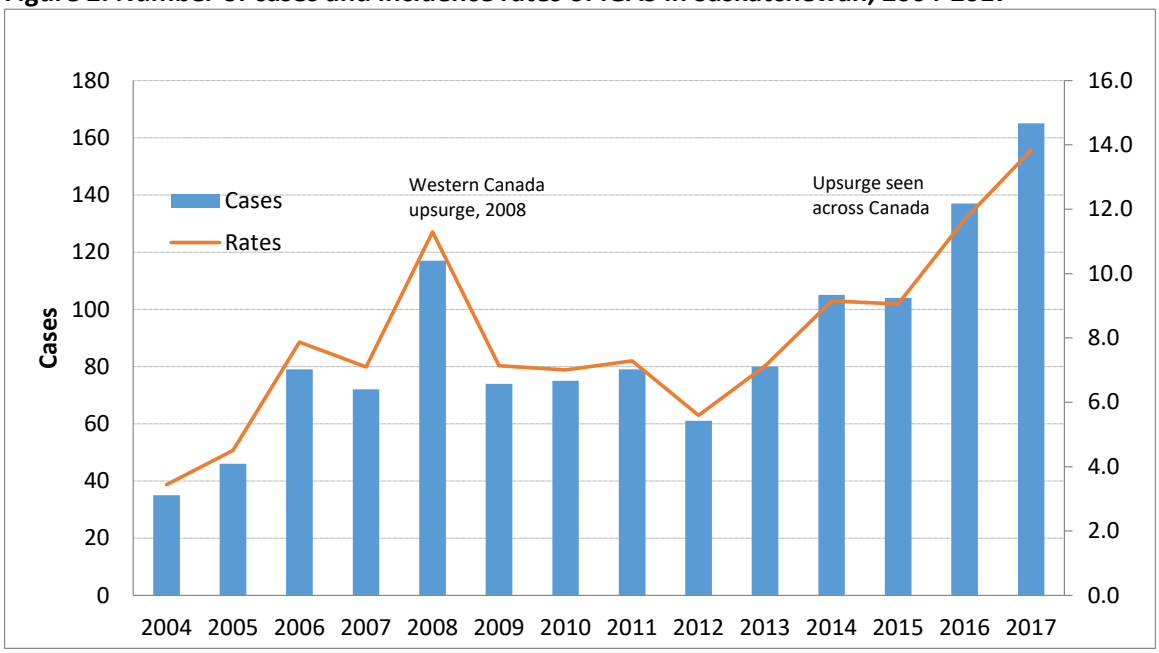
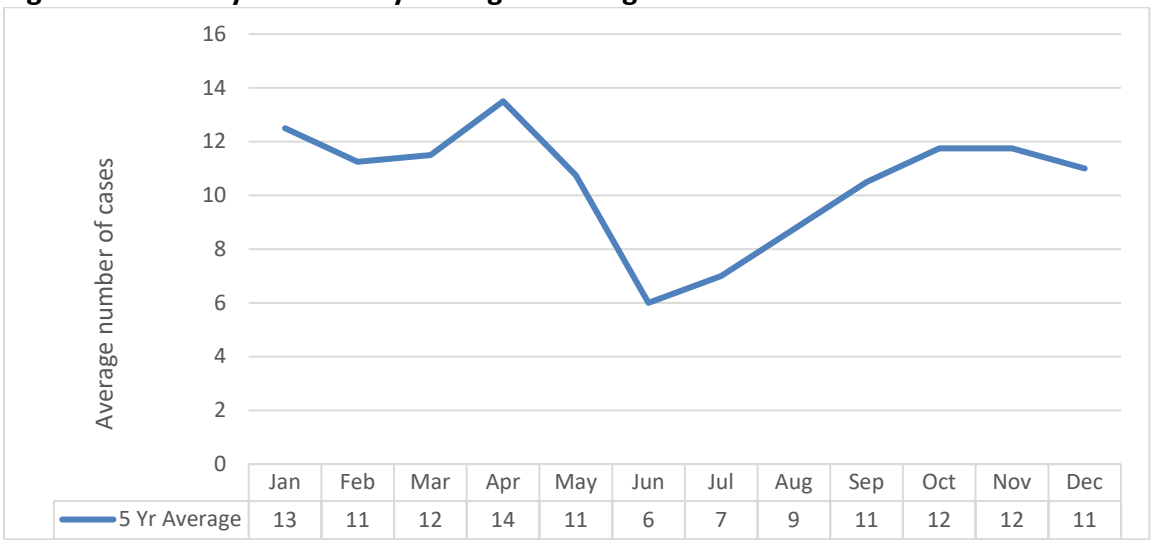


Figure 3 demonstrates the seasonal impacts and a lower incidence in the summer months when there is less crowding of individuals.

Figure 3. iGAS 5-year monthly average showing seasonal variation



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5 Yr Average	13	11	12	14	11	6	7	9	11	12	12	11

Additional Background Information

Causative Agent

Group A streptococcus – *Streptococcus pyogenes,* a gram-positive coccus.

Symptoms

- Early signs and symptoms of necrotizing fasciitis include: fever, severe pain, redness and swelling at the site of wound.
- Symptoms of STSS may include pain (abrupt in onset and severe), pneumonia, acute myocardial infarction, or pericarditis, fever, chills, myalgia, nausea, vomiting, diarrhea, confusion, clinical signs of soft tissue infection (localized swelling and erythema).
- Clinical evidence for STSS is outlined in the case definition, above.
- Refer to clinical textbooks for symptoms of other clinical presentations related to GAS (meningitis, etc.).

Reservoir/Source

Humans.

Incubation Period

The incubation period of iGAS infection has not been determined (Public Health Agency of Canada, 2006).

Period of Communicability

The specified period of infectivity of the index case is:

- 7 days prior to the onset of illness, until 24 hours after the start of treatment.

Mode of Transmission

- Large respiratory droplets.
- Direct person to person contact with patient and or carrier.

Risk Groups/Risk Factors
GAS infection can occur in anyone but risk of iGAS is significantly associated with the following:

- chronic conditions (HIV infection, cancer, heart disease, diabetes, lung disease);
- alcohol abuse;
- injection drug use;
- varicella;
- crowded living conditions;
- suboptimal hygiene practices;
- immunosuppressive therapy;
- elderly (65 years and older);
- systemic steroid use;
- Aboriginal persons.

Specimen Collection and Transport
To confirm the diagnosis of GAS, specimens should be cultured from:

- a sterile site (e.g., blood, CSF, joint fluid) or;
- an aspirate from a non-sterile site, in individuals with clinical signs of hypotension and/or invasive disease such as necrotizing fasciitis.

All GAS isolates from iGAS disease are to be sent to the Roy Romanow Provincial Laboratory (RRPL) for typing and screening for toxin genes. Characterization of the organism (emm type, whole genome sequencing) becomes important for monitoring virulence or identifying transmission patterns.

Public Health Investigation

I. Case

Refer to Attachment – Invasive Group A Streptococcal Disease Data Collection Worksheet to assist.

History

- Presentation of illness and for severity of disease.
- Health conditions that may render the individual more susceptible to invasive disease (see Risk Factors).
- Contact details - refer to Attachment - Contact Follow-up Form in the Respiratory and Direct Contact Introduction and General Considerations section.

Public Health Interventions

Assessment

- Assess for contacts as per Table 1.

Communication

- When clients are hospitalized, communication with hospital staff and or infection control staff is important.

Education

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

Exclusion and Isolation

- Individuals are communicable until at least 24 hours after antibiotics are started.
- Strict enforcement of standard infection control practices including contact and droplet precautions. Refer to local Infection Control Manuals.

Immunization

- There is no immunization for GAS.
- If the case has any risk factors, they may be eligible for other immunizations. If not up-to-date, offer vaccines as appropriate.

Referrals

- Inform clients that supportive services (physiotherapy, occupational therapy, Home Care) are available if necessary. Refer client to primary caregiver for referrals.
- Consultation with the Medical Health Officer (MHO) may be required to determine if chemoprophylaxis is to be offered to contacts.

Treatment/Supportive Therapy

- For patient management, the client's physician is to consult an infectious disease specialist.
- Antibiotic treatment is required.
- Client may need to be hospitalized.
- In the case of necrotizing fasciitis, surgical intervention may be required.

II. Contacts/Contact Investigation

Contact Definition/Categorization

Table 1. Definition of Close Contacts
• Household contacts of a case who has spent at least 4 hours/day on average in the previous 7 days or 20 hours/week with the case. • Non-household persons who share the same bed with the case or had sexual relations with the case. • Persons who have had direct mucous membrane contact with the oral or nasal secretions of a case (e.g., mouth-to-mouth resuscitation, open mouth kissing) or direct contact with an open skin lesion of the case. • Injection drug users who have shared needles with the case.

Source: Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease, 2006.

In order to be considered a close contact, there must have been exposure to the case during the period of communicability (see above). School classmates (kindergarten and older), work colleagues, as well as social or sports contacts of a case are not usually considered close contacts, unless they fit into one of the above categories.

Public Health Interventions

Assessment

- Assess for symptoms.
- Assess for risk factors.

Education

All close contacts (irrespective of whether prophylaxis is given of confirmed cases of severe disease should be alerted to signs and symptoms of iGAS disease, and be advised to seek medical attention immediately should they develop febrile illness or any other clinical manifestations of GAS infection within 30 days of diagnosis in the index case.

Chemoprophylaxis

- Chemoprophylaxis is used to prevent disease in colonized individuals and in those who have recently been exposed, thereby decreasing transmission of a strain known to cause severe infection.
- **NOTE:** Chemoprophylaxis should only be offered to close contacts of a confirmed severe case (cases of STSS, soft-tissue necrosis including necrotizing fasciitis, myositis, or gangrene, meningitis, GAS pneumonia or other life-threatening conditions) or a confirmed case resulting in death (Public Health Agency of Canada, 2006).
- Chemoprophylaxis is not routinely recommended for contacts of cases that are not severe (i.e., bacteremia or septic arthritis). These cases often have milder disease

than those with invasive disease. Their contacts are also likely to have milder disease as well since there is consistency in type and severity of disease with particular strains of GAS.

- Refer to contact definition for listing of those who require prophylaxis. A close contact will be given prophylaxis if they were in contact with the case during the period of communicability (noted above).
- Even though the incubation period is not known, most subsequent cases occur within 7 days after last contact with an infectious case (Public Health Agency of Canada, 2006). Close contacts should ideally be given antibiotics within 24 hours of case identification; however it is still advisable for up to 7 days. The benefits of starting prophylaxis should be discussed with the MHO if it is beyond 7 days of last contact with the infectious case.
- Refer to Attachment - Recommended Chemoprophylaxis Regimens for Close Contacts.

Testing

- Not routinely done – Refer to Attachment - Investigation and Control Approaches for Long Term Care Facilities for the screening procedures for instances in long term care[4] (LTC) facilities.

Exclusion

- No need to exclude contacts from day care, school or work.

III. Environment

Table 2. Impetus for Action for Organization-based Outbreaks or Clusters	
Long-term care facility	▪ An incidence rate of culture-confirmed GAS infections > 1 per 100 residents per month, OR ▪ At least 2 cases of culture-confirmed infection in one month in facilities with less than 200 residents, OR ▪ An incidence rate of suspected GAS infections of > 4 per 100 residents per month.
Child care centre	▪ One severe case of iGAS disease in a child attending a child care centre.
Hospital	▪ One or more linked invasive or non-invasive GAS cases in either patients or staff occurring within one month of an iGAS case (see Annex 3 – National Guidelines, Oct 2006).

Source: Adapted from Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease, 2006.

[4] Adapted from Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease, October 2006.

Child Care Centre Control Measures

- Although outbreaks of iGAS disease occurring among children attending a child care centre are rare, when a case occurs the following needs to occur:
    - strict enforcement of standard infection control practices – refer to the Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities;[5]
    - details of the Child Care Centre (size, attendees, etc.) should be collected.

Institutional Control Measures

- Residents of LTC facilities are at increased risk of morbidity and mortality due to iGAS disease because of their older age and higher prevalence of underlying conditions.
- Strict enforcement of standard infection control practices including contact and droplet precautions are required. Refer to Local Infection Control Manual. In LTC facility outbreaks, the implicated strain is usually widespread within the facility and limited provision of chemoprophylaxis to close contacts is not the optimal approach. Refer to Attachment - Investigation and Control Approaches for Long Term Care Facilities for detailed information regarding investigation and control approaches that may be useful.

IV. Epidemic Measures

- Determine source and manner of spread.
- Investigate promptly the extent of the exposure.
- If there is exposure of groups like schools, LTCs, daycare centres, it may be necessary to administer preventative antimicrobial therapy to the whole group.
- Consider extensive consultation with various specialties including: infectious disease, laboratory medicine, Saskatchewan Ministry of Health, others as appropriate.

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 individuals and environments.

[5] http://www.saskatchewan.ca/live/births-deaths-marriages-and-divorces/starting-a-family/early-learning-and-child-care/child-care.

Education

- Good hygiene, especially hand washing is important to prevent the spread of bacteria.
- Provide information sheet, Attachment - Invasive Group A Streptococcal Disease.
- Non-severe cases will be dealt with on a case-by-case basis in consultation with the MHO.

Revisions

Date	Change
September 2018	• Updated to align with Panorama configuration • Incorporated the purpose for notification of cases to public health • Provided clarification in the case definition on the limited applicability of specimens from wounds. • Incorporated an Epidemiology and Occurrence section to the chapter. • Rearranged and updated the style into the new format of the Manual. • References reaffirmed or updated as necessary.

References

Health Protection Surveillance Centre (2006). The management of invasive group A streptococcal infections in Ireland. Retrieved June, 2018 from https://www.hpsc.ie/a-z/other/groupastreptococcaldiseasegas/publications/File,2080,en.pdf

Public Health Agency of Canada. (2006). Guidelines for the prevention and control of invasive group A streptococcal disease. *Canada Communicable Disease Report (CCDR), 32S2,* October 2006. Retrieved June, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/06vol32/32s2/index-eng.php.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance*. Canada Communicable Disease Report (CCDR), 35S2,* November 2009. Retrieved June, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Strep_A-eng.php.

Government of Saskatchewan

Streptococcal Invasive Disease (group A) Data Collection Worksheet

PANORAMA

Please complete **all** sections.

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

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**	***Classification: CONTACT***	***Date***	***LAB TEST INFORMATION:***
☐ Confirmed	YYYY / MM / DD	☐ *Contact*	*YYYY / MM / DD*	*Date specimen collected:*
☐ Does Not Meet Case Definition	YYYY / MM / DD	☐ *Not a Contact*	*YYYY / MM / DD*	*YYYY / MM / DD*
☐ Person Under Investigation	YYYY / MM / DD	☐ *Person Under Investigation*	*YYYY / MM / DD*	*Specimen type:*
☐ Probable	YYYY / MM / DD			☐ *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_____	

Streptococcal Invasive Disease (group A) Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

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

LHN-> INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Description	No	Yes - Date of onset
Acute respiratory distress syndrome (ARDS) - CXR/CT*		YYYY / MM / DD	**Muscle inflammation (myositis)**		YYYY / MM / DD
Arthritis - septic		YYYY / MM / DD	Necrosis - skin and tissue		YYYY / MM / DD
Cardiac - myocardial infarction		YYYY / MM / DD	**Necrotizing fasciitis**		YYYY / MM / DD
Cellulitis		YYYY / MM / DD	Confusion		YYYY / MM / DD
Chills		YYYY / MM / DD	Pain - severe		YYYY / MM / DD
Fever		YYYY / MM / DD	Cardiac - pericarditis		YYYY / MM / DD
Gangrene		YYYY / MM / DD	Pharyngitis (sore throat)		YYYY / MM / DD
Hypotension*		YYYY / MM / DD	Pneumonia		YYYY / MM / DD
Infection - soft tissue		YYYY / MM / DD	**Rash - erythematous macular ***		YYYY / MM / DD
Infection - wound		YYYY / MM / DD	**Renal impairment *** (refer to CDC Manual for parameters)		YYYY / MM / DD
Lab - liver function abnormality* (refer to CDC Manual for parameters)		YYYY / MM / DD	**Sepsis (e.g. bacteremia, septicemia, etc.)**		YYYY / MM / DD
Lab - platelet count low* (refer to CDC Manual for parameters)		YYYY / MM / DD	Skin - pain and swelling		YYYY / MM / DD
Meningitis		YYYY / MM / DD	**Streptococcal toxic shock syndrome (STSS)** Includes hypotension and 2 or more of the S/S with an *		YYYY / MM / DD
Other s/s					

D) INCUBATION AND COMMUNICABILITY

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Communicability for Case (period for transmission):
Earliest Possible Communicability Date: YYYY / MM / DD **Latest Possible Communicability Date**: YYYY / MM / DD

Communicability Calculation Details:

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

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	YES	N – No NA – not asked U - Unknown	DESCRIPTION	YES	N – No NA – not asked U - Unknown
Chronic Medical Condition - Cardiac Disease +			**Medical Risk Factor** - Varicella	YYYY / MM / DD	
Chronic Medical Condition - Diabetes Mellitus +			**Medical Treatment** - Surgery/surgical wound	YYYY / MM / DD	
Chronic Medical Condition - Liver disease +			**Setting** - Crowded living conditions (>1 person per room excluding bathrooms)		
Chronic Medical Condition - Lung disease +			**Special Population** – Homeless +		
Chronic Medical Condition - Renal disease +			**Special Population** - Lives in a communal setting		
Contact to a known case (Add'l Info)	YYYY / MM / DD		**Special Population** - LTC Facility +		

Streptococcal Invasive Disease (group A) Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

DESCRIPTION	YES	N – No NA – not asked U - Unknown	DESCRIPTION	YES	N – No NA – not asked U - Unknown
Immunocompromised - HIV +			**Special Population** - Self-reported Indigenous identity		
Immunocompromised - Related to underlying disease or treatment			**Substance Use** - Alcohol		
Medical Risk Factor - Postpartum			**Substance Use** - Injection drug use (including steroids) +		
Medical Risk Factor History of injury (Add'l Info)	YYYY / MM / DD		Travel - Outside of Canada (Add'l Info)	YYYY / MM / DD	
Medical Risk Factor - Skin infection or dermatological condition	YYYY / MM / DD		Travel -Outside of Saskatchewan, but within Canada (Add'l Info)	YYYY / MM / DD	

F) TREATMENT

INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication *(Panorama = Other Meds) :* _____

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

G) INTERVENTIONS

INVESTIGATION->TREATMENT & INTERVENTIONS->INTERVENTION SUMMARY

Intervention Type and Sub Type:

Assessment:
☐ Assessed for contacts YYYY / MM / DD
Investigator name

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

Communication:
☐ Phone call attempted (day) YYYY / MM / DD
☐ Phone call attempted (evening) YYYY / MM / DD
☐ Home visit attempted YYYY / MM / DD
☐ Letter sent YYYY / MM / DD
☐ Text message sent YYYY / MM / DD
☐ Other communication (See Investigator Notes) YYYY / MM / DD
☐ Letter (See Document Management) YYYY / MM / DD
Investigator name

Immunization:
☐ Eligible Immunization(s) recommended YYYY / MM / DD
Investigator name

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

Referral
☐ Consult with MHO YYYY / MM / DD
Investigator name

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Other Investigation Findings:
☐ Investigator Notes YYYY / MM / DD
☐ Document Management

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	

Streptococcal Invasive Disease (group A) Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: ___________
Panorama Investigation ID: ___________

H) 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) ____________________________

I) Transmission Events

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Transmission Event ID (system-generated can be documented below	**Exposure Name**	**Setting type** (Select the most appropriate setting for the TE; if >1 select multiple settings will be entered into Panorama)	**Date/Time**	**# of contacts**
		☐ Childcare worker/attendee ☐ Health care setting ☐ Household ☐ Sexual exposure ☐ Type of community contact ☐ Congregate/communal living setting		
		☐ Childcare worker/attendee ☐ Health care setting ☐ Household ☐ Sexual exposure ☐ Type of community contact ☐ Congregate/communal living setting		
		☐ Childcare worker/attendee ☐ Health care setting ☐ Household ☐ Sexual exposure ☐ Type of community contact ☐ Congregate/communal living setting		
		☐ Childcare worker/attendee ☐ Health care setting ☐ Household ☐ Sexual exposure ☐ Type of community contact ☐ Congregate/communal living setting		
	iGAS Contacts – Inv ID# _____	☐ Multiple Settings	YYYY / MM / DD to YYYY / MM / DD	

J) TOTAL NUMBER OF CONTACTS

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> TE HYPERLINK -> UNKNOWN/ANONYMOUS CONTACTS

Anonymous contacts:________ (total number of individuals exposed)

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

Drug	Dosage	Comments
First line - First generation cephalosporins: cephalexin, cephadroxil, cephradine	Children and adults: 25 to 50 mg/kg/day, **to a maximum of 1 g/day**, in 2 to 4 divided doses x 10 days	Recommended drug for pregnant and lactating women. Should be used with caution in patients with allergy to penicillin. Use of cephalosporins with nephrotoxic drugs (e.g. aminoglycosides, vancomycin) may increase the risk of cephalosporin-induced nephrotoxicity.
Second line - Erythromycin	Children: 5 to 7.5 mg/kg every 6 hours or 10 to 15 mg/kg every 12 hours (base) x 10 days (**to a maximum of the adult dose**) Adults: 500 mg every 12 hours (base) x 10 days	Erythromycin estolate is contraindicated in persons with pre-existing liver disease or dysfunction and during pregnancy. Sensitivity testing is recommended in areas where macrolide resistance is unknown or known to be ≥10%.
Second line - Clarithromycin	Children: 15 mg/kg/day in divided doses every 12 hours (**to a maximum of the adult dose)** Adults: 250 mg po bid x 10 days	Contraindicated in pregnancy. Sensitivity testing is recommended in areas where macrolide resistance is unknown or known to be ≥10%.
Second line - Clindamycin	Children: 8 to 16 mg/kg/day divided into 3 or 4 equal doses x 10 days (**to a maximum of the adult dose)** Adults: 150 mg every 6 hours x 10 days	Alternative for persons who are unable to tolerate beta-lactam antibiotics.

Source: Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease, 2006

All prophylactic regimes are administered orally and taken for 10 days.

Note: All persons who receive chemoprophylaxis should watch for signs and symptoms of invasive GAS disease, for 30 days after the diagnosis of invasive disease in the index patient.

Background

Residents of LTC facilities are at increased risk of morbidity and mortality due to iGAS disease because of their older age and higher prevalence of underlying conditions. When a culture-confirmed case of iGAS disease occurs in a LTC facility, there is a 38% likelihood that a second positive blood culture-confirmed case of the same strain will be detected in the facility within six weeks. A number of outbreaks of iGAS infections have been documented in LTC facilities. Infection is often spread through person-to-person contact, with clustering of cases by room or care unit in some instances. Staff may be a source of or conduit of infection either through poor infection control practices or asymptomatic carriage. However, hospital staff who are carriers are more likely to be the source of infection in outbreaks in acute care facilities, whereas outbreaks in LTC facilities are more often patient-propagated. In LTC facility outbreaks, the implicated strain is usually widespread within the facility and limited provision of chemoprophylaxis to close contacts is not the optimal approach.

Procedure

In addition to strict enforcement of standard infection control practices, the following approach may be useful in the investigation and control of iGAS disease in LTC facilities:

1. When a confirmed case of iGAS disease occurs in a LTC facility such as a nursing home, the facility should:
    a. Report the case to the local Medical Health Officer (MHO) or designate.
    b. Review the facility's nosocomial infection reports, for the previous 4 to 6 weeks, for culture-confirmed cases of GAS disease and cases of skin and soft tissue infections (e.g., pharyngitis and cellulitis). An excess of GAS infection and clinically compatible illness, or LTC facility outbreak, is defined in Table 2 Impetus for Action for Organization-based Outbreaks or Clusters.
    c. Assess the potential for a source of infection from outside the facility (e.g., regular visits from children who have recently been ill).

2. If an excess of GAS infection is identified, the following actions should be considered:
    a. Consult the local Infection Control Practitioner/MHO/CD Epidemiologist team, as to the most practical approach. This could comprise the concentric-circles approach, (i.e., begin screening the closest contacts and extending the investigation from there).
    b. Anyone colonized with GAS should receive chemoprophylaxis.
    c. Non-patient care staff[1] should be asked about possible recent GAS infections. Those with a positive history should be screened for GAS and those persons positive should be treated with antibiotics.
        - Treatment choices are governed by the most recent guidelines. The public health practitioner should direct any questions regarding the current treatment protocols to the physician or MHO. Refer to Heymann and other texts and clinical treatment guidelines for specific treatment details. See Appendix H - Sources for Clinical Treatment Guidelines.
    d. All GAS isolates should have further typing. This should be coordinated through the MHO and the Saskatchewan Disease Control Lab (SDCL). Culturing for a test of cure is recommended for individuals found to have the outbreak-related strain. Culturing for a test of cure is not necessary for individuals infected with a non-outbreak-related strain of GAS.
    e. Re-screen all GAS positive residents and staff including their throat and skin lesion(s) 14 days after the treatment has been started. If this screen is positive, the individual should be retreated with antibiotics and re-screened in 14 days. If still colonized, discontinue treatment unless the facility has an ongoing problem with GAS infection.
    f. Active surveillance for GAS infection should be initiated and continued for 1 to 2 months as determined by the local outbreak team.
    g. Appropriate specimens should be taken for culture to rule out GAS when suspected infections are detected by active surveillance.
3. If no excess is identified, especially if there is evidence of an outside source of infection for the index case, then active surveillance alone for 2 to 4 weeks to ensure the absence of additional cases is warranted.

[1] This includes maintenance and housekeeping staff for example.

Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.

From Public Health to Ministry of Health: Within 72 hours.

Public Health Follow-up Timeline: Initiate within 48 hrs.

Public Health Purpose for Notification of *Haemophilus Influenzae* Disease
(adapted from British Columbia Center for Disease Control [2017])

- To minimize mortality and serious morbidity from *Haemophilus Influenzae* B;
- To rapidly identify close contacts of the case and to provide recommendations for appropriate preventive measures for close contacts so as to prevent further spread of infection and disease;
- To provide information about the disease, its transmission, and methods of prevention;
- To identify clusters or outbreaks of infection and to initiate appropriate prevention and control measures;
- To track epidemiology trends of meningococcal disease in Saskatchewan including risk factors and distribution;
- To monitor the effectiveness of prevention and control measures;
- To plan expansion or introduction of future immunization programs;
- To provide timely clinical care including diagnosis and treatment using current, evidence-based guidelines;
- To make timely and evidence informed actions on outbreaks; and
- To inform the public and medical community about *Haemophilus Influenza* disease.

Information

Table 1. Differences between *Haemophilus Influenzae* Invasive B (Hib) and Non-Hib Typeable Strains

	Hib	**Non-Hib Typeable Strains a,c,d,e,f**
Reportable	Yes	Yes
Public Health Follow-Up	Yes	No
Invasive Disease	More common	Less common

Communicability	Not considered communicable after 24-48 hours of effective antimicrobial therapy	Unknown
Hospitalized Patients	Routine and droplet precautions until 24 hours after initiation of antimicrobial therapy	Not defined
Treatment	Third generation cephalosporin or chloramphenicol in combination with ampicillin	No defined regimen. Ceftriaxone and cefotaxime have been used successfully
Management of Contacts	Recommended	Not recommended
Prevention	Vaccine	No vaccine

Source: Manitoba Health Communicable Disease Management Protocol, 2007.

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

Table 2. *Haemophilus Influenzae* B Invasive Disease

Confirmed Case	Clinical evidence[1] of invasive disease with laboratory confirmation of infection: • isolation of *H. influenzae* (serotype b) (Hib) from a normally sterile site^ **OR** • isolation of *H. influenzae* (serotype b) from the epiglottis in a person with epiglottitis.
Probable Case	Clinical evidence of invasive disease with laboratory evidence of infection: • demonstration of *H. influenzae* type b antigen in cerebrospinal fluid **OR** • demonstration of *H. influenzae* DNA in a normally sterile site **OR** • buccal cellulitis or epiglottitis in a child < 5 years of age with no other causative organisms isolated.
[1]Clinical illness associated with invasive disease due to *H. influenzae* includes meningitis, bacteraemia, epiglottitis, pneumonia, pericarditis, septic arthritis and empyema.	

^Includes: blood, cerebrospinal, joint, pleural, pericardial, or peritoneal fluid.

[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.

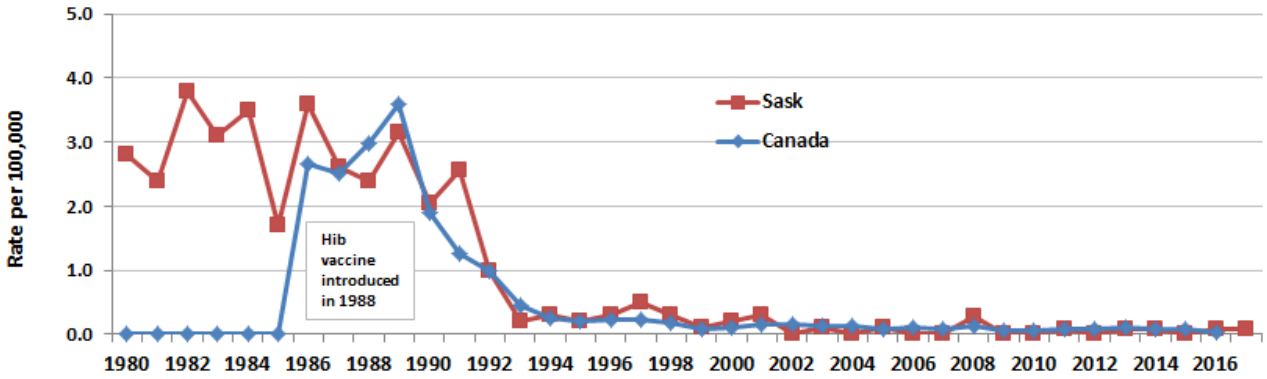
Table 3. *Haemophilus Influenzae* Non-B Invasive Disease

Confirmed Case	Clinical evidence[1] of invasive disease with laboratory confirmation of infection: • isolation of *H. influenzae* (serotype a,c,d,e,f, undifferentiated and non-typeable isolates) from a normally sterile site **OR** • isolation of *H. influenzae* (serotype a,c,d,e,f, undifferentiated and non-typeable isolates) from the epiglottis in a person with epiglottitis.
[1]Clinical illness associated with invasive disease due to *H. influenzae* includes meningitis, bacteraemia, epiglottitis, pneumonia, pericarditis, septic arthritis and empyema.	

Epidemiology and Occurrence

Saskatchewan introduced Hib vaccine in 1988 resulting in a dramatic decline in reported cases. The highest number of cases were reported in 1984 and 1986 (36 cases), mainly infants. The average number of reported cases in the pre-vaccine era was 21 cases per year; the yearly average over the decades 1998 - 2017 was about one case per year (19 cases). These are largely unimmunized children. Between 1979 and 1993 there were 96 deaths and there have been no reported deaths caused by invasive Hib since then.

Figure 1. *H.Influenza* Rates Saskatchewan and Canada before and after Immunization Program



Additional Background Information

Causative Agent

Haemophilus influenzae, a gram-negative coccobacilli. Encapsulated strains are classified into sub-types. Serotype b (Hib) is the most pathogenic.

Symptoms

Illnesses often caused by *H. influenzae* type b include meningitis, epiglottitis, pneumonia, and bacteremia.

Symptoms include fever, lethargy, drowsiness, rapid or difficult breathing, sore throat, stiff neck and bulging fontanelles in infants. Most cases are in children 2 months to 4 years of age (Heymann, 2015; American Academy of Pediatrics, 2015).

Reservoir/Source

Upper respiratory tract of humans.

Incubation Period

Unknown, probably variable, and possibly as short as 2-4 days.[2]

Period of Communicability

As long as organisms are present, asymptomatic carriage may occur indefinitely in up to 2-5% of children. Communicability ends within 24-48 hours after the beginning of antibiotic therapy.

Mode of Transmission

Person-to-person from direct contact or droplet contact of oral or nasal secretions, e.g., saliva, nasal mucus, or respiratory secretions.

Specimen Collection and Transport

If invasive disease, blood cultures and CSF specimens should be submitted as per local lab specimen collection and transport guidelines.

[2] Most "secondary" cases in families usually occur within 2 weeks and in childcare settings within 60 days. However, this may be transmission from an asymptomatic carrier rather than the index case.

Public Health Investigation

I. Case

Refer to Attachment – *Haemophilus Influenzae* Type B (invasive) Data Collection Worksheet to assist.

History

- Onset of illness, presentation and treatment (with what and when) – to determine incubation period and period of communicability which helps to identify the possible source and contacts to be followed.
- Review immunization history of the case.
- Determine case status including a review of the immunization history. Do not wait for specific typing results before initiating public health follow-up.
- Identify contacts (refer to contact definition).
- Determine if case has underlying medical conditions or falls into a risk category.

Public Health Interventions

Assessment

- Assess for contacts - Aggressive contact tracing, identification, and appropriate management, is the foundation to the prevention of secondary cases. Refer to Contact Definition.
- Obtain names, addresses, and phone numbers of all possible contacts. This information may need to be obtained from someone close to the case.

Communication

- Letters can be sent to classrooms and other group settings where individual contact tracing is not required to inform them of the exposure, symptom monitoring and when to seek medical attention (see Sample letter)

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

- Ensure the client's entire immunization status is up-to-date once they have recovered.[3]

[3] Life-long immunity is expected following natural infection with Hib in individuals who were older than 24 months at the time of the disease. Take the opportunity to update any other immunizations that the client is eligible for.

- Grabenstein (2011) indicates that children with invasive Hib disease, when younger than 24 months, may not develop adequate anticapsular antibodies and remain at risk for a subsequent episode of the disease. After recovery from this illness episode, these children should be re-vaccinated with Hib vaccine according to age at presentation as if they have not been previously immunized. Children who were older than 24 months of age at time of disease do not need to be immunized as they should develop a protective immune response.
- Refer to Saskatchewan Immunization Manual – Chapter 5[4]

Isolation

- Respiratory isolation for 24 hours following initiation of appropriate antibiotic treatment

Referrals

- When clients are hospitalized, communication with hospital staff and or infection control staff is important.
- Inform clients that supportive services (physiotherapy, occupational therapy, Home Care) are available if necessary. Refer client to primary caregiver for referrals.

Treatment/Supportive Therapy

The public health practitioner should direct any questions regarding the current treatment protocols to the physician or Medical Health Officer (MHO). The following serves as a reference for the public health investigator:

- *Antibiotic treatment is require. For patient management the client's physician should consult an infectious disease specialist.*
- *In addition to therapeutic antibiotics, the case should receive chemoprophlaxis with rifampin before hospital discharge unless the infection was treated with an antibiotic that is effective in eliminating Hib colonization (American Academy of Pediatric, 2009 and Heymann, 2008). Refer to Attachment – Rifampin Chemoprophylaxis Dosage Guide for Haemophilus influenzae Type b for information on dosing.*

[4]https://www.ehealthsask.ca/services/Manuals/Documents/Ch.%205%20Immunization%20Schedules%20Aug%202018.pdf

II. Contacts/Contact Investigation

Contact Definition (American Academy of Pediatrics, 2009)

- Contacts are defined as:
  - a person residing with the case of invasive Hib disease
    OR
  - non-residents who have spent 4 or more hours per day with the index case for at least 5 of the 7 days preceding the day of hospital admission of the case.
- Complete the Attachment – Contact Follow-up Form in the Respiratory and Direct Contact Introduction and General Considerations for all identified contacts.
- Consult with the MHO immediately to determine whether rifampin chemoprophylaxis and/or Hib immunization is necessary.

Public Health Interventions

Assessment

- Assess for symptoms.

Chemoprophylaxis

When indicated, prophylaxis should be initiated as soon as possible given that most secondary cases in households occur during the first week after hospitalization of the index case. As some secondary cases occur later, initiation of prophylaxis seven days or more after hospitalization of the index case may still be of some benefit (American Academy of Pediatrics, 2009). Discuss with the MHO.

Recommended for:

1. **All household contacts**, regardless of age, in the following circumstances:
   - household with at least 1 contact younger than 4 years of age who is unimmunized or incompletely immunized[5] for age;
   - household with a child younger than 12 months of age if the child has not received the primary series of three doses;
   - household with an immunocompromised child, regardless of that child's Hib immunization status (i.e., even if fully immunized).

[5] Complete immunization is determined by the age at when they received their first dose, their current age and the number of doses received to date. Please refer to the Saskatchewan Immunization Manual for further details: http://www.ehealthsask.ca/services/manuals/Pages/SIM.aspx

2. **Preschool/daycare contacts (including staff)**, regardless of age, when **2** or more cases of invasive Hib disease have occurred within 60 days among attendees.
   - If the index case attends preschool or day care, and the decision is to provide rifampin to all contacts, inform all parents of the situation. Together with the facility operator, plan and provide parent education about invasive Hib disease. It is especially important to discuss contraindications and side effects of rifampin.
3. **The case**, if younger than 2 years of age or is a member of a household with a susceptible contact, and who had been treated with a regimen other than cefotaxime sodium or ceftriaxone sodium; chemoprophylaxis usually is provided just before discharge from hospital (American Academy of Pediatrics, 2009).

   Chemoprophylaxis MAY be considered in the following situations at the discretion of the Medical Health Officer:
   - Health care workers who have administered mouth-to-mouth resuscitation to the case (British Columbia Centre for Disease Control, 2005).

Testing

- Contacts of an index case should **not** be swabbed for culture of Hib prior to initiating rifampin chemoprophylaxis since the result has no bearing on the decision to administer rifampin.

Immunization

- Post-exposure Hib immunization is not known to decrease the risk of transmission. Rather, the situation presents an opportunity for completion of Hib immunization of contacts.
- Offer immunization to contacts less than 60 months of age who are unimmunized or not completely immunized[6] for age and to individuals older than 5 years of age who have chronic conditions associated with increased risk of invasive Hib disease. Refer to Saskatchewan Immunization Manual[5] – Chapter 5: Immunization Schedules and Chapter 7: Immunization of Special Populations).

Exclusion

- Any individual who is eligible to receive prophylaxis should be isolated at home until 24 hours after prophylaxis has been initiated.

[6] Complete immunization is determined by the age at when they received their first dose, their current age and the number of doses received to date. Please refer to the Saskatchewan Immunization Manual for further details: http://www.ehealthsask.ca/services/manuals/Pages/SIM.aspxl.

- New attendees to a daycare should not be permitted until rifampin prophylaxis has been completed.
- Persons entering a setting (new staff and attendees) where rifampin is being given should also receive it and be excluded as above.

III. Environment

Child Care Centre/Schools Control Measures

Ensure each parent receives information about Hib disease. See Attachment – Sample Fact Sheet on *Haemophilus Influenzae* Type B Disease.

Management of the centre. Three situations may occur:

1. If **one case** of invasive Hib disease occurs in a centre with one child under 24 months attending:
   - Notify and educate staff and parents of contacts of the case to be alert for anyone with fever, sore throat, headache, stiff neck, drowsiness, rapid or difficult breathing, excessive irritability, or symptoms at the site of infection. Seek prompt evaluation by a physician for any ill child.
   - The centre director must notify public health if any additional children become ill.
   - The advisability of rifampin prophylaxis in exposed childcare groups with unimmunized or incompletely immunized children is controversial. Discuss this with the MHO.
   - Notify parents of other childcare centre attendees of the occurrence of a case of Hib disease (see the appropriate Attachment – Sample Letter about *Haemophilus Influenzae* Type B Invasive Disease – Prophylaxis Recommended or Sample Letter about *Haemophilus Influenzae* Type B Invasive Disease – Prophylaxis NOT Recommended).
   - Assess immunization status of children.
   - Recommend age-appropriate Hib immunization for all incompletely immunized or unimmunized children.
2. If **one case** of invasive Hib disease occurs in a centre and all children in the centre are at least 24 months of age, regardless of immunization status:
   - Educate parents and staff to be alert for anyone with fever, sore throat, headache, stiff neck, drowsiness, rapid or difficult breathing, excessive irritability, or symptoms at the site of infection. Seek prompt evaluation by a physician for any ill child.

- Notify all parents of the occurrence of a case of Hib disease (see Attachment – Sample Letter about *Haemophilus Influenzae* Type B Invasive Disease – Prophylaxis NOT Recommended).
- The centre director must notify public health if any additional children become ill.
- Do not recommend prophylaxis or vaccine.

3. If **two or more cases** of invasive Hib disease occur within 60 days and incompletely immunized children attend the centre, carry out the same procedures as for one case but prophylaxis for all attendees and staff is recommended.
   - Notify all parents of the occurrence of a case of Hib disease (see Attachment – Sample Letter about *Haemophilus Influenzae* Type B Invasive Disease – Prophylaxis Recommended).
   - Absent attendees should be contacted to determine if they are contacts/cases.
   - All new attendees entering a setting where rifampin has been used within two months must be age-appropriately immunized (Government of Manitoba, 2007).
   - See Chemoprophylaxis section.

IV. Epidemic Measures
Not applicable

Prevention and Education

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

- Immunize infants, children and adults according to the recommended schedule. Refer to Saskatchewan Immunization Manual.[7]
- Complete immunization is determined by the age at when they received their first dose, their current age and the number of doses received to date. Please refer to the Saskatchewan Immunization Manual[2] for further details.

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

Education

- Educate the public about the disease and the need for active immunization.
- Immunization information fact sheets can be used to guide discussion.
- Education should be provided regarding respiratory etiquette and measures to prevent transmission.

Revisions

Date	Change
September 2018	• Updated to align with Panorama configuration; • Clarified the purpose for notification of cases to public health; • Incorporated an Epidemiology and Occurrence section into the chapter; • Incorporated *Haemophilus Influenzae* Infection (invasive) Data Collection Worksheet; • Rearranged and updated the style into the new format of the Manual. • Implemented boxes to draw attention to treatment and chemoprophylaxis information.

References:

Alberta Health and Wellness. (2005). *Public health notifiable disease management guidelines: Haemophilus influenzae*. Retrieved September, 2018 from http://www.health.alberta.ca/professionals/notifiable-diseases-guide.html.

American Academy of Pediatrics. (2009). *Red book: 2009 Report of the Committee on Infectious Diseases* (28th ed.). Elk Grove Village, IL: Author.

British Columbia Centre for Disease Control. (2005). *BCCDC Communicable disease control manual: Haemophilus influenzae type b.* Retrieved June, 2012 from http://www.bccdc.ca/NR/rdonlyres/7AE56F39-C179-434C-80E7-C0304D91AAA7/0/Epid_GF_Hib_Sept_2005.pdf.

Canadian Pharmacists Association. (2006). *Compendium of pharmaceuticals and specialties (CPS): The Canadian drug reference for health professionals.* Ottawa, Canada: Author.

Grabenstein, J. D. (2010) *Immunofacts: Vaccines and immunologic drugs 2011* (36th revision). St. Louis, MO: Wolters Kluwar Health.

Health Canada. (1999). Infection control guidelines – Routine practices and additional precautions for preventing the transmission if infection in health care. *Canada Communicable Disease Report (CCDR), 25S4,* July 1999. Retrieved November, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

Mandell, G. L., Bennett, J. E., Dolin, R. (2000). *Mandell, Douglas, and Bennett's principles and practice of infectious diseases* (5th ed.). Philadelphia, PA: Churchill Livingstone.

Manitoba Health. (2007). *Communicable disease management protocols: Invasive Haemophilus influenza disease.* Retrieved September, 2018 from http://www.gov.mb.ca/health/publichealth/cdc/protocol/ihd.pdf.

Public Health Agency of Canada. (2006). *Canadian immunization guide* (7th ed.). Ottawa, Canada: Public Works and Government Services Canada.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR*), *35S2*, November 2009. Retrieved November, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/index-eng.php.

Government of Saskatchewan

PANORAMA

Haemophilus inflenzae infection (invasive) Data Collection Worksheet

Please complete **all** sections.

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

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 investigation if not the same:	

B) INVESTIGATION INFORMATION

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

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

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_____

Haemophilus inflenzae infection (invasive) Data Collection Worksheet

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

Panorama Client ID: _____
Panorama Investigation ID: _____

C) 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	Lethargy (fatigue, drowsiness, weakness, etc)		YYYY / MM / DD
Bulging fontanelle		YYYY / MM / DD	**Meningitis**		
Cardiac - pericarditis		YYYY / MM / DD	Neck stiffness (nuchal rigidity)		YYYY / MM / DD
Cellulitis		YYYY / MM / DD	Confusion		YYYY / MM / DD
Dyspnea (shortness of breath)		YYYY / MM / DD	**Pneumonia**		YYYY / MM / DD
Epiglottitis		YYYY / MM / DD	Respiratory compromise		YYYY / MM / DD
Fever		YYYY / MM / DD	**Sepsis (e.g. bactremia, septicemia, etc.)**		YYYY / MM / DD
Infection - empyema		YYYY / MM / DD			
Other s/s					

D) INCUBATION AND COMMUNICABILITY

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case (period for acquisition):
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date**: YYYY / MM / DD

Exposure Calculation details:

Communicability for Case (period for transmission):
Earliest Possible Communicability Date: YYYY / MM / DD **Latest Possible Communicability Date**: YYYY / MM / DD

Communicability Calculation Details:

E) RISK FACTORS

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes Start Date	N, NA, U	Add'l Info
Contact - Daycare	YYYY / MM / DD TE		
Contact to a known case (Add'l Info)	YYYY / MM / DD AE		
Special population – Attends Childcare	YYYY / MM / DD TE		
Special population – Attends school	YYYY / MM / DD TE		
Travel - Outside of Canada (Add'l Info)	YYYY / MM / DD TE		
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)	YYYY / MM / DD TE		

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: ☐ IIOM – Interpretation of history by investigator

Haemophilus inflenzae infection (invasive) Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

G) TREATMENT

INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication *(Panorama = Other Meds)* : _____

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

H) INTERVENTIONS

INVESTIGATION->TREATMENT & INTERVENTIONS->INTERVENTION SUMMARY

Intervention Type and Sub Type:

Assessment:
☐ Assessed for contacts YYYY / MM / DD
Investigator name

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

Communication:
☐ Other communication (See Investigator Notes) YYYY / MM / DD
Investigator name
☐ Letter (See Document Management) YYYY / MM / DD
Investigator name
☐ Letter YYYY / MM / DD
Investigator name

Testing:
☐ Laboratory testing recommended YYYY / MM / DD
Investigator name

Treatment:
☐ Treatment not recommended YYYY / MM / DD
Investigator name

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Other Investigation Findings:
☐ Investigator Notes ☐ See Document Management

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

Referral:
☐ Consultation with MHO ☐ Primary Care Provider
☐ Infectious Disease Specialist

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

Haemophilus inflenzae infection (invasive) Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

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) _____

J) Transmission Events

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Transmission Event ID	Exposure Name	Setting type (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	Date/Time	# of contacts
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure ☐Public facilities (e.g daycare)		
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure ☐Public facilities(e.g daycare)		
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure ☐Public facilities (e.g daycare)		
	Hib Contacts – Inv ID# _____	☐Multiple Settings	YYYY / MM / DD to YYYY / MM / DD	

K) TOTAL NUMBER OF CONTACTS

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> TE HYPERLINK -> UNKNOWN/ANONYMOUS CONTACTS

Anonymous contacts:_____ (total number of individuals [including groups that 1:1 follow-up is not required or is not feasible])

1. **What is *Haemophilus influenzae* type b disease?**
   - *Haemophilus influenzae* type b (Hib) is a bacterial infection that can cause deadly brain infections and other serious infections like meningitis (swelling of the covering of the brain and spinal cord), blood infections, pneumonia (lung infection), and infections of other parts of the body.

2. **How is Hib disease spread?**
   - Hib is carried in the nose and throat of children and adults who may be healthy or have mild symptoms. It is then spread to another person through contact with discharges or droplets from the nose or mouth through activities such as kissing, sharing food, utensils, or glasses, or coughing directly on someone.

3. **What will decrease the risk of getting Hib disease?**
   - The best way to prevent infection with Hib is through immunization.
   - Hib vaccine is recommended for all children starting at 2 months of age. Children need a total of 4 shots, given at 2, 4, 6, and 18 months. This vaccine is included in routine immunization provided by Saskatchewan Ministry of Health. Make sure your child's immunizations are up to date.

4. **What are the signs and symptoms of Hib disease?**
   - Hib infections are sometimes difficult to recognize. In general, any infection that seems more serious than usual should be brought to a doctor's attention. Symptoms to look for are:
     - fever;
     - drowsiness;
     - stiff neck;
     - rapid or difficult breathing;
     - loss of appetite;
     - skin or joints that are red, tender, or swollen.
   - If you child develops any of these symptoms, see a doctor immediately for treatment.

5. **How is Hib disease diagnosed?**
   - Lab tests look for the bacteria from various sites (blood, cerebrospinal fluid, etc.) from individuals who are ill.

6. **How is Hib disease treated?**

- Hib is treated with antibiotics. Treatment with antibiotics should be started immediately to reduce serious complications.

7. Who should receive preventive treatment?

- Medications to prevent getting or spreading Hib may be needed for those who live in the same house with a child who had Hib disease, and for children and employees in childcare settings. Check with your local public health office for advice.

8. What are the long-term complications of Hib disease?

- Hib can infect the throat and then can spread causing meningitis, pneumonia, or ear, skin, joint, or blood infections.
- If Hib meningitis occurs, death occurs in one out of 20 children and permanent brain damage in 10-30 % of the survivors.

9. Who is at risk of getting Hib disease?

- Since the vaccine was introduced, the disease usually occurs in children who are too young to be immunized or children who have not finished their immunizations.

For more information contact:
Your local public heath office,
OR your physician or nurse practitioner,
OR the HealthLine at 1-877-800-0002.

References:
American Academy of Pediatrics, 2009.
Control of Communicable Disease Manual, Heymann (2008).

Date

Dear Parent/Guardian:

This letter is to let you know that your child had contact with a child who has been diagnosed with an infection caused by *Haemophilus influenzae* type b (Hib). Hib is a bacteria ("germ") that causes serious infections. More information about Hib is included in the attached Fact Sheet.

Hib infections are sometimes difficult to recognize. In general, any infection that seems more serious than usual should be brought to a doctor's attention. Symptoms to look for:

- drowsiness;
- stiff neck;
- rapid or difficult breathing;
- extreme irritability;
- skin or joints that are red, tender, or swollen.

Notify Public Health at _____ if your child becomes ill with any of the symptoms listed above.

The risk of your child getting this illness is low and Public Health is NOT recommending that your child receive any medicine. Further you should watch your child for fever, excessive sleepiness, trouble breathing, stiff neck, sore throat, or joint or skin infection. Call your doctor immediately if your child becomes sick.

Your child may have received immunizations for Hib as an infant. You should however make sure your child's immunizations are up to date. This will help protect your child. If you have other children under 5 years of age that have not been completely immunized for Hib, they should receive the vaccine.

If either you or your physician require(s) further information, please call _____
Yours sincerely,

_____

Medical Health Officer

Date

Dear Parent/Guardian:

This letter is to let you know that your child had contact with a child who has been diagnosed with an infection caused by *Haemophilus influenzae* type b (Hib). Hib is a bacteria ("germ") that causes serious infections. More information about Hib is included in the attached Fact Sheet.

Hib infections are sometimes difficult to recognize. In general, any infection that seems more serious than usual should be brought to a doctor's attention. Symptoms to look for:

- drowsiness;
- stiff neck;
- rapid or difficult breathing;
- extreme irritability;
- skin or joints that are red, tender, or swollen.

Notify Public Health at _____ if your child becomes ill with any of the symptoms listed above.

Because your child was at the daycare with an infected child, he or she is considered a "close contact." Public Health recommends that all close contacts be given medication to prevent further spread of the disease. Please contact us as soon as possible. The most common medication recommended to prevent infection is called rifampin.

Your child may have received immunizations for Hib as an infant. You should however make sure your child's immunizations are up to date. This will help protect your child, but he or she still needs to take medication and should be watched carefully for signs and symptoms. If you have other children under 5 years of age that have not been completely immunized for Hib, they should receive the vaccine.

If you have any questions please call _____

Sincerely,

_____

Medical Health Officer

Dosage Guide based on the noted weight in kg below. **Calculate dose based on exact weight. Maximum dose 600 mg once every 24 hrs x 4 days (doses).**										
Weight in kg ***Dosage by age***	**5**	**6**	**7**	**8**	**9**	**10**	**15**	**20**	**25**	**30** Max or adult dose
<1 mo of age *10 mg/kg* *(25 mg/ml suspension)*	2.0 ml	2.4 ml	2.8 ml	3.2 ml	3.6 ml	4.0 ml				
>1 mo of age *20mg/kg* *(25 mg/ml suspension)*	4.0 ml	4.8 ml	5.6 ml	6.4 ml	7.2 ml	8.0 ml	12.0 ml	16 ml	20 ml	24 ml

Recommendations

1. Use the appropriate weight-specific dose noted in the first column in the chart above for infants and children.
2. Rifampin Pediatric Suspension can be prepared as follows:
   - **Add contents of 3 – 300mg caps or 6 – 150 mg caps of Ripampin to 36 mls of simple syrup to yield a 25 mg/ml suspension.**
   - **SHAKE WELL.**
3. Store prepared suspension and simple syrup at room temperature because of their tendency to crystallize if refrigerated.
4. Discard prepared suspension after treatment course is completed. Preparation expires after 28 days.
5. As much as possible, use only one preparation form per client (i.e., capsule(s) only, or suspension only).
6. Give client a Rifampin information sheet. See Appendix F – Patient Information Sheets – Rifampin

Note:

- Rifampin is contraindicated in pregnancy. Discuss Ceftriaxone dose with MHO.
- If necessary, discuss alternative treatments with MHO for non-pregnant adults.

Notification Timeline:

From Lab/Practitioner to Public Health[1]:

Novel: Within 24 hours.
Severe: Within 1-2 business days.
Non-severe or non-novel: 1-2 business days.

From Public Health to Ministry of Health:

Novel: Within 24 hours
Severe: Within 1-2 business days (see Attachment – Severe Influenza in Panorama)
Individual case reporting of non-severe or non-novel: Not required
Outbreaks: Initial report within 1 business day.
Updates as necessary.
Final report within 30 days of completing the investigation.

Public Health Follow-up Timeline:

Novel: Within 24 hours.
Severe: Within 1-2 business days.
Non-severe or non-novel: No follow-up required.

Public Health Purpose for Notification of Influenza

- Timely detection of severe morbidity and mortality caused by common strains of the influenza virus or its variants. This may include the exacerbation of underlying medical conditions resulting in the need for intensive medical care.
- To provide an early warning mechanism in order that available control measures may be implemented at the appropriate time to minimize transmission.
- To track epidemiology trends of severe influenza in Saskatchewan including risk factors and distribution;
- To inform the public and medical community in Saskatchewan about influenza; and
- To fulfill International Health Regulation requirements of reporting occurrences of novel influenza.

[1] Local public health is encouraged to collaborate with their partners in ERs and hospitals to ensure all roles and responsibilities are well understood and agreed upon, specifically the timely reporting to public health upon admitting a client or reporting deaths with severe influenza. The Severe Influenza Notification Form should be given to ERs and hospitals along with the fax number where to send completed forms.

Table 1. Surveillance Case Definitions[2] (Public Health Agency of Canada, May 2008)

Confirmed Case	Clinical illness[a] with laboratory confirmation of infection: • detection of influenza virus RNA[b] **OR** • isolation of influenza virus from an appropriate clinical specimen **OR** • demonstration of influenza virus antigen in an appropriate clinical specimen **OR** • significant rise (e.g., 4 fold or greater) in influenza IgG titre between acute and convalescent sera.

[a]Clinical illness defined as influenza-like illness (ILI) is characterized as abrupt onset of respiratory illness with fever and cough and with one or more of the following:

- sore throat;
- arthralgia;
- myalgia;
- prostration that could be due to influenza virus.

In children under 5, gastrointestinal symptoms may also be present. In patients under 5, or 65 and older, fever may not be prominent.

Note: Illness associated with *novel influenza* viruses may present with other symptoms

[b]This includes detection of at lease one specific gene target by a validated point of care (POC) nucleic acid amplification test (NAAT) that has been deemed acceptable to provide a final result (i.e. does not require confirmatory testing). As of December 2022, the only POC tests in Saskatchewan deemed acceptable to provide final results are the Abbott ID NOW and the Cepheid GeneXpert.

Table 2. Other definitions

Severe Influenza [b] (Saskatchewan Ministry of Health, adapted from Public Health Agency of Canada)	A person requiring intensive medical care with: **I. Respiratory symptoms** • Fever (over 38 degrees Celsius)[c] AND new onset of or exacerbation of chronic cough or breathing difficulty **AND** **II. Evidence of severe illness progression** • Either radiographic evidence of infiltrates consistent with pneumonia OR acute respiratory distress syndrome (ARDS) **OR** • Severe ILI, which may also include complications, such as encephalitis or other severe and life threatening complications or exacerbation of existing medical conditions

[2] 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.

	AND • requiring mechanical ventilation **AND** **III. Diagnostic criteria** • Results of laboratory investigations are positive for influenza A or B virus
Severe influenza case - deceased	**I. A person meeting the definition of severe influenza case resulting in death.** **OR** **II. Autopsy performed with findings consistent with severe influenza** • Autopsy findings consistent with the pathology of ARDS **AND** **III. Diagnostic criteria** • Results of laboratory investigations are positive for influenza virus
[b] The indicator of severe influenza is requiring intensive medical care which means mechanical ventilation defined as artificial ventilation where mechanical means is used to assist or replace spontaneous breathing. This includes mechanisms such as continuous positive airway pressure (CPAP), ventilators, and respirators. [c] Age should be taken into consideration in the clinical assessment.	

Table 3. Novel Influenza A (Saskatchewan Ministry of Health, adapted from US Centers for Disease Prevention and Control, 2014)

Confirmed	• A case of human infection with a novel influenza A virus confirmed by National Microbiology Laboratory or using methods agreed upon as noted in Laboratory Criteria[d.]
Probable	• A case meeting the clinical criteria[e] and epidemiologically linked[f] to a confirmed case, but for which no confirmatory laboratory testing for influenza virus infection has been performed or test results are inconclusive for a novel influenza A virus infection.
Suspect	• A case meeting the clinical criteria, pending laboratory confirmation. Any case of human infection with an influenza A virus that is different from currently circulating human influenza H1 and H3 viruses is classified as a suspected case until the confirmation process is complete.
Epi-linked [f]	• Close (within 2 meters) unprotected (without use of respiratory and eye protection) exposure to a person who is a confirmed, probable, or symptomatic suspected case of human infection with novel influenza A virus (e.g. in a household or healthcare facility) or an animal confirmed to be infected with Novel influenza A **AND** • Transmission of the agent by the usual modes of transmission is plausible.

	OR History of travel to an area experiencing novel Influenza A activity within the past 14 days.

[d] A human case of infection with an influenza A virus subtype that is different from currently circulating human influenza H1 and H3 viruses. Novel subtypes include, but are not limited to, H2, H5, H7, and H9 subtypes. Influenza H1 and H3 subtypes originating from a non-human species or from genetic reassortment between animal and human viruses are also novel subtypes. Novel subtypes will be detected with methods available for detection of currently circulating human influenza viruses at provincial public health laboratories (e.g., real-time reverse transcriptase polymerase chain reaction [RT-PCR] or whole genome sequencing [WGS]). Confirmation that an influenza A virus represents a novel virus will be performed by NML. Once a novel virus has been identified by NML, confirmation may be made by public health laboratories following NML-approved protocols for that specific virus, or by laboratories using an authorized test specific for detection of that novel influenza virus.

[e] An illness compatible with influenza virus infection (fever >38 degrees Celsius, with cough and/or sore throat, myalgia, arthralgia, prostration) including conjunctivitis symptoms (red eye, eyelid/ conjunctiva inflammation (swelling), tearful eye, itching eye, painful eye, burning eye, discharge from eye, or sensitivity to light)

[f] A case may be considered epidemiologically linked to a laboratory-confirmed case if at least one case in the chain of transmission is laboratory confirmed. Laboratory testing for the purposes of case classification should use methods verified by NML. Currently, only viral isolation, RT-PCR, gene sequencing, or a 4-fold rise in strain-specific serum antibody titers are considered confirmatory.

Epidemiology and Occurrence

The occurrence and epidemiology of seasonal influenza varies by year. Generally, it occurs in the winter months between October and March. It has a more severe manifestation in those with Risk Factors. Refer to the Saskatchewan Community Respiratory Illness Surveillance Program for current information.

Additional Background Information

Causative Agent

Three strains of human influenza virus exist: they are type A, B, and C. Influenza types A and B are associated with *seasonal* epidemics. Emergence of *novel*, completely new subtypes (antigenic shift) occurs at irregular intervals and occurs only with type A viruses. They are responsible for pandemics and result from the unpredictable reassortment and/or recombination of genetic material from human, swine, or avian Influenza A viruses. Minor antigenic changes also occur frequently in both Influenza A and B viruses and is known as antigenic drift. These “drifted” viruses are responsible for yearly epidemics and regional outbreaks.

Symptoms
Acute upper respiratory tract infection (URTI) characterized by *abrupt onset* of fever and chills; headache; malaise; myalgia; prostration; sore throat and cough (Taubenberger, 2008). Abdominal pain, nausea, and vomiting may also be present. Refer to Case Definition and ILI for details.

Reservoir/Source
Primarily humans. Birds and mammalian reservoirs such as swine are likely sources of new human subtypes thought to emerge through genetic re-assortment.

Incubation Period
Usually 1-3 days.

Period of Communicability
Contagious from 24 hours before the onset of symptoms to 3-5 days after peak symptoms appear.

Mode of Transmission
- Respiratory droplets - Breathing droplets that have been sneezed or coughed into the air by someone with influenza, or having the droplets land on the surface of your eye.
- Direct and indirect contact with infected respiratory secretions - Shaking hands with an infected person or touching a contaminated surface, and then touching your own eyes, nose or mouth.

Risk Factors
Risk factors are associated with individual susceptibility and settings that create opportunities for acquisition or transmission to others. This includes:
- Individuals with the following medical conditions:
  - Cardiac Disease;
  - Diabetes mellitus;
  - Lung disease including asthma;
  - Cancer;
  - Renal disease;
  - Immunocompromised related to underlying disease or treatment;
  - Transplant candidates or recipients;
  - Neurological conditions that impede the clearance of respiratory secretions
- Individuals that are morbidly obese;

- Pregnant women;
- Children under the age of 5;
- Adults 65 years of age and older;
- Children in childcare;
- Individuals in long term care facilities, homeless shelters or crowded living conditions or communal settings;
- Individuals that use alcohol, tobacco or other drugs; and
- Indigenous individuals.

Specimen Collection and Transport

The recommended specimens for diagnosis of influenza are nasopharyngeal specimens collected on a flocked swab or a vigorous throat swab taken within the first 48 hours of infection. Refer to Roy Romanow Provincial Laboratory (RRPL) Compendium of Tests at https://rrpl-testviewer.ehealthsask.ca/. The specimen should reach the lab in 24 hours.

Each specimen is tested by a nucleic acid amplification test (NAAT).
If a novel strain or avian Influenza is suspected, the lab should be notified as they may add further NAAT testing specific to novel or avian Influenza A viruses.

All specimens are tested by PCR within 24 hours of receipt.

Lab Reports and Interpretation

Table 4. Interpretation of Test Results

Results from NAAT/RT-PCR are reported as:	Interpretation as per Case Definition	Test Details:
Positive	Confirmed	Influenza A (or B) virus detected
Presumptive positive	Does not meet case definition	Testing will be repeated at a reference lab (i.e. RRPL or NML).
Indeterminate	Does not meet case definition	Virus is detected below the limit of detection of the assay. Recommend collection of new specimen for repeat testing.
Invalid	Does not meet case definition	Specimen failed Quality Control or exhibited non-specific amplification. Recommend recollection of new specimen for repeat testing.
Negative	Not a Case	No Influenza A (or B) virus detected.

Source: RRPL December 6, 2022

Treatment/Supportive Therapy

Treatment for clinical management is at the discretion of the primary care provider. The following serves as a reference for the public health investigator:

- *Supportive care for symptoms is all that is indicated for most cases of influenza.*
- *An appropriate antiviral may be effective in reducing the duration of the illness when initiated by the attending physician within 48 hrs of the onset of signs and symptoms.*
- *Antiviral treatment is recommended as soon as possible for outpatients and hospitalized patients who are suspected (cases under investigation), probable, or confirmed cases of human infection with novel influenza A (including avian or swine influenza) viruses associated with severe human disease* (CDC, March 2022
- *Refer to Association of Medical Microbiology and Infectious Disease Canada (AMMI) guidelines on the use of antivirals (http://www.ammi.ca/guidelines/).*
- *Antibiotic therapy is not indicated unless bacterial complications arise.*
- *Because of the association with Reye's syndrome, salicylates (e.g., Aspirin) should be avoided in children with influenza.*

Public Health Investigation

I. Case

During influenza season, investigations are limited to cases with *severe* presentations or those infected with a *novel* strain.

History

Refer to Attachment – Influenza Data Collection Worksheet to assist.

- **Novel influenza** – assess for the source including history of travel, contact to a known case or exposure to animals.
    - In the case of exposure to highly pathogenic avian influenza, assess for contacts.

- **Severe influenza** – assess for relevant risk factors and history of Influenza vaccination for the current influenza season.

Public Health Interventions

Communication

- **Novel influenza** – Where history of travel is identified as the potential source for novel influenza, the Ministry of Health must report to the Public Health Agency of Canada.
- **Severe influenza** – Communication with health care providers is important to determine the clinical presentation of severe cases.

Education

- All individuals with severe or novel influenza should be provided information on influenza immunization programs; this may be part of discharge education for severe cases.

Exclusion and Isolation

- All individuals should stay home when sick.
- **Novel influenza** - In a household setting, individuals should strive to reduce exposures by:
    - avoiding shared air spaces;
    - eliminating direct contact with the case or with their infectious fluids;
    - eliminating close range conversations with the case;
    - avoiding use of shared spaces;
    - eliminating use of shared items; and
    - wearing masks when outside of room.
- See Epidemic Measures.
- For additional information on infection prevention and control measures for individuals in health care facilities – refer to Regional Infection Control Manual.
- Health Care Workers (HCWs) – refer to Regional Management of Employees and Other Health Care Workers during Influenza Outbreaks in Health Care Facilities.

Immunization

Offer relevant immunizations if eligible.

II. Contacts/Contact Investigation

Contact tracing is not required except in the case of novel influenza where the source has been identified as ***highly pathogenic avian influenza (AI)***. See Attachment – Management of Contact to Human Cases of Highly Pathogenic Avian Influenza.

III. Environment

Child Care Centres/Institutional Control Measures

- Child care centres – refer to the Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[3]
- Health care facilities – refer to organization's infection control manual.

IV. Epidemic Measures

- Child care centre (CCC) control measures:
  - Educate as per Prevention Measures.
  - Children with influenza or influenza-like illness should not attend until the child has been without fever (without the use of fever reducing medications) for 24 hours (Centers for Disease Control, July 2009).
  - seasonal influenza vaccine should be offered annually to everyone six months of age and older who does not have contraindications to the vaccine, irrespective of previous seasons' influenza vaccination status.
- Institutional control measures:
  - Educate as per Prevention Measures.
  - Persons in the community with influenza or influenza-like illness should not visit until 24 hours afebrile without use of fever-reducing medications and other symptoms improving for 48 hours. Exceptional circumstances should be discussed with facility manager and MHO.
  - Every effort should be made to control influenza outbreaks within institutions to optimize the protection of the patients, staff and the community. The use of antivirals has been used to control outbreaks in Special Care Homes. Refer to Use of Oseltamivir for the Management of Influenza Outbreaks in Special Care Homes.
  - Refer to the Outbreaks section of the manual for additional details about managing an outbreak in a Special Care Home.

NOTE: The MHO is the only designated Public Health Official legislated to declare and/or end an outbreak.

V. Pandemic Measures

See local, provincial, national pandemic plans.

[3] http://publications.gov.sk.ca/documents/11/96181-infection-control-manual-child-care-centres.pdf.

Prevention Measures

Immunization

- Refer to the National Advisory Committee on Immunization Statement on Influenza Vaccination for the current season at http://www.phac-aspc.gc.ca/naci-ccni/index-eng.php.
- Eligible persons should be immunized annually because of declining immunity and change in virus variants.
- Refer to Saskatchewan Ministry of Health's Seasonal Influenza Program for recommendations on risk groups, dosages and schedules.
- Adults do not benefit from multiple doses in the same year; re-immunization may be considered in outbreak situations or for high-risk travellers; discuss with the MHO.
- Encourage immunization of health care workers. Lower mortality in long-term care facilities has been demonstrated in institutions where health care workers are immunized than in those where they were not.
- Administration of influenza vaccine to international travellers should be considered – refer to Saskatchewan International Travel Manual.

Education

- Educate the public about the disease: transmission, symptoms, and preventive measures especially hand hygiene and cough etiquette.

Surveillance

The province-wide community respiratory illness surveillance program (CRISP) contributes to the national FluWatch program in Canada. FluWatch is Canada's national surveillance system that monitors the spread of the flu and other flu-like illnesses on an ongoing basis. The national program is part of international surveillance by World Health Organization (WHO).

Refer to Section 2-220 Community Respiratory Illness Surveillance Program for details.

Revisions

Date	Change
December 2022	• Added reference to point of care tests to the case definition. • Updated to incorporate a link to contact management for individuals exposed to novel influenza associated with highly pathogenic avian influenza. • Added treatment details for novel influenza (including avian influenza). • Removed the details from the Surveillance section and created a link to Section 2-220 (CRISP) where details are provided.
November 2018	• Updated to incorporate severe and novel case definitions • Incorporated the purpose for notification of cases to public health • Updated to align with Panorama configuration • Incorporated an Epidemiology and Occurrence as a placeholder • Rearranged and updated the style into the new format of the Manual. • Incorporated details of Influenza Surveillance Program within and added an attachment with further details.

References

American Academy of Pediatrics. (2015). *Red book: 2015 Report of the Committee on Infectious Diseases* (29th ed.). Elk Grove Village, IL: Author.

Centers for Disease Control. (2008). *Influenza (flu): Preventing the spread of influenza (the flu) in child care settings: Guidance for administrators, care providers, and other staff.* Retrieved August 2011 from www.cdc.gov/flu/professionals/pdf/childcaresettings.pdf.

Health Canada. (1999). Infection control guidelines – Routine practices and additional precautions for preventing the transmission if infection in health care. *Canada Communicable Disease Report (CCDR)*, *25S4*, July 1999. Retrieved August 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf.

Health Canada. (2002). Infection control guidelines – Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR), 28S1*, March 2002. Retrieved August 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

Public Health Agency of Canada. (2006). *Canadian immunization guide* (7th ed.). Ottawa, Canada: Public Works and Government Services Canada.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR), 35S2,* November 2009. Retrieved August, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Influ_lab-eng.php.

Public Health Agency of Canada. (2008). *Influenza: Understanding pandemic influenza*. Retrieved August 2011 from http://www.phac-aspc.gc.ca/influenza/pdf/lang/english_understanding_fact_sheet.pdf.

Public Health Agency of Canada. (2011). *Influenza*. Retrieved August 2011 from http://www.phac-aspc.gc.ca/influenza/index-eng.php.

Taubenberger, J. K., & Morens, D. M. (2008). The pathology of influenza virus infections. *Annual review of pathology*, *3*, 499-522. Retrieved November, 2022 from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2504709/

US Centers for Disease Control and Preventions (2022). Interim guidance on follow-up of close contacts of persons infected with novel Influenza A viruses and use of antiviral medications for chemoprophylaxis. Retrieved November 2022 from https://www.cdc.gov/flu/avianflu/novel-av-chemoprophylaxis-guidance.htm

Government of Saskatchewan

Severe Influenza Notification Form

PANORAMA

A) PERSON REPORTING – HEALTH CARE PROVIDER INFORMATION

Hospital Name and Unit: Location: Attending Physician or Nurse: Phone number:	***Patient information sticker or addressograph***

B) ADDITIONAL CLIENT INFORMATION (not included in Addressograph or sticker)

Last Name:	First Name: and Middle Name:	HSN:	DOB:
Place of Employment/School:	Comments:		
Alternate Contact: _____ Relationship: _____ phone: _____			

C) DISEASE EVENT HISTORY

Presentation: ☐ Severe ☐ Novel Lab results pending?

Date of Influenza Immunization: YYYY / MM/DD **OR** ☐ Did not receive vaccine **OR** ☐ Unknown

D) SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Description	No	Yes - Date of onset
Acute onset of symptoms		YYYY / MMM / DD	Muscle inflammation (myositis)		YYYY / MMM / DD
Acute respiratory distress syndrome (ARDS)		YYYY / MMM / DD	Myalgia (muscle pain)		YYYY / MMM / DD
Arthralgia		YYYY / MMM / DD	Nasal congestion		YYYY / MMM / DD
Bronchiolitis		YYYY / MMM / DD	Neurologic - delerium		YYYY / MMM / DD
Cardiac - myocarditis		YYYY / MMM / DD	Otitis media		YYYY / MMM / DD
Chills		YYYY / MMM / DD	Pain - abdominal		YYYY / MMM / DD
Coryza or rhinitis		YYYY / MMM / DD	Pharyngitis (sore throat)		YYYY / MMM / DD
Cough		YYYY / MMM / DD	Pneumonia - CXR/CT		YYYY / MMM / DD
Croup (laryngotracheobronchitis)		YYYY / MMM / DD	Prostration		YYYY / MMM / DD
Dyspnea (shortness of breath)		YYYY / MMM / DD	Respiratory compromise		YYYY / MMM / DD
Encephalitis		YYYY / MMM / DD	Respiratory failure - requiring mechanical ventilation		YYYY / MMM / DD
Fever		YYYY / MMM / DD	Reye's syndrome		YYYY / MMM / DD
Gastrointestinal symptoms		YYYY / MMM / DD	Seizures		YYYY / MMM / DD
Headache		YYYY / MMM / DD	Sinusitis		YYYY / MMM / DD
Malaise		YYYY / MMM / DD			YYYY / MMM / DD

Government of Saskatchewan

Severe Influenza Notification Form

PANORAMA

E) RISK FACTORS

DESCRIPTION	Yes Start date if applicable	N, NA, U	Add'l Info
Access to healthcare services > 4 hours by road			
Chronic Medical Condition - Cardiac Disease			
Chronic Medical Condition - Diabetes Mellitus			
Chronic Medical Condition - Lung Disease			
Chronic Medical Condition - Malignancies/Cancer			
Chronic Medical Condition - Morbid Obesity			
Chronic Medical Condition - Neurological conditions that impede the clearance of respiratory/oral secretions			
Chronic Medical Condition - Other (add'l info)			
Chronic Medical Condition - Renal Disease			
Contact to a known case (add'l info)	YYYY / MM/DD		
Exposure - Second hand smoke			
Immunocompromised - Related to underlying disease or treatment			
Immunocompromised - Transplant Candidate or Recipient - Solid Organ/Tissue			
Setting - Crowded living conditions (>1 person per room excluding bathrooms)			
Special Population - Attends childcare			
Special Population - Homeless			
Special Population - Lives in a communal setting			
Special Population - LTC Facility			
Special Population - Pregnancy			
Special Population - Self-reported Indigenous identity			
Substance Use - Alcohol			
Substance Use - Injection drug use (including steroids)+			
Substance Use - Tobacco			
Travel - Outside of Canada (Add'l Info)	YYYY / MM/DD		
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)	YYYY / MM/DD		

F) OUTCOMES (For hospitalization and ICU, please include admission date; for intubation/ventilation, please use date initiated.)

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

How was Influenza Related to Cause of Death: (if Fatal was selected) _____

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

PLEASE FAX TO THE PUBLIC HEALTH OFFICE:

CONFIDENTIAL FAX #: _____ THANK YOU.

Government of Saskatchewan

Influenza Data Collection Worksheet

Please complete the following sections:

Severe - intensive medical care - **Sections D, F, G, and I;**

Novel - **Sections D, E, F, H, I, J, K and L;**

PANORAMA

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

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

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

Disease Summary Classification: CASE	**Date**	***Classification: CONTACT***	***Date***	***LAB TEST INFORMATION:***
☐ Confirmed	YYYY / MM / DD	☐ *Contact*	*YYYY / MM / DD*	*Date specimen collected:*
☐ Does Not Meet Case Definition	YYYY / MM / DD	☐ *Not a Contact*	*YYYY / MM / DD*	*YYYY / MM / DD*
☐ Person Under Investigation	YYYY / MM / DD	☐ *Person Under Investigation*	*YYYY / MM / DD*	*Specimen type:*
☐ Probable	YYYY / MM / DD			☐ *Nasopharyngeal* ☐ *Swab*

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_____

C) DISEASE EVENT HISTORY

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

Site / Presentation:	☐ Severe - intensive medical care	**Complete sections D, F, G, and I for Severe Cases;**
	☐ Novel	**Complete sections D, E, F, H, I, J, K and L;**
	☐ Other	

Influenza Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

D) SIGNS & SYMPTOMS

INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Description	No	Yes - Date of onset
Acute onset of symptoms		YYYY / MMM / DD	Muscle inflammation (myositis)		YYYY / MMM / DD
Acute respiratory distress syndrome (ARDS)		YYYY / MMM / DD	Myalgia (muscle pain)		YYYY / MMM / DD
Arthralgia		YYYY / MMM / DD	Nasal congestion		YYYY / MMM / DD
Bronchiolitis		YYYY / MMM / DD	Neurologic - delerium		YYYY / MMM / DD
Cardiac - myocarditis		YYYY / MMM / DD	Otitis media		YYYY / MMM / DD
Chills		YYYY / MMM / DD	Pain - abdominal		YYYY / MMM / DD
Coryza or rhinitis		YYYY / MMM / DD	Pharyngitis (sore throat)		YYYY / MMM / DD
Cough		YYYY / MMM / DD	Pneumonia - CXR/CT		YYYY / MMM / DD
Croup (laryngotracheobronchitis)		YYYY / MMM / DD	Prostration		YYYY / MMM / DD
Dyspnea (shortness of breath)		YYYY / MMM / DD	Respiratory compromise		YYYY / MMM / DD
Encephalitis		YYYY / MMM / DD	Respiratory failure - requiring mechanical ventilation		YYYY / MMM / DD
Fever		YYYY / MMM / DD	Reye's syndrome		YYYY / MMM / DD
Gastrointestinal symptoms		YYYY / MMM / DD	Seizures		YYYY / MMM / DD
Headache		YYYY / MMM / DD	Sinusitis		YYYY / MMM / DD
Malaise		YYYY / MMM / DD			YYYY / MMM / DD

E) INCUBATION AND COMMUNICABILITY FOR NOVEL INFLUENZA ONLY

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case (period for acquisition):
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date**: YYYY / MM / DD

Exposure Calculation details:

Communicability for Case (period for transmission):
Earliest Possible Communicability Date: YYYY / MM / DD **Latest Possible Communicability Date**: YYYY / MM / DD

Communicability Calculation Details:

F) RISK FACTORS FOR NOVEL AND SEVERE INFLIUENZA ONLY

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Start date Yes	N, NA, U	Add'l Info
Access to healthcare services > 4 hours by road			
Chronic Medical Condition - Cardiac Disease+			
Chronic Medical Condition - Diabetes Mellitus+			
Chronic Medical Condition - Lung Disease+			
Chronic Medical Condition - Malignancies/Cancer+			
Chronic Medical Condition - Morbid Obesity			
Chronic Medical Condition - Neurological conditions that impede the clearance of respiratory/oral secretions+			
Chronic Medical Condition - Other (add'l info)			
Chronic Medical Condition - Renal Disease+			
Contact to a known case (add'l info)	YYYY / MM/DD		
Exposure - Second hand smoke			
Immunocompromised - Related to underlying disease or treatment			
Immunocompromised - Transplant Candidate or Recipient - Solid Organ/Tissue+			
Setting - Crowded living conditions (>1 person per room excluding bathrooms)			

Influenza Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

DESCRIPTION	Start date Yes	N, NA, U	Add'l Info
Special Population - Attends childcare			
Special Population - Homeless+			
Special Population - Lives in a communal setting			
Special Population - LTC Facility+			
Special Population - Pregnancy			
Special Population - Self-reported Indigenous identity			
Substance Use - Alcohol			
Substance Use - Injection drug use (including steroids)+			
Substance Use - Tobacco			
Travel - Outside of Canada (Add'l Info)	YYYY / MM/DD AE		
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)	YYYY / MM/DD AE		

G) IMMUNIZATION HISTORY INTERPRETATION SUMMARY

LHN -> INVESTIGATION-> IMMUNIZATION HISTORY INTERPRETATION SUMMARY

Interpretation Date: YYYY / MM / DD

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

☐ Disease Case – Unimmunized ☐ Disease Case - Unclear immunization history **Valid doses received**: _____

Reason:

☐ Interpretation of history by investigator

H) INTERVENTION

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

Intervention Type and Sub Type:

Assessment:
☐ Assessed for contacts YYYY / MM / DD
Investigator name

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

Communication:
☐ Other communication (see Investigator Notes) YYYY / MM / DD
Investigator name
☐ Letter (See Document Management) YYYY / MM / DD
Investigator name

Other Investigation Findings:
☐ Investigator Notes YYYY / MM / DD
☐ See document management YYYY / MM / DD

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Quarantine:
☐ Quarantine YYYY / MM / DD
Investigator name

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

Testing:
☐ Lab testing recommended YYYY / MM / DD
Investigator name

Exclusion: Investigator name
☐ Work YYYY / MM / DD ☐ Preschool YYYY / MM / DD
☐ School YYYY / MM / DD ☐ Daycare YYYY / MM / DD

Referral:
☐ Consultation with MHO Investigator name YYYY / MM / DD
☐ Primary Care Provider Investigator name YYYY / MM / DD
☐ Infection prevention and Control Investigator name YYYY / MM / DD

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

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	

Influenza Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

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 (required)

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
☐ ER Visit YYYY / MM / DD ☐ Other _____ YYYY / MM / DD
☐ Fatal YYYY / MM / DD Cause of Death: (if Fatal was selected) _____

J) Acquisition Event

LHN-> INVESTIGATION-> EXPOSURE SUMMARY-> ACQUISITION EVENT SUMMARY -> QUICK ENTRY

Acquisition Event ID:_____

Exposure Name: _____

Acquisition Start YYYY / MM / DD to **Acquisition End:** YYYY / MM / DD

Location Name: _____

Setting Type

☐ Travel ☐ Health care setting ☐ Public facilities ☐ Recreational facilities ☐ Most likely source

K) Transmission Events

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Transmission Event ID	Exposure Name	Setting type (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	Date/Time	# of contacts
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities	YYYY / MM / DD to YYYY / MM / DD	
	influenza Contacts – Inv ID# _____	☐ Multiple Settings	YYYY / MM / DD to YYYY / MM / DD	

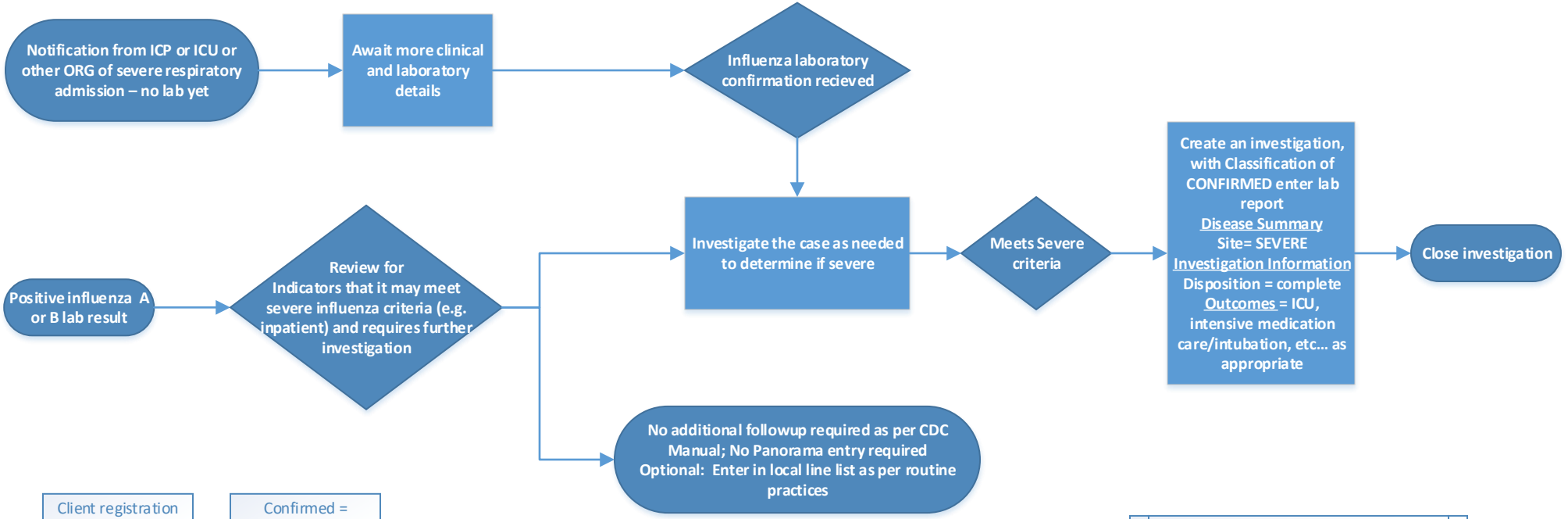
L) TOTAL NUMBER OF CONTACTS

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> TE HYPERLINK -> UNKNOWN/ANONYMOUS CONTACTS

Anonymous contacts:_____ (total number of individuals [including groups that 1:1 follow-up is not required or is not feasible])

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

Attachment - Severe Influenza in Panorama 2018-19 Influenza Season – DRAFT Following Discussion IOM Key User Group Oct 24, 2018



Public Health Follow-up Timeline:

Within 24 hours.

Public Health Purpose for Contact Investigation of Novel Influenza of HPAI Source

- Human illness following exposure to HPAI is uncommon and the risk for a pandemic strain of novel influenza is heightened if human-to-human transmission occurs. The public health purpose for contact follow-up is therefore conducted to:
  - To prevent further spread of novel influenza A viruses associated with HPAI if there are infected persons in Saskatchewan/Canada.
  - To understand human to human transmission risks of HPAI novel influenza.
  - To monitor the impact of antivirals or other therapeutics.
  - To provide an early warning mechanism in order that available control measures may be implemented at the appropriate time to minimize transmission.
  - To track epidemiology trends of novel influenza in Saskatchewan including risk factors and distribution; and
  - To inform the public and medical community about novel influenza.

Table 1. Contact Definition:

Close contacts are defined as persons within approximately 2 meters (6 feet) or within the room or care area of a confirmed or probable novel influenza A case-patient for a prolonged period of time (e.g. 15 minutes), or who had direct contact with infectious secretions while the case-patient was likely to be infectious (beginning 1 day prior to illness onset and continuing until resolution of illness). See Table 2 for Exposure Risk stratifications.

Table 2. Exposure Risk Groups (US Center for Disease Prevention and Control, March 2022)

High exposure risk groups	• Household or close family member contacts with unprotected, prolonged close contact to a confirmed or probable case.

Moderate exposure risk group	• Health care personnel with unprotected close contact with a confirmed or probable case; or • Non-household members with prolonged unprotected close contact with a confirmed or probable case outside of a healthcare facility.
Low exposure risk groups	• Others who have had social contact of a short duration with a confirmed or probable case in a non-hospital setting (e.g., in a community or workplace environment)[4]

Public Health Management of Contacts

Education

- Contacts of cases should be informed of their exposure (potential or actual). For example, letters can be sent to group setting where cases attended to inform them of the exposure, symptom monitoring and when to seek medical attention.
- Explain signs and symptoms and required monitoring expectations, risk mitigation measures and to isolate if they develop any symptoms and contact public health for further direction.

Exclusion

- Self-isolate as quickly as possible should symptoms develop, and contact the local public health office for further direction.
- Contacts who remain asymptomatic can be permitted to continue routine daily activities (e.g., go to work, school).
- High- or moderate-risk exposures should avoid contact with high-risk settings and vulnerable people during their monitoring period if possible.

Monitoring

- All close contacts should self-monitor for 10 days following their last exposure to an individual with confirmed or probable infection with novel influenza of highly pathogenic avian influenza source. This include daily assessment of:
    - Temperature recording
    - Presence of symptoms
- Individuals should be advised to avoid fever-reducing medications (acetaminophen, ibuprofen and ASA) that may mask early symptoms.
- Individuals with symptoms should be managed as a case and should be isolated at home except to seek medical care and advised to avoid contact with other persons until their illness is resolved.

Testing

- Symptomatic close contacts with any illness symptoms (an elevated temperature, or new respiratory symptoms [cough, sore throat, shortness of breath, difficulty breathing]) should be promptly tested for novel influenza A virus infection.
- It is recommended that multiple clinical specimens are collected (Heymann, 2022).
    - Ensure the lab is notified if an individual is being tested because they are suspected of avian influenza so additional biosafety precautions can be implemented as necessary. The lab will expedite typing in the event of positive results.

Chemoprophylaxis

Table 3. Recommendations for Antiviral Chemoprophylaxis of Asymptomatic Close Contacts to Human case of HPAI (US Center for Disease Prevention and Control, March 2022)

Level of Risk	Definition	Recommendation
Highest Risk exposure group (recognized risk of transmission)	• See **Table 2**	Oral oseltamivir or inhaled zanamivir chemoprophylaxis should be provided to close contacts of a confirmed or probable novel influenza A case-patient according to risk of exposure. **Chemoprophylaxis should be administered** as soon as possible (within 48 hours) after the first exposure. Dosing is one dose ***twice*** daily.
Moderate Risk exposure group (unknown risk of transmission)	• See **Table 2**	**Chemoprophylaxis may be considered**.
Low Risk Exposure groups (transmission unlikely)	• See **Table 2**	**Chemoprophylaxis is not routinely recommended.**

Decisions to initiate antiviral chemoprophylaxis for persons in moderate- and low-risk exposure groups should be based on clinical judgment, with consideration given to the type of exposure and to whether the close contact is at higher risk for complications from influenza.

- If post-exposure antiviral chemoprophylaxis is initiated
    - It should begin as soon as possible (within 48 hours) after the first exposure to the confirmed or probable case;
    - The dosing and frequency aligns with the treatment dosing for the neuraminidase inhibitors oseltamivir or zanamivir (i.e. one dose twice daily) is recommended in these instances instead of the typical antiviral chemoprophylaxis regimen (once daily) (US CDC, 2022).

- The course of Antiviral use should be continued for 5 or 10 days (5 days for a time-limited exposure and 10 days for ongoing exposures).

Antivirals for early treatment

- Refer to Section 2-60 – Influenza for recommendations and considerations for antiviral treatment.

Immunization

- Review immunization history for contacts. Offer seasonal influenza vaccination for individuals that have not already been vaccinated.

Revisions

Date	Change
December 27, 2022	New

References

BCCDC (2015). Communicable Disease Control Reportable Zoonoses Guideline. Retrieved April 2022 from http://www.bccdc.ca/Documents/CompleteReportableZoonosesGuidelineFinalVers%20August%202019.pdf

US Center for Disease Control and Prevention (March 24, 2022). Interim guidance on influenza antiviral chemoprophylaxis of persons exposed to birds with avian influenza A viruses associated with severe human disease or with the potential to cause severe human disease. Retrieved April 6, 2022 from https://www.cdc.gov/flu/avianflu/guidance-exposed-persons.htm

Respiratory and Direct Contact

Legionellosis

Notification Timeline:

From Lab/Practitioner to Public Health: Within 48 hours.
From Public Health to Ministry of Health: Within 3 days.
Immediate if outbreak is suspected or if single nosocomial or occupational case.

Public Health Follow-up Timeline: Initiate within 24 to 48 hours.

Information

Case Definition (Public Health Agency of Canada, May 2008)

Table 1. National Case Definition for Legionellosis	
Confirmed Case	Clinical illness* with laboratory confirmation of infection: • isolation of *Legionella* species or detection of the antigen from respiratory secretions, lung tissue, pleural fluid or other normally sterile fluids **OR** • a significant (e.g., fourfold or greater) rise in *Legionella* species IgG titre between acute and convalescent sera **OR** • IgG titre > 1:128 against *Legionella* species **OR** • demonstration of *L. pneumophila* antigen in urine
Probable Case	Clinical illness* with demonstration of *Legionella* species DNA.
*Legionellosis comprises two distinct illnesses: Legionnaires' disease, characterized by fever, myalgia, cough and pneumonia, and Pontiac fever, a milder illness without pneumonia.	

Causative Agent
Some species of *Legionella*, a genus of Gram-negative bacilli. Over 35 species have been described, but most cases of legionellosis are caused by *L. pneumophila* serogroup 1.

Symptoms
Legionellosis is an acute bacterial infection and there are two manifestations recognized: Legionnaire's disease and Pontiac fever.

Initial Symptoms for both Manifestations	Pontiac Fever[1]	Legionnaire's Disease
• Fever and chills. Temperatures can reach 39°C-40.5°C. • Myalgia. • Anorexia. • Malaise. • Headache. • Nonproductive cough, abdominal pain and diarrhea may also be present.	• No pneumonia or multi system involvement. • Patients generally recover in two to five days without treatment.	• Chest x-ray is usually consistent with pneumonia. • May progress to multi-system failure with confusion, disorientation, increasing respiratory distress and disseminated legionellosis. • Death may occur especially in persons with pre existing medical conditions or a depressed immune system.

Incubation Period

- Legionnaire's disease 2-10 days usually 5-6 days.
- Pontiac fever 5-66 hours, usually 24-48 hours.

Reservoir/Source

The bacterium is ubiquitous in nature and is primarily aquatic. Hot water systems (i.e., showers), air conditioning cooling towers, evaporative condensers, humidifiers, whirlpool spas, respiratory therapy devices and decorative fountains have all been implicated in causing disease and outbreaks.

[1] Believed to be caused by a reaction to inhaled antigen rather than bacterial invasion. Pontiac fever has only been recognized during outbreaks.

The bacteria have been isolated from water found in the previously mentioned areas as well as from water in taps, hot tubs, and from creeks, ponds and the soil of their banks. It has been known to survive for months in tap and distilled water. The organism can survive for years in water at 2°C to 8°C and is resistant to usual levels of chlorination (Mandell, 2000).

Mode of Transmission
It is most commonly associated with water-droplet transmission from cooling towers. *Legionella* are transmitted directly from the environment to humans with the most common source thought to be aerosolization of water containing *L. pneumophila*.

Risk Groups/Risk Factors
Illness occurs most frequently with increasing age (most cases are at least 50 years of age), especially in persons who smoke and in those:

- with diabetes mellitus;
- with chronic lung disease;
- that require intubation;
- with renal diseases or;
- with malignancy and;
- who are immunocompromised especially solid organ transplant recipients.

The disease is rare in those under 10 years of age; however, nosocomial infection in neonates has been reported. Several outbreaks have occurred among hospitalized patients. Unrecognized infections are common (Alberta Health and Wellness, 2007).

Period of Communicability
Person to person transmission of these bacteria has not been documented.

Specimen Collection and Transport

- Urine for *L. pneumophila* serogroup 1 antigen in a sterile specimen container.
- Bronchoalveolar lavage (BAL).
- Urine and BAL should be refrigerated during transport.
- Blood for serology in a plain tube (red top).

Methods of Control/Role of Investigator

Prevention and Education

- All devices and equipment that contain, produce, or distribute water or water aerosols must be properly maintained. This may involve draining systems that are not in use, mechanically cleaning systems to remove scale and sediment, and using biocides to limit the growth of *Legionella* (Heymann, 2008).
- Environmental sampling and routine surveillance for this organism is not recommended due to the ubiquitous nature of the organism, the multiplicity of potential sources in the environment, likely recolonization of environmental sources, and the frequency of environmental bacteria in the absence of clinical disease.
- Bacteria can normally be found in the environment with the absence of clinical illness (Alberta Health and Wellness, 2007).

Management

I. Case

History

Source of infection

Inquire about:

- possible exposures to air conditioners, humidifiers, etc., where they work or live;
- presence of other people with similar symptoms to determine if a common source exposure is present.

With the identification of a single laboratory-confirmed case in a health care facility initiate an investigation. This is especially important in facilities serving highly susceptible, immunocompromised patients.

For outbreaks in any other facility, search for:

- common exposures amongst cases;
- common possible environmental source(s) of infection.

Treatment/Supportive Therapy

Cases with Pontiac fever generally recover spontaneously in two to five days without treatment.

- Antibiotics:
  Treatment choices are governed by the most recent guidelines. The public health practitioner should direct any questions regarding the current treatment protocols to the physician or Medical Health Officer. See Appendix H - Sources for Clinical Treatment Guidelines.

Heymann (2008, p. 339) indicates the following:

- "The recommended treatment for Legionnaire's disease is either a respiratory fluoroquinolone, such as levofloxacin, or a newer marcrolide (azithromycin). Observational studies suggest that levofloxacin may be more effective than macrolides, especially in severe cases. Rifampicin has been used as an adjunct in patients failing standard therapy, but data to support this approach are lacking. Penicillin, the cephalosporins and the aminoglycosides are ineffective."

Exclusion
None.

Immunization
Not applicable.

Referrals
Infection control should be notified if the case occurs in a health care facility (acute or long-term).

II. Contacts/Contact Investigation

- Inquire about additional cases in household or school/business setting to determine if a common environmental source exists.
- Quarantine and immunization of contacts are not applicable.

III. Environment

Environmental prevention and control measures (e.g., cleaning, maintenance, decontamination, superheating, superchlorination, etc.) should be referred to the Public Health Inspector Manager/Environmental Health Officer and will likely require engineering expertise.

Infection Control Measures
Routine/Standard precautions are recommended.

Epidemic Measures

- In epidemic situation, investigation of common exposures and possible environmental sources of infection is required.
- Decontamination of implicated sources may be necessary and expert advice may be required.
- Culturing from environmental sources should only be considered once cases have been confirmed.

References

Alberta Health and Wellness. (2007). *Public health notifiable disease management guidelines*: *Legionellosis* Retrieved February, 2011 from http://www.health.alberta.ca/professionals/notifiable-diseases-guide.html.

American Academy of Pediatrics. (2009). *Red book: 2009 Report of the Committee on Infectious Diseases* (28th ed.). Elk Grove Village, IL: Author.

Anti-Infective Review Panel. (2001). *Anti-infective guidelines for community-acquired infections*. Toronto, Canada: MUMS Guideline Clearinghouse.

Centers for Disease Control and Prevention. (2006). *CDC yellow book: Health information for international traveller.* Atlanta, GA: Elsevier Publishing.

Health Canada. (2002). Infection control guidelines: Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR)*, *28S1*, March 2002. Retrieved February, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Health Canada. (2001). Construction-related nosocomial infections in patients in health care facilities: Decreasing the risk of *Aspergillus*, *Legionella* and other infections. *Canada Communicable Disease Report (CCDR*), *27S2:1-42*, July 2001. Retrieved February, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/01pdf/27s2e.pdf.

Health Canada. (1999). Infection control guidelines: Routine practices and additional precautions for preventing the transmission if infection in health care. *Canada Communicable Disease Report (CCDR), 25S4,* July 1999. Retrieved February, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

Last, J. M., & Wallace, R. R. (1992). *Public health and preventive medicine* (13th ed.). Norwalk, CT: Appleton and Lange.

Mandell, G. L., Bennett, J. E., & Dolin, R. (Eds.). (2000). *Mandell, Douglas, and Bennett's principles and practice of infectious diseases* (5th ed.). Philadelphia, PA: Churchill Livingstone.

Manitoba Health. (2001). *Communicable disease management protocols: Legionellosis.* Retrieved February, 2011 from http://www.gov.mb.ca/health/publichealth/cdc/protocol/index.html.

Public Health Agency of Canada. (2006). *Canadian immunization guide* (7th ed.). Ottawa, Canada: Public Works and Government Services Canada.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR*), *35S2*, November 2009. Retrieved February, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Legion-eng.php.

Government of Saskatchewan

Legionellosis Data Collection Worksheet

PANORAMA

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

LHN-> SUBJECT SUMMARY-> ENTERIC ENCOUNTER GROUP ->CREATE INVESTIGATION

Disease Summary Classification: CASE	**Date**	**Classification: CONTACT**	**Date**	**LAB TEST INFORMATION:**
☐ Confirmed	YYYY / MM / DD	☐ Contact	YYYY / MM / DD	Date specimen collected: YYYY / MM / DD
☐ Does Not Meet Case Definition	YYYY / MM / DD	☐ Not a Contact	YYYY / MM / DD	Specimen type: ☐ Blood ☐ Urine ☐ Respiratory Secretions
☐ Person Under Investigation	YYYY / MM / DD	☐ Person Under Investigation	YYYY / MM / DD	
☐ Probable	YYYY / MM / DD			

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_____

C) DISEASE EVENT HISTORY

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

Site Description: ☐ Legionnaires' disease ☐ Pontiac fever ☐ Other

Legionellosis Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

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
Loss of appetite (anorexia)		YYYY / MMM / DD	Headache		YYYY / MMM / DD
Chills		YYYY / MMM / DD	Malaise		YYYY / MMM / DD
Confusion			**Myalgia (muscle pain)**		
Cough		YYYY / MMM / DD	Pain - abdominal		YYYY / MMM / DD
Diarrhea		YYYY / MMM / DD	**Pneumonia**		YYYY / MMM / DD
Fever		YYYY / MMM / DD	Respiratory distress		YYYY / MMM / DD

E) INCUBATION AND COMMUNICABILITY

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case(period for acquisition):
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date**: YYYY / MM / DD

Exposure Calculation details:

F) RISK FACTORS N—No, NA–Not asked, U–Unknown

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes Start date	N, NA, U	Add'l Info
Chronic Medical Condition - Malignancies/Cancer+			
Immunocompromised - Related to underlying disease or treatment			
Immunocompromised - Transplant Candidate or Recipient - Solid Organ/Tissue+			
Travel - Outside of within Canada (Add'l Info)	YYYY / MM/DD AE		
Travel - Outside of Saskatchewan, but within Canada (add'l info)	YYYY / MM/DD AE		
Water - Aerosol - Air conditioning unit	YYYY / MM/DD		
Water - Aerosol - Other (add'l info)	YYYY / MM/DD		
Water - Aerosol - Room/central humidifier	YYYY / MM/DD		
Water - Aerosol - Shower head	YYYY / MM/DD		

G) TREATMENT

LHN-> INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication *(Panorama = Other Meds) :* _____

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

H) INTERVENTION

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

Intervention Type and Sub Type:

Assessment: Investigator name
☐ Assessed for contacts YYYY / MM / DD
(individuals exposed to same source)

Immunization: Investigator name
☐ Eligible immunizations recommended YYYY / MM / DD

Communication:
☐ Other communication (See Investigator Notes) YYYY / MM / DD
Investigator name
☐ Letter (See Document Management) YYYY / MM / DD
Investigator name

Referral:
☐ Infection Prevention and Control YYYY / MM / DD
Investigator name
☐ Consultation with MHO YYYY / MM / DD
Investigator name

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Other Investigation Findings:
☐ Investigator Notes
☐ Document Management Notes

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

Legionellosis Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

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	

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 ☐ Other YYYY / MM / DD
☐ Fatal YYYY / MM / DD ☐ Unknown _____

Cause of Death: (if Fatal was selected) _____

J) EXPOSURES

Acquisition Event

LHN-> INVESTIGATION-> EXPOSURE SUMMARY-> ACQUISITION QUICK ENTRY

Acquisition Event ID:_____

Exposure Name: _____

Acquisition Start YYYY / MM / DD to **Acquisition End:** YYYY / MM / DD

Location Name: _____

Setting Type

☐ Travel ☐ Exposure or consumption of potentially contaminated food or water ☐ Most likely source

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

Respiratory and Direct Contact

Leprosy (Hansen's Disease)

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 hours.

Information

Case Definition (Public Health Agency of Canada, May 2008)

Table 1. National Surveillance Case Definition for Leprosy (Hansen's Disease)	
Confirmed Case	Clinical evidence of illness (see symptoms) with laboratory confirmation: • positive acid fast stain with typical morphology for *Mycobacterium leprae* **OR** • histopathological report from skin or nerve biopsy compatible with leprosy
Probable Case	Clinical illness (see symptoms) in a person who is epidemiologically linked to a confirmed case

Causative Agent
Mycobacterium leprae.

Symptoms (Public Health Agency of Canada, May 2008)
Tuberculoid or paucibacillary disease: one or a few well-demarcated, hypopigmented and anesthetic skin lesions, frequently with active, spreading edges and a clearing centre; peripheral nerve swelling or thickening may also occur.

Lepromatous or multibacillary disease: erythematous papules and nodules or an infiltration of the face, hands and feet with lesions in a bilateral and symmetrical distribution that progress to thickening of the skin and loss of normal hair distribution, particularly on the face (madarosis).

Borderline (dimorphous): skin lesions characteristic of both the tuberculoid and lepromatous forms.

Indeterminate: early lesions, usually hypopigmented macules, without developed tuberculoid or lepromatous features.

Incubation Period
9 months to 20 years. Tuberculoid is an average of 4 years, and 8 years for the lepromatous form. Rarely seen in children under 3 years.

Reservoir/Source
Humans are the reservoir of proven significance however it has been shown that the armadillo, mangabey monkey and chimpanzee can be infected.

Mode of Transmission
Transmission is person to person with nasal secretions, normally containing the highest bacterial load, often causing infection when spread to the skin or respiratory tract of another. Close contact is necessary for transmission. Untreated multibacillary leprosy (high levels of bacillus) has been proven to be the major source of human transmission.

Risk Groups/Risk Factors
- Leprosy is a disease of poverty.
- Approximately 95% of people are genetically immune to infection with *M. leprae.*
- HIV clients are not at increased risk of becoming infected.

Period of Communicability
Clinical and laboratory evidence suggest that infectiousness is lost in most instances within a day of beginning treatment with multidrug therapy (Heymann, 2008).

Specimen Collection and Transport
For specimen collection instructions, consult with Saskatchewan Disease Control Laboratory (SDCL) Medical Director at (306) 787-8636.

Methods of Control/Role of Investigator

Prevention and Education
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.

- The best preventive measure is early diagnosis and treatment of cases.
- Health education should stress the importance of effective multi-drug therapy, the non-infectivity of persons under continuous treatment and the importance of completing therapy.

Management

I. Case

History

- No public health interventions are required; communicability is low, particularly after initiation of treatment.
- Persons with leprosy require medical follow-up from an infectious diseases specialist.
- Manage infectious persons with routine infection control precautions. Handwashing is the most effective measure to prevent transmission when caring for patients.
- Hospitalization is reserved only for managing reactions, surgical correction of deformities and the treatment of ulcers resulting from the anesthesia of the extremities.

Treatment/Supportive Therapy

- Consultation with an infectious disease specialist, internist, dermatologist or pediatrician is recommended. See Appendix H - Sources for Clinical Treatment Guidelines.
  - Multi-drug chemotherapy is necessary for all patients. There is widespread prevalence of dapsone resistance, and the emerging resistance to rifampin.

Exclusion:

No restrictions in employment or attendance at school are indicated for persons whose disease is regarded as non-infectious.

II. Contacts/Contact Investigation

Household and other close contacts should be examined initially, and then annually for at least 5 years. Consult specialist.

- Manage infectious persons with routine infection control precautions. Handwashing is the most effective measure to prevent transmission when caring for patients.
- Chemoprophylaxis is not recommended.

III. Environment

Isolation of cases and quarantine of individuals is not necessary and often leads to stigmatization. No restrictions for employment or school are indicated.

Epidemic Measures

Not applicable.

References

Alberta Health and Wellness. (2005). *Public health notifiable disease management guidelines*: *Leprosy.* Retrieved February, 2011 from http://www.health.alberta.ca/professionals/notifiable-diseases-guide.html.

American Academy of Pediatrics. (2009). *Red book: 2009 Report of the Committee on Infectious Diseases* (28th ed.). Elk Grove Village, IL: Author.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

Last, J. M., & Wallace, R. R. (1992). *Public health and preventive medicine* (13th ed.). Norwalk, CT: Appleton and Lange.

Manitoba Health. (2001). *Communicable disease management protocol manual: Leprosy.* Retrieved February, 2011 from http://www.gov.mb.ca/health/publichealth/cdc/protocol/index.html.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR), 35S2,* November 2009. Retrieved February, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Lepr-eng.php.

Government of Saskatchewan

Leprosy Data Collection Worksheet

Please complete **all** sections.

PANORAMA

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

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) IMMIGRATION INFORMATION

SUBJECT -> CLIENT DETAILS -> PERSONAL INFORMATION->IMMIGRATION INFORMATION

Country Born in: _____
Country Emigrated from: _____ Arrival Date: YYYY / MMM / DD OR Arrival Year_____

C) INVESTIGATION INFORMATION

LHN-> SUBJECT SUMMARY-> ZOONOTIC & VECTORBORNE GROUP->CREATE INVESTIGATION

Disease Summary Classification: CASE	**Date**	***Classification: CONTACT***	***Date***	***LAB TEST INFORMATION:***
☐ Confirmed	YYYY / MM / DD	☐ *Contact*	YYYY / MM / DD	*Date specimen collected:*
☐ Does Not Meet Case	YYYY / MM / DD	☐ *Not a Contact*	YYYY / MM / DD	YYYY / MM / DD
☐ Person Under Investigation	YYYY / MM / DD	☐ *Person Under Investigation*	YYYY / MM / DD	
☐ Probable	YYYY / MM / DD			

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_____

Leprosy Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

D) DISEASE EVENT HISTORY

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

Site / Presentation: ☐Lepromatous ☐Tuberculoid ☐Borderline ☐Other ☐Unknown

E) SIGNS & SYMPTOMS

LHN-> INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Description	No	Yes - Date of onset
Alopecia (loss of normal hair distribution)		YYYY / MMM / DD	Rash - papules - erythematous		YYYY / MMM / DD
Bleeding - nose (epistaxis)		YYYY / MMM / DD	Skin - infiltrative disorders		YYYY / MMM / DD
Iritis (inflammation of the iris)		YYYY / MMM / DD	Skin - lesions - hypopigmented and anaesthetic (painless)		YYYY / MMM / DD
Keratitis (inflammation of the cornea)		YYYY / MMM / DD	Skin nodules		YYYY / MMM / DD
Neurologic - peripheral nerve - swelling or thickening (neuritis)			Skin - thickening		
Neuropathy		YYYY / MMM / DD	Skin - nodules - erythematous		YYYY / MMM / DD
Rash - macules - hypopigmented		YYYY / MMM / DD			YYYY / MMM / DD
Other Signs & Symptoms if applicable					

A) RISK FACTORS (during risk period)

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	YES	N – No NA – not asked U - Unknown	DESCRIPTION	YES	N – No NA – not asked U - Unknown
Contact - Visitor from an endemic country	YYYY / MM / DD		**Travel** - Outside of Canada (Add'l Info)	YYYY / MM / DD AE	
Contact to a known case (Add'l Info)	YYYY / MM / DD		**Travel** - Outside of Saskatchewan, but within Canada (Add'l Info)	YYYY / MM / DD AE	
Special Population - From or residence in an endemic country (Add'l Info)	YYYY / MM / DD				

B) MEDICATIONS

INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication *(Panorama = Other Meds)* : _____

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

C) INTERVENTIONS

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

Intervention Type and Sub Type:

Assessment:
☐ Assessed for contacts YYYY / MM / DD
Investigator name

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

Communication:
☐ Other communication (See Investigator Notes) YYYY / MM / DD
Investigator name
☐ Letter (See Document Management) YYYY / MM / DD
Investigator name

Immunization: Investigator name
☐ Eligible Immunization recommended YYYY / MM / DD

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Other Investigation Findings:
☐ Investigator notes ☐ Document Management

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

Leprosy Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

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				

D) 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

Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.
From Public Health to Ministry of Health: Immediate.

Public Health Follow-up Timeline: Immediate.

Public Health Purpose for Notification of Measles

- To prevent transmission of measles from imported cases and further local transmission;
- To prevent mortality and serious morbidity from measles through contact tracing;
- To track epidemiology trends of measles in Saskatchewan including risk factors and distribution;
- To monitor the effectiveness of prevention and control measures;
- To make timely and evidence informed actions on outbreaks; and
- To inform the public and medical community about measles.

Surveillance Case Definition[1] (Public Health Agency of Canada, 2013)

Confirmed Case (Public Health Agency of Canada, 2013)	Laboratory confirmation of infection in the absence of recent immunization [a] with measles-containing vaccine: • isolation of measles virus from an appropriate clinical specimen [b] **OR** • detection of measles virus ribonucleic acid (RNA) (e.g. PCR) [c] **OR** • seroconversion or a significant (e.g., fourfold or greater) rise in measles immunoglobulin G (IgG) titre by any standard serologic assay between acute and convalescent sera **OR** • positive serologic test for measles immunoglobulin M (IgM) antibody using a recommended assay[d] in a person who is either epidemiologically linked to a laboratory-confirmed case or has recently travelled to an area of known measles activity. **OR** Clinical illness in a person with an epidemiologic link to a laboratory-confirmed case.

[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.

Probable Case (Public Health Agency of Canada, 2013)	Clinical illness • in the absence of appropriate laboratory tests **OR** • in the absence of an epidemiologic link to a laboratory-confirmed case **OR** • in a person who has recently travelled to an area of known measles activity.
Clinical Case (Public Health Agency of Canada, 2013)	Clinical illness is characterized by all of the following features: • fever of 38.3° C or greater; • cough, coryza or conjunctivitis; • generalized maculopapular rash for at least 3 days.
[a] The most frequent reaction to measles-mumps-rubella (MMR) immunization is malaise and fever (with or without rash) occurring 6-23 days after immunization. However, this should be determined for each case, as these reactions and the timeframe can vary (Pubic Health Agency of Canada, 2015). [b] See Specimen Collection and Transport [c] Confirmation of genotype is required in recently vaccinated individuals (within the past 6-45 days) to determine if illness is related to wild virus or vaccine-related. [d] IgM serology has the potential for false-positive findings. If the clinical presentation is inconsistent with a diagnosis of measles or in the absence of recent travel/exposure history, IgM results must be confirmed by the other listed confirmatory methods. Most acute measles cases develop IgM after 3 days post rash onset. Therefore, a suspected measles case in which serum collected ≤ 3 days after rash onset initially tests IgM negative should have a second serum specimen collected > 3 days after onset for retesting for IgM. Further strain characterization is indicated for epidemiologic, public health and control purposes.	

Refer to Specimen Collection and Transport for further details about interpretation of lab results in the context of past immunization for measles.

Epidemiology and Occurrence

Measles became reportable in Canada in 1924 (PHAC). Prior to the development of a vaccine (1924 to 1958), an average of 45,000 cases were reported annually. Through the use of vaccines, Canada eliminated measles in 1998 (PHAC, 2013), however sporadic cases and outbreaks continue as a result of importations (PHAC, 2018). To achieve herd immunity, the recommended 2-dose immunization coverage rate is ≥ 95% (PHAC, 2014). While Canada's overall coverage is high, pockets of susceptible individuals and communities remain so the risk of domestic transmission following an importation of measles remains a reality.

Saskatchewan
UNDER CONTRUCTION

Table 1. Evolution of the Measles Immunization Program in Saskatchewan

1966	Measles vaccine introduced for ages 1-3 (Lirugen - live, further attenuated)
1970	Measles vaccine extended to ages 1-7 (ATTENUVAX - live, further attenuated)
1970	Rubella vaccine for grade 7 girls. (MERUVAX and MERUVAX-II); Cendevax (rubella vaccine) used ~1970-72
1970-1975	Rubella vaccine for grade 1 students (MERUVAX)
1971	Rubella vaccine available to physicians for susceptible women at premarital exams
1979	MMR vaccine for age 1 year
1981 - 1982	Review of measles immunization for children ages 1-14, followed by program to raise coverage to > 98%
Fall 1991 to 1992	Mass MMR immunization for teen-aged boys in high schools and post-secondary institutions
Fall 1996	• Second dose Measles & Rubella (MR) added to 18 months. • Catch-up program included school entry, Grade 6 and 8.
Spring 1997	MR immunization of Grades 9-12
2001	MMR used exclusively for all 1st and 2nd doses; MR discontinued by Berna
2003 - 2004	2 dose mumps catch-up in Grade 6
2007 - 2013	2-dose mumps catch-up for eligible Grade 12 students
2008 - 2013	2-dose mumps catch-up for eligible Grade 8 students
2011 - 2013	2nd dose provided to eligible Grade 6 students
May 2013	Adult born since Jan. 1, 1970 eligible for 2 MMR doses

Saskatchewan Immunization Manual (2018)

The Roy Romanow Provincial Laboratory conducted a review of measles immunity in February 2014 to inform risk populations. Based on this review, approximately 93% of samples tested from individuals born prior to 1965 indicated immunity for measles, while approximately 83% of samples from persons born between 1965 and 1980 indicated immunity to measles. Factors to consider include age, history of exposure to measles, and availability of medical records.

Additional Background Information

Causative Agent

Measles virus, an RNA virus, a member of the family paramyxovirus, genus *Morbillivirus*.

Symptoms

Measles is an acute, highly communicable disease with a prodrome that lasts two to four days (range one to seven days). The prodrome is characterized by fever followed by conjunctivitis, coryza, or cough.

- Koplik spots on the buccal mucosa are considered pathognomic for measles. They occur one to two days before the rash.
- A characteristic red maculo-papular rash appears on the third to seventh day beginning behind the ears and on the face. The rash gradually spreads downwards to the trunk and then the extremities. The skin lesions are usually discrete but may become confluent.
- Fever often rises as the rash appears. The rash may last four to seven days and often fades in the same sequence as it appears.
- Symptoms are more severe in infants and they are more likely to experience complications.
- Immunocompromised individuals experience more severe disease and may have a prolonged course. These individuals may not develop the characteristic rash.
- Other symptoms of measles include anorexia, diarrhea (especially in infants), and generalized lymphadenopathy.
- Individuals who have been previously exposed to measles antigen (e.g., previously vaccinated), may have a modified clinical presentation (Centers for Disease Control and Prevention, 2018).

Complications (Heymann, 2015)

- Diarrhea (8%), otitis media (7%), pneumonia (6%), seizures (0.7%), encephalitis (0.1%), and laryngotracheobronchitis (croup).
- Very rarely, sub-acute sclerosing panencephalitis (SSPE) develops 7-10 years after infection as a late sequelae (Centers for Disease Control and Prevention, 2018).
- The case-fatality rate can be as high as 10-30% in developing countries (typically 3-5%); it is approximately 0.1-0.2% in Canada.

Reservoir

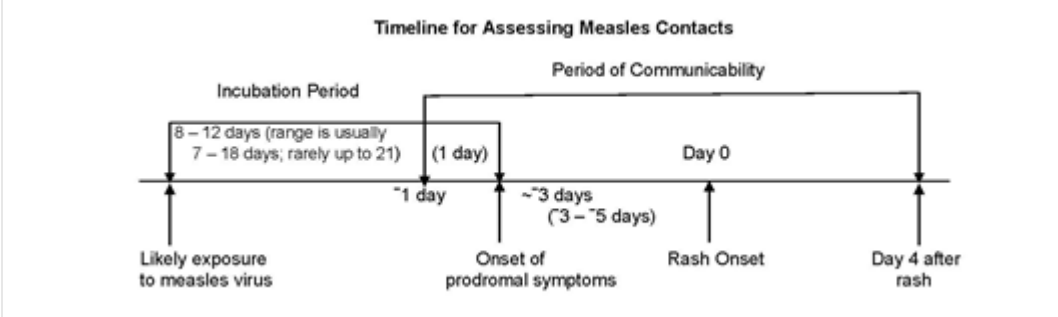
- Humans.

Incubation Period

- About 10 days (range 7 to 18 days) from exposure to onset of fever.
- Usually 14 days until rash appears (range 9 to 21 days).

Period of Communicability

- Measles is highly communicable, with greater than 90% secondary attack rates among susceptible persons.
- Cases are infectious from one day before onset of prodrome, usually about four days before onset of the rash, and continue until four days after rash onset (Heyman, 2015).
- Maximum communicability occurs from onset of prodrome through the first three to four days of rash.



(Adapted from BCCDC, 2014)

Mode of Transmission

- Large respiratory droplets.
- Airborne transmission via droplet nuclei has been documented.
- Direct person-to-person contact with the nasal or throat secretions of the infected person.
- Indirect contact with articles freshly soiled with the respiratory secretions.

Risk Factors

Risk factors are associated with individual susceptibility and settings that create opportunities for acquisition or transmission to others.

- Non-immune individuals.
- Immunocompromised individuals.
- Infants.
- Children in childcare settings.
- Child care workers.
- Health care workers (HCWs).
- Students at post-secondary institutions.
- Travellers.
- Military personnel.

- Infection during pregnancy is associated with an increased frequency of spontaneous abortion, premature labor and preterm birth and low birth weight.

Specimen Collection and Transport

Specimen collection needs to be done in coordination and consultation with public health and infection control to ensure it is completed in a that will reduce further transmission (e.g. in home collection by immune employee or arrangements with the lab for end of day collection).

When sending specimens for measles testing, laboratory requisitions should be clearly marked "suspect case of measles" to facilitate rapid testing. When an outbreak number has been assigned, the outbreak number should be included on the requisition and the transport tote should be marked that outbreak specimens are included.

Molecular isolation/detection[2] of the virus is preferred to confirm the diagnosis of suspected measles cases because of the complications in interpreting positive IgM serology in the absence of an epidemiological link to a confirmed case and the contradictory serological results in previously immunized individuals (Public Health Agency of Canada, 2013). There is no single laboratory test capable of confirming with confidence 100% of true measles cases. Therefore, to confirm the diagnosis the following specimens should be submitted to Roy Romanow Provincial Laboratory (RRPL):

- Urine, throat and nasopharyngeal secretions for isolation of measles virus (i.e. PCR):
    - Collect nasopharyngeal swab or aspirate, or a throat swab[3] as soon as possible after the onset of the rash (within four to seven[4] days). Place in viral transport medium.
    - Collect approximately 50 ml of urine within seven days after the onset of rash.
- Serum sample for measles IgM and IgG (acute and convalescent):
    - IgM response begins with onset of rash and will persist for one to two months.
    - IgG response begins about one week after the onset of rash and will persist for a lifetime.
    - Convalescent sera should be drawn 10 to 30 days after the initial serology to assess the rise in IgG titre (seroconversion).

[2] Isolation permits measles virus genotyping which provides confirmation of epidemiologic data showing measles virus transmission routes and the differentiation of wild-type from vaccine strain measles virus in cases where vaccine may be implicated in serious illness.

[3] Nasopharyngeal and throat swabs must be collected in physicians' office.

[4] Measles virus may be still detected after seven days from the onset of rash, but with rapidly decreasing sensitivity.

Negative results do not definitively rule out measles because both methods are affected by timing of specimen collection and quality of handling.

Treatment/Supportive Therapy

- There is no specific treatment available for measles.
- Supportive therapy as indicated.
- Vitamin A supplementation of children with measles has been associated with decreased morbidity and mortality rates. The World Health Organization (WHO) currently recommends vitamin A for all children with acute measles, regardless of their country of residence. Vitamin A for measles is administered once daily for two days at the following doses:
    - 200 000 IU for children 12 months of age or older;
    - 100 000 IU for children six through 11 months of age;
    - 50 000 IU for infants younger than six months of age (American Academy of Pediatrics, 2015).

Public Health Investigation

I. Single Case/Household Cluster

- All reports of probable and laboratory-confirmed measles cases should be investigated immediately. Refer to Attachment – Measles Data Collection Worksheet to assist.

History

- Determine measles immunization history including number of doses, date(s) administered,[5] and type of vaccine.
- Determine if there is an opportunity for acquisition through:
    - In the 7-21 days before the onset of rash, there was a history of travel or contact with a person who had recent travel.
    - contact with a confirmed or probable case of measles.
- Health conditions that may render the individual more susceptible to infection or alter the period of communicability (e.g. immunocompromised).

[5] Fever and rash may occur in the 6-23 days following administration of a measles-containing vaccine. The inability to rely on positive IgM serology when vaccine was administered in the 6-45 days prior to onset of rash can create challenges in confirming a diagnosis of measles. In this case, specimens for viral isolation should also be obtained (see Specimen Collection and Transport section above); if wild type measles virus is isolated, the case can be confirmed. When strain typing to confirm wild type virus is not available in these situations, the case should only be confirmed if:

i. they meet the clinical case definition, **and**
ii. they are epidemiologically linked to a laboratory-confirmed case(Centers for Disease Control and Prevention, 2013).

- Identify opportunities for transmission events and contacts exposed during the infectious period, which includes four days prior to and four days after the rash appears:
    - household;
    - daycare/school;
    - workplaces;
    - health care facilities[6] (including physicians' offices and waiting rooms).
- Identify locations, dates, times and details of any event the case has attended during the infectious period. This includes gatherings of all sizes in both public and private forums such as:
    - social or religious functions;
    - sports activities;
    - shopping excursions;
    - concerts;
    - conferences and meetings.
- Identify routes, dates, times and details of public transportation (flights, buses, taxis, etc.).
    - Obtain details about the public transportation involved (e.g., company of carrier, seating information, depots/terminals/gates involved, etc.).

Public Health Interventions

Assessment

- Assess for contacts paying particular attention to vulnerable contacts as per Table 3.

Communication

- Letters can be sent to other group settings where individual contact tracing is not required (i.e. in the same workplace, but do not share the same work schedule or location of work) to inform them of the exposure, symptom monitoring and when to seek medical attention (see Sample letter).

Education

- All cases should be provided disease information as well as information on prevention and control measures including period of communicability, to self-isolate at home (no visitors).

Exclusion and Isolation

Exclusion and isolation of cases should be implemented as outlined in Table 2.

[6] In acute care settings, Infection Control and Occupational/ Employee Health should also be involved.

Table 2. Exclusion Requirement for Confirmed, Probable, Clinical Cases and Persons Under Investigation for Measles

Context	Exclusion Requirement	Timeframe
Community Settings.	Self-isolation at home. Exclude from daycare, schools, and workplaces. Avoid exposing non-household contacts (i.e. no outside visitors)	Immediately and up to and including four days after onset of rash.
Hospitalized Settings[7] 1. Immunocompetent patients.	Airborne precautions.	Immediately and up to and including four days after onset of rash (Public Health Agency of Canada, 2013).
2. Immuncompromised patients.	Airborne precautions.	**Immediately and up to and including four days after onset of rash, or for the duration of illness because viral excretion is expected to be prolonged**[8] (Public Health Agency of Canada, 2013). Consult with Medical Microbiologist in charge of Infection Control and/or ID Specialist for an individual assessment

Immunization

- Review the immunization history. Consider potential issues with vaccines administered for cases who are fully immunized. Immunization of case is not indicated, but may be provided to offer protection against other vaccine antigens (e.g. mumps or rubella) if eligible.

Referrals

Not applicable.

[7] Refer to Health Care Facility Control Measures for further details and additional measures to be taken with cases.

[8] An immunocompromised person may shed virus for several weeks after the acute illness (CDC, 2015)

II. Contacts/Contact Investigation

Identification of contacts and contact investigation should proceed immediately and should be re-evaluated once laboratory results are available. Contact Investigation Worksheet should be used to support investigation.

Contacts should be prioritized based on individual and public health risk including:

- high risk contacts;
- employees in health care settings (direct and indirect patient care staff);
- other susceptible contacts;
- public exposures.

Table 3. Contact Definitions (Adapted from Public Health Agency of Canada, 2013)

A. Contact A contact is defined as any individual who has: • spent any length of time in a room or enclosed space with a measles case during that case's infectious period (i.e., from one day before onset of prodrome, usually about four days before onset of the rash, and continue until four days after rash onset); or • spent time in the same room as in infectious case of measles or in a room that the case vacated in the previous two hours.[9] **Individualized (person-by-person) contact investigation should include**: 1. household contacts; 2. in a daycare/educational facility – all employees, volunteers, students, bus drivers, members of a sports team or club; 3. in a workplace – individuals who share the same schedule or office location as the case; 4. in a health care facility – individuals who shared the same room, waiting room or exam room and did not use appropriate protection (i.e., N95 respirator). NOTE: This is not limited to patients in these settings but includes anyone attending appointments with the patient.
B. High Risk Contacts • Infants <1 year of age. • Pregnant women. • Immunocompromised individuals.
C. Susceptible Contacts Employees in health care and daycare settings are considered susceptible if they have: • NO laboratory evidence of immunity, AND • NO documented evidence of two doses of measles-containing vaccine (given at the appropriate interval as outlined in the Saskatchewan Immunization Manual for vaccine type [MMR or MMRV]). Non-health care/daycare workers[10], may be susceptible if they have:

[9] This would include doctors' offices, emergency departments, waiting rooms, classrooms, laboratories, locker rooms, etc. **There is no minimum duration of time for which the case must be present in the room.**

[10] Generally, individuals born before 1970 are considered immune. During outbreak situations and in consultation with the Medical Health Officer, this date may be expanded to 1965 based on the review of the RRPL data in February 2014

- NO laboratory evidence of immunity, AND
- NO documented evidence of two doses of measles-containing vaccine (given at the appropriate interval as outlined in the Saskatchewan Immunization Manual for vaccine type [MMR or MMRV]), AND
- NO history of measles disease[11].

See Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts for further assessment and management

Public Health Interventions

Assessment

Individualized (person-by-person) contact investigations (Table 3) include assessment of immunization records.

Assessment varies by setting:

Individuals in Health Care Settings Who Are Contacts

- Coordination between Public Health, Occupational/Employee Health services as well as Infection Prevention and Control for the facility involved is required so there can be a systematic approach to:
    - Review immunization records and immune status for all employees (both direct and indirect patient care staff), support exclusion requirements as necessary and monitor for suspicious cases within their facility. See Figure 4, Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts.
    - Review immunization records and immune status for all other individuals exposed (both patients and visitors), implementation of exclusion requirements as necessary and active surveillance for secondary cases. See Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts.

Individuals in Child Care Centers Who Are Contacts

- Vaccination history should be reviewed for all employees, attendees and volunteers in daycare settings and appropriate action taken as per Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts.
- Parents may also be considered as potential contacts based on their child's risk of becoming infected.

which indicated thatapproximately 93% of samples tested from individuals born prior to 1965 indicated immunity for measles, while approximately 83% of samples from persons born between 1965 and1980 indicated immunity to measles. Factors to consider include age, history of exposure to measles, and availability of medical records.

[11] Clinical judgement is required to determine if documentation is necessary.

Individuals Exposed in Public Venues

Gatherings apply to events of any size in both public and private fora. They can include (but are not limited to) social or religious functions, sports activities, shopping excursions, concerts, conferences and meetings as well as public transit.

Communication

- Person-by-person individualized investigation of contacts identified in Table 3 should include direct notification where possible.
- Identifiable contacts should, at a minimum, be provided with a letter that includes all details as outlined in education.
- When exposures involve public settings where individuals cannot be identified, news, social media as well as public websites should be used to communicate the exposure setting to the public.
    - Details to be provided in the messaging include dates and times (including two hours after the infected individual vacated the venue). Attachment – Information for People who May Have Been Exposed to Measles in a Public Facility should be used in the messaging or, at a minimum, be made available so exposed individuals have relevant information about measles and what to do if they develop symptoms.

Education

Close contacts of confirmed cases should be educated about measles and the signs and symptoms of measles. They should also be advised:

- that measles is communicable to others 4 days before the onset of the rash and until 4 days after the rash appears. They should be advised to use self-isolation (work, school, travel and other activities) as per exclusion ;
- to limit new or further exposure to other individuals; and
- to call ahead to their health care provider's office if signs and symptoms appear so arrangements can be made to see the patient in a way that reduces the chance of exposing other individuals to measles.

Refer to Attachment – Template Letter to Measles Contacts. Refer to Attachment – Infection Prevention and Control Measures in Physicians' Offices and Attachment – Infection Prevention and Control Measures for Patients Suspected or Known to be Infected with Measles for infection prevention and control measures in these settings.

Exclusion

- Exclusion of susceptible contacts that meet the criteria in Table 3 (C) is outlined in Figures 1–6, Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts.

- Exclusion may be applied in all circumstances where the contact may be exposing other individuals (this includes work or school settings, organized groups and activities and public places including public transit).
- Consideration should be given to the number of susceptible individuals in that setting; the presence of high risk individuals (e.g. susceptible infants, or immunocompromised individuals); and the reliability of the contact to adhere to public health direction regarding early recognition and self-isolation.
- When exclusion is recommended, it should apply:
    - From five days after first exposure and up to 21 days after last exposure; or
    - Until serological confirmation of immunity is provided.
- If the contact develops symptoms compatible with measles, exclusion criteria for cases should be applied.
- When Ig has been provided, extend the exclusion period to 28 days after the last exposure.

Immunoprophylaxis

- There are limited data on the effectiveness of measles vaccine or immune globulin (Ig) for the prevention of measles. The use of either of these products may provide some protection or alter the clinical course of disease when provided within the timeframes outlined in Table 1, Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts, (Centers for Disease Control and Prevention, 2018).
- Post-exposure vaccination is preferable to the use of Ig whenever feasible to prevent secondary cases. In addition, contact follow-up provides an opportunity to improve vaccination coverage in general.
- Figures 1-6 in Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts outline the appropriate immunoprophylaxis recommendations based on the age and setting of contacts based on their immunization history.

Testing

- Routine screening for immune status of susceptible contacts is not recommended. Figures 4–5, Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts outline the testing for contacts who are employees in health care settings or patients in hospital settings.
- Under certain circumstances it would be beneficial to evaluate immunity of individuals involved through immunization history or immunity serology. Figures 3-5 should be referenced if the MHO determines testing is recommended for other contacts.
- No laboratory testing for measles required if asymptomatic.
- Confirmatory testing is recommended for contacts that develop symptoms.

III. Environment

Child Care Centre/Schools Control Measures

Strict enforcement of infection control measures – refer to Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[12]

Recommendations for the facility and attendees/employees must be individualized based on the characteristics and operations of the daycare/school and the susceptibility of the population in attendance.

- The school or child care centre must report immediately to public health any person suspected of having or diagnosed with measles.
- Contact tracing must be completed. Information about staff and attendees, must be obtained as soon as possible so immunization records can be reviewed to determine their susceptibility and their need for post-exposure immunoprophylaxis (see Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts). Provide Attachment – Template Letter to Schools or Group Exposed to a Measles Case.
- Inform parents of the need for unimmunized/under immunized children to be immunized immediately.
- Contacts should be excluded as outlined in Figures 1-3 Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts.
- Individuals who attend the daycare but were not present during the exposure period (i.e. are not considered contacts) should not return to daycare until their immunizations have been brought up to date for age. However, the risks and benefits of returning to daycare need to be considered and exclusion may be indicated until transmission within the facility can be ruled out.
- Active surveillance of absent contacts should be conducted on a daily basis to determine if reason for absenteeism is related to measles. This allows public health to implement additional measures in a timely manner.
- Case finding for the source, concurrent and secondary cases should be targeted to one incubation period before (i.e. 21 days) the current case and for 21 days after the onset of rash of the last case in the setting.
- Evaluate parents and siblings of attendees to detect cases and identify susceptible individuals. Those who are susceptible should be immunized as per the Saskatchewan Immunization Manual.[13]

[12] http://www.saskatchewan.ca/live/births-deaths-marriages-and-divorces/starting-a-family/early-learning-and-child-care/child-care.

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

Health Care Facilities Control Measures

Health care workers (HCWs)[14] have an increased risk of exposure to measles and should have proof of immunity or adequate protection upon employment. See Chapter 7, Section 3.2 (Health Care Workers) of the Saskatchewan Immunization Manual[15] and other relevant Saskatchewan Ministry of Health policies/memos.

- All individuals suspected of having or diagnosed with measles must be reported immediately to the local public health office, infection control and occupational/employee health.
- Strict enforcement of infection prevention and control measures. See Attachment – Infection Prevention and Control Precautions for Patients Suspected or Known to be Infected with Measles and to the Authority's Infection Control Manual for additional details.
    - Airborne precautions in addition to Routine/Standard precautions should be taken immediately from the time measles diagnosis is being considered up to an including four days after onset of rash (Public Health Agency of Canada, 2013).
    - Immunocompromised patients should be isolated for the duration of their illness (Public Health Agency of Canada, 2013)
- Provide measles-containing vaccine to susceptible contacts (or Ig to high risk susceptible contacts) according to Figure 4–5, Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts.
- Employees in health care settings who are contacts should be managed as per Figure 4, Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts.
- Patients in health care settings who are contacts should be managed as per Figure 5, Attachment – Immunoprophylaxis and Exclusion Considerations for Contacts.
- Public Health should ensure that:
    - all susceptible contacts (Table 3), have been immunized as soon as possible;
    - no further cases of related illness have been detected (over the subsequent 21 day period).
    - If a person acquired measles while in hospital, a case finding for the source investigation should be conducted in partnership with public health and infection control.

[14] Health care workers should be considered as ALL employees in health care settings. This includes direct and indirect patient care staff.
[15] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7.pdf .

Outpatient Departments (including Lab and Radiology)/Physicians' Offices

Physicians' offices have been identified as the setting for transmission of secondary cases of measles. Strict application of infection prevention and control measures are required to reduce further transmission.

When measles is circulating in the community, contacts should be instructed to call HealthLine so the MHO/public health can provide direction for seeking medical attention in a way that reduces the risk of further transmission. In addition to staff using personal protective equipment, the following practical measures can be used[16]:

- arrange to see patients with clinical signs of measles at the end of the day;
- provide signage and procedural masks at the entrance instructing patients to don a mask before entering the facility;
- immediately take patients to a separate examination room and only allow staff who are considered immune to measles (documented serology or have been appropriately immunized) to interact with the patient;
- ensure the exam room used by the patient is not used by other patients for two hours after the patient leaves the facility (regardless if the room is cleaned by an immune employee before the 2 hour period lapses).
- Susceptible staff should be immunized as soon as possible.

IV. Epidemic Measures

- Immediate reporting (within 24 hours) of probable and clinical cases or persons under investigation for measles.
- Determine source and manner of spread.
- Determine extent of exposure and transmission.
- If there is exposure of groups like schools, health care facilities, daycare centres, etc., it may be necessary to implement a coordinated immunization program for all unimmunized and incompletely immunized individuals to limit spread. The decision for this will be made in consultation with the Medical Health Officer and Saskatchewan Ministry of Health.
    - If vaccine supply is limited, priority should be given to young children (>6 months) for whom the risk is greatest.

[16] See Attachment – Infection Prevention and Control Measures in Physicians' Offices.

- In institutional settings all individuals without adequate protection should be immunized (Heymann, 2015).
- In community-wide outbreaks, alternative measures such as broad immunization catch up programs may be considered and the date of presumed immunity expanded from 1970 to 1965.

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 children with two doses of a measles containing vaccine in accordance with the recommended schedule in the Saskatchewan Immunization Manual.[17] One dose of measles-containing vaccine given after the first birthday is 95% effective in preventing measles. Most cases of vaccine failure following one dose occur in individuals who had an inadequate immune response to the vaccine and are not related to waning immunity (American Academy of Pediatrics, 2015).
- Those born in 1970 or later who have not had two doses of measles vaccine or have not had natural measles infection should be vaccinated for measles as per the Saskatchewan Immunization Manual[18]
- Individuals who are travelling abroad should have a pre-travel consultation and be offered MMR is appropriate.

Education

- Education should be provided regarding respiratory etiquette and measures to prevent transmission.
- Educate the public about the disease and the need for active immunization for measles. Immunization information fact sheets[19] can be used to guide discussion.

[17] http://www.ehealthsask.ca/services/manuals/Pages/SIM.aspx see Chapter 5, Appendix 5.2
[18] This differs from the CDC year of presumed natural immunity of prior to 1957.
[19] http://www.ehealthsask.ca/services/manuals/Pages/SIM.aspx .

Revisions

Date	Change
May 2019	• Updated notification timeline from Lab/Practitioner to public health and from Public Health to the Ministry of Health. • Updated Public Health purpose to include prevention of local transmission. • Included reference to PCR in case definition. • Risk Factors - Added Child Care Worker; • Specimen Collection - Added footnote regarding nasopharyngeal/throat swabs collected in physicians' office; • Exclusion of Cases - Updated exclusion criteria to remove caveat regarding other susceptible individuals not yet exposed. • Exclusion in Table - Added context on the prolonged duration of illness for immunocompromised individuals and to consult Medical Microbiologist or ID Specialist. • Corrected reference in Contact Exclusion to Table 3(C) rather than 3(A). • Updated Public Health Interventions: o Clarified that coordination is required with Employee/Occupational Health and Infection Control is required for exposures in Health Care and Daycare Settings. o Included discretion of MHO for serological testing of contacts o Provided more explicit information for contacts who develop symptoms to seek advise from public health via HealthLine before seeking medical attention o Added caveat that 1970 is generally considered cut off year for presumed immunity, but included information about RRPL information to use 1965 during outbreak situations. • Prevention Measures o Updated footnote with reference to 1965 in Prevention Measures to explain the Saskatchewan context for this date. o Updated the year for eligibility for measles vaccine in Prevention Measures to align with the Saskatchewan Immunization Manual. o Added reference to recommending a pre-travel consultation for international travel considerations. Updated references as applicable.

May 2018	• Updated to align with Panorama configuration • Clarified the purpose for notification of cases to public health • Incorporated an Epidemiology and Occurrence as a placeholder and included Saskatchewan Immunization program history from Sask Immunization Manual to provide context. • Rearranged and updated the style into the new format of the Manual. • References reaffirmed or updated as necessary.

References

American Academy of Pediatrics. (2015). *Red book: 2015 Report of the Committee on Infectious Diseases* (30th ed.). Elk Grove Village, IL: Author.

Butler, K., Cafferkey, M., Cronin, M., Doyle, R., & Jennings, P. (2002). *Recommendations of Measles Sub-Committee of the Scientific Advisory Committee NDSC: Guidelines for control of measles in Ireland*. National Disease Surveillance Centre, October, 2002. Retrieved March, 2014 from http://www.clinical-virology.org/pdfs/eire_guidelines.pdf.

Centers for Disease Control and Prevention. (2015). *Epidemiology and prevention of vaccine-preventable diseases* (13th ed.). Atkinson, W., Hamborsky, J., McIntryre, L., & Wolfe, S. (Eds.). Washington, DC: Public Health Foundation. Retireved August, 2018 from https://www.cdc.gov/vaccines/pubs/pinkbook/meas.html

Health Canada. (1995). Guidelines for control of measles outbreaks in Canada. *Canada Communicable Disease Report (CCDR), 21-21*, November 1995. Retrieved June, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/95pdf/cdr2121e.pdf.

Health Canada. (1999). Infection control guidelines – Routine practices and additional precautions for preventing the transmission if infection in health care. *Canada Communicable Disease Report (CCDR), 25S4*, July 1999. Retrieved June, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf.

Health Canada. (1999). Measles surveillance: Guidelines for laboratory support, *Canada Communicable Disease Report (CCDR), 25-24*, December 1999. Retrieved June, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr2524.pdf.

Health Canada. (2002). Infection control guidelines – Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR), 28S1,* March 2002. Retrieved June, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Heymann, D. L. (Ed.). (2015). *Control of communicable diseases manual* (20th ed.). Washington, DC: American Public Health Association.

Mandell, G. L., Bennett, J. E., & Dolin, R. (Eds.). (2000). *Mandell, Douglas, and Bennett's principles and practice of infectious diseases* (5th ed.). Philadelphia, PA: Churchill Livingstone.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR), 35S2*, November 2009. Retrieved August, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Measles_Rougeole-eng.php.

Public Health Agency of Canada. (2018). *Canadian immunization guide* (Evergreen ed.). Ottawa, Canada: Public Works and Government Services Canada. Retrieved August, 2018 http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php#toc.

Public Health Agency of Canada. (2013). Guidelines for the prevention and control of measles outbreaks in Canada. *Canada Communicable Disease Report (CCDR), 39ACS-3*, September 2013. Retrieved August, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/13vol39/acs-dcc-3/index-eng.php.

Public Health Agency of Canada (PHAC). Notifiable Diseases On-Line. 2015. Available from: diseases.canada.ca/notifiable/charts?c=pl

Tunis MC, Salvadori MI, Dubey V, Baclic O, on behalf of the National Advisory Committee on Immunization (NACI). Updated NACI recommendations for measles post-exposure prophylaxis. Can Commun Dis Rep 2018;44(9):226-30. Retrieved September, 2018 from https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2018-44/issue-9-september-6-2018/article-7-naci-recommendation-pep.html

US Centers for Disease Control and Prevention. (2018). *Manual for the surveillance of vaccine preventable diseases: Chapter 7: Measles.* Retrieved August, 2018 from http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html#vaccination_2013.

Government of Saskatchewan

Measles Data Collection Worksheet

Please complete **all** sections.

PANORAMA

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

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**	***Classification: CONTACT:***	***Date***	***LAB TEST INFORMATION:***
☐ Confirmed	YYYY / MM / DD	☐ *Contact*	*YYYY / MM / DD*	*Date specimen collected:*
☐ Does Not Meet Case	YYYY / MM / DD	☐ *Not a Contact*	*YYYY / MM / DD*	*YYYY / MM / DD*
☐ Person Under Investigation	YYYY / MM / DD	☐ *Person Under Investigation*	*YYYY / MM / DD*	*Specimen type:* ☐ *Blood* ☐ *Urine* ☐ *Throat* ☐ *Nasopharyngeal*
☐ Probable	YYYY / MM / DD			
☐ Clinical	YYYY / MM / DD			

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	YYYY / MM / DD
☐ Incomplete – Unable to locate	YYYY / MM / DD	(Specify where)	YYYY / MM / DD

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

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

Measles Data Collection Worksheet

Please complete **all** sections

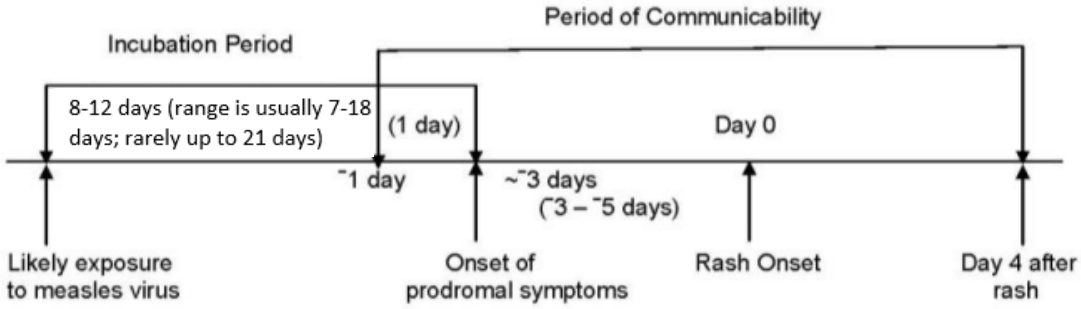
Panorama Client ID: _____
Panorama Investigation ID: _____

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

LHN-> INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Description	No	Yes - Date of onset
Conjunctiva - inflammation (conjunctivitis)		YYYY / MMM / DD	Koplik spots		YYYY / MMM / DD
Coryza or rhinitis		YYYY / MMM / DD	Lymphadenopathy - generalized		YYYY / MMM / DD
Cough		YYYY / MMM / DD	Pain – photophobia (light sensitivity)		YYYY / MMM / DD
Fever		YYYY / MMM / DD	**Rash – maculopapular (3 days)**		YYYY / MMM / DD
Other s/s					

Timeline for Assessing Measles Contacts



D) INCUBATION AND COMMUNICABILITY

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case (period for acquisition):
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date**: YYYY / MM / DD

Exposure Calculation details:

Communicability for Case (period for transmission):
Earliest Possible Communicability Date: YYYY / MM / DD **Latest Possible Communicability Date**: YYYY / MM / DD

Communicability Calculation Details:

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

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	State Date Yes	N, NA, U	Add'l Info
Contact - At risk population (international travellers or immigrants)	YYYY / MM/DD		
Contact – Persons with similar symptoms	YYYY / MM/DD		
Contact to a known case (Add'l Info)	YYYY / MM/DD		
Immunocompromised - Related to underlying disease or treatment	YYYY / MM/DD		
Occupation - Health Care Worker - IOM Risk Factor	YYYY / MM/DD TE		
Special Population - Attends childcare	YYYY / MM/DD TE		
Special Population - Attends school	YYYY / MM/DD TE		
Special Population - Lives in a communal setting	YYYY / MM/DD TE		
Special Population - Post secondary education institution	YYYY / MM/DD TE		
Travel - Outside of Canada (Add'l Info)	YYYY / MM/DD AE/TE		
Travel - Outside of Saskatchewan, but within Canada (specify)_	YYYY / MM/DD AE/TE		
Other risk factor (Add'l Info)	YYYY / MM/DD		

Measles Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

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:

☐ Previous disease ☐ Previous responder/Previous history of immunity ☐ Date Of Birth

☐ IOM - Interpretation of history by investigator

G) INTERVENTIONS

INVESTIGATION->TREATMENT & INTERVENTIONS->INTERVENTION SUMMARY

Intervention Type and Sub Type:

Assessment:
☐ Assessed for contacts YYYY / MM / DD
Investigator name

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

Communication:
☐ Other communication (see Investigator Notes) YYYY / MM / DD
Investigator name
☐ Letter (See Document Management) YYYY / MM / DD
Investigator name

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

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Other Investigation Findings:
☐ Investigator Notes YYYY / MM / DD
☐ Document Management YYYY / MM / DD

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

Quarantine:
☐ Quarantine YYYY / MM / DD
Investigator name

Exclusion: Investigator name
☐ Work YYYY / MM / DD ☐ Preschool YYYY / MM / DD
☐ School YYYY / MM / DD ☐ Daycare YYYY / MM / DD

Testing:
☐ Lab testing recommended 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	

Measles Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: ___________
Panorama Investigation ID: ___________

H) OUTCOMES

LHN-> INVESTIGATION-> OUTCOMES

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

Cause of Death: (if Fatal was selected) ____________________________

I) EXPOSURES

Acquisition Event

INVESTIGATION-> EXPOSURE SUMMARY-> ACQUISITION EVENT SUMMARY > QUICK ENTRY

Acquisition Event ID:_________

Exposure Name: ____

Acquisition Start YYYY / MM / DD to **Acquisition End:** YYYY / MM / DD

Location Name: ____

Setting Type

☐ Travel ☐ Health care setting ☐ Public facilities ☐ Recreational facilities ☐ Most likely source

Transmission Events

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Transmission Event ID	Exposure Name	Setting type (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	Date/Time	# of contacts
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure ☐Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure ☐Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure ☐Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure ☐Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure ☐Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure ☐Public facilities	YYYY / MM / DD to YYYY / MM / DD	
	Measles – Inv ID# _____	☐Multiple Settings	YYYY / MM / DD to YYYY / MM / DD	

J) TOTAL NUMBER OF CONTACTS

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> TE HYPERLINK -> UNKNOWN/ANONYMOUS CONTACTS

Anonymous contacts:________ (total number of individuals [including groups that 1:1 follow-up is not required or is not feasible])

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

Please see the following pages for the Letter Template to a Measles Case.

<DATE>

<MR./MS. NAME OF CASE>
<ADDRESS>
<CITY SK POSTAL CODE>

Re: Temporary Exclusion from Work and Public for <INDIVIDUAL> until <DATE>

Dear <MR./MS. NAME OF CASE>

As we have discussed, you are <SUSPECTED/CONFIRMED> to have measles disease. Because this is a very contagious disease, all precautions need to be taken to prevent possible spread of infection to others. You are considered to be contagious from <DATE> to <DATE>.

Your assistance is important to prevent spreading this disease to individuals who have not been immunized or who have not had the disease previously. This means that you are required to remain in your home (not to be out in public or at school/work) until <DATE>. This also means that during this time, there cannot be visitors in the home. **Should you require medical attention, it is important to call ahead to your health care provider so they can plan to see you in a way that reduces the chance of exposing other individuals to measles.**

Thank you for your cooperation in identifying individuals and locations where people may have been exposed to measles and for your cooperation during this period. We appreciate that you are doing your best to prevent further spread of infection. Please feel free to call < PHONE NUMBER> as needed.

The Medical Health Officer has authority under *The Public Health Act, 1994* of Saskatchewan to enforce compliance with this requirement.

Sincerely,

<NAME OF PUBLIC HEALTH DESIGNATE>
<TITLE>

cc: Medical Health Officer

Table 1. Vaccination or Immune Globulin (Ig) for Susceptible Contacts – See Table 3 (Person-by-person contact investigation)		
If measles vaccine is given within 72 hours of exposure, it may provide some protection. **Do not delay providing vaccine to contacts that are not up-to-date, even if >72 hours have lapsed in order to provide protection from future exposures. Immune globulin is available in two products:** • IMIg (intramuscular immune globulin) • IVIg (intravenous immune globulin)		
Population	**Time since Exposure to Measles**	
	≤ 72 hours	**73 hours – 6 days**
Susceptible infants 0-6 months of age;	IMIg (0.5 mL/kg)	
Susceptible immunocompetent infants 6-12 months of age;	MMR vaccine	IMIg (0.5 mL/kg)
Susceptible immunocompetent persons 12 months of age or older	MMR vaccine series	
susceptible pregnant women	IVIg (400 mg/kg) OR IMIg (0.5 mL/kg) to maximum of 15 mL (limited protection if 30 kg or more);	
immunocompromised individuals 6 months of age or older;*	IVIg (400 mg/kg) OR IMIg 0.5 mL/kg to maximum of 15 mL (limited protection if 30 kg or more);	
Individuals with confirmed measles immunity	N/A	
* Ig is recommended for immunocompromised individuals for whom measles vaccination is contraindicated and past measles vaccination is no longer considered to be effective as outlined in the Saskatchewan Immunization Manual, Chapter 7[1]. Maximum doses and sites are outlined in SIM, Chapter 8[2]		

Source: Canada Communicable Disease Report, 2018 (Tuvis)

The following figures outline when vaccine or immune globulin should be provided to different populations and when exclusion/self-isolation should be implemented.

When exclusion is recommended, it should apply:

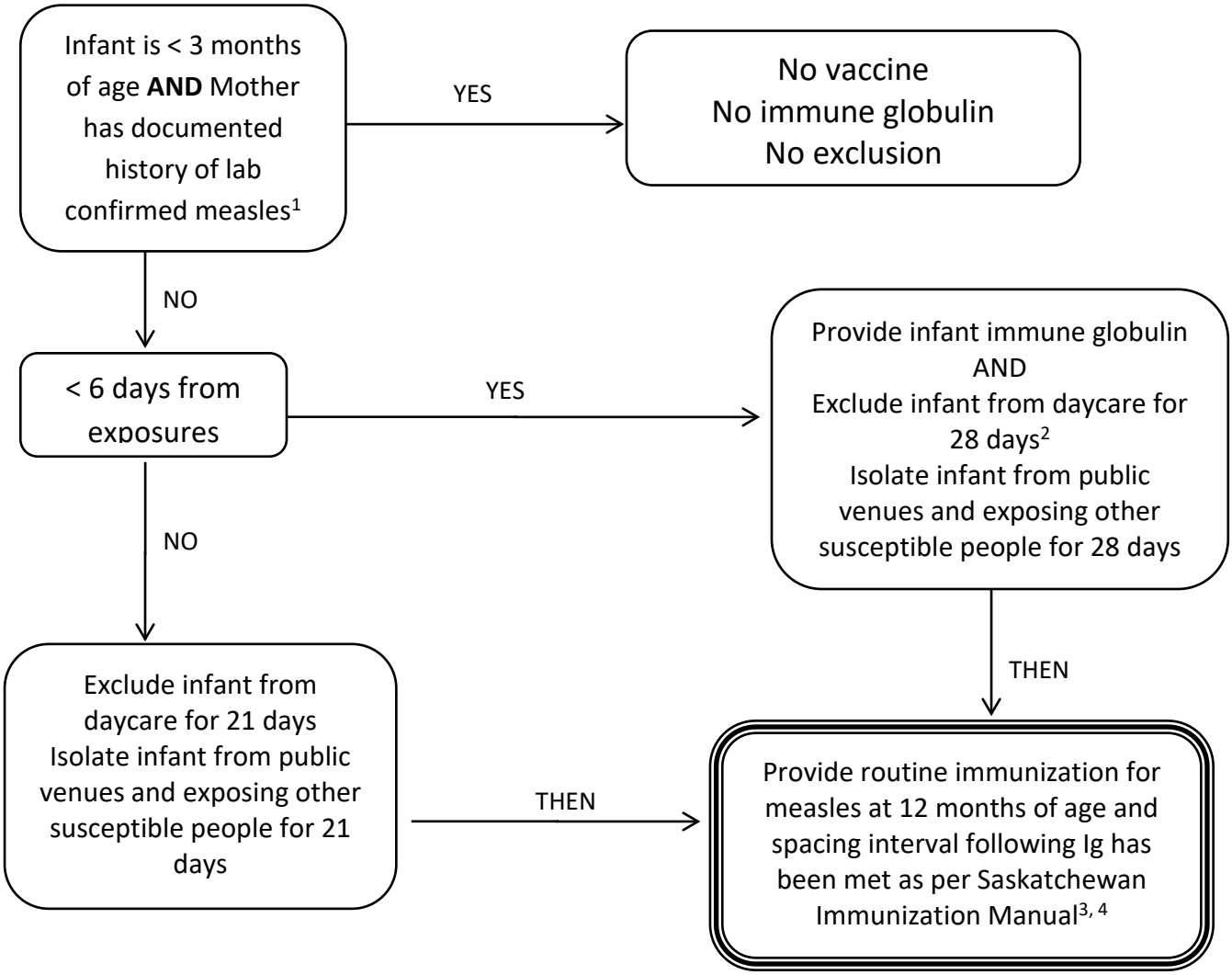
- From five days after first exposure and up to 21 days after last exposure; or
- Until serological confirmation of immunity is provided.

If a contact develops symptoms compatible with measles, exclusion criteria for cases should be applied. When Ig has been provided, extend the exclusion period to 28 days after the last exposure.

[1] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7 and

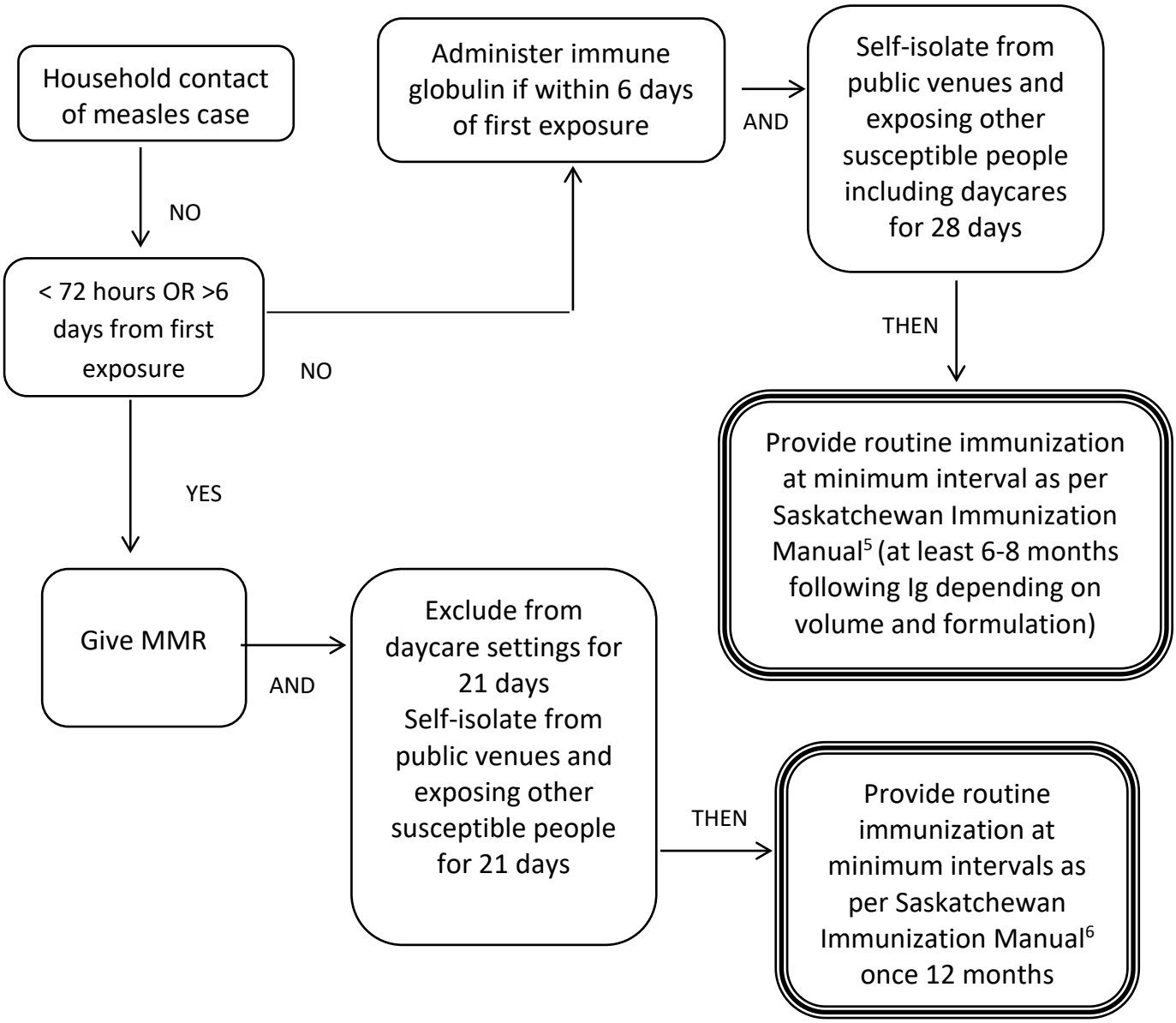
[2] https://www.ehealthsask.ca/services/Manuals/Documents/Ch.%208%20Administration%20of%20Bio%20Prods.%20Oct%202018.pdf

Figure 1. Infants < 6 months of age



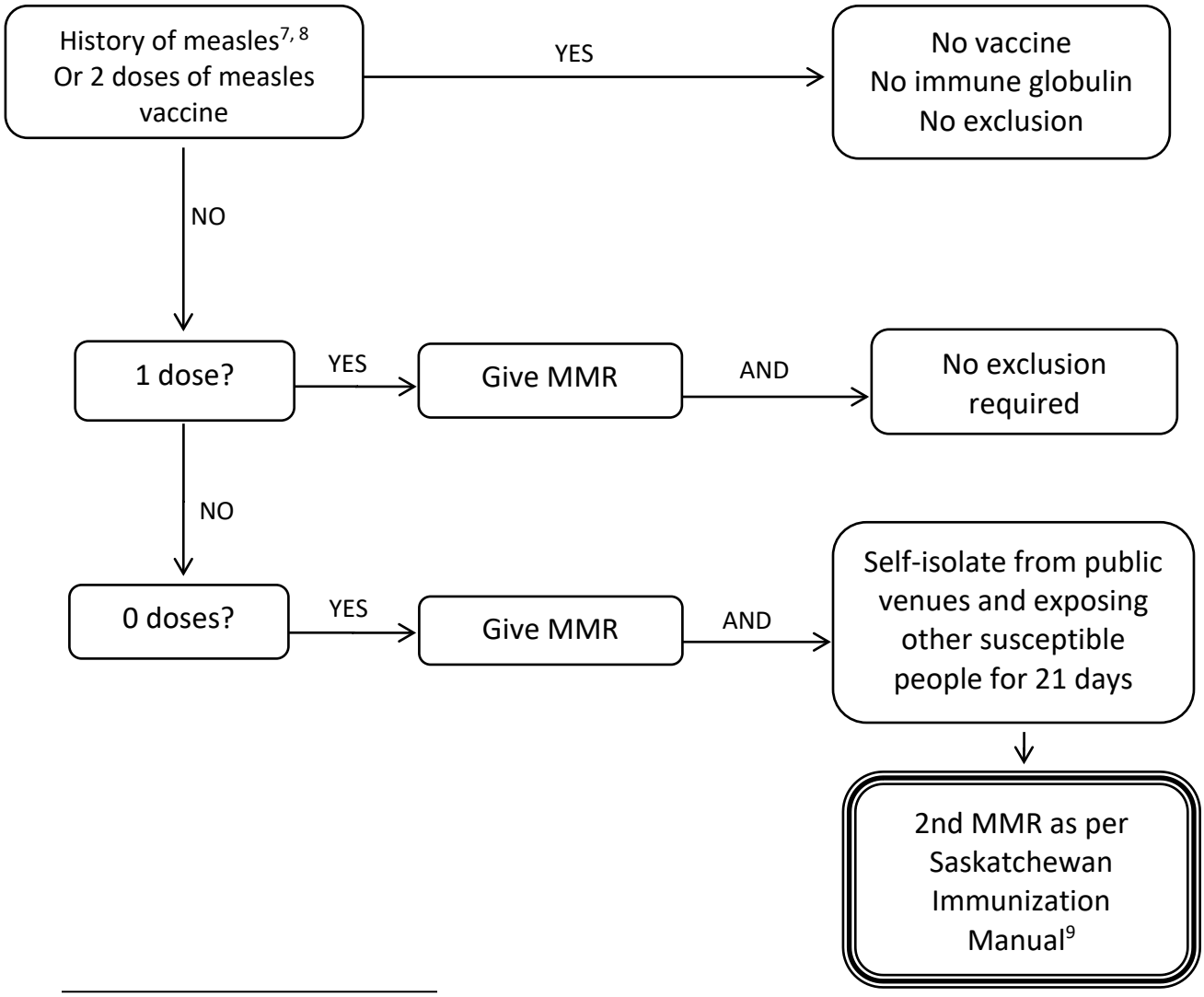
[1] Maternal antibodies from vaccination wane more quickly than antibodies from natural infection. Considering the vulnerable population, immune globulin is recommended for infants < 3 months if mother's immunity is vaccine-induced.
[2] Immune globulin may not prevent measles, and may cause a longer incubation period up to 28 days
[3] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter5
[4] If risk of measles is ongoing and Ig was not given, MMR may be given at 6 months of age.

Figure 2. Infants 6 month to <12 months of age[5]



[5] No previous measles-containing vaccine previously provided for travel or past measles exposure.
[6] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter5

Figure 3. Immunocompetent Children and Adults (Non-Health Care Settings)

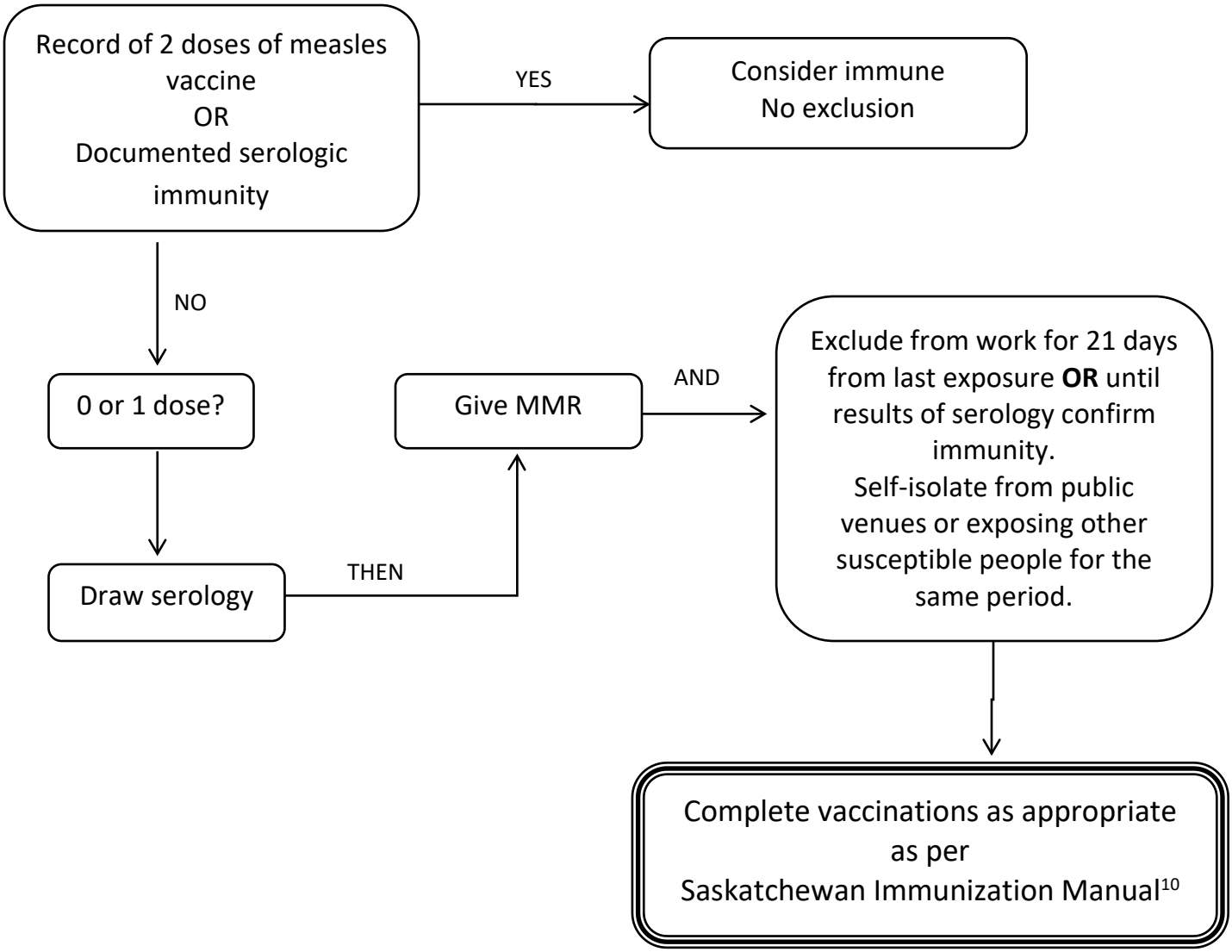


[7] Generally, people born prior to 1970 are considered to have natural immunity. During outbreak situation, this date may be expanded to 1965 based on a review of RRPL (February 2014): approximately 93% of samples tested from individuals born prior to 1965 indicated immunity for measles, while approximately 83% of samples from persons born between 1965 and 1980 indicated immunity to measles. Factors to consider include age, history of exposure to measles, and availability of medical records.

[8] Clinical judgement is required to determine if serology is necessary. If born in Canada in 1970 or later, previous rubella immunity serves as a proxy for measles immunity based on past measles-rubella vaccine.

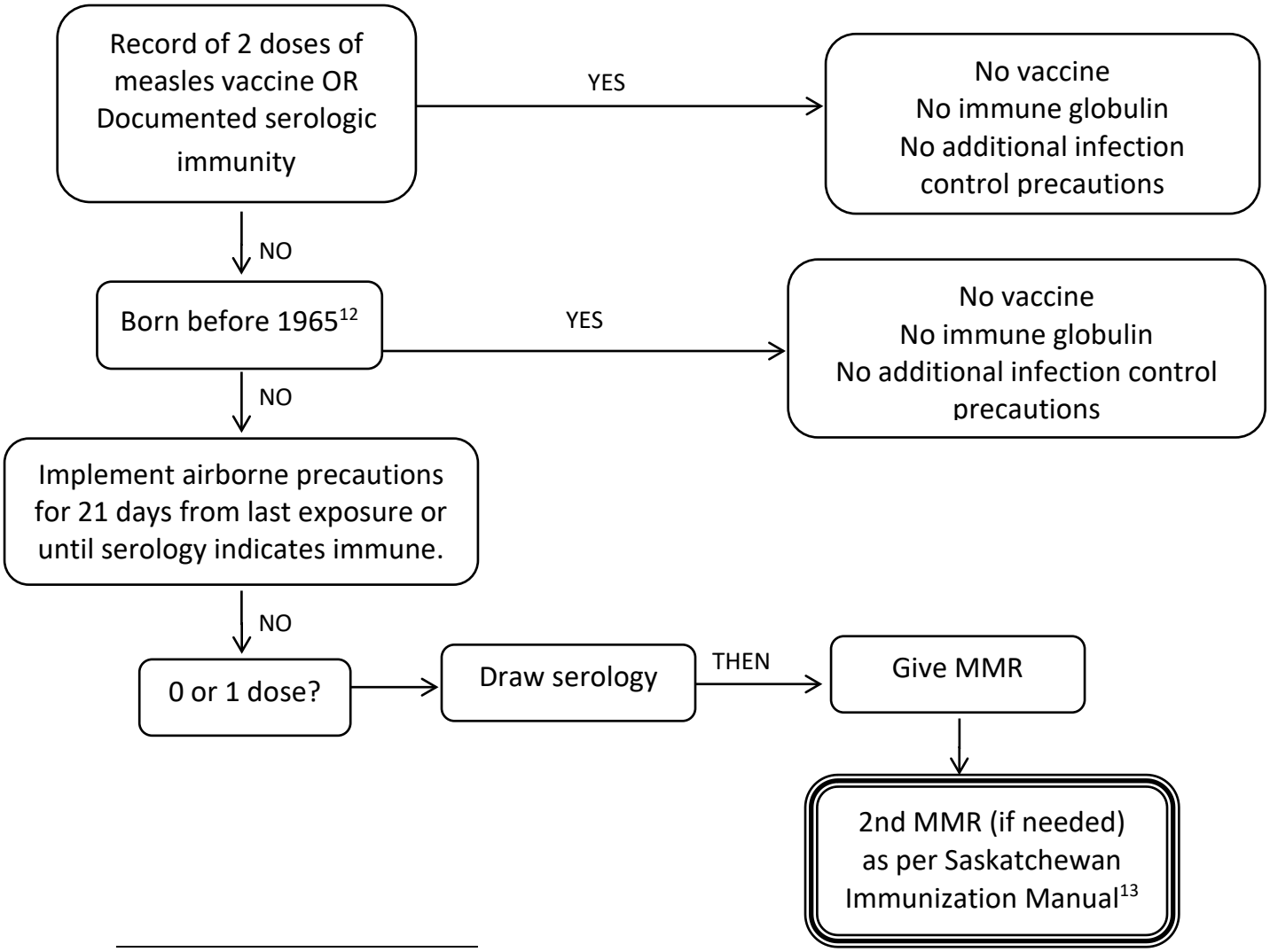
[9] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter5 and http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7

Figure 4. Health Care Settings – All Employees



[10] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7

Figure 5. Health Care Settings – Patients[11]

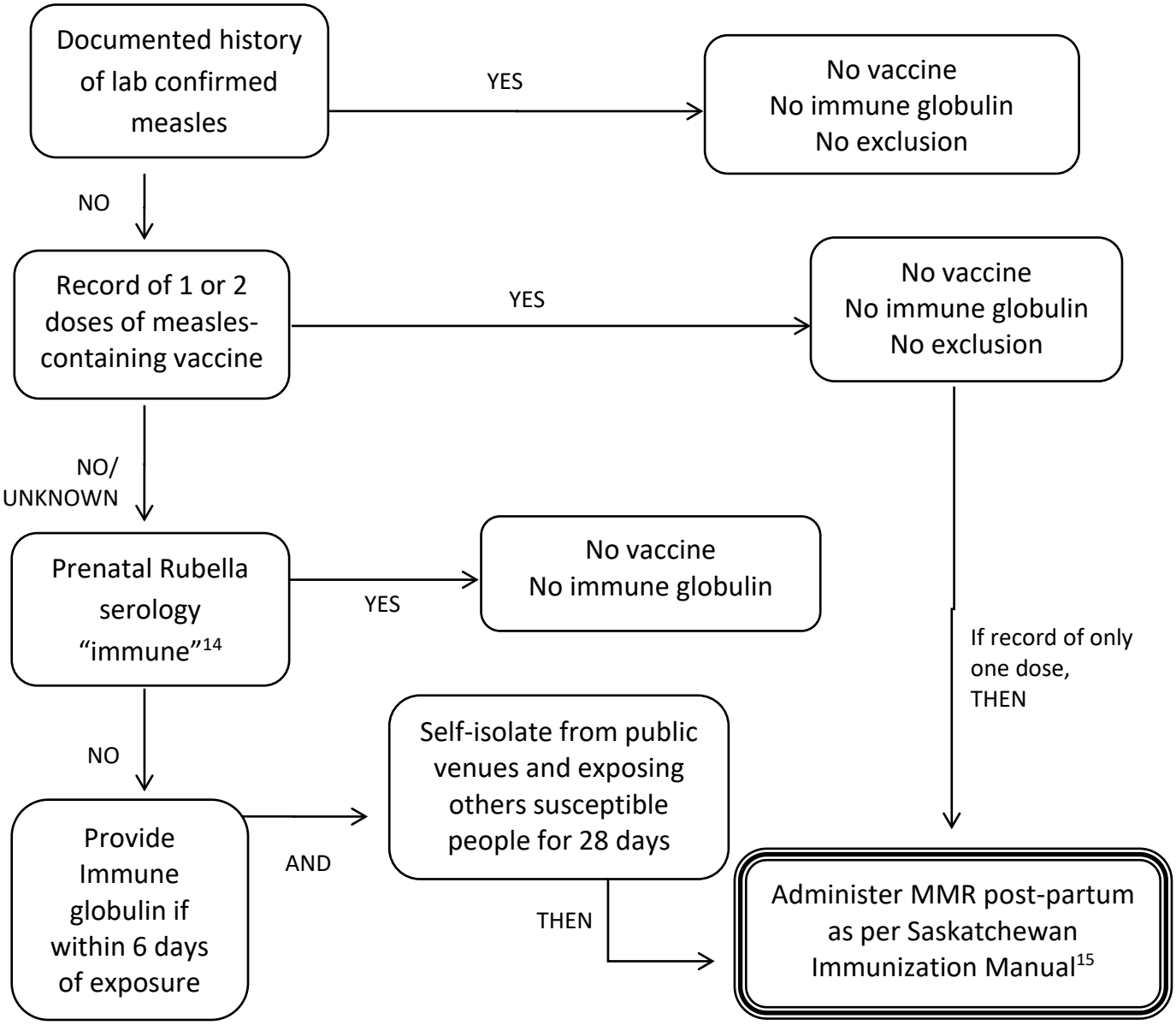


[11] If immunocompromised, consult with MHO and attending physician.

[12] Generally, people born prior to 1970 are considered to have natural immunity. During outbreak situation, this date may be expanded to 1965 based on a review of RRPL (February 2014): approximately 93% of samples tested from individuals born prior to 1965 indicated immunity for measles, while approximately 83% of samples from persons born between 1965 and 1980 indicated immunity to measles. Factors to consider include age, history of exposure to measles, and availability of medical records.

[13] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter5 and http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7

Figure 6. Pregnant Women



[14] For women born in Canada after 1970, rubella immunity is a proxy for immunization with measles/rubella vaccine. This may not be try for foreign born women.
[15] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter5
and http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7

Revisions

Date	Change
April 2019	Figure 1 – added footnote #4 regarding use of MMR in ongoing exposure situations; added caveat about use of MMR as per spacing guidelines following Ig. Figure 2 – simplified flowchart; updated spacing interval following Ig from 5 months to 6-8 months; corrected footnote 5 to refer to measles exposure (not disease) Figure 3 – added footnote that rubella immunity may serve as proxy for measles immunity; adjusted to refer to year of birth 1965 for immunity during outbreaks Figure 4 – simplified flowchart for 0 or 1 doses of vaccine Figure 5 – simplified flowchart for 0 or 1 doses of vaccine Figure 6 – added footnote that rubella immunity may serve as a proxy for measles immunity
September 2018	Updated the dosage and formulation recommendations for immunoglobulin to align with the September 2018 National Advisory Committee on Immunization recommendations.

Please see the following pages for the Letter Template to a Measles Contact.

<DATE>

<MR./MS. NAME OF CONTACT REQUIRING EXCLUSION>
<ADDRESS>
<CITY SK POSTAL CODE>

Re: Temporary Exclusion from Work and Public for <INDIVIDUAL> until <DATE>

Dear <MR./MS. NAME OF CONTACT REQUIRING EXCLUSION>

As we have discussed, you have been exposed to measles, a highly contagious disease. Because this is a very contagious disease, and you have not been immunized previously, you are at increased risk of developing infection. Until it is determined that you have not been infected, all precautions need to be taken to prevent possible spread of infection to others. You are considered to be contagious from <DATE> to <DATE>.

Your assistance is very important to prevent spreading this disease to individuals who have not been immunized or who have not had the disease previously. Measles is contagious from 4 - 5 days before a person develops a rash until 4 days after the rash appears. This means that you are required to remain in your home (not to be out in public or at school/work) and should not have visitors to your home from <DATE> (5 days after 1st exposure) to <DATE> (21 days after last exposure). It is during this time that you may develop infection.

If you develop symptoms during this time, it is important to call ahead to your health care provider's office so arrangements can be made for you to be seen a way that reduces the chance of exposing other individuals to measles. Early symptoms include:

- high fever;
- cough;
- runny nose;
- red eyes.

A rash then develops after a day or 2 and usually starts on the face then spreads over the rest of the body.

If you do develop symptoms, we will be in touch with you to gather a list of individuals that you have been in contact with so we can offer immunization and education as necessary.

Thank you for your cooperation during this period. We appreciate your assistance in preventing the possible spread of infection. Please feel free to call <PHONE NUMBER> as needed.

Sincerely,

<NAME OF PUBLIC HEALTH DESIGNATE>
<TITLE>

cc: Medical Health Officer

Please see the following pages for the Letter Template to a School or Group Exposed to a Measles Case.

<DATE>

<NAME SCHOOL/SPORTS GROUP/ETC.>
<ADDRESS>
<CITY SK POSTAL CODE>

Re: Possible Exposure to Measles between <DATE> to <DATE>

Dear <NAME SCHOOL/SPORTS GROUP/ETC.>

We are investigating a person with red measles (Rubeola) who, while infectious, may have exposed others during <SCHOOL/SPORTS GROUP ACTIVITY/ETC.> Measles is a highly contagious disease spread through the air (by coughing, sneezing, talking). Public health is actively obtaining immunization records for individuals who have been exposed and may be contacting you to ask for your assistance in obtaining this information. Individuals who have had two doses of measles-containing vaccine (commonly provided as measles, mumps rubella [MMR] vaccine) or who have had a lab-confirmed infection in the past are considered immune and not at risk for infection.

Individuals who have not been immunized are at risk of developing infection and may be asked to stay out of <SCHOOL/SPORTS GROUP ACTIVITY/ETC.> until immunization has been provided.

Individuals who have been exposed may develop symptoms as early as 7 or as late as 21 days after the exposure. Early symptoms usually include:

- high fever;
- cough;
- runny nose;
- red eyes.

A rash then develops after a day or 2 and usually starts on the face then spreads over the rest of the body.

If you develop symptoms during this time, it is important to call ahead to your health care provider's office and inform them of your exposure so arrangements can be made for you to be assessed in a way that reduces the chance of exposing other individuals to measles.

Measles is contagious before early symptoms develop, which is 4 - 5 days before a person develops a rash, and remains contagious until 4 days after the rash appears. If you have symptoms and are waiting for laboratory confirmation, it is very important that you avoid contact with others who are not immune until the 5th day after the rash appears (you are no longer considered contagious after that time). If you require further medical attention, it is important call ahead to your health care provider as mentioned above.

We appreciate your assistance in preventing the possible spread of infection. Please feel free to call NUMBER as needed.

Sincerely,

<NAME OF PUBLIC HEALTH DESIGNATE>
<TITLE>

cc: Medical Health Officer

Public Health is investigating persons with measles who, while infectious, visited one or more public venues.

Measles is a highly contagious disease. Individuals who have had two doses of measles-containing vaccine (commonly provided as MMR or MMR-V) are considered immune and not at risk for infection. Individuals born before 1965 are likely to have been exposed to measles in childhood, and are considered to have a natural immunity to it.

Individuals born in 1965 or later and who have not been immunized are at risk of developing infection. Symptoms may develop as early as 7 or as late as 21 days after the exposure. Early symptoms usually include:

- high fever;
- cough;
- runny nose;
- red eyes.

A rash then develops after a day or 2 and usually starts on the face then spreads over the rest of the body.

If you develop symptoms compatible with measles in 7 to 21 days after being exposed, it is important to call ahead to your health care provider's office and inform them of your exposure so arrangements can be made for you to be assessed in a way that reduces the chance of exposing other individuals to measles.

Measles is contagious before symptoms develop, which is 4 to 5 days before a person develops a rash, and remains contagious until 4 days after the rash appears. If you have symptoms and are waiting for laboratory confirmation, it is very important that you avoid contact with others who are not immune until the 5th day after the rash appeared (you are no longer considered contagious after that time). If you require further medical attention, it is important to call ahead to your health care provider as mentioned above.

We appreciate your assistance in preventing the possible spread of infection. Please call your local public health office or the HealthLine at 811 as needed.

Please see the following pages for the Infection Prevention and Control Measures in Physicians' Offices.

Infection Prevention and Control Measures in Physicians' Offices

- For each patient encounter, screen the patient to determine whether the patient has any signs/symptoms of measles. Screen the patient:
  - at time of booking;
  - upon arrival in the waiting room; or
  - in exam room.

NOTE: Symptoms of measles include prodromal fever, conjunctivitis, coryza, cough and small spots with white or bluish white centers on an erythematous base on the buccal mucosa (Koplik spots). Three to five days after the start of the symptoms a red, blotchy (maculopapular) rash appears on the face and then progresses down the body.

- Book anyone with symptoms at the end of the day if clinical status allows; ensure other patients are not in the office.
- Use airborne precautions as measles virus remains suspended in the air; health care providers (HCP) entering the patient's room must wear a fit-tested N95 respirator unless the HCP has documented immunity to measles.
- Where possible immune staff should provide care to patients suspected to have measles.
- Post signage at the entrance (Attachment – Measles Alert Poster) instructing patients with signs and symptoms of measles or other respiratory symptoms to put on a surgical mask **before** entering the clinic.
- Provide surgical face masks for symptomatic patients as close to the entry of the clinical office as possible, with instructions on how to put on and take off mask. Consider having client call when in the parking lot (outside) and having immune staff go out to provide patient with a surgical mask. Instruct patient to wear the mask at all times while in the clinical office. Pediatric masks should be available on an individual patient basis if needed.
- Quickly triage the patient out of the common waiting areas and move the patient to an examining room. If possible, the patient should enter and exit through a separate entrance and go directly in and out of the examination room. Close door to examination room. The room should be a single room with a solid door (closed).
- Place a "DO NOT ENTER" sign for staff on the closed door.
- Keep the door closed to allow sufficient time (**two hours**) for the air to change in the room and be free of droplet nuclei before using the room for a non-immune patient.
- A bathroom used by a suspect case, to collect urine for measles virus, should also be off limits to non-immune patients for **two hours**. The bathroom door should be closed and have a "DO NOT ENTER" sign for staff/patients placed on the closed door. This is another reason to have patients seen at the end of the day.
- Routine cleaning for the room/equipment (once free of droplet nuclei) is sufficient.
- Ensure/encourage appropriate hand hygiene by staff and patient.

These recommendations align with Ontario's Infection Prevention and Control for Clinical Office Practice (June 2013) at:
http://www.publichealthontario.ca/en/eRepository/IPAC_Clinical_Office_Practice_2013.pdf

Please see the following pages for the Non-Saskatchewan Measles Alert Poster.

Measles Alert

Do you have a **FEVER** and **RASH**, with **COUGH** or **RUNNY NOSE** or **RED EYES**?

Have you been **EXPOSED TO SOMEONE** with suspected or confirmed measles?

If **YES**

PLEASE: Put on a mask.
Clean your hands with alcohol hand rub.
Report to the nurse or front desk immediately.

Measles is very contagious.
Help prevent the spread of measles.

Adapted from Alberta Health Services

Government of Saskatchewan

Please see the following pages for the Measles Alert Poster.

Measles Alert

Do you have a **FEVER** and **RASH**, with **COUGH** or **RUNNY NOSE** or **RED EYES**?

Have you been **EXPOSED TO SOMEONE** with suspected or confirmed measles?

If **YES**

PLEASE: Put on a mask.
Clean your hands with alcohol hand rub.
Report to the nurse or front desk immediately.
Measles has been confirmed in Saskatchewan.

Measles is very contagious.
Help prevent the spread of measles.

Adapted from Alberta Health Services

Government of Saskatchewan

Please see the following pages for the Infection Prevention and Control Measures for Patients Suspected or Known to be Infected with Measles.

Infection Prevention and Control Precautions for patients suspected or known to be infected with Measles (Rubeola)

Always follow Routine Practices including a Point of Care Risk Assessment

Triage

Display posters at patient/client entrances with instructions for anyone with measles symptoms to identify themselves immediately to staff

If patient presents with symptoms of measles[1]

- **Triage suspected patients as expeditiously as possible** into an airborne infection isolation room/AIIR (negative pressure room) to avoid exposure to contacts in waiting rooms.
  - If a negative pressure room is unavailable, the patient should be managed in a private room with the door closed.
- **Place appropriate signage** (Airborne Precautions) outside of the room in a noticeable location (if applicable)

Assessment

Where possible, **only immune[2] staff should provide care** to patients suspected or confirmed to have measles (Staff should check with local Employee Health and Wellness/Occupational Health and Safety nurse for their immune status)

History & signs and symptoms suggestive of measles

- A fitted **N-95 respirator** should be worn by all non-immune Healthcare Workers (HCWs) who enter the room.
- **Patient should be restricted to their room,** but instructed or assisted with respiratory and hand hygiene, if transport out of room is required
- **Patients should be provided with a surgical mask** to wear when they are outside of the exam room
- **Postpone elective procedures that generate droplets**

Following Discharge

- **DO NOT use the room occupied by a patient** with suspected or confirmed case of the measles for **2 hours** after they have been discharged
- **Leave the door closed and leave alert signage posted** until 2 hours have elapsed and a terminal clean has been performed

Communication

Inform:

- **Patient of the requirements for isolation precautions/visitor restrictions**
- **IMMEDIATE notification of all <u>suspect and confirmed</u> cases to your local Public Health Office (306-___-____) or the MHO on call (306-___-____).**

The Public Health Office will provide additional guidance for case management.

- **Your Infection Control Professional**
- **Your local Housekeeping department** after 2 hours have elapsed following discharge, to perform a terminal clean of the exam room as per regional policies and procedures.
- **If exposure of a Healthcare Worker (HCW) is suspected**, contact local Employee Health and Wellness/ Occupational Health and Safety office.

1. **Symptoms** include Fever 38.3° C or higher, cough, runny nose or red eyes, red blotchy rash appearing three to seven days after fever starts, beginning behind the ears and on the face and spreading down to the body and then to the arms and legs
2. **Immune** - Serological evidence of measles IgG antibodies; or Documentation of 2 doses of measles-containing vaccines for all HCWs.

Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.

From Public Health to Saskatchewan Health: Within 72 hours.

Public Health Follow-up Timeline: Initiate within 24-48 hours.

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

- To minimize mortality and serious morbidity from meningococcal disease;
- To rapidly identify close contacts of the case and to provide recommendations for appropriate preventive measures for close contacts so as to prevent further spread of infection and disease;
- To provide information about the disease, its transmission, and methods of prevention;
- To identify clusters or outbreaks of infection and to initiate appropriate prevention and control measures;
- To track epidemiology trends of meningococcal disease in Saskatchewan including risk factors and distribution;
- To monitor the effectiveness of prevention and control measures;
- To plan expansion or introduction of future immunization programs;
- To provide timely clinical care including diagnosis and treatment using current, evidence-based guidelines
- To make timely and evidence informed actions on outbreaks; and
- To inform the public and medical community about meningococcal disease.

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

Confirmed Case	Clinical evidence[1] of invasive disease with laboratory confirmation of infection: • isolation of *Neisseria meningitidis* from a normally sterile site (blood, cerebrospinal fluid (CSF), joint, pleural or pericardial fluid)

[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.

	OR • demonstration of *N. meningitidis* DNA by an appropriately validated nucleic acid test (NAT) [2] from a normally sterile site.
Probable Case	Clinical evidence[1] of invasive disease with purpura fulminans or petechiae, with no other apparent cause and with non-confirmatory laboratory evidence: • detection of *N. meningitidis* antigen in the CSF.
[1]Clinical illness associated with invasive meningococcal disease usually manifests itself as meningitis and/or septicaemia, although other manifestations may be observed (e.g., orbital cellulitis, septic arthritis). Invasive disease may progress rapidly to petechiae or purpura fulminans, shock and death. [2]Each jurisdiction will have a validation process for the NAT that they have in place.	

Both confirmed and probable cases of **invasive** meningococcal disease (IMD) are notifiable to the provincial and national level.

At this time, conjunctivitis and pneumonia cases due to *N. meningitidis* are not notifiable nor reported to the Ministry of Health or the Public Health Agency of Canada, however case definitions are as follows:

- A conjunctivitis case requires isolation of *N. meningitidis* from the eye or the conjunctival sac in association with purulent conjunctivitis.
- A pneumonia case is one with a Gram strain (if done) showing Gram-negative diplococci and a polymorphonuclear cell response from sputum or respiratory aspirate, isolation with heavy growth of *N. meningitides*, **and** clinical or radiological evidence of pneumonia.
- Patients with *N. meningitidis* conjunctivitis or pneumonia should be treated by the clinician with appropriate systemic antibiotics (Public Health Agency of Canada, 2005).

Epidemiology and Occurrence

Under development

Additional Background Information

Causative Agent

Neisseria meningitidis, the meningococcus, is a Gram-negative, aerobic diplococcus. *Neisseria* are divided into Serogroups including A, B, C, W-135, X and Y (Heymann, 2015).

Symptoms

- Sudden onset of fever, intense headache, nausea and often vomiting, stiff neck, and photophobia.
- Petechial rash with pink macules or, very rarely, vesicles (Heymann, 2015).
- Delirium and coma often appear.
- Occasional fulminating cases exhibit sudden prostration, ecchymoses, and shock.

Complications

10-20% of survivors suffer long-term sequelae:

- Neurological deficits
- Hearing loss
- Limb loss

The case fatality rate is 8-15% (Heymann, 2015)

Reservoir/Source

Humans are the only reservoir. Asymptomatic colonization in the upper respiratory tract occurs in up to 5-10% of people. Less than 1% of colonized individuals develop disease (Heymann, 2015).

Incubation Period

2 to 10 days, commonly 3 to 4 days (Heymann, 2015).

Period of Communicability

As long as 7 days before the onset of symptoms until meningococci are no longer present in discharges from the nose and mouth, usually within 24 hours of the beginning of appropriate antibiotic treatment. Up to 5-10% of people can be asymptomatic carriers; communicability is difficult to determine in carriers (Heymann, 2015)**.**

Mode of Transmission

- Person-to-person by direct contact with respiratory droplets from the nose and throat of an infected person. Can be carried for distances < 1 meter by droplets generated by coughing or sneezing (Public Health Agency of Canada, 2005).
- Fomite transmission is insignificant (Heymann, 2015).

- The likelihood/risk of person-to-person transmission of meningococcal disease is related to the type of contact and length of the contact with the confirmed case (Public Health Agency of Canada, 2005).

Specimen Collection and Transport

- Cultures of blood and CSF are indicated in all patients with suspected invasive disease.
- Cultures of petechial (purpuric lesions) scrapings, synovial fluid, pleural fluid and pericardial fluid are positive in some patients.
- In accordance with the Saskatchewan Disease Control Regulations, section 21.1, all clinical isolates **must** be forwarded to the Roy Romanow Provincial Laboratory (RRPL) for serotyping. Ideally this should be done when the initial gram stain or positive preliminary culture results are available if not ordered sooner by the Medical Health Officer (MHO). Further characterization may be done by National Microbiology Lab.
- **Note:** Since *N. meningitidis* can be part of the normal nasopharyngeal flora, isolation of this organism from the throat is not helpful in determining the cause of the disease.

Refer to the RRPL Compendium of Tests for details on specimen collection and transportation – available online at https://rrpl-testviewer.ehealthsask.ca/.

Risk Factors/Risk Groups

Susceptibility to the clinical disease is low and decreases with age. Persons deficient in certain complement components are especially prone to recurrent disease.

Increased risk of IMD is associated with the following:

- functional or anatomic asplenia;
- underlying immune deficiencies (properdin deficiency, deficiency of terminal complement components or factor D deficiency);
- candidates and recipients of solid organ transplant;
- recipients of hematopoietic stem cell transplant;
- infants, adolescents, and young adults;
- crowded housing/living conditions;
- low socioeconomic status;

- active or passive exposure to tobacco smoke and concurrent upper respiratory tract infections (U.S. Centers for Disease Control and Prevention, 2015);
- young people living in an institutional setting such as military recruits or enlisted personnel and university students in a dormitory setting or at residential camps;
- living in the African meningitis belt (area from Senegal to Ethiopia).

Public Health Investigation

I. Case

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

History

- Determine if case has been laboratory confirmed and if molecular serotyping has been completed.
- Onset of illness, presentation and treatment (with what and when) – to determine incubation period and period of communicability which helps to identify the possible source and contacts to be followed.
- Travel history may be of significance in contact tracing.
- Determine if case has underlying medical conditions or falls into a risk category.
- Try to determine acquisition exposures as well as transmission exposures (e.g. student residence, sporting events, childcare or occupational settings etc.).
- Liaison with school authorities when a case is a student.
- Review immunization history of the case.

Public Health Interventions

Assessment

- Assess for contacts - Aggressive contact tracing, identification, and appropriate management, is the foundation to the prevention of secondary cases. Refer to Table 2 - Contact Definition.
- Obtain names, addresses, and phone numbers of all possible contacts. This information may need to be obtained from someone close to the case.

Communication

- Letters can be sent to classrooms and other group settings where individual contact tracing is not required (i.e. involving school age and adults where there are no vulnerable contacts) to inform them of the exposure, symptom monitoring and when to seek medical attention (see Sample letter).

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.

Exclusion

- Individuals with the disease are generally in hospital so are not attending activities. They are isolated until 24 hours after initiation of an appropriate antibiotic (e.g., ceftriaxone, etc.). Otherwise cases or contacts generally do not need to be excluded from any activities.

Immunization

- Case follow-up should be used as an opportunity to recommend immunizations they are eligible for as per the Saskatchewan Immunization Manual. The case should be assessed for underlying risk factors and should be offered vaccine as outlined in the Saskatchewan Immunization Manual, Appendix 7.1.[2]

Referrals

- When clients are hospitalized, communication with hospital staff and or infection control staff is important.
- Refer client to primary caregiver for referrals (physiotherapy, occupational therapy, Home Care) are available if necessary.

Treatment

The public health practitioner should direct any questions regarding the current treatment protocols to the physician or MHO. The following serves as a reference for the public health investigator:

- *Antibiotic treatment is required and should be started as soon as presumptive diagnosis is made. For patient management the client's physician should consult an infectious disease specialist.*
- *In addition to therapeutic antibiotics, the case should receive chemoprophlaxis before hospital discharge unless the infection was treated with an antibiotic that is effective in nasopharyngeal eradication of N. meningitidis (Public Health Agency of Canada, 2005).*

[2] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7

II. Contacts/Contact Investigation

Contact Definition

Table 2: Definition of Close Contacts (Public Health Agency of Canada, 2005)

- Household contacts of a case.
- Persons who share sleeping arrangements with the case (e.g. shared bedrooms or dorm rooms in residences).
- Persons with intimate contact with the case.
- Persons who have direct contamination of their nose or mouth with the oral/nasal secretions of a case (e.g., kissing on the mouth, shared cigarettes, shared drinking bottles) in the 7 days before onset of illness.
- Health care workers (HCWs) who have had intensive (e.g., intubating, resuscitating or closely examining the oropharynx), unprotected contact (without using droplet precautions) with infected patients in the 7 days before onset of illness and completion of the first 24 hours of treatment.[3]
- Children and staff in childcare and nursery school facilities during the 7 days before onset of illness.
- Airline passengers sitting immediately on either side of the case (but not across the aisle) when the total time spent aboard the aircraft was at least 8 hours during the 7 days before onset of illness.

Chemoprophylaxis is not recommended for close contacts of patients with evidence of *N. meningitidis* only in non-sterile sites such as an oropharyngeal swab, endotracheal secretions, or conjunctival swab. (US Centers for Disease Prevention and Control, 2018).

Prior to the introduction of the routine use of chemoprophylaxis for household contacts, they were 500 to 1,200 times at greater risk of IMD than the general population. There is also an increased risk in child care settings, although the risk is lower than in household settings. Risk is not increased in social contacts, therefore the individual relationship to the case must be considered as outlined in Table 2 for school, transportation, social, and workplace contacts.

[3] HCWs are rarely at risk even when caring for infected patients and chemoprophylaxis is rarely warranted except when they meet the definition of a close contact (Heymann, 2015).

Public Health Interventions

Assessment

- Assess for symptoms.

Communication

- Individual follow-up of contacts in in larger daycares, classrooms, schools, teams, workplaces, etc., is generally not recommended. These individuals should be informed by letter from public health, advising them to see their physician if they develop symptoms. These persons, if they become symptomatic, should not be assumed to have pertussis but should be assessed, tested and treated appropriately.

Chemoprophylaxis

The purpose of chemoprophylaxis is to eradicate nasopharyngeal colonization by *N. meningitidis* and thus prevent disease in contacts and further transmission to susceptible persons (Public Health Agency of Canada, 2005).

- Antimicrobial chemoprophylaxis should be administered *as soon as possible*, ideally less than 24 hours, after identification of the index patient but is still recommended for up to 10 days after the last contact with the index case while they were infectious (Public Health Agency of Canada, 2005; U.S. Centers for Disease Control and Prevention, 2011)[4].
- Chemoprophylaxis should be offered for close contacts (as defined in Table 2).
- It should also be considered for close contacts of a case that is strongly suspected to be IMD, if laboratory confirmation cannot be obtained within 24 hours.
- Chemoprophylaxis is not routinely recommended for HCWs including emergency personnel[5]. Only health care personnel who were managing an airway[6] or exposed to respiratory secretions of a patient with meningococcal disease (US Centers for Disease Prevention and Control, 2018).

[4] Chemoprophylaxis is unlikely to be of benefit if given > 10 days after the most recent exposure to an infectious case (Public Health Agency of Canada, 2005).
[5] HCWs are rarely at risk even when caring for infected patients and chemoprophylaxis is rarely warranted except when they meet the definition of a close contact (Heymann, 2015).
6 intubating, resuscitating or closely examining the oropharynx

- For residents of an institutional living or residential camp setting, only contacts that share a room with the case need prophylaxis. If there are other persons who meet the contact definition, they should also receive prophylaxis.
- Refer to Attachment – Meningococcal Chemoprophylaxis Guidelines for details.

Education

- Close contacts of confirmed cases should be educated about meningococcal disease and the signs and symptoms of meningococcal disease (meningitis and meningococcemia).
- They should be advised to seek immediate medical attention if they develop febrile illness or any other signs (see Symptoms).
- They should also be advised about the modes of transmission, period of communicability, and measures that they can take to reduce the risk of acquiring the disease.
- Reinforce proper hand washing and personal protective measures as per Respiratory and Direct Contact Introduction and General Considerations regarding diseases transmitted via respiratory and direct contact.
- Exposed household contacts and daycare contacts should be observed and advised to seek prompt medical attention if they develop a febrile illness.
- Meningococcal Disease (*Neisseria meningitidis*) information sheet can be provided.
- Advise individuals of the increased risk from overcrowding in living quarters and workplaces, such as schools, camps, and ships.

Exclusion

Due to the low secondary attack rate and the short duration of chemoprophylaxis, contacts do not need to be excluded from day care, school, or work.

Immunoprophylaxis

- Close contacts of individuals with meningococcal infections have an increased risk of developing IMD; this risk is greatest for household contacts. The increased risk of meningococcal disease for household contacts persists for up to one year after disease in the index case and beyond any protection from antibiotic chemoprophylaxis. In general, this prolonged risk is not seen among other contacts that do not have ongoing exposure (Public Health Agency of Canada, 2005).

When the serogroup is vaccine-preventable (i.e., serogroup A, B, C, W-135 or Y), the following individuals should be considered for immunoprophylaxis in addition to chemoprophylaxis:

- household contacts of a case;
- persons who share sleeping arrangements with the case;
- persons who have direct exposure of their nose or mouth with oral/nasal secretions of a case (e.g., kissing on the mouth, shared cigarettes, shared drinking bottles); and
- children and staff in child care and nursery school facilities.

The following individuals are close contacts who **do not** require immunoprophylaxis (they should only receive chemoprophylaxis) as they do not have ongoing exposure:

- HCWs who have managed the airway[7] of a meningococcal case.
- Airline passengers sitting immediately on either side of the case (but not across the aisle) when the total time spent aboard the aircraft was at least 8 hours.

Vaccination history should be reviewed for eligible close contacts (date and type of previous meningococcal vaccine). When indicated, immunization should be carried out as soon as possible. For those who were previously immunized, revaccination should be provided based on the following criteria:

- Individuals with underlying medical risk factors (as per Saskatchewan Immunization Manual, Appendix 7.1[8]) should be revaccinated if it has been **more than four weeks** since a previous meningococcal vaccine was received (Public Health Agency of Canada, 2015).
- Individuals who were immunized at less than 1 year of age should be revaccinated if it has been **more than 4 weeks** since a previous meningococcal vaccine was received (Public Health Agency of Canada, 2015).
- Individuals who were immunized after their first birthday and individuals without underlying medical risk factors should be revaccinated if they have not been vaccinated with a meningococcal vaccine **in the past year** (Public Health Agency of Canada, 2015).

[7] intubating, resuscitating or closely examining the oropharynx
[8] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7.

To the extent possible, Saskatchewan follows the recommendations in the 2015 Canadian Immunization Guide for post-exposure vaccination of close contacts for vaccine preventable meningococcal serogroups[9].

Special Considerations for Immunoprophylaxis

Serogroup B:
Recommendations for post-exposure use of meningococcal B vaccine are not included in the current version of the evergreen Canadian Immunization Guide (as of April 2015). Refer to Chapter 10 of the Saskatchewan Immunization Manual for the multicomponent meningococcal B vaccine (4CMenB) schedule and complete the series that they are eligible for based on their age.

Serogroup C:
Individuals 11 years of age and older who are contacts to serogroup C can receive either Men-C-C or Men-C-ACYW-135. Saskatchewan parameters for which vaccine to provide are outlined in Attachment – Immunoprophylaxis Guidelines for Serogroup C Contacts Who Are 11 Years of Age and Older.

Testing

- Testing of asymptomatic contacts is of no value and is not recommended.

III. Environment

Child Care Centre/Schools Control Measures

Ensure each parent receives the information sheet about Meningococcal Disease (*Neisseria meningitidis*).

[9] https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-13-meningococcal-vaccine.html

Management of the centre/school:

- Notify and educate staff and parents of contacts of the case to be alert for anyone with sudden onset of fever, intense headache, nausea and often vomiting, stiff neck and photophobia. Seek prompt evaluation by a physician for any ill child.
- The centre director must notify public health if any additional children become ill.
- All children and care providers should be evaluated as to whether they meet criteria for contact definition for meningococcal disease and be given chemoprophylaxis as appropriate.
- Notify parents of all childcare centre attendees of the occurrence of a case of meningococcal disease (see the appropriate Attachment – Sample Letter about Invasive Meningococcal Disease – Prophylaxis Recommended or Sample Letter about Invasive Meningococcal Disease – Prophylaxis NOT Recommended) and a Meningococcal Disease *(Neisseria meningitidis)* information sheet.
- Assess immunization status of children and staff and immunize as per Immunoprophylaxis section.

Special Considerations for Funeral Homes

Follow routine infection control practices when handling cadavers.

Traditionally, cadavers with meningococcal disease have been considered a possible source of infection. The risk is likely very low if the deceased person had been treated with an effective antibiotic for at least 24 hours before death.

In instances when the deceased had not been treated with an effective antibiotic before death, it is prudent for those who have occupational contact with a cadaver to follow routine infection control practices with additional droplet and contact precautions (Public Health Agency of Canada, 2005).

IV. Epidemic Measures

Outbreaks

An outbreak is defined as increased transmission of *N. meningitidis* in a population, manifested by an increase in cases of the same serogroup.

Outbreaks can be subdivided into organization-based or community-based outbreaks using the criteria shown in Table 3.

Table 3: Types of Outbreak

Organization-based	Increased transmission of *N. meningitidis* in an organization or institution with two or more cases of the same serogroup occurring within a 4-week interval. This includes restricted populations, such as schools, day cares, sports groups, or social groups, as well as nursing homes or long-term care facilities.
Community-based	Increased transmission of *N. meningitidis* in a community, with three or more confirmed cases of the same serogroup occurring within a three-month interval AND an age-specific incidence OR specific community population incidence of approximately 10/100,000, where there is an absence of an epidemiologic link between cases. This is not an absolute threshold and should be considered in the context of other factors.

Regardless of the type of outbreak, contact tracing, identification of close contacts, and provision of chemoprophylaxis to close contacts need to be conducted as described for sporadic cases.

When evidence suggests that an outbreak is occurring with increased transmission of *N. meningitidis* involving a vaccine-preventable serogroup in a delineated population, vaccination of persons at high risk should be considered. The specific epidemiology of the outbreak needs to be ascertained to define the group at risk. Decisions regarding the use of vaccine in communities with a higher than expected rate of disease should be made in consultation with the chief MHO.

When an outbreak occurs:

1. Communication strategy should be in place to provide timely information to the public. This would include:
   - why some people are being immunized and not others;
   - why some people are being given rifampin and not others;
   - not sharing of drinking equipment, cigarettes, etc. especially at sports and high school events;
   - low risk to people entering outbreak area.

2. A communication strategy aimed at the health care community should also be developed. This includes notification of local hospital emergency departments, labs, infection control departments, and physicians/nurse practitioners.
3. An outbreak advisory committee comprising ministry and local public health representatives, clinicians, and medical laboratory personnel should be established. Keep other jurisdictions informed about the outbreak and related control strategies.
4. A communication strategy is prepared before a decision is made to undertake an outbreak immunization program.

Prevention and Education

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.

Education

- Educate the public about the disease and the need for active immunization. Immunization information fact sheets can be used to guide discussion.
- Education should be provided regarding respiratory etiquette and measures to prevent transmission.

Immunization

- Immunize infants, children, and adults according to the recommended age-appropriate schedules. Refer to Saskatchewan Immunization Manual.[10]
- Provide the appropriate vaccine to travelers at risk (refer to local travel health consultant for details). The risk to travelers planning to have prolonged contact with the local population in areas experiencing endemic/epidemic meningococcal A or C diseases may be reduced by immunization.
- Consider vaccination/revaccination for individuals at risk in outbreak situations if one of the vaccine preventable serogroups has been confirmed.

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

Revisions

Date	Change
September 2018	• Updated to align with Panorama configuration; • Incorporated Meningococcal Disease Data Collection Worksheet; • Clarified the purpose for notification of cases to public health; • Incorporated an Epidemiology and Occurrence placeholder into the chapter; • Rearranged and updated the style into the new format of the Manual. • Implemented boxes to draw attention to treatment, chemo and Immunoprophylaxis information. • Removed reference to treatment of conjunctivitis and chemoprophylaxis for contacts to cases with conjunctivitis based on more recent references. • Updated chemoprophylaxis recommendations for HCWs based on more recent references. • References reaffirmed or updated as necessary.

References

Alberta Health and Wellness. (2018). *Public health notifiable disease management guidelines: Meningococcal disease, invasive (IMD)*. Retrieved August, 2018 from http://www.health.alberta.ca/professionals/notifiable-diseases-guide.html.

American Academy of Pediatrics. (2015). *Red Book: 2015 Report of the Committee on Infectious Diseases* (30th ed.). Elk Grove Village, IL: Author.

British Columbia Centre for Disease Control. (2017). *Meningococcal disease.* In *BCCDC Communicable disease control manual.* Retrieved August, 2018 from http://www.bccdc.ca/health-professionals/clinical-resources/communicable-disease-control-manual/communicable-disease-control

Health Canada. (2002). Prevention and control of occupational infections in health care: An infection control guideline. *Canada Communicable Disease Report (CCDR), 28S1:1-264.* Retrieved March, 2013 from http://www.collectionscanada.gc.ca/webarchives/20071124130346/http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Heymann, D. L. (Ed.). (2015). *Control of Communicable Diseases Manual* (20th ed.). Washington, DC: American Public Health Association.

Public Health Agency of Canada. (2005). Guidelines for the prevention and control of meningococcal disease. *Canada Communicable Disease Report (CCDR), 31S1:1-20*. Retrieved August, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/05vol31/31s1/index-eng.php.

Public Health Agency of Canada. (2006). Update: Guidelines for the prevention and control of meningococcal disease. *Canada Communicable Disease Report (CCDR), 32(22).* Retrieved March, 2013 from http://www.collectionscanada.gc.ca/webarchives/20061212105411/http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/06vol32/dr3222ec.html.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR), 35S2*, November 2009. Retrieved August, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Mening-eng.php.

Public Health Agency of Canada. (2009). Update on the invasive meningococcal disease and meningococcal vaccine conjugate recommendations. *Canada Communicable Disease Report (CCDR),* V35*(ACS-3).* Retrieved August, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/acs-dcc-3/index-eng.php.

Public Health Agency of Canada. (2015). *Canadian immunization guide* (Evergreen ed.). Ottawa, Canada: Public Works and Government Services Canada. Retrieved August, 2018 http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php#toc.

U.S. Centers for Disease Control and Prevention. (2010). Updated recommendations for use of meningococcal conjugate vaccines: Advisory Committee on Immunization Practices. *Morbidity and Mortality Weekly Report (MMWR), 60(03);72-76,* January 28, 2011. Retrieved August, 2018 from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6003a3.htm.

U.S. Centers for Disease Control and Prevention. (2015). *Epidemiology and prevention of vaccine-preventable diseases.* (13th ed.). Atkinson, W., Hamborsky, J., Wolfe, S., (Eds.). Washington DC: Public Health Foundation. https://www.cdc.gov/vaccines/pubs/pinkbook/mening.html

U.S. Centers for Disease Control and Prevention. (2018). *Manual for the surveillance of vaccine-preventable diseases. Chapter 8: Meningococcal disease (2018).* (MacNeil, J., Patton, M.). Atlanta GA: Washington DC. https://www.cdc.gov/vaccines/pubs/surv-manual/chpt08-mening.html

Government of Saskatchewan

PANORAMA

Meningococcal 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

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

Disease Summary Classification: CASE:	**Date**	**Classification: CONTACT:**	**Date**	**LAB TEST INFORMATION:**
☐ Confirmed	YYYY / MMM / DD	☐ *Contact*	*YYYY / MMM / DD*	*Date specimen collected:*
☐ Does Not Meet Case	YYYY / MMM / DD	☐ *Not a Contact*	*YYYY / MMM / DD*	*YYYY / MMM / DD*
☐ Person Under Investigation	YYYY / MMM / DD	☐ *Person Under Investigation*	*YYYY / MMM / DD*	☐ *Blood* ☐ *Other* ☐ *CSF* ☐ *Joint fluid* ☐ *Pericardial fluid*
☐ Probable	YYYY / MMM / DD			

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:
Provider's Phone number:	Date Received (Public Health): YYYY / MMM / DD

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

C) DISEASE EVENT HISTORY

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

Site / Presentation: ☐ Meningitis ☐ Sepsis ☐ Unknown

Meningococcal Disease (invasive) Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

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 / MMM / DD	Neurologic - delerium		YYYY / MMM / DD
Bruising - ecchymoses		YYYY / MMM / DD	Pain - photophobia (sensitivity to light)		YYYY / MMM / DD
Cellulitis - orbital		YYYY / MMM / DD	Prostration		YYYY / MMM / DD
Coma		YYYY / MMM / DD	**Purpura fulminans (coagulation of small blood vessels)**		YYYY / MMM / DD
Fever		YYYY / MMM / DD	Rash - maculopapular		YYYY / MMM / DD
Headache		YYYY / MMM / DD	Rash - petechial		YYYY / MMM / DD
Meningitis		YYYY / MMM / DD	**Sepsis (e.g. bacteremia, septicemia, etc.)**		YYYY / MMM / DD
Nausea		YYYY / MMM / DD	**Shock**		YYYY / MMM / DD
Neck stiffness (nuchal rigidity)		YYYY / MMM / DD			YYYY / MMM / DD
Other s/s					

E) INCUBATION AND COMMUNICABILITY

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case (period for acquisition):
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date**: YYYY / MM / DD

Exposure Calculation details:

Communicability for Case (period for transmission):
Earliest Possible Communicability Date: YYYY / MM / DD **Latest Possible Communicability Date**: YYYY / MM / DD

Communicability Calculation Details:

F) 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 - Cochlear Implant +			
Chronic Medical Condition Congenital or Acquired, or Functional Asplenia +			
Contact At risk population (international travellers or immigrants) (i.e. risk areas)			
Contact - IMD Case: serogroup A, Y, or W-135 +	YYYY / MM/DD		
Contact - IMD Case: serogroup B +	YYYY / MM/DD		
Contact - IMD Case: serogroup C +	YYYY / MM/DD		
Contact to a known case (Add'l Info)	YYYY / MM/DD		
Immunocompromised – Acquired Complement Deficiency +			
Immunocompromised – Congenital immunodeficiency +			
Immunocompromised - Related to disease or treatment (Add'l Info)			
Immunocompromised - Transplant Candidate or Recipient - Solid Organ/Tissue +			
Occupation - Health care worker - IOM Risk Factor	TE		
Occupation - Child care worker	TE		
Behaviour - Sharing personal items (cigarettes, water bottles, etc)	TE		
Setting - Crowded living conditions (>1 person per room excluding bathrooms)	TE		
Special Population – Attends childcare	TE		
Special Population - Attends school	TE		
Special Population - Lives in a communal setting	TE		

Meningococcal Disease (invasive) Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

DESCRIPTION	Yes Start Date	N, NA, U	Add'l Info
Special Population - Post secondary education institution	TE		
Travel: Outside of Canada (Add'l Info)	YYYY / MM/DD AE		
Travel Outside of Saskatchewan, but within Canada (Add'l Info)	YYYY / MM/DD AE		
Other risk factor (Add'l Info)			

G) COMPLICATIONS

LHN-> INVESTIGATION->COMPLICATIONS

Description	Yes Date of onset	Description	Yes Date of onset
Disseminated intravascular coagulation (DIC)	YYYY / MMM / DD	Gangrene	YYYY / MMM / DD
Other complications			

H) IMMUNIZATION HISTORY INTERPRETATION SUMMARY

LHN -> INVESTIGATION-> IMMUNIZATION HISTORY INTERPRETATION SUMMARY

Interpretation Date: YYYY / MM / DD **serotype: _____**

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

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

Reason:

☐ Previous disease ☐ Previous responder/Previous history of immunity ☐ Date Of Birth

☐ IOM – Interpretation of history by investigator

I) TREATMENT

LHN-> INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication *(Panorama = Other Meds) :* _____

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

J) INTERVENTIONS

INVESTIGATION->TREATMENT & INTERVENTIONS->INTERVENTION SUMMARY

Intervention Type and Sub Type:

Assessment: Investigator name
☐ Assessed for contacts YYYY / MM / DD

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

Communication:
☐ Other communication (see Investigator Notes) YYYY / MM / DD
Investigator name
☐ Letter (See Document Management) YYYY / MM / DD
Investigator name

Immunoprophylaxis
☐ Immunoprophylaxis (Contacts only)

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

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

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

Testing:
☐ Lab testing recommended YYYY / MM / DD
Investigator name

Exclusion: Investigator name
☐ Daycare YYYY / MM / DD ☐ Preschool YYYY / MM / DD
☐ School YYYY / MM / DD ☐ Work YYYY / MM / DD

Referral:
☐ Consultation with MHO ☐ Primary Care Provider

Other Investigation Findings:
☐ Investigator notes ☐ Document Management

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	

Meningococcal Disease (invasive) Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: ___________
Panorama Investigation ID: ___________

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	

K) 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) ____________________________

L) Acquisition Event LHN-> INVESTIGATION-> EXPOSURE SUMMARY-> ACQUISITION EVENT SUMMARY -> QUICK ENTRY

Acquisition Event ID:_________

Exposure Name: ____

Acquisition Start YYYY / MM / DD to **Acquisition End:** YYYY / MM / DD

Location Name: ____

Setting Type

☐ Travel ☐ Health care setting ☐ Public facilities ☐ Recreational facilities ☐ Most likely source

M) Transmission Events LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Transmission Event ID	Exposure Name	Setting type (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	Date/Time	# of contacts
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities (daycare, school, etc)	YYYY / MM / DD to YYYY / MM / DD	
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities (daycare, school, etc)	YYYY / MM / DD to YYYY / MM / DD	
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities (daycare, school, etc)	YYYY / MM / DD to YYYY / MM / DD	
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities (daycare, school, etc)	YYYY / MM / DD to YYYY / MM / DD	
	Meningococcal Contacts – Inv ID# _____	☐ Multiple Settings	YYYY / MM / DD to YYYY / MM / DD	

N) TOTAL NUMBER OF CONTACTS

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> TE HYPERLINK -> UNKNOWN/ANONYMOUS CONTACTS

Anonymous contacts:________ (total number of individuals [including groups that 1:1 follow-up is not required or is not feasible])

Initial Report completed by:		**Date initial report completed:** YYYY / MMM / DD

Meningococcal Disease - invasive
Attachment – Meningococcal Chemoprophylaxis Guidelines

Chemoprophylaxis* for Close Contacts of Individuals with Meningococcal Infection		
Drug* **	**Dosage****	**Comments**
Rifampin	**Adults:** ▪ 600 mg orally every 12 hours for 4 doses **Children ≥ 1 month of age (up to 60 kg):** ▪ 10 mg/kg (maximum 600 mg) orally every 12 hours for 4 doses **Infants < 1 month of age:** ▪ 5 mg/kg per dose orally every 12 hours for 4 doses	Should not be used in pregnancy - Ceftriaxone is a safer alternative. Urine and tears may be stained red. Advise against wearing of soft contact lenses as they can also be stained. Can reduce effectiveness of oral contraceptives. Advise use of alternative/ additional contraceptive measures. Refer to Rifampin Chemoprophylaxis Dosage Guide for *Neisseria meningitidis* for information on dosing.
Ceftriaxone	**Adults and adolescents ≥ 12 years:** ▪ 250 mg IM x 1 dose **Children < 12 years:** ▪ 125 mg IM x 1 dose	Recommended drug for pregnant women. Alternative for persons who cannot tolerate oral medication. Dilute in 1% lidocaine to reduce pain at injection site.
Ciprofloxacin	**Adults ≥ 18 years of age:** ▪ 500 mg PO x 1 dose	Contraindicated during pregnancy and lactation. Only approved for persons > 18 years of age. Not recommended for prepubertal children
*Chemoprophylaxis should be offered to all persons having close contact with an IMD case during the infectious period (the 7 days before onset of symptoms in the case to 24 hours after onset of effective treatment) regardless of their immunization status. Chemoprophylaxis is unlikely to be of benefit if given > 10 days after the most recent exposure to an infectious case. If antibiotics such as penicillin, which do not reliably eliminate nasopharyngeal carriage, have been used for treatment, the index case should also receive antibiotics that clear nasal carriage before discharge. **PO, orally; IM, intramuscularly. *** See Appendix F - Patient Information Sheets for medication fact sheets.		

(Source: Public Health Agency of Canada, 2005)

Rifampin Chemoprophylaxis Dosage Guide for *Neisseria meningitidis*

Dosage Guide based on the noted weight in kg below. **Calculate dose based on exact weight. Maximum dose 600 mg.**																
Weight in kg ***Dosage by age***	**5**	**6**	**7**	**8**	**9**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60** Max or adult dose
<1 mo of age *5 mg/kg/dose (25 mg/ml suspension)* 1 Dose PO q 12 h x 4 doses	1.0 ml	1.2 ml	1.4 ml	1.6 ml	1.8 ml	2.0 ml	3.0 ml	4.0 ml								
>1 mo of age *10 mg/kg/dose (max dose 600 mg)* *1 Dose PO q 12 h x 4 doses*	2.0 ml	2.4 ml	2.8 ml	3.2 ml	3.6 ml	4.0 ml	6.0 ml	8.0 ml	10.0 ml	12.0 ml	14.0 ml	16.0 ml	18.0 ml	20.0 ml	22.0 ml	24.0 ml

Recommendations

1. Use the appropriate weight-specific dose noted in the first column in the chart above for infants and children.
2. Rifampin Pediatric Suspension should be prepared by a pharmacist as follows:
   - **Add contents of 3 (300mg) caps or 6 (150 mg caps) of Rifampin to 36 mls of simple syrup to yield a 25 mg/ml suspension.**
   - **SHAKE WELL.**
3. Store prepared suspension and simple syrup at room temperature because of their tendency to crystallize if refrigerated.
4. Discard prepared suspension after treatment course is completed. Preparation expires after 28 days.
5. As much as possible, use only one preparation form per client (i.e., capsule(s) only, or suspension only).
6. Give client a Rifampin information sheet.

Note:

- Rifampin is contraindicated in pregnancy. Discuss Ceftriaxone dose with MHO.
- If necessary, discuss alternative treatments with MHO for non-pregnant adults.

Meningococcal Disease - invasive

Attachment – Immunoprophylaxis Guidelines for Serogroup C Contacts Who Are 11 Years of Age and Older

Individuals 11 years of age and older who are contacts to serogroup C can receive either Men-C-C or Men-C-ACYW-135. Saskatchewan parameters for which vaccine to provide are outlined as follows:

Contact Group	Vaccine	Recommendation
Individuals 11 years and older with underlying risk factors (as per SIM Appendix 7.1[1])	Men-C-ACYW-135	Provide to individuals who: • have not received a previous dose of Men-C-ACYW-135 as part of their routine immunization **OR** • are due for a Men-C-ACYW-135 booster dose as per high-risk immunization schedule.[1]
	Men-C-C	Provide to high-risk individuals who: • have had a dose of Men-C-ACYW-135 **more than 4 weeks ago** **BUT** • are not yet due for their routine Men-C-ACYW-135 booster.[1]
Grade 6 students (regardless of age)	Men-C-ACYW-135	Provide to individuals who: • have not received a dose of meningococcal C-containing vaccine **in the past year** **AND** • are eligible for Men-C-ACYW-135 as part of the routine school immunization program.
	Men-C-C	If Men-C-C is provided at the time of exposure, Men-C-ACYW-135 should be provided a minimum of 4 weeks after Men-C-C to complete the routine immunization Grade 6 program.

[1] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7

Meningococcal Disease - invasive
Attachment –Immunoprophylaxis Guidelines for Serogroup C Contacts Who Are 11 Years of Age and Older

Contact Group	Vaccine	Recommendation
Individuals born Jan 1, 2000 or later (up to age 22)[2]	Men-C-ACYW-135	Provide to individuals who: • have not received a dose of meningococcal C-containing vaccine **in the past year** **AND** • have not received a single dose of Men-C-ACYW-135 as part of the routine school immunization program.
	Men-C-C	Provide to individuals who: • have received one dose of Men-C-ACYW-135 **AND** • it has been **more than 1 year** since their last meningococcal C-containing vaccine.
Individuals 11 years and older with no risk factors and not eligible for the Grade 6 program	Men-C-C	Provide to individuals who have not received a dose of meningococcal C-containing vaccine **in the past year.**

[2] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter5

Notification Timeline:

From Lab/Practitioner to Public Health: Within 48 hours

From Public Health to Ministry of Health: Within 24-48 hours

Public Health Follow-up Timeline: Initiate immediately[1]

Public Health Purposes for Notification of Monkeypox:

- To prevent transmission of monkeypox from imported cases and further local transmission.
- To rapidly stop the chains of transmission of monkeypox in the community by targeting public health measures to those highest risk for transmission.
- To prevent endemicity of Monkeypox in Canada by preventing introduction in additional higher risk groups and the greater Canadian population through contact tracing.
- To protect public health and health care in Canada, including those services which can diagnose and manage cases, in the context of community transmission of monkeypox.
- Ensure the public health response and clinical management are evidence-based by enabling epidemiologic studies, research and evaluation activities that will address prioritized knowledge gaps.
- To track epidemiology trends of monkeypox in Saskatchewan including risk factors and distribution;
- To monitor the effectiveness of prevention and control measures;
- To take timely and evidence informed actions on outbreaks; and
- To inform the public and medical community about monkeypox.

[1]. Follow up should be initiated immediately for all probable, suspect and confirmed cases as prophylaxis for eligible contacts is time limited.

Table 1. Surveillance Case Definitions[2] (Adapted from Public Health Agency of Canada, June 15, 2022)

Confirmed Case	• A person who is laboratory confirmed for monkeypox virus by detection of unique sequences of viral DNA either by real-time polymerase chain reaction (PCR) and/or sequencing.
Probable Case	A person of any age who presents with an unexplained[1] acute rash or lesion(s)[2] **AND** • Has one or more of the following 1. Has an epidemiological link to a probable or confirmed monkeypox case in the 21 days before symptom onset, such as ▪ face-to-face exposure, including health workers without appropriate personal protective equipment (PPE) ▪ Direct physical contact, including sexual contact; or contact with contaminated materials such as clothing or bedding **OR** 2. Reported travel history to or residence in a location where monkeypox is reported[3] in the 21 days before symptom onset. **OR** 3. Presumptive positive laboratory PCR result, pending confirmation (Saskatchewan Ministry of Health, June 2022).
Suspect Case	A person of any age who presents with one or more of the following: • An unexplained[1] acute rash[2] **AND** has at least one of the following signs or symptoms: ○ Headache ○ Acute onset of fever (>38.5°C) ○ Lymphadenopathy (swollen lymph nodes) ○ Myalgia (muscle and body aches) ○ Back pain ○ Asthenia (profound weakness) • An unexplained[1] acute genital, perianal or oral lesion(s) **AND** • Pending (or invalid) laboratory PCR result (Saskatchewan Ministry of Health, June 2022).

[1] *Common causes of acute rash can include* Varicella zoster, herpes zoster, measles, herpes simplex, syphilis, chancroid, lymphogranuloma venereum, hand-foot-and-mouth disease

[2] *Acute rash* - Monkeypox illness includes a progressively developing rash that usually starts on the face and then spreads elsewhere on the body. The rash can affect mucous membranes in the mouth, tongue, and genitalia. The rash can also affect the palms of hands and soles of the feet. The rash can last for 2 to 4 weeks and progresses through the following stages before falling off:

- Macules
- Papules
- Vesicles
- Pustules
- Scabs

[3] Reported travel history includes regional, national, or international travel in the 21 days before symptom onset to any area where monkeypox may be reported.

[2] 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

Monkeypox (MPX) is a viral zoonotic disease that occurs primarily in tropical rainforest areas of Central and West Africa and is occasionally exported to other regions through travel. (WHO, 2022)

As of July 23, 2022, more than 16,000 cases were reported from 75 countries and territories including five deaths and the World Health Organization declared the Monkeypox outbreak a public health emergency of international concern. At this time, the cases are concentrated among men who have sex with men, especially those with multiple partners. MPX is transmitted through direct contact and although not known to be sexually transmitted, sexual exposure is high risk for transmission, due to direct contact involved.

As of August 17, 2022, 1,112 cases of MPX have been reported in Canada with more individuals under investigation.

Public health authorities and clinicians in Canada are advised to be vigilant and to consider MPX in their differential diagnosis of patients presenting with unusual rash, and other clinical signs consistent with MPX (e.g. fever, headache, and/or lymphadenopathy). (CNPHI alert May 19, 2022).

Additional information is available from the Government of Saskatchewan under Emerging Public Health Issues. Refer to Public Health Agency of Canada (PHAC) and World Health Organization (WHO) for information.

Additional Background Information

At the time of writing, the body of evidence surrounding MPX is limited, with little recent scientific data available. The guidance will evolve as new information becomes available; the focus is on the current Canadian context.

Causative Agent

MPX is a viral infection, caused by a virus of the Orthopoxvirus genus related to smallpox virus (BCCDC, 2022). There are two distinct genetic clades of the virus— the Congo basin clade (Central African) and the West African clade. The former is known to be more virulent and transmissible. Human infections with the West African clade appear to cause milder illness and be associated with a case fatality rate (CFR) of approximately 1% in endemic countries. When outbreaks of the West African clade have occurred in non-endemic countries previously, the CFR has been lower. The West African subtype has been implicated in the 2022 outbreak.

Symptoms
MPX typically presents clinically with fever, rash and swollen lymph nodes and may lead to a range of medical complications (WHO, 2022). The extent to which asymptomatic infection may occur is unknown.

MPX is usually a self-limited disease with the symptoms lasting from 2 to 4 weeks (WHO, 2022).

- Typically*, the clinical presentation begins with a prodromal systemic illness consisting of one or more of the following symptoms: fever, headaches, intense fatigue, sweating, lymphadenopathy, myalgias and arthralgias.
- Within 1 to 3 days of the prodromal illness, a rash typically* appears which tends to be more concentrated on the face and extremities rather than on the trunk
- The rash evolves from macules to papules, vesicles, pustules, and crust which dry up and fall off.
- *During the multi-country 2022 outbreak, not all cases are presenting in the typical fashion described above. Lesions may appear before/without systemic symptoms.

Complications
Severe illness can occur in some individuals.

Children are at higher risk of severe disease and historically have a higher case fatality rate in endemic countries. Potential complications include secondary infections, pneumonia, sepsis, encephalitis, keratitis with vision loss.

Reservoir/Source
The natural reservoir of MPX remains unknown. A number of animal species are susceptible to MPX, especially rodent species, but the full range of animals susceptible to MPX, particularly in North America, remains unknown at this time (PHAC, 2022).

Incubation Period
- Ranges from 5 to 21 days, usually 6 to 13 days (Public Health Agency of Canada, June 15, 2022).

Period of Communicability
- Cases are considered contagious from onset of symptoms (Public Health Agency of Canada, June 13, 2022). This includes the prodrome and lasts until after the scabs have fallen off and new skin can be seen.

Mode of Transmission

- MPX can be spread to humans in three ways; animal-to-human, human-to-human and via fomites.
- The virus can enter the body through broken skin, the respiratory tract, or through mucous membranes. Transmission can occur via direct contact with MPX skin lesions, non-intact skin or scabs, indirect contact with clothing or linens used by an infected person, or close contact with the respiratory tract secretions of an individual with MPX (Public Health Agency of Canada, May 27, 2022).
- Human-to-human transmission is relatively limited and occurs primarily through:
    - Direct contact with bodily fluids, skin lesions or lesion materials (including sexual contact), and this can occur through direct contact with lesion materials, such as contaminated clothing, linens or bedding.
    - Large respiratory droplets transmitted during prolonged face-to-face contact, which places infected individuals' household members and health care workers at greater risk.
- The secondary attack rate after contact with a known human source is 3%, with attack rates up to 50% having been reported among contacts living with an infected person
- Placental mother-to-fetus transmission is also possible (congenital MPX).
- Milder cases of MPX may sometimes go unnoticed and present a risk of person-to-person transmission.
- The longest documented chain of transmission in a community was six successive person-to-person infections.

Risk Factors

Risk factors associated with exposure to MPX include:

- History of travel in the past 21 days to areas experiencing MPX transmission
- Exposure to animals known to transmit MPX in an area endemic with MPX
- Contact to a known case of MPX
- Exposure to settings where exposure to respiratory droplets of cases or where people may come into contact with or share personal items of a case (towels, bedding, linens, etc.) such as households, congregate living settings, daycares, health care settings, or mass gatherings
- In the context of sexual behaviours that may pose a risk for acquisition or transmission, the following circumstance may require alternative contact tracing approaches:
    - Anonymous partnering in specific venues or via e-partnering sites.

Individuals with a history of smallpox vaccine may afford some protection to MPX.

Medical risk factors that compromise immune response may be associated with more severe disease. For example,

- Diabetes mellitus

- Immunocompromised related to underlying disease or treatment (cancer, chemotherapy, steroids, etc.)
- Organ or stem cell transplant recipients
- HIV or AIDS

Infection among pregnant women may result in congenital MPX.

Specimen Collection and Transport

Refer to the RRPL Compendium of Tests for up-to-date information[3].

- MPX diagnosis is confirmed by PCR testing (presence of MPX DNA).
- Samples will be forwarded from RRPL to the National Microbiology Laboratory (NML) in Winnipeg for testing. The turnaround time (TAT) for testing is approximately 2 days once the sample is received at the NML.
- RRPL is able to conduct an initial screen for orthopoxvirus with a TAT of 24 hours.

Lab Reports and Interpretation

Table 2. Interpretation of Test Results

Results from NAAT/RT-PCR are reported as:	Interpretation as per Case Definition	Test Details:
Positive	Confirmed	Monkeypox virus detected.
Presumptive positive	Probable	Orthopoxvirus detected; confirmatory testing pending.
Indeterminate	Probable	Virus is detected below the limit of detection of the assay. Recommend collection of new specimen for repeat testing.
Invalid	Not a case	Specimen failed Quality Control or exhibited non-specific amplification. Recommend recollection of new specimen for repeat testing.
Negative	Not a Case	Monkeypox virus NOT detected.

Source: RRPL June 14, 2022

[3] https://rrpl-testviewer.ehealthsask.ca/SCI/What%20is%20new%20at%20SDCL/2022%20Monkeypox%20Laboratory%20Bulletin%20-%20UPDATED%202.0.pdf

Treatment/Supportive Therapy (BCCDC, 2022)

- Most diseases are self-limited and require only supportive treatment.
- A limited supply of a treatment is available through the National Emergency Strategic Stockpile.
- *Indications for clinical use may be considered on a case by case basis in consultation with the infectious disease specialist and the Medical Health Officer.*
- *Access to treatment is via and subject to the requirements of the Special Access Programme.*

Public Health Investigation

I. Case

- All reports of **probable, suspect and laboratory-confirmed** MPX cases should be investigated as soon as possible so contact tracing and post-exposure prophylaxis, if appropriate, can be administered within the window (ideally, within four days).

History

- Refer to *Attachment – Monkeypox Data Collection Worksheet* to assist.
- Determine if there is an opportunity for acquisition in the 21 days before onset of the rash through:
    - contact to a case (confirmed, probable or suspect) while they were infectious;
    - exposure in a high risk setting;
    - exposure in the workplace – if so, see Referrals
    - history of travel (international or domestic)
        - Refer to Attachment – Travel Protocol for details required in the notification to the Ministry of Health to facilitate reporting obligations under the *International Health Regulations*.
- Identify contacts during the period of communicability (including persons, places and events)

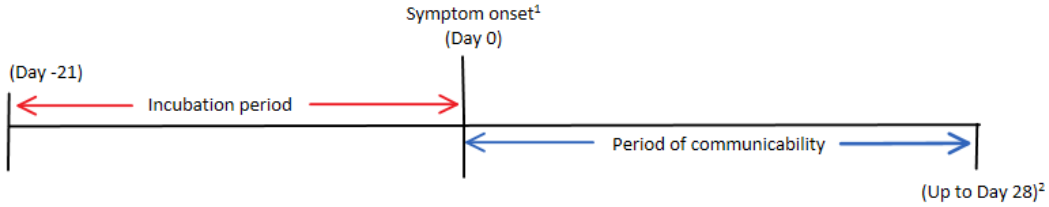
Public Health Interventions

Assessment

- Assess for known and unknown Contacts (Table 3 and Figure 1)
- History of smallpox vaccination (a smallpox vaccination scar is sufficient in the absence of documentation)

- Health conditions may render the individual more susceptible to severe illness; It is not known if the period of communicability is altered in these individuals (e.g. immunocompromised)

Figure 1 – Timeline for Investigation



[1] Onset of symptoms includes the onset of prodromal symptoms
[2] Communicability lasts until the scabs have all fallen off and the skin is healing- typically 2-4 weeks

Communication

- In the context of the current epidemiology of MPX in Canada, many of the contacts are unknown: outreach strategies with high-risk groups, event organizers, club owners, other stakeholders (shelters, CBOs, etc.) may be required in order to notify persons that may have had a high risk exposure when at a particular location or event.

Education

- All cases should be provided disease information including period of communicability as well as information on measures to prevent and control the spread (see Exclusion and Isolation) and how to access medical care and supplies for daily needs if required.
- Provide general advice on steps to take if symptoms worsen, instruction on self-care, when to contact their health care provider and how/when to access medical care.
- Cleaning and disinfecting practices as well as proper hand hygiene and respiratory etiquette to reduce the spread in the household setting including laundry and dishes as well as appropriate handling and disposal of soiled items.

Exclusion and Isolation (Adapted from Alberta Public Health Disease Management Guidelines Monkeypox, July 2022)

- Ideally, cases should isolate in a separate space (e.g., private room for sleeping and washroom) whenever possible, especially if they have respiratory symptoms, lesions that are hard to cover (e.g., on the face), or weeping lesions.
- Cases should stay home and avoid close contact with others, especially vulnerable populations (e.g. children under 12 years of age, immunocompromised individuals, and pregnant women) until scabs have fallen off and a fresh layer of skin has formed (i.e. the wound has a light pink/shiny pearl appearance). This typically takes 2 to 4 weeks, but may take longer.
    - During this time:

  - Keep lesions covered;
  - Avoid direct physical contact with others, including sexual contact;
  - Wear a well-fitting medical mask whenever in the presence of others (including household members);
  - Avoid sharing clothes, linens, bedding, towels, utensils, toothbrush, razors, sex toys, needles or any other items that may be contaminated with infectious particles from lesions or body fluids;
  - Avoid contact with animals/pets when possible;
  - Avoid donating blood or body fluids including sperm and tissue;
- Cases may attend school, work or other settings deemed necessary for daily living (i.e. grocery, pharmacy, medically necessary appointment) if they can confirm they can do all of the above AND:
  - Have been afebrile for 24 hours without use of fever-reducing medication;
  - Other systemic symptoms (e.g. headache, muscle pain, fatigue) and respiratory symptoms (if any) have improved; AND
  - They feel well enough to resume these activities.
- Assess if supports for self-isolation are required. Alternate isolation settings may be necessary based on the cases' individual circumstances (e.g. homeless, shelter, etc.).
- If needing immediate medical attention, call ahead to health care provider so they can prepare to provide care with appropriate measures.

Modified isolation should be designed to maintain the objective to rapidly stop chains of transmission, prevent edemicity and to protect public health and health care in Canada. In general, the least restrictive measures should be implemented to achieve public health goals.

Monitoring

- Active monitoring to support learning about the clinical evolution of the infection, address emerging issues and identify if supports are required for continued isolation.
- Monitoring (i.e., through regular communication) may be facilitated by self-report (i.e., case contacts public health) or outreach (i.e., public health contacts case, or in the context of providing assisted self-isolation or home care services).

Referrals

- To primary care provider or infectious disease specialist for clinical management.
- To community supports as needed while isolating.

Environmental Hygiene

- Clean and disinfect areas after use (especially high-touch surfaces and objects (e.g. toilets, door handles, light switches, etc)
- Unless cases are not able, they should handle and launder their own clothing, bedding, towels etc.
- Increase ventilation of the setting when possible (open windows, etc)

II. Contacts/Contact management

Identification of contacts and contact investigation should proceed immediately and should be re-evaluated once laboratory results are available. The Data Collection Worksheet should be used to support investigation.

The purpose of contact tracing is to:

- Ensure contacts are aware of:
    - their potential exposure,
    - any signs and symptom monitoring expectations,
    - risk mitigation measures to practice,
    - and what to do if they develop MPX symptoms (i.e., immediately isolate and notify public health)
- Provide information about post-exposure prophylaxis if eligible. See Prophylaxis to prevent the onset of disease and stop further transmission.
- Identify any symptomatic contacts as early as possible
- Facilitate prompt clinical assessment by a health care provider, laboratory diagnostic testing and treatment

Transmission of MPX requires prolonged close interaction with a symptomatic individual. Brief interactions and those conducted using appropriate PPE in accordance with Standard Precautions are not high risk and generally do not warrant PEP or public health follow-up (CDC, 2022).

Table 3. Contact Definition (Public Health Agency of Canada, June 2022)

Exposure Risk	Description	Examples
High	Prolonged [a] or intimate contact including: • Skin/mucosa to skin contact with a case (regardless of the case's lesion location) • Skin/mucosa contact with a case's biological fluids, secretions, skin lesions or scabs • Skin/mucosa contact with surfaces or objects contaminated by a case's secretions, biological fluids, skin lesions or scabs • Face-to-face interaction with a case, without the use of a medical mask by the case or contact	• Sexual partner • Household members • Roommate in a group home or student residence • HCP without appropriate PPE as per IPAC guidance [b] • Skin/mucosa contact with a case's unwashed bedding, linens, towels, clothing, lesion dressings, utensils, razors, needles, sex toys, etc.
Intermediate	• Not meeting high-risk exposure criteria above AND: o Limited or intermittent close proximity[c] to a case without wearing adequate PPE for the type of exposure risk (i.e., medical mask and gloves) o Shared living space where there are limited interactions with a case or their belongings	• Sitting next to case on plane • Person sharing close proximity workspace for long periods of time
Low or Uncertain	• Not meet the high- or intermediate-risk exposure criteria above AND: o Very limited exposures to a case o Wearing adequate PPE for the type of exposure risk (i.e., medical mask and gloves)	• Brief social interactions • Colleagues not sharing a confined or close-proximity office space • HCP wearing appropriate PPE as per IPAC guidance [a]

Acronyms:
- HCP: Health care provider
- PPE: Personal protective equipment
- IPAC: Infection prevention and control

[a] USCDC considers prolonged to be 3 hours.

[b] This guidance is focused on community settings and does not replace point-of-care risk assessments by health care providers in health care settings, or a risk assessment conducted by PHAs to determine the exposure risk for a health care provider. Guidance is available for infection prevention and control of MPX cases in healthcare settings.

[c] USCDC considers proximity to be within 6 feet (2 meteres)

Public Health Interventions

For both high- and intermediate-risk contacts (Table 3):

Assessment

- For symptoms
- Assess if contacts live or work in high-risk settings or with vulnerable individuals.

Education

- Contacts of cases should be informed of their exposure (potential or actual).
- Explain any signs and symptoms and required monitoring expectations, risk mitigation measures and to isolate if they develop any symptoms and contact public health for further direction.
- Provide information about post-exposure prophylaxis and referral to health care provider where appropriate, to prevent the onset of disease and stop further transmission. Refer to Prophylaxis.

Monitoring

- Contacts should monitor for symptoms for 21 days after their last exposure. (CDC, 2022)
    - Symptoms* of concern include:
        - Fever ≥100.4°F (38°C)
        - Chills
        - New lymphadenopathy (periauricular, axillary, cervical, or inguinal)
        - New skin rash

      *Fever and rash occur in nearly all people infected with MPX virus.
- Contacts should be instructed to monitor their temperature twice daily.
- Individuals should be advised to avoid fever-reducing medications (acetaminophen, ibuprofen and ASA) that may mask early symptoms of MPX.
- Conduct active (or passive, where appropriate) public health monitoring for signs and symptoms and counselling.

Exclusion

- Self-isolate as quickly as possible should symptoms develop, and contact the local public health office for further direction.
- Contacts who remain asymptomatic can be permitted to continue routine daily activities (e.g., go to work, school). Contacts should not donate blood, cells, tissue, breast milk, semen, or organs while they are under symptom surveillance.
- High- or intermediate-risk exposures should avoid contact with high-risk settings and vulnerable people during their monitoring period if possible. Refer to Table 4.

Immunoprophylaxis

- Imvamune is an active immunizing agent approved for active immunization against smallpox, MPX and related Orthopoxvirus infections and disease in adults 18 years of age and older determined to be at high-risk for exposure. See Saskatchewan Immunization Manual for vaccine details.
- A limited supply of the vaccine is available through the National Emergency Strategic Stockpile (NESS).
- The National Advisory Committee on Immunization released interim guidance on the use of Imvamune (Modified Vaccinia Ankara - Bavarian Nordic [MVA-BN], a non-replicating smallpox vaccine) in the context of MPX outbreaks in Canada in June 2022. The following are the NACI recommendations for post-exposure prophylaxis:
    - Post-exposure prophylaxis (PEP) using a single dose of the Imvamune® vaccine may be offered to individuals with high risk exposures* to a probable or confirmed case of MPX, or within a setting where transmission is happening. PEP should be offered as soon as possible and within 4 days of last exposure and can be considered up to 14 days since last exposure.
    - PEP **should not be offered** to individuals who are symptomatic and who meet the definition of suspect, probable or confirmed case.
    - The use of vaccination after an exposure to MPX may prevent or attenuate the infection if given within four days of the last exposure (ACIP suggests it be offered up to 14 days following exposure as it may reduce the symptoms of disease though not preventing disease. Use between 4 to 14 days should be offered to those at high-risk of ongoing exposures. (United Kingdom, June 6, 2022)
- PEP dosing:
    - For individuals with a history of receiving a single dose of a live smallpox vaccine, a single dose of Imvamune is recommended.
    - For individuals who have received a single dose of MVA-BN (i.e. Imvamune) previously (at least 28 days ago, a second dose (i.e. a booster dose) is recommended if repeated or predictable ongoing risk of exposure. For individuals who have received a previous live smallpox vaccine and one MVA-BN vaccine, no further doses are recommended.
    - For individuals who have received 2 doses of MVA-BN within the last 2 years, no further doses are recommended.
- Imvamune may prevent infection is administered within four days of exposure.

Table 4. Public Health Management of Contacts based on Exposure Risk

Risk Level	Education and Exclusion for Contacts	Public Health Action

All Exposures	For 21 days following last exposure to a case:
	• **Self-monitor** for symptoms. Try to avoid medications that are known to lower fever as these medications could mask an early symptom; please advise the public health if acetaminophen, ibuprofen, acetylsalicylic acid have been taken.
	• Practice proper hand hygiene and respiratory etiquette
	• Practice safe sex behaviours[b]
	• Alert any health care providers that provide medical care of the potential exposure
	• Self-isolate as quickly as possible should symptoms develop, and contact the local public health office for further direction, which will include
	  ○ where to go for care,
	  ○ the appropriate mode of transportation to use, and
	  ○ Infection prevention and control precautions to be followed
		• Provide instructions on what to do if signs and symptoms develop.

Low Risk	• As above	• As above • PEP is not recommended

Intermediate Risk	• As above AND
	• Avoid high risk setting (e.g. congregate living settings) and vulnerable populations (children under 12 years of age, pregnant women, immunocompromised individuals) where possible
	  ○ If this is unavoidable, consider wearing a well-fitting medical mask in these settings or around vulnerable populations
	  ○ For contacts who work in high-risk settings, refer to occupational health and safety advice or defer to the advice of their local PHA, based on a risk assessment
	• As a precaution to prevent possible spread to animals, including pets and livestock, and until more is known, it is recommended that contacts:
		• Active or passive Public Health monitoring
		• If symptoms develop, consider as a probable case and manage as a confirmed case.
		• Consult with MHO.

Risk Level	Education and Exclusion for Contacts	Public Health Action
	○ Have another member of their household care for their animals ▪ If this is not possible, contacts should wear a well-fitting medical mask and gloves when near the animals, and clean and disinfect high-touch surfaces frequently ○ Avoid handling, feeding or working closely with wildlife to prevent any possible spread of the virus – this is to limit risk of creating a wildlife reservoir for this virus in Canada	
High Risk Exposures	• As above AND • Be especially vigilant when self-monitoring for symptoms if working or living with vulnerable populations • Wear a well-fitting medical mask whenever in the presence of others (including household members) • Refrain from sexual contact with others	• Active public health monitoring for signs and symptoms • Determine if alternate approaches are needed to identify and notify high-risk contacts if not all exposed individuals are known to the case. • PEP is recommended based on time since exposure and in consultation with MHO
[b]While condom use and reduction of the number of partners is not completely protective in the case of MPX, it could reduce the risk of exposure.		

Table 5. Summary of NACI Recommendations for Vaccine Use (June 2022)

Type of Individual	Vaccine Eligibility	Dosing
Case	Do not use	N/A
High-Risk Exposure Contact	R*ecommended within 4 days* Consult with MHO and CMHO ***Do not administer to individuals who are symptomatic and who meet the suspect, probable or confirmed case definition.*** Refer to SIM for vaccine information	One dose should be offered as soon as possible and within 4 days. • *May be considered* up to 14 days after last exposures. Some high-risk exposures may extend beyond 28 days. In situations where confirmed high-risk exposures are multiple (i.e., beyond a single case) and expected to be ongoing over a period of weeks, PEP recipients *may be offered* a second dose 28 days after the first dose.
Intermediate Exposure Contact	Not recommended	N/A
Low-Risk Exposure	Not recommended	N/A
Special Populations: • Individuals who are: o Immunocompromised due to disease or treatment o pregnant or lactating o Children and youth <18 years of age o with atopic dermatitis	Imvamune® vaccine *may be* offered to the following populations, if recommended to receive vaccine based on high-risk exposure	Refer to SIM and product monograph for additional details.
Pre-Exposure	PrEP as an outbreak measure may be considered. Refer to Epidemic Measures. PrEP may be offered to personnel working with replicating orthopoxviruses that pose a risk to human health (vaccinia or MPX) in laboratory settings and who are at high risk of occupational exposure. NOTE: This recommendation	If Imvamune is used, *two doses should be given at least 28 days apart.* A booster dose may be offered after 2 years if the risk of exposure extends beyond that time. This recommendation does not apply to clinical diagnostic laboratory settings at this time, due to very low risk of transmission

	does not apply to clinical diagnostic laboratory settings at this time, due to very low risk of transmission.	

Testing

- Individuals with symptoms should be advised to seek testing; consultation with the Medical Microbiologist should occur to determine what testing is recommended.
- If the exposure was associated with sexual behaviours (casual sex, anonymous partnering, etc), individuals should also be assessed for other sexually transmitted and blood borne infections.

III. Environment

Routine Cleaning and disinfecting, particularly of frequently touched surfaces, can kill viruses. Using water and regular household cleaning products or a diluted bleach solution (0.5% sodium hypochlorite) is sufficient.

- **Cleaning the home and co-living setting:** Clean frequently touched areas such as toilets, bedside tables, light switches and door handles frequently and after use. Use the same solution or an alcohol prep wipe to clean frequently touched electronics such as phones, computers and other devices. Place all disposable contaminated items in a lined container before disposing of them with other household waste.

IV. Setting-Specific Control Measures

A. Child care centres

- Refer to the Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.

V. Epidemic Measures

- Immediate reporting (within 24 hours) of probable and suspect cases.
- Determine source and manner of spread.
- Determine extent of exposure and transmission.
- In the event of Monkeypox outbreaks and pending availability of Imvamune®, PrEP may be utilized. In the 2022 outbreak occurring within the network involving MSM, MPX vaccine has been expanded to include eligibility criteria among the at-risk population informed by the national and global epidemiology. Refer to the Monkeypox website for further details and the Saskatchewan Immunization Manual)

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

Individuals with a history of smallpox vaccine may have some protection against MPX. Routine immunization with smallpox vaccine was discontinued in early 1980 when smallpox was considered eradicated. Individuals born in 1970s may not have been given smallpox vaccine based on the immunization program in their local area.

Education

- Good hygiene, especially hand washing and respiratory etiquette is important to prevent the spread of viruses and bacteria.
- Routine environmental hygiene including cleaning and disinfecting practices should be used as standard practices in home and workplace settings to reduce the risk of disease transmission.

Revisions

Date	Change
August 18, 2022	• Updated epidemiology section • Corrected grammatical and punctuation errors • Included the use of PrEP in the Epidemic Measures including a link to the Sk Immunization Manual for details.
July 28, 2022	• Corrected the error regarding fever-reducing medications – moved the statement "Individuals should be advised to avoid fever-reducing medications (acetaminophen, ibuprofen and ASA) that may mask early symptoms of MPX" from case monitoring to contact monitoring. • Amended Exclusion and Isolation section for cases. • Amended Exclusion section for contacts to simplify when symptoms develop, to contact local public health for further direction.
June 27, 2022	• Added Figure 1 – Timeline for Investigation • Removed incomplete sentence - Immunoprophylaxis
June 16, 2022	New

References

Alberta public health disease management guidelines: monkeypox July 2022
https://open.alberta.ca/publications/monkeypox

BCCDC Information for healthcare providers about monkeypox May 19, 2022
http://www.bccdc.ca/health-professionals/clinical-resources/monkeypox

CDC (June 2022). Monkeypox: Monitoring people who have been exposed. Retrieved June, 2022: https://www.cdc.gov/poxvirus/monkeypox/clinicians/monitoring.html

Public Health Agency of Canada (June 2022). NACI Rapid Response – Interim guidance on the use of Imvamune in the context of monkeypox outbreaks in Canada. Retrieved Jun 2022, https://www.canada.ca/content/dam/phac-aspc/documents/services/immunization/national-advisory-committee-on-immunization-naci/guidance-imvamune-monkeypox/guidance-imvamune-monkeypox-en.pdf

Public Health Agency of Canada (June 15, 2022). Monkeypox: For health professionals. Retrieved June 2022, https://www.canada.ca/en/public-health/services/diseases/monkeypox/health-professionals.html#a4

Public Health Agency of Canada (June 15, 2022). National case definition: Monkeypox. Retrieved June 2022, https://www.canada.ca/en/public-health/services/diseases/monkeypox/health-professionals/national-case-definition.html

United Kingdom Health Security Agency (June 2022). Monkeypox: Background information. https://www.gov.uk/guidance/monkeypox#:~:text=a%20milder%20disease.-%2cInfection%20prevention%20and%20control%2c%2c%20clothing%2c%20and%20so%20on

United Kingdom Health Security Agency (June 2022). Recommendations for the use of pre and post exposure vaccination during a monkeypox incident 6 June 2022 – retrieved June 2022 from: https://www.gov.uk/government/publications/monkeypox-vaccination

WHO monkeypox fact sheet May 19, 2022
Retrieved from https://www.who.int/news-room/fact-sheets/detail/monkeypox

Monkeypox Data Collection Worksheet

Please complete **all** sections.

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

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

LHN-> SUBJECT SUMMARY-> RESPIRATORY AND DIRECT CONTACT ENCOUNTER GROUP->CREATE INVESTIGATION

Disease Summary Classification: CASE	**Date**
☐ Confirmed	YYYY / MM / DD
☐ Does Not Meet Case	YYYY / MM / DD
☐ Person Under Investigation	YYYY / MM / DD
☐ Probable	YYYY / MM / DD
☐ Suspect	YYYY / MM / DD

Classification: CONTACT	***Date***
☐ *Contact*	*YYYY / MM / DD*
☐ *Not a Contact*	*YYYY / MM / DD*
☐ *Person Under Investigation*	*YYYY / MM / DD*

LAB TEST INFORMATION:

Date specimen collected:

YYYY / MM / DD

Specimen type:

- ☐ *Throat*
- ☐ *Nasopharyngeal*
- ☐ *Lesion*
- ☐ *Blood*

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	YYYY / MM / DD
☐ Incomplete – Unable to locate	YYYY / MM / DD	(specify where)	

Responsible Organization

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_____

Monkeypox Data Collection Worksheet

Please complete **all** sections.

C) DISEASE EVENT HISTORY

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

Site / Presentation: ☐ Genital ☐ Extra-genital ☐ Localized ☐ Generalized

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

INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Onset Symptom (√)	Description	No	Yes - Date of onset	Onset Symptom (√)
Arthralgia		YYYY / MMM / DD		Myalgia (muscle pain)		YYYY / MMM / DD	
Chills				Pneumonia			
Cough		YYYY / MMM / DD		**Rash**		YYYY / MMM / DD	
Diaphoresis (e.g. night sweats, profuse sweating, etc.)		YYYY / MMM / DD		**Rash** - crusted lesions or scabs		YYYY / MMM / DD	
Encephalitis				**Rash** - macules			
Fever		YYYY / MMM / DD		**Rash** - papule - ulcerated		YYYY / MMM / DD	
Headache		YYYY / MMM / DD		**Rash** - papules		YYYY / MMM / DD	
Lesion less than 50 (mild) (Specify # of lesions in add'l info if <10)		YYYY / MMM / DD		**Rash** - pustules		YYYY / MMM / DD	
Lesion 50 to249 (mild-moderate)		YYYY / MMM / DD		**Rash** - pustules - umbilicated		YYYY / MMM / DD	
Lethargy (fatigue, drowsiness, weakness, etc)		YYYY / MMM / DD		**Rash** - vesicles		YYYY / MMM / DD	
Lymphadenopathy - generalized		YYYY / MMM / DD		Sepsis (e.g. bactremia, septicemia, etc.)		YYYY / MMM / DD	
Lymphadenopathy – regional (specify location in add'l info i.e. cervical, inguinal, submandibular, axillary)		YYYY / MMM / DD					

D) INCUBATION AND COMMUNICABILITY (manually calculate based on identified organism)

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case (period for acquisition): 5-21 days
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date**: YYYY / MM / DD
Exposure Calculation details:

Communicability for Case (period for transmission): from onset of symptoms (prodrome) until scabs healed
Earliest Possible Transmission Date: YYYY / MM / DD **Latest Possible Transmission Date**: YYYY / MM / DD
Exposure Calculation details:

E) RISK FACTORS

INVESTIGATION-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes	N, NA, U	DESCRIPTION	Yes	N, NA, U
Chronic Medical Condition - Diabetes Mellitus+			**Setting –** Crowded living conditions (>1 person per room excluding bathrooms)		
Chronic Medical Condition - Malignancies/Cancer+			**Special Population -** Infant born to an infected mother		
Chronic Medical Condition - Other (Add'l Info)			**Special Population -** Pregnancy		
Immunocompromised - Related to underlying disease or treat't			**Special Population -** Homeless +		
Medical History - Previous STI (Add'l info)			**Behaviour** – Lack of personal protective measures		
Unknown Source					

Monkeypox Data Collection Worksheet

Panorama Client ID: _____
Panorama Investigation ID: _____

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

Exposure Risk Factors (in the 21 days prior to onset of illness)

DESCRIPTION	Yes	N, NA, U	START DATE	END DATE	ADD'L INFO
Contact - Contact to a known case (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include INV ID # if known in add'l info Create an AE with details
Contact - Persons with similar symptoms			YYYY / MM/DD	YYYY / MM/DD	Create an AE with details
Lives in a communal setting					Enter facility/ residence in add'l info
Risk Behaviour - Sharing non-injection drug equipment			YYYY / MM/DD	YYYY / MM/DD	
Risk Behaviour - Sharing personal items (cigarettes, water bottles, sex toys, etc.)			YYYY / MM/DD	YYYY / MM/DD	
Sexual Behaviour - Casual sex			YYYY / MM/DD	YYYY / MM/DD	
Sexual Behaviour - E-partnering (internet or apps) (Add'l info))			YYYY / MM/DD	YYYY / MM/DD	Include name of app or website in add'l info
Sexual Behaviour - Events with multiple sexual partners (party and play)			YYYY / MM/DD	YYYY / MM/DD	
Sexual Behaviour – Goods received (food, shelter, money or drugs) in exchange for sex			YYYY / MM/DD	YYYY / MM/DD	
Sexual Behaviour – MSM+			YYYY / MM/DD	YYYY / MM/DD	
Sexual Behaviour – Unknown/anonymous partner (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	
Sexual Behaviour – More than 2 sexual partners in past 3 months					
Travel - Outside of Canada (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include name of country in add'l info
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include name of province in add'l info
Travel – Within Saskatchewan (Add'l Info)			YYYY / MM/DD	YYYY / MM/DD	Include name of community in add'l info.
Animal Exposure - Rodents/rodent excreta			YYYY / MM/DD	YYYY / MM/DD	
Animal Exposure - Wild animals (other than rodents) (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	Enter type of animal in add'l info
Animal Exposure - Farms (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	Enter type of animal in add'l info
Animal Exposure - petting zoos/zoos/special events/other (Add'l info)					
Animal Exposure - Infected animal (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	Enter type of animal in add'l info
Animal Exposure - Other (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	Enter type of animal in add'l info
Animal Exposure - Pets (only mammals) (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	Enter type of animal in add'l info
Occupation - Health Care Worker – IOM use only			YYYY / MM/DD	YYYY / MM/DD	Include facility name Create AE or TE based on when worked if applicable
Occupation – LTC Staff + (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	
Occupation – Personal Care Home Staff + (Add'l info)			YYYY / MM/DD	YYYY / MM/DD	
Other (add'l Info)					Include Outbreak number if investigation associated with an OB

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Panorama Client ID: _____
Panorama Investigation ID: _____

Please complete **all** sections.

Has the individual received smallpox vaccine in the past? NOTE – routine smallpox vaccine was administered prior to 1978 with travel recommendation until 1982; successful smallpox vaccination left a scar in deltoid region of the arm.

Interpretation Date: YYYY / MM / DD

Interpretation of Disease Immunity: ☐ IOM - Fully immunized (for age) (via documentation or scar) ☐ IOM – Unimmunized ☐ IOM - Unclear immunization history

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

H) INTERVENTIONS

INVESTIGATION->TREATMENT & INTERVENTIONS->INTERVENTION SUMMARY

Intervention Type and Sub Type:

Assessment:
☐ Assessed for contacts YYYY / MM / DD
Investigator name

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

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Communication:
☐ Letter- e.g. school outbreak (specify) YYYY / MM / DD
Investigator name
☐ Other communication (specify) YYYY / MM / DD
Investigator name

Exclusion: Investigator name
☐ Work YYYY / MM / DD ☐ Preschool YYYY / MM / DD
☐ School YYYY / MM / DD ☐ Daycare YYYY / MM / DD

Symptom Monitoring: Investigator name
☐ Symptom Monitoring, indirect active YYYY / MM / DD
☐ Symptom Monitoring, indirect passive YYYY / MM / DD

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

Other Investigation Findings
☐ Investigator Notes YYYY/ MM /DD
☐ See Document Management YYYY/ MM /DD

Immunoprophylaxis: Investigator name
☐ Immunoprophylaxis YYYY / MM / DD
Enter details in immunization module

Treatment
☐ Treatment recommended (see Investigator Notes) YYYY / MM / DD

Testing:
☐ Lab testing recommended YYYY / MM / DD
Investigator name

Immunization:
☐ Eligible Immunization recommended YYYY / MM / DD
Investigator name

Referral:
☐ Infectious Disease Specialist YYYY / MM / DD
☐ Primary Care Provider YYYY / MM / DD
☐ Consultation with MHO 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	

Monkeypox Data Collection Worksheet

Panorama Client ID: _____
Panorama Investigation ID: _____

Please complete **all** sections.

I) OUTCOMES (if applicable)

INVESTIGATION->OUTCOMES

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

Cause of Death: (if Fatal was selected) _____

J) EXPOSURES – CONSIDER THE MODE OF TRANSMISSION

Acquisition Event

LHN-> INVESTIGATION-> EXPOSURE SUMMARY-> ACQUISITION QUICK ENTRY

Exposure Name (use the most appropriate and most specific Key Descriptor check box as the name)	**Location City/Town**	**Setting type** (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	**Start/End Date**	**Most likely source**
☐ Contact to a case ☐ Contact to a person with similar symptoms		☐ Household ☐ Type of community contact	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Primary Care Center ☐ Doctor's office ☐ Acute Care	City, name of facility	☐ Health care setting	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Provincial corrections ☐ Federal corrections		☐ Corrections Facility	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Shelter (e.g. lighthouse) ☐ Rooming house/Residential hotel ☐ Short term residential facility		☐ Congregate/Communal Living settings	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Daycare/day home ☐ Hotel/Motel ☐ School ☐ Nightclub		☐ Public Facilities	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Massage ☐ Personal care setting (e.g. hair salon, etc.)		☐ Personal Service	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Fitness Center(gyms) ☐ Exhibition ground ☐ Park ☐ Street festival ☐ Sauna/bathhouse		☐ Recreational Facility	YYYY / MM / DD to YYYY / MM / DD	☐
☐ Sex party		☐ Private Function		
Name of workplace		☐ Workplace	YYYY / MM / DD to YYYY / MM / DD	☐
City, Province OR City, Country		☐ Travel	YYYY / MM / DD to YYYY / MM / DD	☐

Transmission Events

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Exposure Name (use the most appropriate Key Descriptor as per the RF/AE Quick Reference as the name)	**Location City/Town**	**Setting type** (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	**Date/Time**
Use key descriptor or the name of the setting		☐ Congregate/Communal Living settings ☐ Health care setting ☐ Corrections Facility ☐ Household ☐ Workplace ☐ Type of Community Contact ☐ Public Facilities ☐ Personal Service ☐ Travel ☐ Recreational Facility ☐ Private Function	YYYY / MM / DD to YYYY / MM / DD

Monkeypox Data Collection Worksheet

Please complete **all** sections.

Use key descriptor or the name of the setting		☐ Congregate/Communal Living settings ☐ Health care setting ☐ Corrections Facility ☐ Household ☐ Workplace ☐ Type of Community Contact ☐ Public Facilities ☐ Personal Service ☐ Travel ☐ Recreational Facility ☐ Private Function	YYYY / MM / DD to YYYY / MM / DD

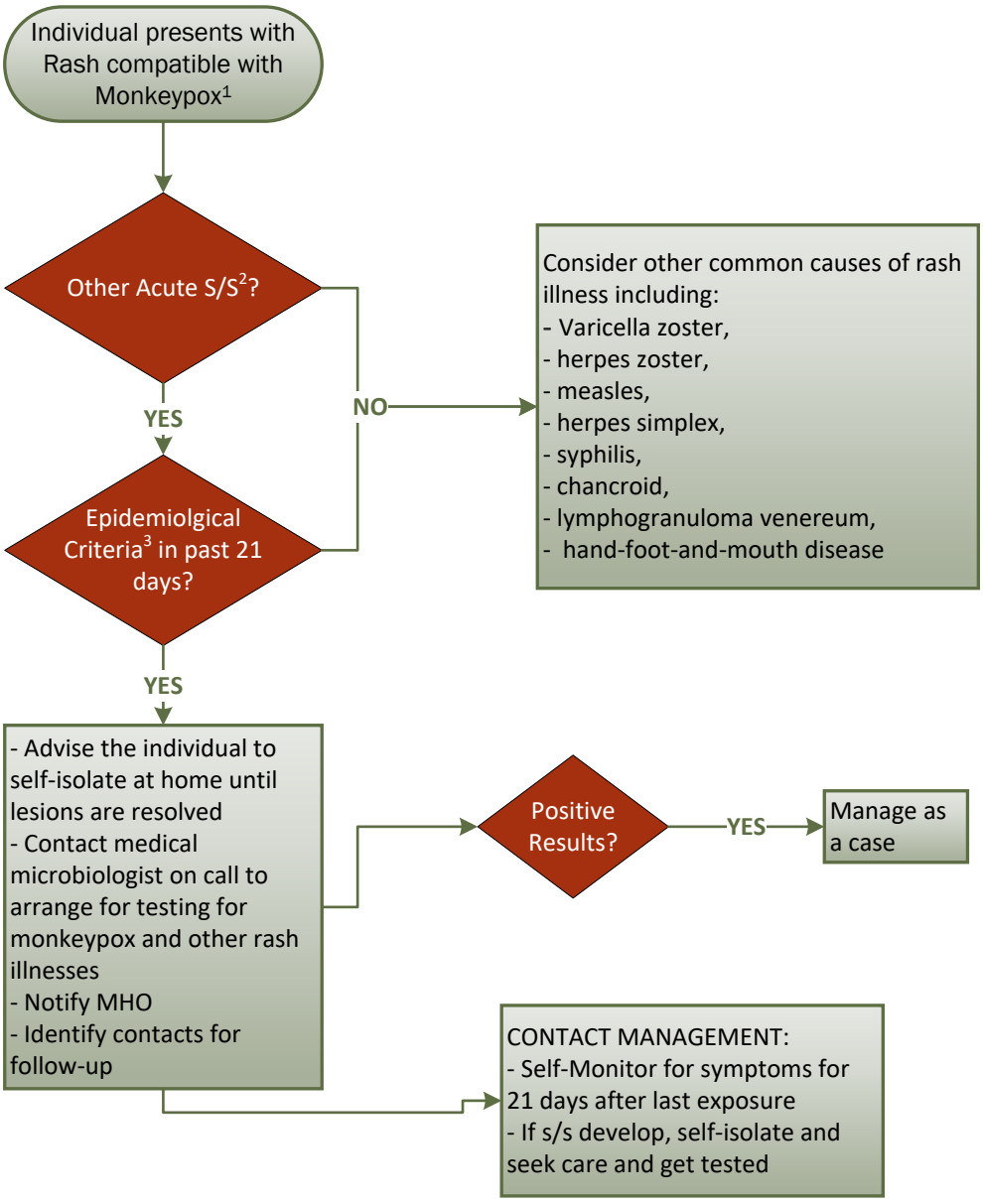
I) Total number of contacts LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> TE HYPERLINK

_____ (total number of *unknown* and *known* contacts)

Initial Report completed by:		**Date initial report completed:** YYYY / MMM / DD

Revisions

Date	Change
June 20, 2022	Aligned RF language with Panorama PROD and added prompt for imms history interpretation.
June 16, 2022	New



[1] **Monkeypox Illness**
- includes progressively developing rash that usually starts on the face and then spreads elsewhere on the body. The rash can affect the mucous membranes in the mouth, tongue and genitalia. The rash can also affect the palms of the hands and soles of the feet. The rash can last for 2-4 weeks and progresses through the following stages before falling off:
Macules, papules, vesicles, pustules and scabs.
There are case reports from North America of an atypical monkeypox virus rash that inlcudes painful genital/oral lesions.

[2] **Other Acute Signs or Symptoms of Monkeypox:**
Fever, lymphadenopathy, chills and or sweats, headache, back pain/ache, sore throat and or cough, coryza, malaise/listlessness, prostration/distress.

[3] **Epidemiological Criteria**:
High-Risk Exposure to a probable or confirmed case of human monkeypox (i.e. Living in the same household, having direct physical contact including sexual contact and direct contact with a skin lesion or bodiy fluid without appropriate personal protective equipment) **OR**
History of travel to a region that has reported confirmed cases or monkeypox, **OR**
A **relevant zoonotic exposur**e

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 Mumps (Adapted from Massachusetts, 2017)

- To prevent mortality and serious morbidity from mumps through rapid contact tracing;
- To prevent transmission of mumps from imported cases;
- To track epidemiology trends of mumps in Saskatchewan including risk factors and distribution;
- To monitor the effectiveness of prevention and control measures including the immunization program;
- To inform decisions about future immunization programs
- To make timely and evidence informed actions on outbreaks; and
- To inform the public and medical community about mumps.

Information

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

Confirmed Case	Clinical illness [a] and laboratory confirmation of infection in the absence of recent immunization [b] with mumps-containing vaccine: • isolation of mumps virus from an appropriate clinical specimen **OR** • detection of mumps virus ribonucleic acid (RNA) **OR** • seroconversion or a significant rise (e.g., fourfold or greater) in mumps immunoglobulin G (IgG) titre by any standard serologic assay between acute and convalescent sera

[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.

	OR • positive serologic test for mumps immunoglobulin M (IgM) antibody [c] in a person who is either epidemiologically linked to a laboratory-confirmed case or has recently travelled to an area of known mumps activity. **OR** Clinical illness in a person with an epidemiologic link to a laboratory-confirmed case.
Probable Case	Clinical illness [a] • in the absence of appropriate laboratory tests **OR** • in the absence of an epidemiologic link to a laboratory-confirmed case.

[a] Clinical illness is characterized by acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting > 2 days, and without other apparent cause.

[b] The most frequent reaction to measles-mumps-rubella (MMR) immunization is malaise and fever (with or without rash) occurring 7-12 days after immunization. Parotitis has occasionally occurred after immunization. However, this should be determined for each case, as these reactions and the time frame can vary (*Canadian Immunization Guide*, 7th edition).

A laboratory-confirmed case may not exhibit clinical illness, as up to 30% of cases are asymptomatic.

[c] IgM serology has the potential for false-positive findings. *If the clinical presentation is inconsistent with a diagnosis of mumps or in the absence of recent travel/exposure history, IgM results must be confirmed by the other listed confirmatory methods.

Further strain characterization is indicated for epidemiologic, public health and control purposes.

Although the case definition indicates that a positive serologic test for mumps IgM is a confirmed case, the challenge with relying on the IgM serology alone is that other etiologic agents (e.g., infection with parainfluenza virus, Epstein-Barr virus (EBV), or *Mycoplasma pneumoniae*) cross react and result in a false positive IgM for mumps. The positive predictive value of mumps IgM is low when the incidence of mumps is low in the community and most results will be false positives. If you have any questions regarding the interpretation of lab results, please call the to Roy Romanow Provincial Laboratory (RRPL) or the local Medical Health Officer (MHO).

To confirm diagnosis of mumps, the following must be taken into consideration:

- lab information;
- clinical presentation;
- case history.

Epidemiology and Occurrence

Canada

With the introduction of vaccine in 1969 in Canada, the number of reported mumps cases nationally decreased by more than 99% from an average of 34,000 cases per year in the early 1950s to fewer than 400 cases in the early 1990 and an annual average of 79 cases in the period 2000–2006. From 1996 to 2006, only five outbreaks primarily involving pre-school or school-aged children, adolescents, and young adults were reported.

Over time, the age distribution of mumps cases has changed. In Canada, the proportion of reported cases aged 20 years and older increased from 14% in 1988–1990 to 64% in 2003–2005 while the proportion of cases aged 1–9 decreased from 49% to 17% during the same period (Public Health Agency of Canada, 2009).

In Saskatchewan, between 2000-2016, a total of 32 cases of mumps were reported with zero cases reported in 6 of these years.

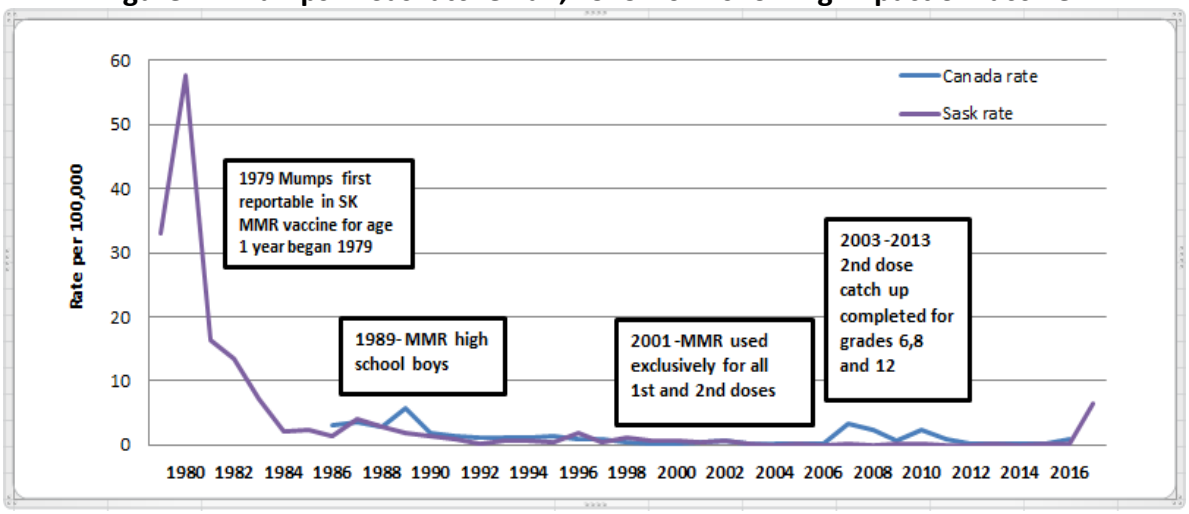
In 2017, 77 cases were largely related to three outbreaks: one involved a mine worksite; another involved a sports team which likely contracted the virus during interprovincial sports events. Mumps was introduced into a remote community from a neighbouring province.

Table 1. Evolution of the Mumps Immunization Program in Saskatchewan

1979	MMR vaccine for age 1 year
Fall 1991 to 1992	Mass MMR immunization for teen-aged boys in high schools and post-secondary institutions
2001	MMR used exclusively for all 1st and 2nd doses; MR discontinued by Berna
2003 - 2004	2 dose mumps catch-up in Grade 6
2007 - 2013	2-dose mumps catch-up for eligible Grade 12 students
2008 - 2013	2-dose mumps catch-up for eligible Grade 8 students
2011 - 2013	2nd dose provided to eligible Grade 6 students
May 2013	Adult born since Jan. 1, 1970 eligible for 2 MMR doses

Saskatchewan Immunization Manual (2018)

Figure 1. Mumps in Saskatchewan, 1979-2017 showing impact of vaccine



Additional Background Information

Causative Agent

Mumps virus, a member of the family *Paramyxoviridae*, genus *Rubulavirus.*

Symptoms

Prodromal symptoms are non-specific and include myalgia, headache, malaise and low-grade fever.

This acute viral illness is characterized by fever, swelling and tenderness of one or more salivary glands, usually the parotid and sometimes the sublingual or submaxillary glands. Children often experience respiratory symptoms. Up to 30% of infected cases can be asymptomatic.

- Orchitis can occur in as many as 20-30% of postpubertal males.
- Asceptic meningitis occurs in up to 10% of cases and rarely, encephalitis may occur as a complication (Heymann, 2015).
- Other rare complications may include arthritis, mastitis, glomerulonephritis, myocarditis, endocardial fibroelastosis, thrombocytopenia, cerebellar ataxia, transverse myelitis, ascending polyradiculitis, pancreatitis, oophoritis, hearing impairment etc. (American Academy of Pediatrics, 2018).
- During the first trimester of pregnancy, mumps is associated with an increased rate of spontaneous abortion (Heymann, 2015).

Reservoir/Source
Humans are the only known natural hosts.

Incubation Period
Range from 12-25 days (usually16-18 days) (American Academy of Pediatrics, 2018).

Period of Communicability
Can be isolated for up to 7 days before the onset of symptoms and for as long as 9 days after the onset of the illness. The period of maximum infectiousness is between 2 days before to 5 days after the onset of illness (Heymann, 2015)

Mode of Transmission
Droplet spread or direct contact with the respiratory secretions of an infected person; airborne transmission also occurs.

Specimen Collection and Transport
For the diagnosis of mumps the recommended specimens to be collected are:

- serum sample
  AND
  - a swab from around opening of Stenson's duct
    OR
  - a urine sample.

The buccal swab and urine sample will be tested by polymerase chain reaction (PCR). The respiratory pathogens currently in circulation can interfere with the serologic diagnosis (cross-reactions leading to false positive IgM).

- It is recommended that a buccal swab be obtained at the same time as the serological sample.
- Samples should be collected when the patient first presents with symptoms; these have the best chance of having a positive result by PCR if mumps infection is present. Among symptomatic persons who have received a dose of MMR, the virus may be cleared rapidly.

Public Health Investigation

I. Case

Control measures must be implemented immediately for all confirmed, probable or clinical cases. Awaiting lab confirmation must not delay the initiation of control measures. Refer to Attachment – Mumps Data Collection Worksheet to assist.

History

- Determine mumps immunization history including number of doses, date(s) administered, and type of vaccine.
- If the case has been fully immunized against mumps, further details of immunizations are required (lot numbers, where the vaccines were received, etc.).
- Determine if there is an opportunity for acquisition through:
  - contact with a confirmed or probable case of mumps.
  - history of travel (seven to 21 days before onset of rash), or contact (seven to 21 days before onset of rash) with a person who had recent travel.
- Health conditions that may render the individual more susceptible to infection or alter the period of communicability (e.g. immunocompromised).
- Identify contacts (refer to contact definition) by inquiring about opportunities for transmission events during the infectious period, which includes seven days prior to and five days after the parotitis appears:
  - household;
  - daycare/school;
  - workplaces;
  - health care facilities[2] (including physicians' offices and waiting rooms).

Public Health Interventions

Assessment

- Assess for contacts paying particular attention to susceptible contacts as per Table 3.

Communication

- Letters can be sent to classrooms and other group settings where individual contact tracing is not required (i.e. involving school age and adults where there are no vulnerable contacts) to inform them of the exposure, symptom monitoring and when to seek medical attention (see Sample letter).

[2] In acute care settings, Infection Control and Occupational/ Employee Health should also be involved.

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 susceptible individuals.

Exclusion and Isolation

Exclusion and isolation of cases should be implemented as outlined in Table 2.

Table 2. Exclusion Requirements for Cases

Who	Exclusion Requirements	Timeframe
Cases (including confirmed, clinical and suspect).[3]	Exclude from childcare, school, post-secondary institutions, and workplaces. Avoid contact with susceptible people.	For at least 5 days from parotitis onset. This should be extended to 9 days if the case remains symptomatic.
Health Care Workers (HCWs) who are cases (including confirmed, clinical and suspect).[3] Note – Advise case to immediately notify Occupational Health and/or Infection Control for the facility in which they work.	Cases should be excluded from work. Cases who work with vulnerable patients (i.e., immunocompromised).	For at least 5 days from parotitis onset. This should be extended to 9 days if the case remains symptomatic. For 9 days from parotitis onset.
Cases in the hospital or other health care facility.	The case should be on droplet precautions.	For at least 5 days from parotitis onset. This should be extended to 9 days if the case remains symptomatic.

Immunization

Ensure the client's entire immunization status is up-to-date once they have recovered.[4]

Treatment

- Supportive therapy as there is no specific treatment for mumps.
- Individuals with severe central nervous system involvement may require hospitalization.

[3] The exclusion of epidemiologically-linked contacts with symptoms can be discontinued before five days if laboratory results rule out a diagnosis of mumps.

[4] Life-long immunity is expected following natural infection with mumps.

II. Contacts/Contact Investigation

Table 3. Contact Definition (Public Health Agency of Canada, 2009)

Definition of Close Contact
Contacts of confirmed cases are defined as any of the following during the infectious period (approximately 7 days before to 5 days after symptom onset): • household contacts of a case; • persons who sleep in the same room as the case; • direct contact with the oral/nasal secretions of a case (e.g., face-to-face contact where droplet contact may occur, sharing cigarettes/drinking glasses/food/cosmetics (lip gloss), kissing on the mouth, children and staff in child care and nursery school facilities, etc.); • children and staff in child care and school facilities; • HCWs who have unprotected face-to-face interaction (within 1 metre) to an infectious mumps case in the facility.
Definition of Susceptible Contacts
• Those born in 1970 or later who have not received two doses of mumps-containing vaccine (at least four weeks apart) after their first birthday **AND** o who have not had laboratory confirmed mumps **OR** o who do not have documented immunity due to mumps illness. Serological screening to identify susceptible contacts is impractical and unnecessary, since there are no additional risks of immunizing those already immune.

In Canada, it is assumed that people who were born before 1970 are generally considered immune due to natural immunity.

<u>Public Health Interventions</u>

Assessment

Assess for signs and symptoms and immunization history.

Communication

- Identifiable contacts should, at a minimum, be provided with a letter that includes all details as outlined in education.

Education

- All contacts of confirmed cases should be educated about mumps including the signs and symptoms, period of communicability and measures to prevent transmission of respiratory viruses – handwashing, not sharing water bottles, etc.
- The risk of exposure should also be communicated to all students and parents and other contacts.

- Individuals should be advised to visit one's health-care provider should any symptoms develop.

Exclusion and Immunization

- Exclusion of susceptible contacts that meet the criteria in Table 3 is outlined in Table 4.
- If the contact develops symptoms compatible with mumps, exclusion criteria for cases should be applied.

Table 4. Exclusion and Immunization Requirements for Contacts

Non-HCW Contacts who are:	Required Immunizations	Exclusion Requirements	Timeframe
Immune.	None.	None.	None.
Susceptible (in school, childcare or workplace setting).	As per Saskatchewan Immunization Manual.[5]	None.	None.

The following additional requirements apply to ***Health Care Workers who are Contacts***

- Advise the health-care worker to contact Occupational Health and/or Infection Control for the facility in which they work.
- Public Health will notify Occupational Health and/or Infection Control that contacts to mumps have been identified in their facility. Personal details of the contacts will not be disclosed.
- Provide information on mumps disease and its symptoms.
- Assess immunization status.

Table 5. Exclusion and Immunization Requirements for Contacts who are Health Care Workers

History of Immunization	Required Immunizations	Exclusion Requirements
Documented 2 doses of mumps-containing vaccine.	None.	None.
Documented 1 dose of mumps-containing vaccine.	Provide second dose of mumps-containing vaccine.	Return to work immediately.

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

History of Immunization	Required Immunizations	Exclusion Requirements
Undocumented immunization history.	1. Draw blood for mumps IgG serology. 2. Provide a dose of mumps-containing vaccine (after serology taken).	While waiting for serology results, exclude case from work for period of communicability, which starts on day 10 after exposure where exposure is day 1: a. If IgG positive, then consider immune and can return to work; consider a second dose of MMR for adequate measles and rubella protection. b. If IgG negative, then consider susceptible, provide a second dose of mumps-containing vaccine 28 days after the first and exclude from work on day 10 after first exposure until day 26 after last exposure.

Testing

Attempt to confirm diagnosis in any contacts that develop symptoms consistent with mumps.[6]

Prophylaxis/Immunization

Although immunization with live virus mumps-containing vaccine has not been demonstrated to be effective in preventing infection after exposure, the following still applies:

- Immunization of susceptible contacts with mumps-containing vaccine, recognizing that immunization after exposure may not prevent disease if the individual is already infected. See Table 4. Exclusion and Immunization Requirements for Contacts. Serological screening to identify susceptible contacts is impractical and unnecessary, since there is no risk to those already immune.

[6] This recommendation is applicable when sporadic cases are occurring. Recommendations for testing during an outbreak should be discussed with the MHO.

III. Environment

Child Care Centre/Schools Control Measures

Strict enforcement of infection control measures. Refer to the Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[7]

Health Facilities Control Measures

Strict enforcement of infection control measures. Refer to your Regional Infection Control Manual.

Cases should be on isolation and in a private room for at least 5 days from parotitis onset. This should be extended to 9 days if the case remains symptomatic. Refer to Table 2 (Exclusion Requirements for Cases) and Table 5 (Exclusion and Immunization Requirements for Contacts who are Health Care Workers).

IV. Epidemic Measures

The resources required for contact tracing and the management of contacts may put significant demands on public health and laboratory capacity.

- Logistics for providing immunization to susceptible contacts, including prioritization of vaccine supply, should be carefully considered.
- Serological screening to identify susceptible individuals is impractical and unnecessary, since there is no risk to those already immune.

When determining means to control outbreaks, exclusion of susceptible students from affected schools, thought to be at risk of transmission, should be considered. Excluded students can be readmitted following immunization. Immunization is not known to prevent mumps in those already exposed, but will protect against future exposures if the individual has had time to mount an immune response. Those who continue to be unimmunized due to medical, religious, or other reasons should be excluded until at least 26 days after the onset of parotitis in the last person with mumps in the affected school.

In the event of an outbreak, promote awareness in the community affected by the outbreak and among healthcare personnel:

- share information about the settings within which transmission is occurring;
- transmission patterns among fully vaccinated populations;

[7] http://www.saskatchewan.ca/live/births-deaths-marriages-and-divorces/starting-a-family/early-learning-and-child-care/child-care

- remind healthcare personnel to not rule out mumps on the assumption that individuals have evidence of mumps immunity because outbreaks have occurred in highly vaccinated populations in high transmission settings, including school settings (e.g., elementary school, middle school, high school, and college students) (Centers for Disease Prevention and Control, 2018).

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
Immunize infants, children, and adults according to the recommended schedule. Refer to the Saskatchewan Immunization Manual.[8]

Education
- Education should be provided regarding respiratory etiquette and measures to prevent transmission of mumps.
- Educate the public about the disease and the need for active immunization with a mumps-containing vaccine. Immunization information fact sheets can be used to guide discussion.

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

Revisions

Date	Change
September 2018	• Updated to align with Panorama configuration • Clarified the purpose for notification of cases to public health • Incorporated an Epidemiology and Occurrence section with Canadian information and included Saskatchewan Immunization program history from Sask Immunization Manual to provide context. • Updated period of communicability to remove outer limit of 14 days following parotitis. • Rearranged and updated the style into the new format of the Manual. • Added information into Epidemic section regarding transmission among fully vaccinated individuals. • References reaffirmed or updated as necessary.

References

American Academy of Pediatrics. (2018). *Red book: 2018-2021 Report of the Committee on Infectious Diseases* (31st ed.). Elk Grove Village, IL: Author.

Centers for Disease Control and Prevention. (2008). *Epidemiology and prevention of vaccine-preventable diseases* (10th ed.). Atkinson, W., Hamborsky, J., McIntyre, L., Wolfe, S. (Eds.). Washington, DC: Public Health Foundation.

Centers for Disease Control and Prevention (2018). *Manual for the surveillance of vaccine-preventable diseases – Chapter 9. Mumps.* Centers for Disease Control and Prevention, Atlanta, GA. Retrieved September, 2018 from https://www.cdc.gov/vaccines/pubs/surv-manual/chpt09-mumps.html

Heymann, D. L. (Ed.). (2015). *Control of communicable diseases manual* (20th ed.). Washington, DC: American Public Health Association.

Mandell, G. L., Bennett, J. E., & Dolin, R. (Eds.). (2000). *Mandell, Douglas, and Bennett's principles and practice of infectious diseases* (5th ed.). Philadelphia, PA: Churchill Livingstone.

Public Health Agency of Canada. (2002). Infection control guidelines: Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR*), *28S1,* March 2002. Retrieved October, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Public Health Agency of Canada. (2018). *Canadian immunization guide* (Evergreen ed.). Ottawa, Canada: Public Works and Government Services Canada. Retrieved August, 2018 http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php#toc.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR), 35S2*, November 2009. Retrieved September, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Mumps_Oreill-eng.php.

Public Health Agency of Canada. (2009). Guidelines for the prevention and control of mumps outbreaks in Canada. *Canada Communicable Disease Report (CCDR), 35S4*, December 2009. Retrieved September, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/10pdf/36s1-eng.pdf.

Government of Saskatchewan

Mumps Data Collection Worksheet

PANORAMA

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

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

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

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_____	

Mumps Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

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

LHN-> INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Description	No	Yes - Date of onset
Abortion - spontaneous (miscarriage)		YYYY / MM / DD	Lab - platelet count low		YYYY / MM / DD
Coryza or rhinitis		YYYY / MM / DD	Lethargy (fatigue, drowsiness, weakness, etc)		YYYY / MM / DD
Cough		YYYY / MM / DD	Meningitis - aseptic		YYYY / MM / DD
Encephalitis		YYYY / MM / DD	Orchitis (inflamed testicle)		YYYY / MM / DD
Hearing loss		YYYY / MM / DD	**Pain - salivary glands**		YYYY / MM / DD
Infection - upper respiratory tract		YYYY / MM / DD	**Parotid gland - inflammation (parotitis)**		YYYY / MM / DD
Other S/S					

D) INCUBATION AND COMMUNICABILITY

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case (period for acquisition):
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date**: YYYY / MM / DD

Exposure Calculation details:

Communicability for Case (period for transmission):
Earliest Possible Communicability Date: YYYY / MM / DD **Latest Possible Communicability Date**: YYYY / MM / DD

Communicability Calculation Details:

E) RISK FACTORS

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Start date Yes	N, NA, U	Add'l Info
Contact - At risk population (international travellers or immigrants)	YYYY / MM/DD		
Contact to a known case (Add'l Info)	YYYY / MM/DD		
Immunocompromised - Related to underlying disease or treatment			
Occupation - Health Care Worker - IOM Risk Factor	TE		
Risk Behaviour - Sharing personal items (cigarettes, water bottles)	TE		
Special Population - Attends childcare	TE		
Special Population - Attends school	TE		
Special Population - Lives in a communal setting	TE		
Special Population - Post secondary education institution	TE		
Special Population - Pregnancy			
Travel - Outside of Canada (Add'l Info)	YYYY / MM/DD AE		
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)	YYYY / MM/DD AE		

F) IMMUNIZATION HISTORY INTERPRETATION SUMMARY

LHN -> INVESTIGATION-> IMMUNIZATION HISTORY INTERPRETATION SUMMARY

Interpretation Date: YYYY / MM / DD

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

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

Reason:

☐ Previous disease ☐ Previous responder/Previous history of immunity ☐ Date Of Birth

☐ Interpretation of history by investigator

Mumps Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: ___________
Panorama Investigation ID: ___________

G) INTERVENTION

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

Intervention Type and Sub Type:

Assessment: ☐ Assessed for contacts YYYY / MM / DD Investigator name	**Exclusion:** Investigator name ☐ Work YYYY / MM / DD ☐ Preschool YYYY / MM / DD ☐ School YYYY / MM / DD ☐ Daycare YYYY / MM / DD
Other Investigation Findings: ☐ Investigator Notes YYYY / MM / DD ☐ See document management YYYY / MM / DD	**Immunization:** Investigator name ☐ Eligible Immunization recommended YYYY / MM / DD ☐ Disease-specific immunization recommended YYYY / MM / DD ☐ Disease-specific immunization given YYYY / MM / DD
Communication: ☐ Other communication (see Investigator Notes) YYYY / MM / DD Investigator name ☐ Letter (See Document Management) YYYY / MM / DD Investigator name	**Isolation:** ☐ Facility isolation YYYY / MM / DD Investigator name ☐ Home isolation YYYY / MM / DD Investigator name
General: Investigator name ☐ Disease-Info/Prev-Control YYYY/ MM / DD ☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD	**Quarantine:** ☐ Quarantine YYYY / MM / DD Investigator name
Education/counselling: Investigator name ☐ Prevention/Control measures YYYY / MM / DD ☐ Disease information provided YYYY / MM / DD	**Testing:** ☐ Lab testing recommended 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	
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YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	
YYYY / MM / DD			YYYY / MM / DD	

H) 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) _____________________________

Mumps Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: ___________
Panorama Investigation ID: ___________

I) Acquisition Event

LHN-> INVESTIGATION-> EXPOSURE SUMMARY-> ACQUISITION EVENT SUMMARY -> QUICK ENTRY

Acquisition Event ID:_________

Exposure Name: ____

Acquisition Start YYYY / MM / DD to **Acquisition End:** YYYY / MM / DD

Location Name: ____

Setting Type

☐ Travel ☐ Health care setting ☐ Public facilities ☐ Recreational facilities ☐ Most likely source

J) Transmission Events

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Transmission Event ID	**Exposure Name**	**Setting type** (Consider the following settings for TE; if >1 select "multiple settings" in Panorama)	**Date/Time**	**# of contacts**
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities	YYYY / MM / DD to YYYY / MM / DD	
		☐ Congregate/Communal living ☐ Health Care setting ☐ Type of community contact ☐ Household Exposure ☐ Public facilities	YYYY / MM / DD to YYYY / MM / DD	
	Mumps Contacts – Inv ID# _____	☐ Multiple Settings	YYYY / MM / DD to YYYY / MM / DD	

K) TOTAL NUMBER OF CONTACTS

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> TE HYPERLINK -> UNKNOWN/ANONYMOUS CONTACTS

Anonymous contacts:________ (total number of individuals [including groups that 1:1 follow-up is not required or is not feasible])

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

Respiratory and Direct Contact

Neonatal Group B *Streptococcus*

Notification Timeline:

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

Public Health Follow-up Timeline: Within 72 hours.

Information

Case Definition (Public Health Agency of Canada, May 2008)

Confirmed Case	Clinical illness[1] in an infant less than 1 month of age with laboratory confirmation of infection: • isolation of group B *Streptococcus* (*Streptococcus agalactiae*) from a normally sterile site (such as blood or cerebrospinal fluid) **OR** • demonstration of group B *Streptococcus* DNA in a normally sterile site.
Probable Case	Clinical illness[1] in an infant less than 1 month of age with laboratory confirmation of infection: • detection of group B *Streptococcus* antigen in a normally sterile site.

[1]There are two forms of clinical illness; early onset disease (1-7 days), characterized by sepsis, respiratory distress, apnea, shock, pneumonia, and meningitis; and late onset (7 days to 1 month), characterized by sepsis and meningitis.

Even though the case definition is for infants < 1 month, follow-up of infants between 1 to 3 months may be considered.

Causative Agent
Streptococcus agalactiae, group B *Streptococcus* (GBS).

Symptoms
There are 2 distinct forms:

- Early-onset disease – lethargy, poor feeding, jaundice, fever, grunting respirations and other signs of respiratory distress, pallor and hypotension. Respiratory distress is usually present at or within a few hours after birth. Diagnosed as sepsis, pneumonia and less frequently meningitis, osteomyelitis or septic arthritis. It is acquired in utero or during delivery; low-birth weight, premature infants are more susceptible.

- Late-onset disease – lethargy, poor feeding, irritability and fever. Diagnosed as sepsis and meningitis and, less frequently, bone and joint infections.

Incubation Period

- Early-onset – 1 to 7 days.
- Late-onset – 7 days to 1 month.

Reservoir/Source

Humans. Heymann (2008) says about 10-30% of pregnant women harbour group B streptococci in the genital tract, and about 1-2% of their offspring may develop symptomatic infection.

Mode of Transmission

- Early-onset is acquired in utero or during delivery.
- Late-onset is acquired through person-to-person contact and occurs in full-term infants.
- Nosocomial transmission may occur if appropriate infection prevention and control measures are not taken.

Risk Factors/Risk Group

The American Academy of Pediatrics (2009) indicates that the risk for GBS is increased in the following:

- maternal age younger than 20 years;
- previous baby with GBS disease;
- urinary tract infection due to GBS during the pregnancy;
- GBS carriage late in pregnancy;
- maternal temperature of 38 degrees Celsius or higher during labour;
- rupture of membranes 18 hours or more before delivery;
- preterm infants born at less than 37 weeks gestation.

Period of Communicability

The administration of intravenous antibiotics (generally penicillin) to women colonized with group B streptococci at the onset and throughout labour interrupts transmission to newborn infants, decreasing infection and mortality. (This is consistent with Society of Obstetricians and Gynaecologists of Canada Guidelines, Jan 2007.)

Specimen Collection and Transport

- Take a vaginal and rectal swab for culture at 35-37 weeks gestation. Cultures collected earlier do not accurately predict whether a woman will have GBS at delivery.
- For diagnosis in a neonate, culture of sterile fluid (blood or CSF) is required.

Methods of Control/Role of Investigator

Prevention and Education

There are limited effective primary prevention strategies for the early onset form of this disease. 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. Prevention of the late onset form of this disease is best accommodated via handwashing.

Studies that looked at screening versus risk-based approach found that risk of early-onset disease was significantly lower among the infants of screened women compared to those in the risk-based approach. As such, pregnant women are to be tested late in pregnancy (35-37 weeks) to determine whether or not they are positive for GBS, so they can be treated during labour.

Intrapartum therapy of women with positive screenings and certain other risk factors has been found to be the most effective in preventing neonatal GBS disease (Dobson & Money, 2004).

Immunization

Immunization strategies have been researched for many years, but currently, there is no vaccine for group B *Streptococcus*.

Education

- Prenatal education of high risk mothers about screening and intrapartum treatment.
- Physicians should be aware of the need for testing of pregnant women and appropriate treatment of the women who screen positive.

Management

I. Case

History

See Risk Factors/Risk Groups above.

Immunization

Not applicable.

Treatment/Supportive Therapy

- Treatment choices are governed by the most recent guidelines. The public health practitioner should direct any questions regarding the current treatment protocols to the physician or Medical Health Officer. See Appendix H – Sources for Clinical Treatment Guidelines.
- See Attachment – Recommendations for Prevention and Management of Neonatal Group B *Streptococcus*.

Exclusion

Not applicable.

Referrals

15-30% of survivors of group B streptococcal meningitis have permanent neurologic sequelae (hearing/vision loss or learning disabilities). Referral by physician to appropriate disciplines.

II. Contacts/Contact Investigation

Contact Definition

No contact tracing is required**.**

Testing

Test only if symptomatic.

Prophylaxis/Immunization

Not applicable.

Exclusion
Not applicable.

III. Environment

Child Care Centres/Institutional Control Measures
Neonatal nurseries – hand hygiene is the best way to prevent the spread to other infants (American Academy of Pediatrics, 2009).

Epidemic Measures

- Contact precautions and cohorting of ill and colonized infants is recommended during an outbreak.
- Epidemiologic evaluation of late-onset cases in a special care nursery may be required to determine a common source and prevent spread to others.

References

American Academy of Pediatrics. (2009). *Red book: 2009 Report of the Committee on Infectious Diseases* (28th ed.). Elk Grove Village, IL: Author.

Dobson, S. & Money, D. (2004). The prevention of early-onset neonatal group B streptococcal disease. *Journal of Obstetric and Gynecology Canada, 26(9)*, 826-32, September 2004. Retrieved August, 2011 from http://www.sogc.org/guidelines/public/149E-CPG-September2004.pdf.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR), 35S2*, November 2009. Retrieved August, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Strep_B-eng.php.

Neonatal Group B *Streptococcus*
Attachment – Recommendations for Prevention and Management of Neonatal Group B *Streptococcus*

The following are recommendations for pregnant women (Society of Obstetricians and Gynaecologists of Canada [SOGC], 2004):

1. Offer all women screening for group B *streptococcus* (GBS) disease at 35 to 37 weeks' gestation with culture done from one swab first to the vagina then to the rectal area.
2. Treat the following women intrapartum at time of labour or rupture of membranes with IV antibiotics:
    - all women positive by GBS culture screening done at 35 to 37 weeks;
    - any women with an infant previously infected with GBS;
    - any women with documented GBS bacteriuria (regardless of level of colony-forming units per mL) in this pregnancy.
3. Treat women at less than 37 weeks' gestation with IV antibiotics unless there has been a negative GBS vaginal/rectal swab culture within 5 weeks.
4. Treat women with intrapartum fever with IV antibiotics (i.e., chorioamnionitis must be treated, but broader spectrum antibiotics would be advised).
5. If a woman is GBS-positive by culture screening or by history of bacteriuria, with prelabour rupture of membranes at term, treat with GBS antibiotic prophylaxis and initiate induction of labour with IV oxytocin.
6. If GBS culture result is unknown and the woman has ruptured membranes at term for greater than 18 hours, treat with GBS antibiotic prophylaxis.

Neonatal Management (SOGC, 2004)

1. Infants delivered by women who have received intrapartum antibiotics at least 4 hours before delivery, do not need a septic workup. These infants should be observed in hospital for the first 24 hours for signs of infection, but do not need additional therapy or investigations.
2. Infants who appear well despite their mothers being GBS colonized and not receiving adequate antibiotics (< 4 hours) should be observed for 48 hours and evaluated or treated if signs of sepsis develop.
3. Infants of mothers with chorioamnionitis should undergo a diagnostic evaluation for sepsis and be treated with antibiotics. (Sepsis workup includes a complete blood-cell count and differential, blood culture, and chest radiograph, including a lumbar puncture if feasible.)

Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.

From Public Health to Ministry of Health: Within 2 weeks.

Public Health Follow-up Timeline: Immediate.

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

- To minimize mortality and serious morbidity from pertussis in young children through contact tracing;
- To track epidemiology trends of pertussis in Saskatchewan including risk factors and distribution;
- To identify locations where increased transmission of pertussis may be occurring in order to inform other interventions;
- To monitor the effectiveness of prevention and control measures;
- To plan expansion or introduction of future immunization programs;
- To provide timely clinical care including diagnosis and treatment using current, evidence-based guidelines;
- To make timely and evidence informed actions on outbreaks; and
- To inform the public and medical community about pertussis.

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

Confirmed Case	Laboratory confirmation of infection: • isolation of *Bordetella pertussis* (e.g. from a culture) from an appropriate clinical specimen **OR** • detection of *B. pertussis* DNA (e.g NAAT or PCR) from an appropriate clinical specimen **AND** one or more of the following: ○ cough lasting 2 weeks or longer ○ paroxysmal cough of any duration ○ cough with inspiratory "whoop" ○ cough ending in vomiting or gagging, or associated with apnea. **OR**

[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.

	Epidemiologic link to a laboratory-confirmed case **AND** one or more of the following for which there is no other known cause: ○ paroxysmal cough of any duration ○ cough with inspiratory "whoop" ○ cough ending in vomiting or gagging, or associated with apnea.
Probable Case	Cough lasting 2 weeks or longer in the absence of appropriate laboratory tests and not epidemiologically linked to a laboratory-confirmed case **AND** one or more of the following, with no other known cause: • paroxysmal cough of any duration • cough with inspiratory "whoop" • cough ending in vomiting or gagging, or associated with apnea.
Suspect Case	One or more of the following, with no other known cause: • paroxysmal cough of any duration • cough with inspiratory "whoop" • cough ending in vomiting or gagging, or associated with apnea.
Public health follow-up of probable and suspect cases should be considered based on the epidemiology of pertussis in the community and the involvement of vulnerable populations.	

Epidemiology and Occurrence

Pertussis is a cyclical disease which peaks at 4 to 5 year intervals (see Figure 1). Infants are the most vulnerable and are often infected by older siblings, parents or caregivers. Figure 2 shows the rates of pertussis in infants relative to children 1-19 years of age.

- An adolescent pertussis vaccine (Tdap) was introduced to students in Grade 8 in 2003. This widened the gap in the rate of illness in these age groups; the gap was narrowed following the implementation of a Tdap program for all adults in 2010, especially parents and caregivers of infants, in an effort to reduce the risk to these vulnerable infants.
- In October 2017, it was recommended that all pregnant women be offered Tdap in the third trimester irrespective of prior Tdap receipt.
- The waning of immunity conferred by pertussis vaccine in infancy was reflected in an increase of incidence in 2015 to 2017, mainly among the 10-14 year old cohort.

Figure 1: Rates of Pertussis disease showing its cyclical nature, 1990 - 2017

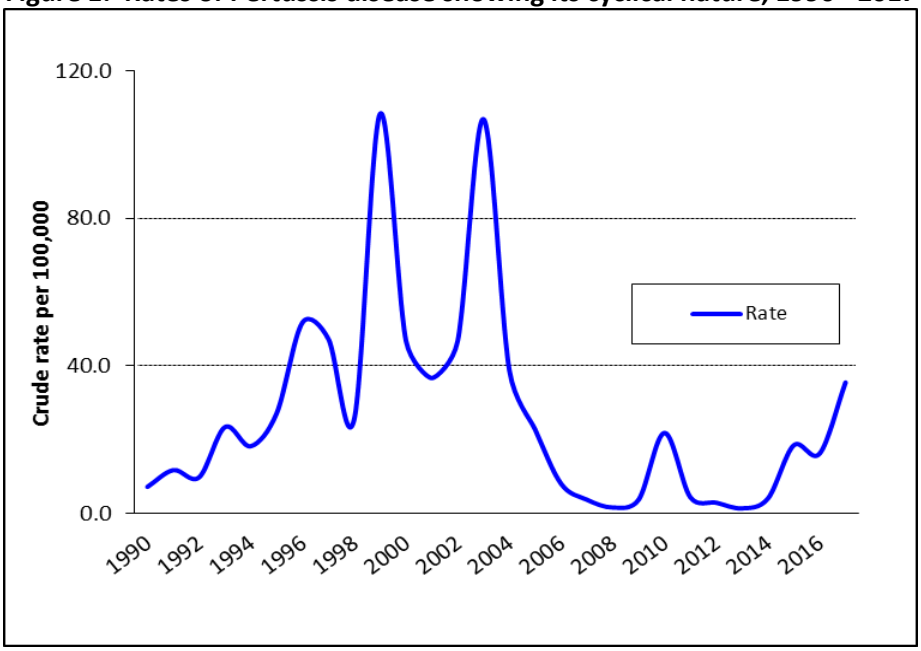
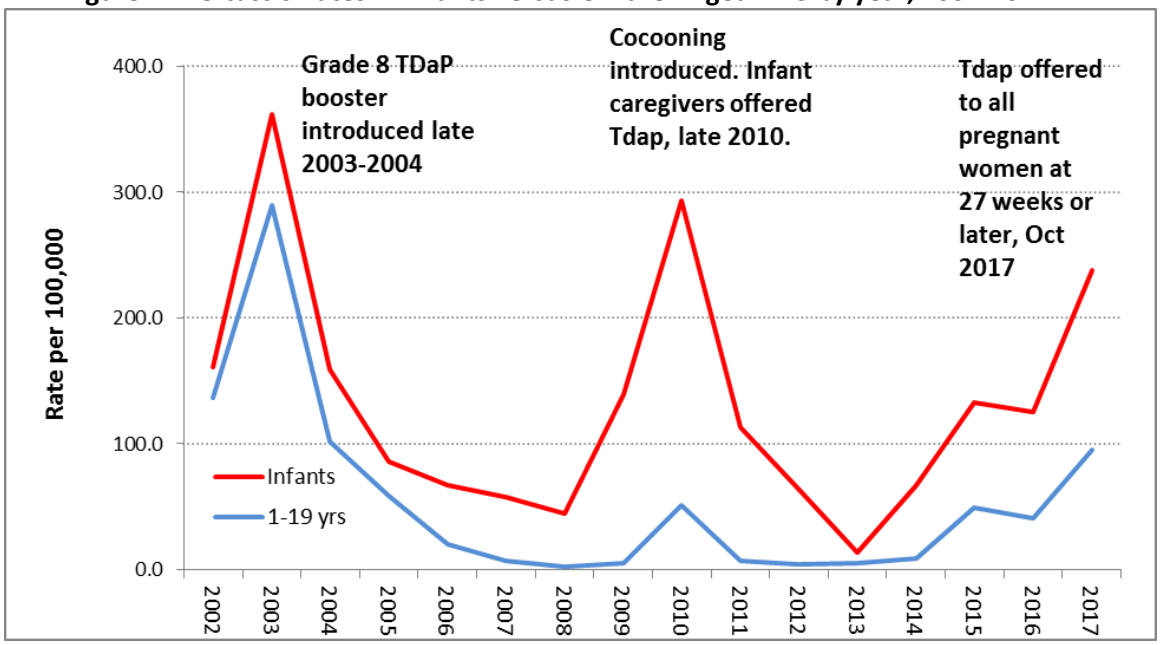


Figure 2: Pertussis Rates in Infants versus Children Aged 1-19 by year, 2002-2017



Additional Background Information

Causative Agent

Bordetella pertussis.

Symptoms

Catarrhal Stage: starts with mild respiratory symptoms of cough, rhinorrhea and possible fever.
Paroxysmal Stage: paroxysms of cough characterized by inspiratory whoop and vomiting after cough.
Convalescent Stage: gradual recovery with cough lasting 1-2 months or longer.

Infants less than 6 months can have an atypical presentation with short catarrhal stage, gagging, gasping or apnea as prominent early manifestations, absence of whoop and prolonged convalescence.

Complications among infants include pneumonia, seizures, encephalopathy and death. Complications in adolescents and adults include syncope, sleep disturbance, incontinence, rib fracture and pneumonia.

Reservoir/Source

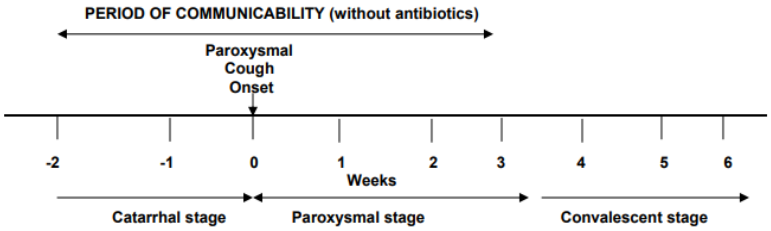
Humans.

Incubation Period

6-20 days (average 9-10 days).

Period of Communicability

- Highly communicable in the early catarrhal stage and the beginning of the paroxysmal stage (first 2 weeks).
- Communicability decreases after the catarrhal and paroxysmal stages and becomes negligible 3 weeks after onset of symptoms.
- Case is no longer contagious after completing 5 days of treatment.



Mode of Transmission
Person-to-person by direct contact with discharges from respiratory secretions via aerosolized droplet.

Specimen Collection and Transport
Nasopharyngeal swab in Regan Lowe transport medium. See the Saskatchewan Disease Control Laboratory Compendium for further details at https://rrpl-testviewer.ehealthsask.ca/

Public Health Investigation

I. Case

Refer to Attachment – Pertussis Data Collection Worksheet to assist.

History

- Key elements to inquire about include:
  - Immunization history of case.
  - Onset of illness and treatment (with what and when) – to determine incubation period and period of communicability which helps to identify the possible source and contacts to be followed.
  - Travel history may be of significance in contact tracing.
  - Underlying medical conditions and severity of illness (e.g. if hospitalization was required).
  - Current health status of household contacts (are contacts symptomatic?).
  - Identify contacts (refer to Table 2 – Definitions of Contacts) paying particular attention to vulnerable contacts (infants and women in the third trimester).
  - Occupational considerations exist for health care settings – see Special Considerations for Cases and Contacts in the Health Care Setting

Public Health Interventions

Assessment

- Assess for contacts paying particular attention to vulnerable contacts as per Table 2.

Communication

- Letters can be sent to classrooms and other group settings where individual contact tracing is not required (i.e. involving school age and adults where there are no vulnerable contacts) to inform them of the exposure, symptom monitoring and when to seek medical attention (see Sample letter).

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.

Exclusion

- There is limited evidence supporting the use of exclusion; by the time a person is diagnosed with pertussis, they have likely exposed most of their contacts. Therefore **exclusion is no longer recommended in most situations**; however the consensus was to use exclusion if there are vulnerable individuals involved (see Table 2 – Definitions of Contacts).
    1. **Cases** should be excluded from school or daycare/preschool **where there are vulnerable persons, for 5 days** after they start the medication, or 21 days from onset of cough if untreated. If there are no vulnerable persons in the school or day care, the case can return to school or daycare/preschool as soon as he/she feels well enough to do so.
    2. **Adult cases** who have **close contact with vulnerable persons at work** should be excluded from work **for 5 days** after they start the medications, or 21 days from onset of cough if untreated. If there are no vulnerable persons in the workplace, the case can return to work as soon as he/she feels well enough to do so.
- When exclusion is recommended, it should continue for 5 days after they start the appropriate medication, or 21 days from onset of cough if untreated or until test results come back negative for pertussis.
- Exclusion is **not recommended in most other situations** as there is limited evidence to support it since a person who has been diagnosed with pertussis may have likely exposed most of their contacts. Please refer to Special Considerations for Cases and Contacts in the Health Care Setting below for additional recommendations.

Immunization

- Case follow-up should be used as an opportunity to recommend immunizations they are eligible for as per the Saskatchewan Immunization Manual. Infants and children who have recovered from pertussis should complete their pertussis immunization series, as natural infection does not confer life-long immunity (American Academy of Pediatrics, 2015).

Treatment

- Treatment recommendations have been summarized in Attachment – Pertussis Treatment and Chemoprophylaxis Guidelines.

Who Should be Treated

Treatment is recommended for all individuals that are laboratory confirmed, clinically diagnosed and epidemiologically linked to another case, or probable cases (clinically diagnosed) during an outbreak.

1. **All cases** – laboratory confirmed **OR** clinically diagnosed and epidemiologically linked to another case **OR** clinically diagnosed during an outbreak.
2. **All symptomatic household contacts** – the assumption is that these symptomatic people will also have pertussis. *Sometimes symptomatic household contacts may be reluctant to take antibiotics without a confirmed diagnosis. If there are no vulnerable persons in the household, it is acceptable to wait for results of testing.*
3. All other community contacts who are symptomatic should **not** be assumed to have pertussis unless clinical symptoms are very predictive, but should be assessed, tested and treated appropriately.

II. Contacts/Contact Investigation

Table 2. Definitions of Contacts	
Close Contact	• Individuals that have shared respiratory secretions (e.g., kissing) or shared the same confined air space for more than an hour, or have had face-to-face exposure for more than 5 minutes.
Vulnerable Contact	• **Children less than 1 year of age**, because they have a higher rate of mortality from pertussis infection. • **Pregnant women in the third trimester**, because if infectious at the time of birth they may pass the infection to their newborn.
Household Contact	• Household contact is living in the same household as the case including family[2] day care setting.
Occupational Contact	• Contact of Health Care Workers (HCW's) oral or nasal mucosa with infected secretions from the pertussis case. **OR** • Sharing the same confined air space (within 2 metres) for more than an hour with the pertussis case, without implementing droplet precautions. **OR** • Having had face-to-face exposure for more than 5 minutes with a pertussis case without implementing droplet precautions.

Public Health Interventions

Assessment

- Assess for symptoms.
- Assess for vulnerable individuals in their household. Recommend chemoprophylaxis as appropriate.

Communication

- Individual follow-up of contacts in in larger daycares, classrooms, schools, teams, workplaces, etc., is generally not recommended. These individuals should be informed by letter from public health, advising them to see their physician if they develop symptoms. These persons, if they become symptomatic, should not be assumed to have pertussis but should be assessed, tested and treated appropriately.

[2] Family day care refers to day cares that are run out of an individual's home to a limited number of children (*The Child Care Act, 2003*).

Education

- All contacts should be provided disease information on symptom monitoring, prevention and control measures including avoiding contact with vulnerable individuals.

Exclusion

- **Symptomatic family daycare contacts** should be excluded from **daycare where there are vulnerable persons**, until they have completed 5 days of appropriate antibiotic or until test results come back negative for pertussis. In other words, if there are no vulnerable persons in the family day care, the symptomatic day care contact can return to day care as soon as he or she feels well enough to do so.
- **Symptomatic contacts** (non-household, non family-daycare) who have been assessed and tested but are not being treated until the test results are back, do not need to be excluded. They should be asked to **avoid close contact with vulnerable persons** until their diagnosis is established.

Immunization

- Immunization status of exposed individuals should be reviewed. Priority should be given to infants, children, and pregnant women in their third trimester.
- Accelerated immunization with the first dose at 6 weeks of age and the second and third doses using minimum intervals may be indicated in case of an outbreak in a defined community. See *Saskatchewan Immunization Manual*[3] and discuss with Medical Health Officer.
- Immunizations should be completed for those whose schedules are incomplete.

Testing

- Non-immediate household and non-family day care contacts who are symptomatic should be assessed, tested and treated as appropriate.

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

Chemoprophylaxis

Chemoprophylaxis efficacy is related to early implementation and is **unlikely to be of benefit after 21 days** has elapsed since the first contact with a case. **Prophylaxis is generally not recommended for contacts in larger daycares, classrooms, schools, teams, workplaces, etc.** Contacts will be informed, usually by letter from public health, and advised to see their physician/nurse practitioner if they develop symptoms. The letter will inform these contacts that if they become symptomatic they should be assessed, tested and treated appropriately.

- See Attachment – Pertussis Treatment and Chemoprophylaxis Guidelines.
- Chemoprophylaxis should be offered to the following contacts:
  1. **All symptomatic immediate household contacts** – persons in a family day care setting are considered immediate household contacts. The assumption is that these symptomatic people will also have pertussis.
  2. **Symptomatic vulnerable persons** who have had "close contact" with a case should be started on antibiotics until their diagnosis is established.
  3. **Asymptomatic immediate household contacts**, including family-daycare attendees, where there is a vulnerable person in the household. The vulnerable person being ill does not eliminate the need for chemoprophylaxis of household contacts.
  4. Outside of the immediate household or family day care, offer prophylaxis only **to asymptomatic vulnerable persons** who have had "close contact" with a **case**.
  5. **Non immediate-household and non family-daycare contacts who are symptomatic** should **not** be assumed to have pertussis unless clinical symptoms are very predictive, but should be assessed, tested and treated appropriately.
- Chemoprophylaxis efficacy is related to early implementation and is unlikely to be of benefit after 21 days has elapsed since the first contact with a case.
- Chemoprophylaxis for all people in larger daycares, classrooms, schools, teams, workplaces, etc., is generally not recommended. These individuals should be informed by letter from public health, advising them to see their physician if they develop symptoms. These persons, if they become symptomatic, should not be assumed to have pertussis but should be assessed, tested and treated appropriately.

Special Consideration for Cases and Contacts in the Health Care Setting
(Ontario Hospital Association, 2015)

Collaboration with Occupational Health/Employee Health is important in appropriate management of health care workers (HCWs). HCWs who do not provide direct patient care, such as housekeeping staff, may be managed as in the community setting. HCWs who do not provide direct patient care, such as housekeeping staff, may be managed as in the community setting. Community contacts who are health care workers should be managed as outlined below.

Prevention is always the primary goal and HCWs should protect themselves and their patients by being vaccinated as per the *Saskatchewan Immunization Manual*[4] – Chapter 7: Immunization of Special Populations, Section 3.2 Health Care Workers. Status of vaccination with Tdap (tetanus, diphtheria, and acellular pertussis vaccine) should be evaluated for all HCW contacts.

The most effective control of transmission of pertussis in hospital settings includes isolation of the suspected or known case and use of droplet precautions. In addition, the following outlines appropriate management:

Management of Health Care Workers

1. HCWs who are considered **vulnerable contacts**[5] should be offered chemoprophylaxis.
2. HCWs who are **confirmed cases** of pertussis:
   - Should be referred for appropriate antibiotic treatment.
   - Should be excluded from work until after 5 days of treatment or for 21 days from onset of cough if untreated.

[4] http://www.ehealthsask.ca/services/manuals/Pages/SIM.aspx.
[5] HCW vulnerable or high risk contacts include:
- pregnant women in their third trimester,
- household contact of infants under 12 months of age or a woman who is in her third trimester of pregnancy; OR
- who may expose these vulnerable patient populations (e.g. hospitalized infants or pregnant women).

3. HCWs who are **symptomatic contacts** to pertussis case:
   - Should be referred for clinical management, which should include laboratory investigation (nasopharyngeal swab) and appropriate antibiotic treatment.
   - Should be excluded from work until after 5 days of treatment **or** for 21 days from onset of cough if untreated, **or** until swab comes back negative for pertussis. A surgical mask is not sufficient for protection of patients and other staff.
4. HCWs who are **asymptomatic contacts** to pertussis case:
   - Should be given chemoprophylaxis with an appropriate antibiotic if they are **vulnerable or work or live with a vulnerable contact(s)** (American Academy of Pediatrics, 2015).
   - Should be advised of early symptoms of pertussis and be put under surveillance by their employee health nurse.
   - Report development of symptoms to Occupational Health and Safety/Employee Health Department for an individual assessment.
   - Those with no history of an adult dose of Tdap vaccine should be given vaccine.
   - Exclusion of asymptomatic contacts is not indicated.

III. Environment

Child Care Centre/Schools Control Measures

Strict enforcement of infection control measures. Refer to the *Infection Control Manual for Child Care Facilities*.[6] Notification of parents of children in either of these settings where a case has occurred is important. This can be accomplished via a letter sent through the school or daycare.

Chemoprophylaxis for all people in larger daycares, classrooms, schools, teams, workplaces, etc., is generally not recommended. They should be informed by letter from public health, and advised to see their physician if they develop symptoms. Review immunization histories of childcare attendees.

Health Facilities Control Measures

Strict enforcement of infection control measures. Refer to the Health Authority Infection Control Manual. Refer to Special Considerations for Cases and Contacts in the Health Care Setting for additional information.

[6] http://publications.gov.sk.ca/documents/13/105320-infection-control-manual-child-care-centres.pdf

IV. Epidemic Measures

- Enhanced surveillance including details about immunization history of case and household contacts.
- Accelerated immunization with the first dose at 6 weeks of age and the second and third doses at 4 week intervals may be indicated at a community level.
- Immunizations should be completed for those whose schedule is incomplete.
- Additional measures may be instituted by the medical health officer to help contain the outbreak.
- As of October 2017, an enhanced outbreak measure is to provide pregnant women at 27 weeks gestation or later, irrespective of prior Tdap receipt, an additional dose of Tdap to offer protection to their newborn until they are eligible to be vaccinated.

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

Immunize infants, children, pregnant women and adults according to the recommendations in the *Saskatchewan Immunization Manual*.

Education

- Education should be provided regarding respiratory etiquette and measures to prevent transmission of pertussis by practising good hand hygiene and not sharing drinking glasses or utensils.
- Educate the public about the disease and the need for active immunization. Immunization information fact sheets can be used to guide discussion.

Revisions

Date	Change
November 2018	• Clarified which HCW require chemoprophylaxis.
September 2018	• Updated to align with Panorama configuration. • Updated Epidemiology and Occurrence section with 2017 data. • Incorporated incubation and communicability graphic. • Updated Special Considerations for Cases and Contacts in the Health Care Setting based on Ontario Hospital Association 2017 updates. • Updated purpose for notification based on BCCDC objectives of surveillance (2017).
September 2017	• Clarified the purpose for notification of cases to public health. • Incorporated an Epidemiology and Occurrence section to the chapter indicating timeframes of when changes were made to pertussis immunization program. • Incorporated reference regarding when public health management should be considered for probable and suspect cases. • Incorporated reference to outbreak measure of enhanced immunization of pregnant women in 3rd trimester. • Incorporated clarification on the use of chemoprophylaxis for health care workers. • Rearranged and updated the style into the new format of the Manual. • References reaffirmed or updated as necessary.

References

American Academy of Pediatrics. (2015). *Red book: 2015 Report of the Committee on Infectious Diseases* (30th ed.). Elk Grove Village, IL: Author.

British Columbia Centre for Disease Control (2017). Objectives of surveillance. BCCDC.

Government of Saskatchewan. (2003). *The Child Care Act*. Regina, SK: Queens Printer Saskatchewan.

Ontario Hospital Association. (2017). *Pertussis surveillance protocol for Ontario hospitals.* Retrieved August, 2018 from https://www.oha.com/Documents/Pertussis%20Protocol%20October%202017%20(last%20reviewed%20and%20revised%20on%20October%202017).pdf.

Public Health Agency of Canada. (2002). Infection control guidelines: Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR), 28S1,* March 2002. Retrieved May, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Public Health Agency of Canada. (2003). National consensus conference on pertussis. *Canada Communicable Disease Report (CCDR), 29S3*, April 2003.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR*), *35S2*, November 2009. Retrieved September, 2017 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Pertus_Coquel-eng.php.

Government of Saskatchewan

PANORAMA

Pertussis 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

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

Disease Summary Classification: CASE	**Date**	***Classification: CONTACT***	***Date***	***LAB TEST INFORMATION:***
☐ Confirmed	YYYY / MM / DD	☐ *Contact*	*YYYY / MM / DD*	*Date specimen collected:*
☐ Does Not Meet Case	YYYY / MM / DD	☐ *Not a Contact*	*YYYY / MM / DD*	*YYYY / MM / DD*
☐ Person Under Investigation	YYYY / MM / DD	☐ *Person Under Investigation*	*YYYY / MM / DD*	*Specimen type:*
☐ Probable	YYYY / MM / DD			☐ *Nasopharyngeal*
☐ Suspect	YYYY / MM / DD			☐ *Throat*

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_____

Pertussis Data Collection Worksheet

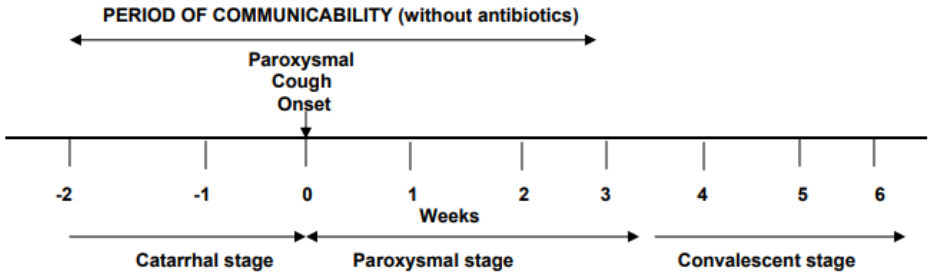
Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

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

LHN-> INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes - Date of onset	Description	No	Yes - Date of onset
Apnea		YYYY / MM / DD	**Cough – paroxysmal**		YYYY / MM / DD
Coryza or rhinitis		YYYY / MM / DD	**Cough – with whoop**		YYYY / MM / DD
Cough		YYYY / MM / DD	**Cough > 2 weeks**		YYYY / MM / DD
Cough – with apnea		YYYY / MM / DD	**Gagging - infant**		YYYY / MM / DD
Cough – with vomiting		YYYY / MM / DD	**Gasping - infant**		YYYY / MM / DD



D) INCUBATION AND COMMUNICABILITY

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case (period for acquisition):
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date:** YYYY / MM / DD

Exposure Calculation details:

Communicability for Case (period for transmission):
Earliest Possible Communicability Date: YYYY / MM / DD **Latest Possible Communicability Date:** YYYY / MM / DD

Communicability Calculation Details:

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

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes	N –No NA – not asked U - unknown	DESCRIPTION	Yes	N –No NA – not asked U - unknown
Special Population - Pregnancy	YYYY / MM / DD		**Setting** - Crowded living conditions (>1 person per room excluding bathrooms)		
Contact - Persons with similar symptoms	YYYY / MM / DD		**Special Population** - Lives in a communal setting		
Contact to a known case (Add'l Info)	YYYY / MM / DD		**Travel** - Outside of Canada (Add'l Info)	AE/TE YYYY / MM / DD	
Immunocompromised - Related to underlying disease or treatment			**Travel** - Outside of Saskatchewan, but within Canada (Add'l Info)	AE/TE YYYY / MM / DD	
Maternal Tdap not received between 27 weeks and 2 weeks prior to delivery *(For infant cases <1 year)*	YYYY / MM / DD				

Pertussis Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

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

H) INTERVENTION

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

Intervention Type and Sub Type:

Assessment:
☐ Assessed for contacts YYYY / MM / DD
(especially pregnant or < 1 year of age)
Investigator name

Other Investigation Findings:
☐ Investigator Notes ☐ See Document Management

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

Communication:
☐ Other communication (see Investigator Notes) YYYY / MM / DD
Investigator name
☐ Letter (See Document Management) YYYY / MM / DD
Investigator name

Referral:
☐ Other (specify)_____ YYYY / MM / DD
Investigator name

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Testing:
☐ Laboratory testing recommended YYYY / MM / DD
Investigator name

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

Treatment:
☐ Treatment not recommended YYYY / MM / DD
Investigator name

Exclusion: Investigator name
☐ Daycare YYYY / MM / DD ☐ Preschool YYYY / MM / DD
☐ School YYYY / MM / DD ☐ Work YYYY / MM / DD

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	

Pertussis Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

I) OUTCOMES (required for infants <12 months) 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) _____

J) Transmission Events LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Transmission Event ID	Exposure Name	Setting type	Date/Time	# of contacts
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure		
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure		
		☐Congregate/Communal living ☐Health Care setting ☐Type of community contact ☐ Household Exposure		
	Pertussis Contacts – Inv ID# _____	☐Multiple Settings	YYYY / MM / DD to YYYY / MM / DD	

K) TOTAL NUMBER OF CONTACTS

LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> TE HYPERLINK -> UNKNOWN/ANONYMOUS CONTACTS

Anonymous contacts:_____ (total number of individuals [including groups that do not require 1:1 follow-up])

Initial Report completed by:		**Date initial report completed:** YYYY / MMM / DD

Drug[1]	Dosage	Comments
Azithromycin	**Infants <6 months:** 10 mg/kg/day orally for 5 days. **Children (>= 6 months to 50 kg):** 10 mg/kg/day (to a maximum of 500 mg)orally on the first day followed by 5mg/kg/day (to a maximum of 250 mg) once a day for the next 4 days (5 days total). **Adults (50 kg and over):** 500 mg orally on the first day followed by 250 mg daily for the next 4 days (5 days total).	Preferred antibiotic for infants under 1 month of age. Azithromycin is likely safe in pregnancy. No teratogenicity in humans or animals (Rx Files, 2013).
Clarithromycin	**Children (up to 33 kg):** 15 mg/kg/day provided in a divided dose bid for 7 days **(not to exceed maximum of adult dose**). **Adults (33 kg and over):** 250-500 mg po bid for 7 days	Clarithromycin should not be used in **pregnancy** except where no alternative therapy is appropriate (eCPS, 2015)
Erythromycin	**Children (up to 25 kg):** **Erythromycin estolate:** 40 mg/kg/day (to maximum of 1 g per day) provided in a divided dose tid for 7 days. The estolate is a liquid preparation, only used for children or people with difficulty swallowing. **Adults :** **Erythromycin 250 mg qid** for 7 days (to maximum of 1 g per day). Some experts recommend 2 g daily in divided doses, for example: a) The Anti-infective Guidelines for Community Acquired Infections: 2001, recommends 1-2 g po daily in divided doses. b) b) The Sanford Guide to Antimicrobial Therapy, 2002, recommends 500 mg qid po.	When prescribing erythromycin prophylactically for neonates one should consider that there have been reports of infantile hypertrophic pyloric stenosis (IHPS) associated with its use as pertussis prophylaxis for newborns. The risk of IHPS after treatment with azithromycin and clarithromycin is unknown. **Erythromycin estolate is contraindicated in individuals with existing liver disease or dysfunction, and in pregnancy (CPS, 2010).**

Prescribers of macrolide antibiotics for infants <2 months of age on should monitor for signs and symptoms of pyloric stenosis.

For those who are allergic to macrolides, the following may be used although its efficacy is not proven:

1. Children: trimethoprim 8mg/kg/day-sulfamethoxazole 40mg/kg/day for 10 days.
2. Adults: 2 tabs bid or 1 double strength (DS) tab bid.

[1] Refer to the product monograph and/or the current version of the CPS before prescribing medications.

References

Jensen, B., Regier, L. D., (Ed.) (2013). *Rx files, Drug Comparison Charts* (9th ed.). Saskatoon, SK: Saskatoon Health Region.

Canadian Pharmacists Association. (2015). *Online Compendium of pharmaceuticals and specialties (eCPS): The Canadian drug reference for health professionals*. Ottawa, Canada: Author.

Heymann, D. L., (Ed.). (2015). *Control of Communicable Diseases Manual* (20th ed.). Washington, DC: American Public Health Association.

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.

References

American Academy of Pediatrics. (2015). *Red book: 2015 Report of the Committee on Infectious Diseases* (30th ed.). Elk Grove Village, IL: Author.

Fauci, A. S., Braunwald, E., Kasper, D., Hause, S. L., Longo, D. L., Jameson, J. L., et al. (2007). *Harrison's principles of internal medicine* (17th ed.). Whitby, ON: The McGraw-Hill Companies.

Heymann, D. L. (Ed.). (2015). *Control of communicable diseases manual* (20th ed.). Washington, DC: American Public Health Association.

Mandell, G. L., Bennett, J. E., & Dolin, R. (Eds.). (2000). *Mandell, Douglas, and Bennett's principles and practice of infectious diseases* (5th ed.). Philadelphia, PA: Churchill Livingstone.

Public Health Agency of Canada. (2006). *Canadian immunization guide* (7th ed.). Ottawa, Canada: Public Works and Government Services Canada.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR*), *35S2,* November 2009. Retrieved August, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Pneumoco-eng.php.

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

Respiratory and Direct Contact

Rubella

Notification Timeline:

From Lab/Practitioner to Public Health: Within 48 hours (or immediate if an outbreak is suspected).

From Public Health to Ministry of Health: Within 72 hours (or immediate if an outbreak is suspected).

Public Health Follow-up Timeline: Initiate within 24-48 hrs.

Information

Case Definition (Public Health Agency of Canada, May 2008)

Confirmed Case	Laboratory confirmation of infection in the absence of recent immunization[1] with rubella containing vaccine: • isolation of rubella virus from an appropriate clinical specimen **OR** • detection of rubella virus RNA **OR** • seroconversion or a significant (e.g., fourfold or greater) rise in rubella IgG titre by any standard serologic assay between acute and convalescent sera **OR** • positive serologic test for rubella IgM antibody using a recommended assay* in a person with an epidemiologic link to a laboratory-confirmed case or who has recently travelled to an area of known rubella activity. **OR** Clinical illness[2] in a person with an epidemiologic link to a laboratory-confirmed case.
Probable Case	Clinical illness[2] • in the absence of appropriate laboratory tests **OR** • in the absence of an epidemiologic link to a laboratory-confirmed case **OR** • in a person who has recently travelled to an area of known rubella activity.

[1] The most frequent reaction to measles-mumps-rubella (MMR) immunization is malaise and fever (with or without rash) occurring 7-12 days after immunization. However, this should be determined for each case, as these reactions and time frames can vary (*Canadian Immunization Guide*, 2006).

[2] Clinical illness is characterized by fever and rash, and at least one of the following:

- arthralgia/arthritis
- lymphadenopathy
- conjunctivitis

*IgM serology has the potential for false-positive findings. If the clinical presentation is inconsistent with a diagnosis of rubella or in the absence of recent travel/exposure history, IgM results must be confirmed by the other listed confirmatory methods. Rubella avidity serology is recommended for IgM positive results in pregnant women. Most acute rubella cases develop IgM after 5 days post rash onset. Therefore, a suspected rubella case in which serum collected < 5 days after rash onset initially tests IgM negative should have a second serum collected > 5 days after onset for retesting for IgM. Further strain characterization is indicated for epidemiologic, public health and control purposes.

Causative Agent
Rubella virus, an RNA virus of the genus *Rubivirus*.

Symptoms
Adults may experience a 1 to 5 day prodrome of mild fever, malaise, headache, and conjunctiva. Characteristic postauricular and suboccipital lymphadenopathy is followed by a diffuse maculopapular rash 5 to 10 days later. Children usually have few or no symptoms.

Complications (American Academy of Pediatrics, 2009)

- Encephalitis.
- Thrombocytopenia.
- Maternal rubella during pregnancy can result in miscarriage, fetal death or a variety of congenital anomalies. Refer to Congenital Rubella Syndrome/Infection in the Respiratory and Direct Contact section of the manual.

Incubation Period
Usually 16-18 days, but ranges from 14-23 days, (American Academy of Pediatrics, 2009).

Reservoir/Source
Humans.

Mode of Transmission
Spread by direct or droplet contact with nasopharyngeal secretions of an infected individual. In congenital rubella syndrome, the virus is transmitted to the fetus during pregnancy in 25% of cases of women who were exposed to rubella during their first trimester of pregnancy.

Period of Communicability
Approximately 1 week before to 4-5 days after onset of the rash.

Specimen Collection and Transport
To facilitate rapid testing, laboratory requisitions should be clearly marked "suspect case of rubella" when sending specimens for rubella testing.

To confirm the diagnosis the following specimens should be submitted to Saskatchewan Disease Control Laboratory (SDCL):

- Submit 5 mL serum samples for rubella IgM and IgG (acute and convalescent).
  - IgM response begins with onset of rash and will persist for 1 to 2 months. Only a small proportion of cases will have IgM present in serum samples collected on the day the rash appears. The proportion with IgM rises rapidly until the great majority of cases have IgM by day 5 post-onset of rash.
  - IgG response begins about 1 week after the onset of symptoms and will persist for a lifetime.
  - Convalescent sera should be drawn 10 to 20 days after the initial serology to assess the rise in IgG titre (seroconversion). This interval may be shorter if maternal rubella is being investigated.
  - Rubella specific IgM serology is the standard test for routine diagnosis of rubella but demonstration of a significant increase in the rubella specific IgG titre is a reliable alternative serologic method for diagnosis.
- Nasopharyngeal secretions, for isolation of rubella virus. Collect nasopharyngeal swab or a throat swab, and place in virus transport medium, within 4 days after the onset of symptoms. Refer to the SDCL Compendium of Tests at http://sdcl-testviewer.ehealthsask.ca/ for specimen collection instructions.
- Refrigerate specimens immediately and ship on ice to SDCL. Specimen must be received within 24 hr of collection.

Methods of Control/Role of Investigator

Prevention and Education

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

- Immunize infants, children and adults according to the recommended schedule. Refer to Saskatchewan Immunization Manual.[1]
- Because of the implication of congenital rubella syndrome, special attention to immune status should be paid to women in their preconception, prenatal and postnatal period. If necessary, immunizations should be offered in accordance with the Saskatchewan Immunization Manual.[1]
- Postpartum women who are non-immune should be given rubella-containing vaccine before discharge from hospital. Refer to Saskatchewan Immunization Manual[1] for details.

Education

- Education should be provided regarding respiratory etiquette and measures to prevent transmission of rubella.
- Educate the public about the disease and the need for active immunization with a rubella-containing vaccine. Immunization information fact sheets can be used to guide discussion.

Management

The primary goal of rubella control is to prevent defects in the infants of women who acquire the disease while pregnant. Educate all individuals who are considered contacts. Provide information about rubella to all individuals who may have been exposed to the virus, especially women who may be pregnant or of reproductive age.

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

Information about the signs and symptoms of the disease and the importance of isolation from other possible contacts, including health care workers, daycares and schools and especially other pregnant women is essential.

I. Case

History

- Determine case status and immunization history including a review of the number and dates of rubella-containing vaccine.
- Determine the source of infection. Discuss social events, visitors from out of province, travel out of province and any contact with others who have been ill or with infants who may have congenital rubella syndrome.
- Discuss in detail the dates, names and places where the individual may have been in contact with others during the period of communicability and record contact details on the Attachment – Contact Follow-up Form in the Respiratory and Direct Contact Introduction and General Considerations section of the manual.

Immunization

Investigate immunization history, record date and place.

Treatment/Supportive Therapy

None. Supportive care in the home if symptoms of fever and headache indicate encephalitis, the case should seek medical attention.

Exclusion

Exclude cases from school, daycare, and work for 7 days following the onset of rash (Health Canada 1999, American Academy of Pediatrics 2009).

Referrals

In case of infection with wild rubella virus early in pregnancy, referral to family physician for appropriate counselling should be provided.

II. Contacts/Contact Investigation

Contact Definition/Categorization

- Anyone who is likely to have been exposed to the nose or throat secretions of a person with rubella during their infectious period.

- Investigate all household and close contacts, with special emphasis on exposure to pregnant women, and determine susceptibility. See Definition of Susceptible Contacts. The following settings should be considered:
  - work, school, childcare centres;
  - social events;
  - medical or clinical facilities may be considered as well.
- Individuals are considered immune if they:
  - were born in Canada prior to 1970;
  - were born in Canada in 1970 or later and have documented evidence of immunization with live rubella-containing vaccine after their first birthday;
  - were born outside Canada and have documented evidence of immunization with live rubella-containing vaccine after their first birthday,
  - have laboratory-documented evidence of rubella or laboratory evidence of immunity.

Definition of Susceptible Contacts
• Infants less than one year of age. • Immunocompromised individuals. • Persons born in Canada in 1970 or later and people born outside of Canada who do not have: ▪ documented evidence of vaccination with one dose of live rubella-containing vaccine received after their first birthday **OR** ▪ laboratory evidence of immunity **OR** ▪ a history of laboratory-confirmed rubella.

Prophylaxis/Testing/Immunization

- All pregnant women who have been exposed to the virus should have a blood test for rubella antibody if not already documented. Immune globulin may be suggested for those who are non-immune in consultation with the infectious disease specialist and gynaecologist. The value of this approach has not been established.

- Immunize all susceptible contacts with the exception of pregnant or immunosuppressed individuals. All individuals who have been exposed to the virus and who have no medical contraindications to the rubella vaccine should be given rubella-containing vaccine immediately.[2] Post pubertal females should be advised not to get pregnant for 1 month after receiving rubella-containing vaccine.
- Follow up all contacts within one week to confirm that they have been immunized and/or that they have or have not developed symptoms.

Exclusion

Exclude all suspected cases from school, daycare or work. If possible do not send them home on public transportation or on the school bus.

III. Environment

Child Care Centres/Institutional Control Measures

- Investigate immune status of health care/daycare workers and immunize all who are non-immune, except in the case of pregnancy or immunosuppression.
- Health care workers who are susceptible must not work with patients suspected or confirmed to have rubella. These workers can become infected and may also become a source for transmission (Health Canada, 2002).
- Inform parents of children in daycare centres of the need for susceptible children 12 months of age or older to be immunized immediately.
- Cases in a hospital or institution should be managed under strict contact and droplet isolation precautions.

Epidemic Measures

- Ensure prompt reporting of all confirmed and suspected cases. The medical community and general public should be made aware of rubella epidemics in order to identify and protect any pregnant women who may be susceptible.
- Active surveillance for infants with congenital rubella syndrome (CRS) should be carried out until 9 months after the last reported case of rubella.

[2] Although live-virus rubella vaccine given after exposure has not been demonstrated to prevent illness, vaccine theoretically could prevent illness if administered within 3 days of exposure. If this exposure does not result in illness, immunization will provide protection in the future (American Academy of Pediatrics, p. 582, 2009).

- There is a special concern when rubella cases are identified in unimmunized or underimmunized communities and additional control measures may be implemented.

References

American Academy of Pediatrics. (2009). *Red book: 2009 Report of the Committee on Infectious Diseases* (28th ed.). Elk Grove Village, IL: Author.

Health Canada. (1999). Infection control guidelines: Routine practices and additional precautions for preventing the transmission of infection in health care. *Canada Communicable Disease Report (CCDR), 25S4*, July 1999. Retrieved August, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf.

Health Canada. (2002). Infection control guidelines: Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR*), *28S1*, March 2002. Retrieved August, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR), 35S2*, November 2009. Retrieved August, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Rube-eng.php.

Respiratory and Direct Contact

Congenital Rubella Syndrome/Infection (CRS/CRI)

Notification Timeline:

From Lab/Practitioner to Public Health: Within 48 hours.
From Public Health to Ministry of Health: Within 72 hours.

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

Information

Case Definition (Public Health Agency of Canada May 2008**)**

Table 1. National Case Definition for Congenital Rubella Syndrome (CRS)	
Confirmed Case	*Live birth*: two clinically compatible manifestations (any combination from Table 3, Columns A and B) with laboratory confirmation of infection: • isolation of rubella virus from an appropriate clinical specimen **OR** • detection of rubella virus RNA **OR** • positive serologic test for IgM antibody in the absence of recent immunization with rubella-containing vaccine **OR** • rubella IgG persisting for longer than would be expected (approximately six months after birth) from passive transfer of maternal antibody, or in the absence of recent immunization. *Still birth*: two clinically compatible manifestations with isolation of rubella virus from an appropriate clinical specimen.
Probable Case	In the absence of appropriate laboratory tests, a case that has at least: • any two clinically compatible manifestations listed in Table 3, Column A **OR** • one manifestation listed in Table 3, Column A, plus one listed in Table 3, Column B.
Not a Case	• rubella antibody titre absent in the infant **OR** • rubella antibody titre absent in the mother **OR** • rubella antibody titre declining in the infant consistent with the normal decline after birth of passively transferred maternal antibody.

Case Definition (Public Health Agency of Canada, May 2008**)**

Table 2. National Case Definition for Congenital Rubella Infection (CRI)	
Confirmed Case	Laboratory confirmation of infection but with no clinically compatible manifestations: • isolation of rubella virus from an appropriate clinical specimen **OR** • detection of rubella virus RNA **OR** • positive serologic test for rubella IgM antibody in the absence of recent immunization with rubella-containing vaccine **OR** • rubella IgG persisting for longer than would be expected (approximately six months after birth) from passive transfer of maternal antibody, or in the absence of recent immunization.

Table 3. Congenital Rubella Syndrome: Clinically Compatible Manifestations (Public Health Agency of Canada, May 2008)	
Column A	**Column B**
1. Cataracts or congenital glaucoma (either one or both count as one). 2. Congenital heart defect. 3. Sensorineural hearing loss. 4. Pigmentary retinopathy.	1. Purpura. 2. Hepatosplenomegaly. 3. Microcephaly. 4. Micro ophthalmia. 5. Mental retardation. 6. Meningoencephalitis. 7. Radiolucent bone disease. 8. Developmental or late onset conditions such as diabetes and progressive panencephalitis and any other conditions possibly caused by rubella virus.

Causative Agent
Rubella virus, an RNA virus of the genus *Rubivirus*.

Symptoms
In addition to the manifestations identified in Table 3, the following may also be seen (American Academy of Pediatrics, 2009):

- growth retardation;
- interstitial pneumonitis;
- thrombocytopenia;
- dermal erythropoesis ("blueberry muffin" lesions).

Moderate to severe cases of CRS are usually recognizable at birth. Mild cases that involve slight cardiac involvement or deafness may not be detected for months or even years. A frequent late manifestation of CRS is insulin-dependent diabetes mellitus (Heymann, 2008).

Fetal infections during the 1st trimester are at the greatest risk of intrauterine death, spontaneous abortion and congenital malformations of major organ systems. Infection in the first 20 weeks of gestation is most often associated with CRS and birth defects. Infections after the first 20 weeks of gestation are most often associated with CRI (Alberta Health & Wellness, 2005).

Incubation Period
Not applicable.

Reservoir/Source
Humans.

Mode of Transmission

- From an infected mother to her developing fetus.
- The occurrence of congenital defects is up to 85% if infection associated with maternal rash occurs during the first 12 weeks of gestation, 54% during 13-16 weeks, and 25% during the end of the second trimester (American Academy of Pediatrics, 2009).

Period of Communicability
Infants with CRS/CRI can shed virus in their pharyngeal secretions and urine for up to a year or more.

Specimen Collection and Transport
Laboratory confirmation of CRS/CRI is done by:

- detection of IgM in cord blood or serum of the infant
  OR
- detection of persistent rubella IgG in the infant (beyond approximately 6 months at which time maternally acquired antibodies usually wane)
  OR
- detection of rubella virus in samples (e.g., respiratory specimens collected during the first few months of life) (Alberta Health & Wellness, 2005).

Contact Saskatchewan Disease Control Laboratory (SDCL) Virology Section for additional information about specimen collection.

Methods of Control/Role of Investigator

Prevention and Education
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

- Immunize infants, children and adults according to the recommended schedule. Refer to Saskatchewan Immunization Manual.[1]
- Special attention must be paid to the immune status of women in their preconception, prenatal and postnatal period. If necessary, immunizations should be offered in accordance with the Saskatchewan Immunization Manual.[1]
- Postpartum women who are non-immune should be given rubella-containing vaccine before discharge from the hospital. Refer to the Saskatchewan Immunization Manual.[1]

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

Education

- Educate the public about the disease and the need for active immunization with a rubella-containing vaccine. Immunization information fact sheets can be used to guide discussion.

Management

I. Case

History

Confirm the diagnosis.

Treatment/Supportive Therapy

There is no specific treatment for CRS.

Exclusion

- The infant should be isolated after birth. Routine practices, as well as droplet and contact precautions should be strictly enforced.
- Health care workers who are susceptible must not work with patients suspected or confirmed to have rubella. These workers can become infected and subsequently become a source for transmission (Health Canada, 2002).
- Once discharged from hospital, only persons that are immune to rubella should have contact with and care for the infected newborn.
- Children with CRS/CRI should be presumed infectious at least through to age one year, unless nasopharyngeal and urine cultures are negative for virus after three months of age. The Medical Health Officer (MHO) should determine a schedule of nasopharyngeal swabs and urine cultures for the first year of life in consultation with the physician and SDCL.
- Viral isolation is not always successful and repeated attempts at viral isolation testing may be necessary – the pediatrician may consult with MHO who is to consult with SDCL for guidance in this regard.

Referrals

- The family physician may make referrals to specialists for infants with CRS/CRI, as appropriate (ophthalmologists, audiologists, heart specialists, etc.).
- The infant should continue to be monitored for clinical manifestations by their physician.

II. Contacts/Contact Investigation

Susceptible (non-immune) persons should avoid contact with the infant until they are immunized. This is particularly relevant for non-immune pregnant women and children less than 12 months of age.

III. Environment

Child Care Centres/Institutional Control Measures

- Contact and droplet isolation precautions should be implemented in hospitals to infants with CRS/CRI who are under 12 months, unless urine and pharyngeal virus cultures are negative for rubella virus after 3 months of age.
- Investigate immune status of health care/daycare workers and immunize all who are non-immune, except in the case of pregnancy or immunosuppression.

References

Alberta Health and Wellness. (2005). *Public health notifiable disease management guidelines*: *Congenital rubella.* Retrieved August, 2011 from http://www.health.alberta.ca/professionals/notifiable-diseases-guide.html.

American Academy of Pediatrics. (2009). *Red book: 2009 Report of the Committee on Infectious Diseases* (28th ed.). Elk Grove Village, IL: Author.

Health Canada. (1999). Infection control guidelines: Routine practices and additional precautions for preventing the transmission of infection in health care. *Canada Communicable Disease Report (CCDR), 25S4*, July 1999. Retrieved August, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf.

Health Canada. (2002). Infection control guidelines: Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR), 28S1*, March 2002. Retrieved August, 2011 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR), 35S2*, November 2009. Retrieved August, 2011 from www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/CRS_SRC-eng.php.

Respiratory and Direct Contact

Severe Acute Respiratory Infection (SARI)

Notification Timeline

From Lab/Practitioner to Public Health: Immediate.
From Public Health to Ministry of Health: Upon notification from lab or physician.

Public Health Follow-up Timeline: Within 24-48 hours.

Information

Case Definition (adapted from Public Health Agency of Canada, 2013)
To confirm the diagnosis of a case of SARI, the case must meet criteria in each of the categories listed below for hospitalized cases **(A)** or for cases who are deceased **(B)**:

1. Respiratory symptoms.
2. Severity.
3. Unknown diagnosis.
4. Epidemiological exposure, as detailed in the specific case definitions below.

SARI Case (A)
A person admitted to hospital with the following:

1. **Respiratory symptoms, i.e.:**
   - Fever[1] of over 38 degrees Celsius **AND** new onset of (or exacerbation of chronic) cough or breathing difficulty.

AND

2. **Evidence of severe illness progression, i.e.:**
   - Either radiographic evidence of infiltrates consistent with pneumonia, or a diagnosis of acute respiratory distress syndrome (ARDS) or severe influenza-like illness (ILI),[2] which may also include complications such as encephalitis, myocarditis or other severe and life threatening complications.

AND

3. **Either admission to the ICU/other area of the hospital where critically ill patients are cared for OR mechanical ventilation**.

AND

[1] As per the ILI definition, fever may not be prominent in patients under 5 years or 65 years and older as well as in immunosuppressed individuals. Failure to take temperature should not rule out a history of self-reported fever. Clinical judgment should always prevail with regard to these groups.
[2] **Severe ILI:** In addition to the symptoms of ILI noted below, severe ILI may also include complications such as encephalitis, myocarditis or other severe and life threatening complications.

4. **No alternate diagnosis within the first 72 hours[3] of hospitalization, i.e.:**
   - Results of preliminary clinical and/or laboratory investigations, within the first 72 hours of hospitalization, cannot ascertain a diagnosis that reasonably explains the illness.

AND

5. **One or more of the following exposures/conditions, i.e.:**
   - Residence, recent travel (within ≤ 14 days of illness onset) to a country where human cases of novel influenza virus or other emerging/re-emerging pathogens have been detected or are known to be circulating in animals[4].
   - Close contact[5] with an ill person who has been to an affected area/site within the 14 days prior to onset of symptoms.
   - Exposure to settings in which there had been mass die offs or illness in domestic poultry or swine in the previous six weeks.
   - Occupational exposure involving **direct** health care, laboratory or animal exposure, i.e.:
     - **Health care exposure** involving health care workers who work in an environment where patients with SARI are being cared for, particularly patients requiring intensive care.

     OR
     - **Laboratory exposure** in a person who works directly with Laboratory biological specimens.

     OR
     - **Animal exposure** in a person employed as one of the following:
       - Poultry/swine farm worker;
       - Poultry/swine processing plant worker;
       - Poultry/swine culler (catching, bagging, transporting or disposing of dead birds/swine);

[3] It is suggested that laboratory investigation, including laboratory testing for influenza and other respiratory pathogens should be started as soon as possible upon presentation (i.e., do not wait 72 hours to initiate testing) and it requires immediate infection control and public health action. Refer to Attachment – Severe Acute Respiratory Illness (SARI) Screening Tool and discuss with the Medical Health Officer and Infection Control.

[4] Refer to the World Health Organization Human Animal Interface for the most recent information http://www.who.int/influenza/human_animal_interface/en/)

[5] Close contact is defined as: Anyone who provided care for the patient, including a health care worker or family member, or who had other similarly close physical contact; Anyone who stayed at the same place (e.g. lived with, visited) as a probable or confirmed case while the case was ill.

- Worker in live animal market;
- Dealer or trader of pet birds, pigs or other potentially affected animals;
- Chef working with live or recently killed domestic poultry, swine or other potentially affected animals;
- Veterinarian worker;
- Public health inspector/regulator.

OR

SARI Case (B)

A deceased person with the following:

1. **A history of respiratory symptoms, i.e.:**
   - History of unexplained acute respiratory illness (including fever and new onset of (or exacerbation of chronic) cough or breathing difficulty) resulting in death.

AND

2. **Autopsy performed with findings consistent with SARI, i.e.:**
   - Autopsy findings consistent with the pathology of ARDS without an identifiable cause.

AND

3. **No alternate diagnosis that reasonably explains the illness.**

AND

4. **One or more of exposures/conditions, as listed in (A).**

SARI Case Exclusion Criteria

A person should not be reported as a case of SARI if an alternate diagnosis can reasonably explain their illness.

Health Care Facility Surveillance for SARI

It is recommended that regions/jurisdictions use the Attachment – Severe Acute Respiratory Illness (SARI) Screening Tool in their acute and integrated health care facilities to ensure the early recognition of potential SARI cases and the prompt notification of Infection Control and Medical Health Officers (MHOs). This will ensure that sporadic cases of SARI are reported and assessed using this case definition.

Causative Agent
Varies; includes several emerging respiratory pathogens including but not limited to influenza A (H5N1), other novel influenza virus, SARS-CoV (coronavirus), etc.

Symptoms
- Fever (> 38 degrees Celsius).
- New onset of (or exacerbation of chronic) cough or breathing difficulty.
- Radiographic evidence of infiltrates consistent with pneumonia or acute respiratory distress syndrome (ARDS) or Severe ILI.

Incubation Period
Varies depending on the organism; for example:
- SARS-CoV is 3 to10 days.
- Avian influenza ranges from 2-8 days and as long as 17 days.

Reservoir/Source
Varies depending on the organism; for example:
- SARS-CoV is unknown.
- Avian influenza – primarily birds, but can affect humans and pigs as well.

Mode of Transmission
- Direct contact with respiratory secretions or body fluids of a confirmed, suspect of probable case or direct contact with suspected animals implicated in transmission.
- Airborne via aerosol-generating medical procedures.[6]
- SARS-CoV – person to person by close contact. Primarily through droplets and fomites.
- Avian influenza – refer to Vector-Borne and Zoonotic Diseases Avian Influenza section of the manual. (The virus is transmitted through close contact with dead or sick birds. There is limited human-to-human transmission occurring at this time.)
- MERS-CoV – contact with camels or their milk or urine; person to person by close contact.

[6] **Aerosol Generating Medical Procedure**: A medical or surgical procedure that involves manipulation or stimulation of a patient's airway in a manner that may stimulate coughing and/or promote the generation of aerosols.

Period of Communicability

- Varies depending on the specific organism suspected or identified.
- Not completely understood for SARS-CoV – initial studies suggest that transmission does not occur before onset of clinical symptoms and maximum period of communicability is less than 21 days.
- Difficult to determine when there is no evidence of direct human-to-human transmission (avian influenza).

Specimen Collection and Transport

Appropriate testing for routine respiratory pathogens should be reinforced.

The following are suggested laboratory diagnostic tests that should be considered in the **initial** laboratory work-up of patients presenting with symptoms of SARI. Relevant medical history, as well as clinical signs and symptoms will dictate appropriate ongoing testing for each patient, (The Public Health Agency of Canada, 2013).

Specimens should be sent on a STAT basis. Refer to the Saskatchewan Disease Control Laboratory (SDCL) Compendium of Tests[7], Time or Temperature Sensitive, STAT and Outbreak Samples Policy for details on submitting STAT samples. The MHO may be able to assist in expediting testing.

The **initial** specimens must be clearly marked **"SARI Screen".**

- Blood culture.
- Sputum for C&S.
- Nasopharyngeal swab in viral transport for:
  - influenza PCR;
  - respiratory virus culture;
  - direct antigen testing.
- CBC and differential.
- Liver function tests.
- Stool for viral studies (only if the patient has diarrhea).
- Arrange for other testing as recommended by MHO and/or Infectious Disease (ID) Specialist.

[7] http://sdcl-testviewer.ehealthsask.ca/

Methods of Control/Role of Investigator

Infection control procedures are paramount. Contact, droplet and airborne precautions must be implemented as necessary for patients in health care facilities and should be done in consultation with Infection Control and MHO. Refer to Infection Prevention and Control Measures and Initial Management of Persons who May Be Infected with a Novel Respiratory Virus.

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

Refer to Vector-Borne and Zoonotic Diseases Avian Influenza section of the manual for additional prevention measures if poultry is involved as a host or source of infection.

SARI alerts should trigger MHOs to inform clinicians about the SARI screening tool and reinforce the "Think, Tell and Test" message.

- THINK about the possibility of an emerging respiratory infection, e.g., novel respiratory virus and how the spread can be prevented (implementation of appropriate infection control measures).
- TELL the local MHO and local infection control and consult with ID Specialist.
- TEST for pathogens only after appropriate consultation with the MHO and ID Specialist and based on clinical and epidemiologic symptoms.

Refer to Specimen Collection and Transport above, Attachment – Severe Acute Respiratory Illness (SARI) Screening Tool or Laboratory Testing for Persons Who May Be Infected with a Novel Respiratory Virus.

- Educate cases and contacts on the appropriate infection control measures that must be taken to reduce the spread.
- Provide education and instructions for staff who have cared for the case before appropriate precautions were implemented (i.e., had unprotected close contact with the case). This should include specific advice on how to self-monitor for fever and symptoms of respiratory illness for 14 days.

Management

I. Case

Contact, droplet and airborne precautions must be implemented as necessary for all clients being investigated for SARI.

History

- Complete the Attachment – Severe Acute Respiratory Illness (SARI) Screening Tool and Attachment – Emerging Respiratory Pathogens and Severe Acute Respiratory Infection (SARI) Case Report.
- If person-to-person spread is typical for the suspected organism, identify those who may have been exposed to this case and follow-up as per Contact Investigation below.
- If the case was severely ill with the respiratory illness during air travel (i.e., on return to Canada), then the MHO should contact Health Canada's Centre for Emergency Preparedness and Response (CEPR), to request passenger contact information (e.g., airplane manifest). Follow-up of passengers may be considered if the case meets the SARI case definition and there is an identified concern of SARI globally and travel exposure occurred during the incubation period (within 14 days prior to the onset of illness), or the case is found to have another illness with significant public health implications.

Immunization

- Review immunization history specifically for Pneu-P-23 (pneumococcal 23 polysaccharide vaccine) and Influenza. If high-risk, offer as appropriate.

Treatment/Supportive Therapy

- Consult with ID Specialist.

Exclusion

- The period of exclusion will be based on the specific organism.
- While laboratory results are pending, appropriate infection control measures should be implemented including exclusion where appropriate.

Referrals

- All SARI cases should be managed in consultation with the ID specialist and MHO.
- If no organism is identified, consultation with colleagues to determine further action is recommended.

II. Contacts/Contact Investigation

Close Contact means having cared for, lived with, or had face-to-face (within 1 metre) contact with, or has had direct contact with respiratory secretions and/or body fluids of a person with SARI (Public Health Agency of Canada, 2003).

- Household contacts, intimate contacts and health care providers should be the initial priority.
- Follow-up of the other close contacts should occur if the contacts can be reached within 14 days of their last contact with an infectious case.[8]

The extent of investigation for remote contacts is dependent on the extent of illness in the close contacts and specific organism and will be directed by the MHO.
See Attachment – Sample Severe Acute Respiratory Infection Contact Management Form.

Testing

- Consult with MHO for recommendations.

Prophylaxis/Immunization

- Review immunization history for contacts. The opportunity should be taken to catch up on immunizations for which the contact meets the eligibility criteria.

[8] This recommendation takes into account the need to prioritize limited public health resources. It is acknowledged that some cases may be symptomatic and missed if no attempt is made to reach potentially ill contacts identified beyond the 14-day time frame. Therefore this should be considered a reasonable approach to contact management and should not preclude any jurisdiction from undertaking a more complete contact investigation.

Education

- Public health should ensure that contacts receive education/instructions regarding infection control measures, self-monitoring, and who to contact if they become ill with respiratory symptoms. This should include informing the contact that if they develop symptoms (i.e., fever, cough or difficulty breathing), they should do the following:
  - Phone their personal physician so that decisions regarding the need for a clinical assessment can be individualized.
  - Health care providers should be asked to check in with their respective occupational health departments prior to returning to work.
  - Hospital/home isolation[9] may be recommended until symptoms have resolved/returned to baseline.

Exclusion

- If the close contact is **symptomatic** (i.e., has fever, cough or difficulty breathing), manage as a case.
- No exclusion recommended if the close contact is **asymptomatic** (i.e., is afebrile and has no respiratory symptoms that are different from their baseline status):
  - Self-monitor for fever and new respiratory symptoms for 14 days following last contact with the case.

III. Environment

Child Care Centres/Institutional Control Measures

- Facilities should promptly initiate contact, droplet and airborne precautions (in addition to Routine/Standard Precautions) and consult their local infection control policies. Infection Control and the MHO should be consulted on all SARI cases.
- Patients with suspected SARI should be moved to a designated isolation room ASAP (or negative pressure room if available).

[9] The symptomatic contact should be isolated in their home unless hospitalization is clinically indicated. These individuals would be instructed to stay home from work/school/other activities, wash their hands frequently and avoid direct face to face contact with others for the duration of their illness. The extent of the isolation requirements should be based on the severity of illness in the case, the composition of the household (e.g., presence of immunocompromised individuals) and any available evidence regarding communicability and ease of transmission.

Refer to provincial and national guidelines and discuss with the local MHO or Infection Control Practitioner for Infection Control guidance. Initial precautions may be more conservative and include airborne as well as contact and droplet precautions.

Epidemic Measures

If SARI cases are identified in a health care facility, it is important to heighten surveillance to assist in early identification and implementation of control measures and further outbreak control measures as required.

PHAC may be in a position to provide direction. Saskatchewan Ministry of Health will participate in communication messages and provide direction. Specific measures include:

- Use media to clearly inform the general public about the disease, risk of transmission/infection, signs and symptoms, and how to avoid contact with cases.
- Provide HealthLine with updated information to address concerns from the public.
- Ensure that health care workers are well informed of infection control measures and have appropriate facilities for triage.
- Promote the location of the triage facilities to the public.

References

Public Health Agency of Canada. (2003). *Public health management of cases and clusters of severe respiratory illness (SRI) in the SARS post-outbreak period: Interim guidelines, version 1.* Retrieved October, 2011 from http://www.phac-aspc.gc.ca/sars-sras/pdf/phm-of-cases-and-clusters-sars-pop_e.pdf.

Public Health Agency of Canada. (2013). *Severe acute respiratory illness (SARI) Case Definition.*

Public Health Agency of Canada. (2013). *Protocol for Microbiological Investigations of Severe Acute Respiratory Infections (SARI).* Retrieved January, 2015 from http://www.phac-aspc.gc.ca/eri-ire/proto-sari-iras-eng.php .

Please see the following pages for the Severe Acute Respiratory Illness (SARI) Screening Tool.

SEVERE ACUTE RESPIRATORY ILLNESS (SARI)* SCREENING TOOL

PHYSICIANS to complete

For all persons with severe acute respiratory illness* presenting to the Emergency Department or admitted to Hospital.

*SARI may be caused by respiratory pathogens of known or unknown origin including novel respiratory viruses (Avian Influenza H7N9, H5N1, Novel Coronaviruses e.g. MERS CoV, Wuhan, etc.)

Addressograph/Patient Name:

Date/Time	**Place surgical mask on all patients presenting with *severe acute* respiratory symptoms** (unless the patient's clinical condition will be compromised by wearing the mask). **Ensure that it remains in place during any transportation of the patient for medical investigations/examinations, including Chest X-ray**

COMPLETE THE FOLLOWING SCREENING QUESTIONS - Indicating Yes or No for each of the criteria

PATIENT presents with SARI-defining features:

Yes	**No**	**Fever** (over >38˚ C), **and**
Yes	**No**	**Cough** or breathing difficulty, **and**
Yes	**No**	**Radiographic evidence** of infiltrates consistent with pneumonia or Respiratory Distress Syndrome

NOTE: If answered "NO" to any of the above, there is no need to proceed with this screening tool.

IN THE **14 DAYS** BEFORE THE ONSET OF SYMPTOMS, WERE **ANY OF THE FOLLOWING** PRESENT:

Yes	**No**	1.a) **Close contact** with a suspect or probable case of SARI *[Close contact means having cared for, lived with, or had face to face (within 2 meters) contact with, or having had direct contact with respiratory secretions and/or body fluids of a person with SARI]*
Yes	**No**	1.b) **Travel** to a country where there is a Public Health Agency of Canada public health notice of respiratory illness in effect: http://www.phac-aspc.gc.ca/phn-asp/index-eng.php
Yes	**No**	1.c) **Recent exposure/close contact** to a potential source of a SARI which may include reports of illness or die offs in domestic poultry flocks or illness in other animal vectors such as camels or swine.
Yes	**No**	2. **Current illness is inconsistent with other known cause.**

If you answered "NO" to questions 1 (a, b & c) and 2 The patient has *not* had any exposures of concern, and *does* have another explanation for their symptoms	→	**Initiate Contact & Droplet Precautions (in addition to Routine Practices)**
If you answered "YES" to questions 1 (a, b or c) or 2	→	• **Initiate Airborne and Contact precautions; admit patient to a single room with negative pressure (AIIR). If not available, place in a private room with the door closed.**

1. **THINK infection control** • **Everyone** entering the room should observe hand hygiene, airborne and contact precautions (N95 respirator, gowns, gloves, eye protection)**.**	**Done**	**Not Done**
2. **TELL** your Medical Health Officer **(**Regional contact ##) or if after hours, the MHO on call. ### The MHO will call Roy Romanow Provincial Laboratory (RRPL) to expedite STAT testing (306-798-1234).	**Done**	**Not Done**
3. **TELL** Infection Control (Monday to Friday) – insert Regional contact ##	**Done**	**Not Done**
4. **CONSULT** an Infectious Disease Specialist – insert Regional contact ##	**Done**	**Not Done**
5. **TEST -** Collect specimens and clearly mark specimens **"URGENT: for *SARI Screen*"** **Collect the specimens when clinically indicated**	**Done**	**Not Done**

- Nasopharyngeal and oropharyngeal swab in viral transport media
- CXR
- CBC and differential
- Endotracheal secretions, Broncoalveolar lavage (BAL)
- Serum for *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* serology.
- If patient has diarrhea, send stool for viral studies.
- Arrange other testing as recommended by MHO and/or ID specialist (document on this form).
- Local lab to contact RRPL and confirm details related to delivery/arrival for the STAT specimens.
- Liver function tests
- Blood culture
- Sputum C & S

Notification Timeline:

From Lab/Practitioner to Public Health: Within 48 hours.
From Public Health to Ministry of Health: Immediate for known outbreaks. Individual cases are not reportable to the Ministry.

Public Health Follow-up Timeline: Less than 48 hours for prenatal and neonatal cases and contacts.

Information

Table 1: Case Definition (Public Health Agency of Canada, 2008)

Confirmed case	Clinical evidence of illness[1] and laboratory confirmation of infection: • isolation or direct antigen detection of varicella-zoster virus (VZV) from an appropriate clinical specimen **OR** • detection of VZV DNA **OR** • seroconversion or a significant rise (e.g., fourfold or greater) by any standard serologic assay in varicella-zoster IgG titre between acute and convalescent sera **OR** • positive serologic test for varicella-zoster IgM antibody **OR** • clinical evidence of illness[1] in a person with an epidemiologic link to a laboratory-confirmed case of chickenpox or VZV infection.
Probable Case	Clinical evidence of illness[1] in the absence of laboratory confirmation or epidemiologic link to a laboratory confirmed case.
[1]Clinical illness is characterized by a rash with rapid evolution of macules to papules, vesicles, and crusts; all stages are simultaneously present; lesions are superficial and may appear in crops.	

*Refer to Specimen Collection and Transport for details on appropriate clinical specimens.

Causative Agent
Human herpesvirus3 (alpha); member of VZV (Heymann, 2015).

Symptoms
Varicella may or may not begin with a prodromal period. The prodromal period, when present, is characterized by fever, malaise and upper respiratory tract infection followed by the characteristic lesions. The lesions appear in successive crops over the first 2-5 days of the rash and tend to develop on the trunk and face, with progression to the extremities. They progress rapidly from macules to papules, vesicles and crusts, all stages are simultaneously present; lesions are superficial, distribution is centrifugal. Ulcerated lesions may also be present on mucous membranes including the oropharynx, upper respiratory tract, conjunctiva and rectal and vaginal mucosa. In adults, these symptoms may be more severe (Mandell, Bennett & Dolin, 2000).

Complications
Varicella is generally considered a mild infection; however, 5-10% of otherwise healthy children may develop complications that may be fatal. Complications may include pneumonia, secondary bacterial infections, soft tissue infections, bacteraemia, septicemia, septic arthritis, necrotizing fasciitis, toxic shock-like syndrome, thrombocytopenia, cerebellar ataxia, encephalitis and hepatitis (American Academy of Pediatrics, 2015; Heymann, 2015).

Primary varicella is a more severe disease in adults, with a case fatality rate 10 to 30 times higher than in children. Moreover, in both adults and children, the majority who die of varicella have no identifiable risk factor for severe disease (Health Canada, 1999).

Neonates who develop varicella at 5-10 days are at increased risk for severe generalized varicella. The case-fatality rate for neonates whose mother developed varicella five days before delivery to within two days following delivery and who did not receive Varicella- Zoster Immune Globulin (VarIg) or antiviral therapy can reach 30% (Heymann, 2015).

Incubation Period
Usually 14-16 days but it can be as early as 10 days or as late as 21 days (Heymann, 2015).

Reservoir/Source
Humans.

Mode of Transmission
- Direct or indirect contact of oral or nasal mucous membranes with respiratory secretions or vesicular fluid.
- Inhalation of airborne virus.
- Indirect transmission may occur through contact with respiratory secretions or discharge from lesions on freshly soiled linens or towels.
- Transmission of vaccine virus is rare (Public Health Agency of Canada, 2006).
- Transmission can occur from direct contact with fluids from localized shingles lesions but is rare if the lesions are covered. Disseminated zoster can be transmitted by airborne route. (Household transmission rates have been noted to be approximately 15% [Stankus, Dlugopolski & Packer, 2000]).
- In utero infection through transplacental passage during maternal infection.

Risk Groups/Risk Factors
- Neonates born to non-immune mothers.
- Newborns of mothers who develop varicella between five days prior to delivery and 48 hours after the delivery.
- Infants.
- Adolescents (American Academy of Pediatrics, 2015).
- Individuals with chronic cutaneous/pulmonary disorder (American Academy of Pediatrics, 2015).
- Pregnant women who have never had varicella vaccine, varicella disease or shingles.
- Immunocompromised individuals.
- Cancer patients, especially lymphoid tissue, with or without steroid therapy.

Period of Communicability
- From one to two days before onset of rash and continuing until all lesions are crusted, approximately five days (Heymann, 2015; American Academy of Pediatrics, 2015).
- In immuno-competent individuals most virus replication has stopped by 72 hours after onset of the rash. The time may be longer in immunocompromised individuals (Mandell et al., 2000).

Specimen Collection and Transport

- Swabs from the base of a freshly de-roofed lesion for culture and direct fluorescent antibody (DFA) or polymerase chain reaction (PCR).
- Cerebrospinal fluid (CSF) for culture or PCR.
- Blood for serology.

Methods of Control/Role of Investigator

Prevention and Education

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

Immunize infants, children, and adults according to the recommended schedules in the Saskatchewan Immunization Manual.[1]

Education

- Education should be provided regarding respiratory etiquette, hand hygiene and other measures to prevent transmission.
- Educate the public about the disease and the need for active immunization. Immunization information fact sheets can be used to guide discussion.

Management

I. Case

History

- Assess risk factors and exposure history. The source of infection could be a case of varicella or herpes zoster (rarely unless disseminated).
- Identify contacts (refer to contact definition).

Immunization

Assess immunization history.

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

Education

- Practicing good hand hygiene.
- Not sharing personal items such as drinking glasses, eating utensils, or towels.
- Respiratory etiquette.
- Cases should avoid contact with high risk individuals who have not yet been exposed.

Treatment/Supportive Therapy

- Supportive therapy as indicated.
- Treatment with antivirals has a limited window of opportunity to affect the outcome of varicella-zoster infection. Acyclovir therapy initiated within 24 hours after onset of the rash is effective in accelerating skin lesion healing and can be used for generally healthy population (at increased risk of moderate to severe varicella) as soon as possible after rash onset (Public Health Agency of Canada, 2006).

Exclusion

- Cases should not be cared for by susceptible persons.
- Children with chickenpox may remain in school/daycare as long as they are feeling well enough to take part in normal activities (Canadian Pediatric Society, 2016).
  - Exclusion for five days after the appearance of the rash should still be considered when the child has severe illness or is going into a new setting where the classmates have not already been exposed.
- In health care facilities, the appropriate infection control measures should be implemented because of the risk of serious varicella in susceptible immunocompromised individuals. Refer to Health Facility Control Measures.
- Air travel is not recommended until lesions are crusted.
- Swimming in public pools is not recommended until lesions have healed and crusts are no longer present (Alberta Health and Wellness, 2008).

Referrals

Not applicable.

II. Contacts/Contact Investigation

Identify susceptible contacts with significant exposure (see Contact Definition).

Table 2: Contact Definition

Contact	Anyone who shared the same airspace with a case during the infectious period (48 hours before to five days after onset of rash).
Significant Exposure [2] (Public Health Agency of Canada, 2016 and 2013)	Varicella • Continuous household contact (living in the same dwelling) with a person with varicella. • Close contact with an infectious person, such as close indoor contact (e.g., in the same room) or face-to-face contact[3]. • Being in the same hospital room for >1 hour, or >15 minutes of face-to-face contact, with a patient with varicella. • Touching the lesions of a person with active varicella. Zoster • Touching a zoster rash, exposed lesion or vesicle fluid or articles freshly soiled by discharges from vesicles; • Contact with an individual who has disseminated zoster; • Contact with articles freshly soiled by mucous membrane secretions of a person with disseminated zoster; or • Exposure to an immunocompromised person with localized zoster anywhere on the body because their viral shedding may be greater.

[2] Verbal history of infection is not acceptable following a significant exposure to varicella in individuals at **high risk for varicella complications** and cannot be accepted as evidence of immunity

[3] Experts differ in their opinion about the duration of contact; some suggest five minutes and others up to one hour, but do agree that it does not include transitory contact (Centers for Disease Control and Prevention, 2016)

Susceptible Contacts	• Newborns of mothers who develop varicella between five days prior to delivery and 48 hours (two days) after delivery. • Hematopoietic stem cell transplant (HSCT) recipients regardless of pre-transplant varicella immune status or history of varicella disease or vaccination. • Immunocompromised individuals. • Hospitalized patients, especially premature infants. ➢ Preterm infants >/= 28 weeks gestation whose mother lacks a reliable history of chickenpox or serologic immunity (American Academy of Pediatrics, 2009). ➢ Preterm infants < 28 weeks gestation or birth weight of 1,000 g or less, regardless of the maternal history of chickenpox or serostatus (American Academy of Pediatrics, 2009). • Pregnant women who do not have documentation of immunity to varicella (routine prenatal screening includes varicella immunity). • Healthy individuals who (Public Health Agency of Canada, 2015): ➢ Do not report having a health care provider diagnosed or self-diagnosed history of varicella or zoster prior to implementation of a one dose varicella program[4] ➢ Do not have documented evidence of immunization with two doses of varicella containing vaccine, or ➢ Do not have previous laboratory evidence of immunity[5] to varicella.

[4] One-dose varicella program was implemented in Saskatchewan on January 1, 2005
[5] Laboratory testing should be conducted only once in a lifetime. If a person has been found to be seropositive, it is not necessary to test again.

Education

- Close contacts of confirmed cases should be educated about varicella and its signs and symptoms.
- They should also be advised that varicella is communicable to others long before the rash appears.
- Adult contacts (including pregnant women), and any individual with immunocompromising conditions, should be advised to see a physician if early signs and symptoms appear.
- Household contacts of confirmed and probable cases should avoid contact with susceptible/high risk groups/individuals during the incubation period.

History

- Assess risk factors.
- History of vaccination.
- History of varicella disease and/or shingles.

Preventive Measures

Immunize individuals as per the Saskatchewan Immunization Manual[6].

Prophylaxis Immunization

Although varicella vaccine has been shown to be effective in preventing or reducing the severity of the disease if given to susceptible individuals within 72 hours and no longer than five days after exposure, Saskatchewan Ministry of Health, at this time, does not routinely provide publicly funded immunization for contacts of chickenpox. The exception is children who fall into the target group who have not yet been immunized, and who do not have contraindications to immunization.

Immune Globulin Prophylaxis

Susceptible individuals at higher risk for severe disease (see list below), should be evaluated immediately for administration of VarIg. The National Advisory Committee for Immunization (NACI) (2016) recommends:

- For optimum benefit, VarIg should be administered as soon as possible (ideally within 96 hours) following first exposure.

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

- In instances of prolonged exposures, where the exact timing of transmission may be unknown, it may be used within 96 hours of the most recent exposure.
- If more than 96 hours but less than 10 days have elapsed since the last exposure, the susceptible high-risk individuals' clinician may determine that VarIg would be useful to attenuate (rather than prevent) disease. The benefit of administering VarIg after 96 hours is uncertain.

Dosage: 125 units/10 kg of body weight, to a maximum of 625 units IM. Refer to Appendix D – Publicly Funded Medications for Chemoprophylaxis/Treatment for information on how to access VarIg from Canadian Blood Services.

NACI recommends VarIg for the following susceptible **high-risk groups** after exposure to VZV (Public Health Agency of Canada, 2016):

1. Susceptible pregnant women.
2. Newborn infants of mothers who have varicella that began during the five days before to 48 hours after delivery.
3. Selected neonates in neonatal or pediatric intensive care units for the management of significant varicella exposure in consultation with the infectious diseases/infection control specialist.
4. Susceptible immunocompromised individuals, including (including those with HIV with CD4 cell count < 200 × 106/L or CD4 percentage < 15%) and HSCT recipients regardless of pre-transplant varicella immune status or history of varicella disease or vaccination.

Testing

Adolescents and adults who have a negative or uncertain past history of varicella and no documentation of vaccination should have serologic tests to establish susceptibility, since as many as 70 to 95% of such individuals have immunity to varicella. However, delays in obtaining test results should not delay appropriate post-exposure varicella management (Public Health Agency of Canada, 2006).

Chemoprophylaxis

Clinicians may want to consult with specialists to determine if and when acyclovir should be used for specific contacts in circumstances where the timeframe for VarIg has elapsed.

Acyclovir is generally not recommended for immunocompetent contacts.

Treatment

Antiviral drugs such as acyclovir appear useful in preventing or modifying varicella in exposed individuals if given within a week of exposure.

Exclusion

Susceptible caregivers, including healthcare workers (HCWs) exposed to chickenpox should be excluded from contact with high-risk patients from 8-21 days after exposure. Extend to 28 days if VarIg was given as it may prolong the incubation period if it is unable to fully protect against infection in the susceptible person who received it (Health Canada, 2002).

III. Environment

Prevent the spread of infection by using a household cleaner to wash any articles soiled with fluid from chickenpox blisters. Keep the infected person away from others who have not had chickenpox.

Health Facilities Control Measures

- HCWs should have proof of immunity or previous immunization assessed upon employment. Refer to the Saskatchewan Immunization Manual[7] – Chapter 7: Immunization of Special Populations, Section 3.2 Health Care Workers and other relevant Saskatchewan Ministry of Health policies/memos.
- A suspected or confirmed case of varicella occurring within a facility must be reported immediately to the local public health office and to infection control.
- Strict enforcement of infection control practices (routine practices as well as contact and airborne precautions) should be taken for a minimum of five days and until all lesions are crusted (Health Canada, 2002 and Health Canada, 1999).
- Immunocompromised cases should be isolated with contact and airborne precautions for the duration of their illness which can be up to a week (American Academy of Pediatrics, 2015).
- Provide varicella vaccine or VarIg to susceptible contacts as described in contact management.

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

- Susceptible contacts who are HCWs should be excluded from working with high-risk susceptible patients during the potential period of communicability (from eight days, after first exposure to 21 days from last exposure to an infectious client) or to day 28 for those who received immune globulin as it may prolong the incubation period (Public Health Agency of Canada, 2006).
- Health care facilities may, after consultation with the Medical Health Officer (MHO), provide HCWs immunization and other follow up. HCWs must be instructed to call public health if they develop any signs or symptoms suggestive of varicella.
- HCWs who are symptomatic should be excluded from work until all lesions are dry and crusted and no new lesions are forming.
- Occupational Health (OH) should not exclude HCWs with a localized, postimmunization varicella-like rash that can be covered with an occlusive dressing.
- OH should exclude HCWs with a postimmunization varicella-like rash if the rash cannot be covered and if the HCWs are involved in the care of high-risk patients, (e.g., immunocompromised and newborn patients) for the duration of the rash.
- OH should inform Infection Control as soon as possible of a suspected or confirmed case.

Epidemic Measures

- Follow as per case and contact management.
- The use of varicella vaccine may be considered in the management of outbreaks in consultation with Saskatchewan Ministry of Health.

Revisions

Date	Change
March 2016	Updated recommendations on use of VarIg based on NACI Statement 2015.
March 2017	Updated definition of susceptible individuals based on NACI Statement (2015) and included contact to zoster under significant exposure definition as per PHAC (2015). References reaffirmed or updated as necessary.

References

Alberta Health and Wellness. (2013). *Public health notifiable disease management guidelines: Varicella (chickenpox)*. Retrieved March, 2014 from http://www.health.alberta.ca/professionals/notifiable-diseases-guide.html.

American Academy of Pediatrics. (2012). *Red book: 2012 Report of the Committee on Infectious Diseases* (29th ed.). Elk Grove Village, IL: Author.

Canadian Pediatric Society (2016). School and daycare exclusion policies for chickenpox: A rational approach. Retrieved April, 2017 from http://www.cps.ca/documents/position/exclusion-policies-for-chickenpox

Centers for Disease Control and Prevention. (2016). Strategies for the Control and Investigation of Varicella Outbreaks 2008. *National Center for Immunization and Respiratory Diseases.* Retrieved April 2017 from https://www.cdc.gov/chickenpox/outbreaks/manual.html

Centers for Disease Control and Prevention. Prevention of varicella: Recommendations of the advisory committee on immunization practices. *Morbidity and Mortality Weekly Report (MMWR), 56RR-4*, June 2007.

Feigin, R. & Cherry, J. (Eds.). (1998). *Textbook of pediatric infectious diseases*, *Vol. 2,* (4th ed.). Australia: Elsevier.

Health Canada. (1998). Infection control guidelines: Hand washing, cleaning, disinfection and sterilization in health care. *Canada Communicable Disease Report (CCDR), 24S8,* December 1998. Retrieved March, 2014 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/98pdf/cdr24s8e.pdf.

Health Canada. (1999). Infection control guidelines: Routine practices and additional precautions for preventing the transmission of infection in health care. *Canada Communicable Disease Report (CCDR), 25S4,* July 1999. Retrieved March, 2014 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf.

Health Canada. (1999). Proceedings of the national varicella consensus conference, May 1999. *Canada Communicable Disease Report (CCDR), 25S5*, August 1999. Retrieved March, 2014 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s5e.pdf.

Health Canada. (2002). Infection control guidelines: Prevention and control of occupational infections in health care. *Canada Communicable Disease Report (CCDR), 28S1*, March 2002. Retrieved March, 2014 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf.

Heymann, D. L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington, DC: American Public Health Association.

Mandell, G. L., Bennett, J. E., & Dolin, R. (Eds.). (2000). *Mandell, Douglas, and Bennett's principles and practice of infectious diseases* (5th ed.). Philadelphia, PA: Churchill Livingstone.

Public Health Agency of Canada. (2016). Varicella (Chickenpox) vaccine. *Canadian immunization guide* (7th ed.). Ottawa, Canada: Public Works and Government Services Canada.

Public Health Agency of Canada. (2013). Passive immunizing agents. *Canadian immunization guide* (7th ed.). Ottawa, Canada: Public Works and Government Services Canada.

Public Health Agency of Canada. (2006). VariZIG™ as the varicella zoster immune globulin for the prevention of varicella in at-risk patients. *Canada Communicable Disease Report (CCDR), 32 ACS-8*, October 2006. Retrieved March, 2014 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/06vol32/acs-08/index-eng.php.

Public Health Agency of Canada. (2008). Case definitions for communicable diseases under national surveillance. *Canada Communicable Disease Report (CCDR*), *35S2*, November 2009. Retrieved March, 2014 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Varicel-eng.php.

Public Health Agency of Canada. (2015). Updated recommendations for the use of varicella zoster immune globulin (VarIg) for the prevention of varicella in at risk patients. *An Advisory Committee Statement National Advisory Committee on Immunization.*

Public Health Agency of Canada. (2015). Varicella proof of immunity – 2015 Update. *An Advisory Committee Statement National Advisory Committee on Immunization.* Retrieved from https://www.canada.ca/en/public-health/services/publications/healthy-living/varicella-proof-immunity-2015-update.html

Stankus, S. J., Dlugopolski, M., & Packer, D. (2000). Management of herpes zoster (shingles) and postherpetic neuralgia. *American Family Physicians.* Retrieved March, 2014 from http://www.aafp.org/afp/20000415/2437.html.

Government of Saskatchewan

PANORAMA

Varicella 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

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

Disease Summary Classification: CASE	**Date**	***Classification: CONTACT***	***Date***	***LAB TEST INFORMATION:***
☐ Confirmed	YYYY / MM / DD	☐ *Contact*	*YYYY / MM / DD*	*Date specimen collected:*
☐ Does Not Meet Case Definition	YYYY / MM / DD	☐ *Not a Contact*	*YYYY / MM / DD*	*YYYY / MM / DD*
☐ Person Under Investigation	YYYY / MM / DD	☐ *Person Under Investigation*	*YYYY / MM / DD*	
☐ Probable	YYYY / MM / DD			
☐ Suspect	YYYY / MM / DD			

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_____

C) DISEASE EVENT HISTORY

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

Site / Presentation: ☐ Severe ☐ Neonatal ☐ Case with high risk contacts

Staging: ☐ Acute ☐ Reactivation

Varicella Data Collection Worksheet

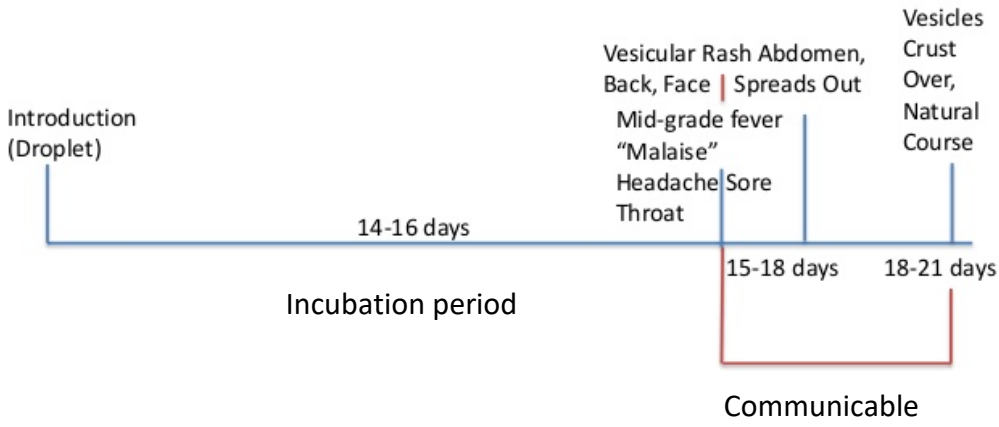
Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

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

LHN-> INVESTIGATION->SIGNS & SYMPTOMS

Description	Yes Date of onset	Date of recovery	Description	Yes Date of onset	Date of recovery
Fever		YYYY / MMM / DD	**Rash - crusted lesions or scabs**		YYYY / MMM / DD
Lesion - less than 50 lesions (Mild)		YYYY / MMM / DD	Rash - herpes zoster (shingles)		YYYY / MMM / DD
Lesion - 50 to 249 lesions (Mild - moderate)		YYYY / MMM / DD	Rash - itchy		YYYY / MMM / DD
Lesion - 250 to 499 lesions (Moderate)		YYYY / MMM / DD	**Rash - macules, papules, and vesicles**		YYYY / MMM / DD
Lesion - 500 or more lesions (Severe)		YYYY / MMM / DD	Rash - painful		YYYY / MMM / DD
Lesions - conjunctiva		YYYY / MMM / DD	Rash - ulcerated lesions		YYYY / MMM / DD
Lesions - mucous membrane - ulcerated		YYYY / MMM / DD	Rash - unilateral red painful blisters		YYYY / MMM / DD
Malaise		YYYY / MMM / DD	Infection - upper respiratory tract		YYYY / MMM / DD
Other Signs & Symptoms if applicable					



E) INCUBATION AND COMMUNICABILITY

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

Incubation for Case (period for acquisition):
Earliest Possible Exposure Date: YYYY / MM / DD **Latest Possible Exposure Date:** YYYY / MM / DD

Exposure Calculation details:

Communicability for Case (period for transmission):
Earliest Possible Communicability Date: YYYY / MM / DD **Latest Possible Communicability Date:** YYYY / MM / DD

Communicability Calculation Details:

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

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	YES	N – No NA – not asked U - Unknown	DESCRIPTION	YES	N – No NA – not asked U - Unknown
Contact to a known case (Add'l Info)	YYYY / MM / DD AE		**Special Population** - Pregnancy	YYYY / MM / DD	
Immunocompromised - Related to underlying disease or treatment			**Travel** - Outside of Canada (specify)		
Occupation - Health Care Worker - IOM Risk Factor	TE		**Travel** - Outside of Saskatchewan, but within Canada (specify)		
Special Population - Infant born to an infected mother	YYYY / MM / DD				

Varicella Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

G) 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

H) TREATMENT

LHN -> INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication *(Panorama = Other Meds)* : _____

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

I) INTERVENTION

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

Intervention Type and Sub Type:

Assessment:
☐ Assessed for contacts YYYY / MM / DD
(especially pregnant or < 1 year of age)
Investigator name

Other Investigation Findings:
☐ Investigator Notes ☐ See Document Management

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

Communication:
☐ Other communication (see Investigator Notes) YYYY / MM / DD
Investigator name
☐ Letter (See Document Management) YYYY / MM / DD
Investigator name

Referral:
☐ Other (specify)_____ YYYY / MM / DD
Investigator name

General: Investigator name
☐ Disease-Info/Prev-Control YYYY/ MM / DD
☐ Disease-Info/Prev-Cont/Assess'd for Contacts YYYY/ MM / DD

Testing:
☐ Laboratory testing recommended YYYY / MM / DD
Investigator name

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

Exclusion: Investigator name
☐ Daycare YYYY / MM / DD ☐ Preschool YYYY / MM / DD
☐ School YYYY / MM / DD ☐ Work YYYY / MM / DD

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	

Varicella Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

J) 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) _____

K) Transmission Events LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Transmission Event ID	Exposure Name	Setting type	Date/Time	# of contacts
		☐Congregate/Communal living ☐Health Care setting ☐ Household Exposure		
		☐Congregate/Communal living ☐Health Care setting ☐ Household Exposure		
		☐Congregate/Communal living ☐Health Care setting ☐ Household Exposure		
	varicella Contacts – Inv ID# _____	☐Multiple Settings	YYYY / MM / DD to YYYY / MM / DD	

L) TOTAL NUMBER OF CONTACTS

M) LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> TE HYPERLINK -> UNKNOWN/ANONYMOUS CONTACTS

Anonymous contacts:_____ (total number of individuals [including groups that do not require 1:1 follow-up])

Initial Report completed by:		**Date initial report completed:** YYYY / MMM / DD

Effective October 13, 2022, coinciding with the start of fall respiratory season, the start of the annual influenza immunization campaign, and the availability of the COVID-19 bivalent vaccine which provides Omicron-specific protection against COVID-19 infection, the Ministry of Health launched the community respiratory illness surveillance program (CRISP).

This report provides Saskatchewan residents the most up-to-date surveillance data of respiratory virus activity in the province to inform their individual risk assessment. CRISP comprises a number of data-driven indicators of respiratory activity in Saskatchewan - COVID-19, influenza and other respiratory illnesses, including rhinovirus, respiratory syncytial virus (RSV), parainfluenza viruses 1-4 (PIV 1-4), adenovirus (ADV) and human metapneumovirus (HMPV).

Indicators available in CRISP include: indicators of viral transmission (case counts, test positivity, outbreaks, coinfections and variants circulating); sentinel indicators (emergency department visits, calls to HealthLine 811, wastewater reports); and outcome, health care capacity and immunization coverage indicators. Data is available for the province as a whole and select indicators by zone.

This report is a collaborative effort across health system partners in Saskatchewan, including the Ministry of Health, the Saskatchewan Health Authority (SHA), First Nations partners, wastewater researchers, individual clinicians submitting respiratory specimens for testing and the Roy Romanow Provincial Laboratory (RRPL), public health providers and the Ministry of Education.

Public posting of CRISP occurs every two weeks during respiratory virus season in Saskatchewan. www.saskatchewan.ca/COVID-19-cases
https://www.saskatchewan.ca/government/government-structure/ministries/health/other-reports/community-respiratory-illness-surveillance-program

The specific elements of the Community Respiratory Illness Surveillance Program (CRISP) as provided by system partners include:

- *Laboratory surveillance* – data provided by RRPL and includes tests performed at provincial laboratories and, Point-of-Care tests conducted in SHA facilities. Epidemiological analyses including number of cases and test positivity by week of specimen collection, age category, zone and etiological agent (COVID-19; Influenza; RSV; 'Other' respiratory viruses).
- *Sentinel Health Providers* – data provided by RRPL. Sentinel Health Providers comprise a geographical-based network in practices across the province who submit one to two specimens weekly to the Virology Section of RRPL from patients presenting with

respiratory-like symptoms. SHA Executive Directors of Primary Health Care are responsible for recruitment of SHA primary care providers representative of each health network in the province. Indigenous Services Canada and Northern Inter-Tribal Health Authority recruit Community Health Centers in First Nations communities to participate in the sentinel provider program. RRPL manages and analyzes the sentinel provider program data. Indicators reported by sentinel providers include: case counts; test positivity, and, most commonly detected respiratory pathogen by week and location.

- *Wastewater Markers* – data provided by the University of Saskatchewan and University of Regina Wastewater Teams. Currently in Saskatchewan, wastewater surveillance is conducted by two academic laboratories (USask and University of Regina). SARS-CoV-2 (the virus that causes COVID-19 disease) viral RNA load levels are detected by the academic labs for each of the wastewater treatment facilities they are in partnership with. The academic labs report weekly a calculated indicator of 'low', 'medium' and 'high' viral load detections, and, an overall trajectory (increasing, decreasing, no change) by treatment site for inclusion in CRISP.
- *Emergency Department Monitoring - Surveillance of Respiratory-like illness (RLI) from Emergency departments (EDs)* – data provided by participating SHA EDs and local public health services. As there is currently no centralized data capture source for ED admissions in the province SHA recruits EDs and sets up a mechanism for participating EDs to report to public health services in various ways – See Attachment 2-220a – Infectious Respiratory Illness Surveillance in Emergency Departments. Some public health offices aggregate raw data from their EDs on the prescribed data collection form and sends it to the Ministry of Health for overall provincial monitoring. FNIHB and NITHA will report to the local zone which the ED or health centre is located. This does not preclude monitoring in First Nations health care facilities. CRISP reports RLI ED visits per 1,000 provincially and by zone, where available. Note: this data flow may change effective 2023 with work proceeding on creating automated extracts from Sunrise Clinical Manager to improve representativeness, completeness, and accuracy of the surveillance data.
- *HealthLine 811 callers with Respiratory-Like Illness* – data provided by SHA HealthLine. This count of response protocols collected by HealthLine nurses is specific to callers reporting respiratory-like symptoms. HealthLine data is collected for a seven-day week, Monday to Sunday. Data is transformed into the rate of callers with respiratory symptoms from each Integrated Service Area (ISA) per 1,000 calls from that ISA concerning any type of symptom.
- *School illness absenteeism* – data provided by the Ministry of Education. This data includes a weekly count of registered students and the number of students absent due to illness by school. CRISP reports the proportion absent due to illness by zone and for the province as a whole.

- *Outbreaks* – data based on reports provided by local public health services. Defined as two or more lab confirmed respiratory virus cases in high-risk settings where transmission is evident or there is a high level of suspicion of transmission. Outbreaks are reported by the week they were reported to the local public health office and not necessarily in the week that the outbreak began. CRISP reports outbreaks in high risk settings where vulnerable populations reside such as long-term care facilities, personal care homes and group homes and by etiologic agent (Influenza, COVID-19 and 'other').
- *COVID-19 Hospitalizations* – data provided by SHA Digital Health. Defined as the number of COVID-19 (C-19) positive cases that during the surveillance week were admitted as an inpatient to an acute care facility in Saskatchewan. This includes patients with C-19 related illness, incidental COVID infection, and patients under investigation. COVID ICU admissions is the number of C-19 positive cases that during the surveillance week were admitted to an ICU location in SK. This includes both infectious and non-infectious cases. Co-infected Cases = if positive for Influenza and RSV or, positive for Influenza and Other Respiratory viruses or, positive for RSV and Other respiratory viruses or, positive for COVID-19 and Influenza or, positive for Covid-19 and RSV or, positive for Covid-19 and Other Respiratory viruses.
- *Influenza, RSV and 'other' hospitalizations* - data provided by SHA Digital Health through a data linkage of RRPL lab-confirmed data to the Admissions, Discharges and Transfers database. Delays in testing results affect the total number of Influenza, RSV and other respiratory virus admissions for a particular day. This lag in data has the greatest impact on the two days prior to when the report is updated. Counts include individuals who are laboratory positive for influenza, RSV, and other respiratory viruses, within four days prior to date of admission AND/OR at any point during the hospital stay. Co-infected Cases = if positive for Influenza and RSV or, positive for Influenza and Other Respiratory viruses or, positive for RSV and Other respiratory viruses or, positive forCOVID-19 and Influenza or, positive for COVID-19 and RSV or, positive for COVID-19 and Other Respiratory viruses.
- *Percentage of staffed inpatient beds occupied by COVID patients* - data provided by SHA Digital Health. Weekly average COVID Occupancy is a 7-Day average percentage of acute inpatient beds staffed and in operation COVID positive patients occupy.)
- *Deaths* of individuals due to COVID-19 and Influenza – data provided by public health services based on reports received from physicians, coroners or prescribed practitioners (nurse practitioners) responsible for completing the Medical Certificate of Death. Includes deaths entered into Panorama IOM among laboratory-confirmed cases. Deaths are reported based on the actual date of death.

Please see the following pages for the Infectious Respiratory Illness Surveillance in Emergency Departments. The excel format includes formulas. Please use the excel document to assist in data submission. The excel document can be located at https://www.ehealthsask.ca/services/Manuals/Documents/Sec-2-220-CLI-ILI-surveillance-in-EDs.xls

COVID 19-like Illness and Influenza-like illness Surveillance in Emergency Departments (blended)

<Former Health Region>		Patients with COVID-like and Influenza-like illness							Total patients seen for all reasons					
		Pre school Approx 0-4 yr	**School age** Approx 5-19 yr	**Working age** Approx 20-64 yr	**Seniors** Approx 65 +	Age unknown	Total CLI all age groups		**Pre school** Approx 0-4 yr	**School age** Approx 5-19 yr	**Working age** Approx 20-64 yr	**Seniors** Approx 65 +	Age unknown	Total patients all age groups
CLI Sum		0	0	0	0	0	0		0	0	0	0	0	0
Rate/1000 patients		0.0	0.0	0.0	0.0	0.0	0.0							
Percent CLI		0.0	0.0	0.0	0.0	0.0	0.0							
Emergency department	**Date** info collected	Approx 0-4 yr	Approx 5-19 yr	Approx 20-64 yr	Approx 65 +	Age unknown	Total CLI		Approx 0-4 yr	Approx 5-19 yr	Approx 20-64 yr	Approx 65 +	Age unknown	Total patients
							0							0
							0							0
							0							0
							0							0
							0							0
							0							0
							0							0

Instructions for EDs to complete the electronic Excel reporting template:

- For the chosen 24-hour surveillance period(s), the ED will tally the total number of patients seen in each of the four broad age categories. The number of patients seen will be entered on the spreadsheet (right hand boxes)
- The ED will tally the total number of patients with CLI or with ILI symptoms in each of the age categories and enter the information on the spreadsheet (left hand boxes).
- By correctly entering data to the template, sums and rates by age group are calculated automatically in the coloured cells. **Be careful not to delete any data in the colored cells to avoid deleting the formulas from these cells.**
- Some EDs will wish to capture data on more than one 24-hour period per week. Data for each surveillance 24-hour period will be recorded in a separate row.
- The ED will send the report to local public health services by Thursday morning, 8:00 am.

CLI will manifest as: Gradual onset of respiratory illness, over one to three days, with fever or cough and with one or more of the following - sore throat, arthralgia, myalgia, or prostration which could be due COVID 19.

ILI will manifest as: Rapid, acute onset of respiratory illness, within 4-6 hours of feeling well, with fever and cough and with one or more of the following - sore throat, arthralgia, myalgia, or prostration which could be due to influenza virus. The acute (rapid) onset onset of symptoms differentiates ILI patients from those with other viral respiratory illnesses circulating in the community.

In patients under 5 years or 65 and older, fever may not be prominent.

Developed by SK Ministry of Health
10/7/2020

*This is a replica of the excel document.

This is an example of an emergency department weekly report to Public Health.

<St Joseph's>		Patients with ILI							Total patients seen for all reasons including ILI					
		Pre school	**School age**	**Working age**	**Seniors**		Total ILI		**Pre school**	**School age**	**Working age**	**Seniors**		Total patients
		Approx 0-4 yr	Approx 5-19	Approx 20-64	Approx 65 +	Age unknown	all age groups		Approx 0-4	Approx 5-19	Approx 20-64	Approx 65 +	Age unknown	all age groups
ILI Sum		6	9	17	10	0	42		18	22	80	26	0	146
Rate/1000 patients		333.3	409.1	212.5	384.6	0.0	287.7							
	Percent ILI	33.3	40.9	21.2	38.5	0.0	28.8							
Emergency Dept.	**Date** info collected	Approx 0-4	Approx 5-19	Approx 20-64	Approx 65 +	Age unknown	Total ILI		Approx 0-4	Approx 5-19	Apprx 20-64	Approx 65 +	Age unknown	Total patients
	<Monday date>	2	8	12	6		28		10	12	45	15		82
	<Tuesday date>	4	1	5	4		14		8	10	35	11		64

This is an example of a former health region weekly report to the Ministry of Health.

<Health Region>		Patients with ILI							Total patients seen for all reasons including ILI					
		Pre school	**School age**	**Working age**	**Seniors**		Total **ILI**		**Pre school**	**School age**	**Working age**	**Seniors**		Total patients
		Approx 0-4 yr	Approx 5-19	Approx 20-64	Approx 65 +	Age unknown	all age groups		Approx 0-4	Approx 5-19	Approx 20-64	Approx 65 +	Age unknown	all age groups
ILI Sum		9	22	39	14	0	84		26	49	147	42	0	264
Rate/1000 patients		346.2	449.0	265.3	333.3	0.0	318.2							
Proportion ILI		34.6	44.9	26.5	33.3	0.0	31.8							
Emergency Dept.	**Date** info collected	Approx 0-4	Approx 5-19	Approx 20-64	Approx 65 +	Age unknown	Total ILI		Approx 0-4	Approx 5-19	Apprx 20-64	Approx 65 +	Age unknown	Total patients
St.Joseph's	Jan 25	3	14	20	8	0	45		15	26	102	25	0	168
St. Paul's	Jan 24	2	6	13	2		23		5	10	24	7		46
St. Peter's	Jan 26	4	2	6	4		16		6	13	21	10		50
<Name>							0							0
<Name>							0							0
<Name>							0							0
<Name>							0							0

This protocol describes the process to alert public health authorities of exposure involving an individual with an infectious communicable disease during travel on a plane, train (e.g. VIA Rail) or other public conveyance (e.g. bus/coach) **between provinces or internationally**. This protocol is also to meet International Health Regulation requirements to notify the Public Health Agency of Canada (PHAC) of exposures with International connections.

Individuals are managed according to the case and contact a management guidelines for the disease under investigation.

Process:
Public health offices (Saskatchewan Health Authority, Indigenous Services Canada, Northern Intertribal Health Authority) provide information of a plane, train or other public conveyance that transported an individual that was communicable during travel to the Ministry of Health via cdc@health.gov.sk.ca.

- Case details to include:
  - **Panorama Investigation ID number**
  - Date of symptom onset or date of specimen collection if asymptomatic
- Flight details to include:
  - Origin and destination of flight(s);
  - airline carrier(s);
  - flight number(s);
  - date of flight(s);
  - seat row and number of a infected passenger; and
- If travel was on a train (e.g. VIA Rail) or public conveyance (e.g. bus/coach), include details as outlined above.

- Information on affected domestic flights transporting to other jurisdictions are relayed to that jurisdiction.
- Information on affected international flights transporting cases internationally, including US, are relayed to PHAC for *International Health Regulations (2005)* requirements.

Additional Details for International Notification

The more detailed the travel history, the more useful is the information to assist with public health action:

- date and location of positive test,
- date, location, and result of previous tests if known or applicable,
- travel dates (date left Canada and date returned to Canada),
- accommodations, events attended, excursions, tour company, etc.

Information to provide on **close contacts that are out of country:**

- name,
- date of birth,
- address,
- phone number,
- e-mail address, especially if they are residing in foreign countries.
- Any additional information the case may be able to provide e.g. whether or not they are symptomatic, have been tested, or are vaccinated