Section 3
Enteric Illness

Government of Saskatchewan

Enteric Illness

Introduction and General Considerations

This section provides a general overview of the communicable diseases that are primarily transmitted through food and water and affect the gastrointestinal system. 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 with communicable enteric infections will be identified, investigated and managed in a timely manner.
2. Complications will be reduced or prevented through timely identification and implementation of control measures.
3. To offer information to the public as needed, related to safe food handling, food-borne and waterborne illness.
4. Isolated cases and outbreaks of enteric diseases will be prevented through public health measures such as water sampling and the provision of safe food handling courses.
5. Outbreaks will be contained through timely identification of the source and contacts and through the implementation of control measures. This may include making recommendations related to the closure of public facilities, withdrawing products from shelves, implementing boil water orders or precautionary drinking water advisories, exclusion of cases and/or contacts from settings where there is a high risk of transmission, etc.
6. 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.
7. Information that is required for notification purposes will be entered in the electronic case management system to be used for surveillance purposes.

Enteric Illness

Introduction and General Considerations

Background

In Saskatchewan, enteric diseases comprise approximately one quarter of all reportable communicable diseases. This is only a small percentage of the infectious agents that cause enteric illnesses. Gastrointestinal tract infections caused by bacteria, viruses and parasites account for a greatly under-appreciated burden of illness and death both overseas and domestically. Symptoms that arise from enteric diseases range from mild gastroenteritis to severe dehydrating diarrhea and life-threatening systemic infections. A safe, healthy, sustainable environment is important to the health status of a population. A safe food and water supply contribute to a population's health. Management of water supplies and safe food handing are vital to ensure safe drinking water and food security for the population.

Reporting Requirements

See Reporting Requirements in the General Information Introduction - 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 enteric illnesses are spread via food, water or other common vehicles. Transmission to others is also facilitated through poor personal hygiene practices of individuals. In general, the following measures are the best way to prevent contact with organisms that cause gastrointestinal illness.

Drinking Water Safety
Drinking water supplies should be sampled and tested on a regular basis. Samples are tested for a number of characteristics, however in the interest of communicable disease control, we are concerned about micro-organisms (bacteria and protozoa) such as *Giardia*, *Cryptosporidium*, *E. coli*, etc. found in drinking and recreational water, that pose risks to individuals' health.

Public drinking water supplies are tested and sampled on a regular basis. Public water systems undergo regular, often daily, chlorine testing coupled with periodic (weekly or monthly) bacteriological monitoring. Public water supplies will typically be tested for coliform bacteria which are a useful indicator of contamination with soil and/or fecal material. Most routine coliform bacteriological samples will also test for *E. coli*. Sampling for viruses and protozoa is not typical however this sampling may be performed in the event of a treatment failure or during a suspected waterborne illness outbreak.

Legislation/Regulations for Public Water Systems

- Through *The Environmental Management and Protection Act, 2002* and the Water Regulations, 2002, Saskatchewan Ministry of Environment is responsible for ensuring sampling and testing of all municipal water supplies connected to a water distribution system (villages, towns, cities, etc.).
- Through *The Public Health Act, 1994* and the Health Hazards Regulations, Regional Health Authorities are responsible for sampling and testing all small public systems that are not regulated by the Saskatchewan Ministry of Environment. This would include rural municipality (RM) wells that are used for hauling water for private or public use.

Private water systems are not regulated. However, it is recommended that private water supplies be sampled and tested for bacteriological analysis at least annually unless there is reason to believe that the source has been contaminated through flooding or other means.

Bacteriological water sample containers and requisition forms are available through RM offices, public health offices and Saskatchewan Disease Control Laboratory for private water supplies. Health Regions can provide advice on water test results and treatment. Saskatchewan Watershed Authority operates various services to the public such as the Rural Water Quality Program.

Protocols for First Nations Communities

- While existing regulations governing public water systems do not apply on reserves, when Chiefs and Councils sign their funding arrangements with Aboriginal Affairs and Northern Development Canada (AANDC) they agree to design, construct and operate these systems in accordance with AANDC's *"Protocol for Centralised Drinking Water Systems in First Nations"*. Health Canada funds monitoring services for the water distribution systems in First Nations and uses its "*Procedure Manual for Safe Drinking Water in First Nations Communities South of 60º*" as a guide. The intent of AANDC's Protocol and Health Canada's Procedure Manual is to ensure that community drinking water supplies are safe.

Food Safety

Safe food is the responsibility of individuals, industry, local Public Health Authorities, the Government of Saskatchewan, federal agencies (Public health Agency of Canada and Canadian Food Inspection Agency) and Health Canada. Some of the roles in food safety include ensuring proper handling and preparation, ensuring safe production and distribution, inspecting food establishments, providing public education on food safety, and setting food safety standards and policies.

The Food Safety programs in health jurisdictions work to reduce the risk of the public contracting a food-borne illness. Through public health officers,[1] the health jurisdictions monitor food establishments and conduct safe food handling courses. Public health officers investigate reports of food-borne illness and food-related complaints (Government of Saskatchewan, 2007).

One aspect of the Canadian Food Inspection Agency's (CFIA) mandate is to safeguard food. The CFIA is involved from the producer level through to the consumable product in order to protect public health. Products that may be subject to inspection certification by the CFIA range from agricultural inputs, such as seeds, feeds and fertilizers, to fresh, prepared and packaged foods.

[1] For the purpose of this document, this term is inclusive of Public Health Inspectors and Environmental Health Officers that provide similar functions in Saskatchewan.

In carrying out its mandate in relation to food safety, the CFIA strives to:

- protect Canadians from preventable health risks;
- protect consumers through a fair and effective food, animal and plant regulatory regime;
- sustain the plant and animal resource base;
- contribute to the security of Canada's food supply and agricultural resource base;
- provide sound agency management.

Food safety in the home environment is the responsibility of private individuals. See Attachment – Safe Food Handling Tips for client education.

Hand Washing

Proper handwashing with soap and water is one of the most practical and effective ways of preventing the spread of disease (World Health Organization). See Attachment – Hand Washing for client education tips.

Recreational Water Safety

Recreational water can be divided into artificial bodies of waters such as swimming pools, which are governed by the Swimming Pool Regulations, and natural bodies such as lakes, rivers, and streams.

Public swimming pools in Saskatchewan are regulated under *The Swimming Pool Regulations, 1999* and are required to submit monthly bacteriological samples. In addition, swimming pools are required to maintain minimum disinfectant residuals and test for these and other chemical parameters on a daily basis. These values must be recorded in daily log books held at the facilities and must be made available to public health inspectors at the time of inspection. These records are a valuable reference in the event of suspected water-borne illnesses. Swimming Pool Operators courses are provided annually in most health regions across Saskatchewan. Swimming pool facilities are encouraged to certify as many employees as possible to promote knowledge of safe pool management.

Whirlpools or hot tubs, both public and private, create unique challenges for maintaining bacteriological safety. The high temperatures combined with heavy bather loads, smaller volumes of water, and increased aeration lead to high disinfectant demands. If disinfectant levels are able to drop below the required minimum, bacteria can survive and multiply. Organisms such as *Pseudomonas aeruginosa* are especially adept to surviving in this type of environment due to the formation of a relatively chlorine resistant biofilm. Routine maintenance of this type of pool should involve complete draining, physical scrubbing of all surfaces, and focused disinfection of the recirculation system using strong chlorine or accelerated hydrogen peroxide solution.

A popular summertime activity, particularly for kids, is "fill and drain" paddling pools found in many communities across Saskatchewan. These pools lack recirculation systems and as such are filled with water in the morning, chlorinated, then drained at the end of the day. Fill and drain pools do require licenses to operate as public swimming pools and therefore are required to maintain a minimum disinfectant residual. Therefore, they are subject to the same disinfectant testing requirements. However, since operators are not typically present during the full day of operation and because bather loads are variable and unmonitored it is easy for the disinfectant residual to drop below the minimum. For these facilities it is especially important for the bathers to shower off after swimming and to avoid consuming any of the water.

Health regions may perform periodic sampling of bathing beaches. Testing is most often used to detect types of bacteria that indicate fecal contamination. More information on recreational water safety can be found in Health Canada's *Guidelines for Canadian Recreational Water Quality.* The guidelines deal with health hazards associated with recreational water use, as well as aesthetic and nuisance conditions. Health hazards associated with direct contact with water include infections transmitted by pathogenic microorganisms, as well as injuries and illness due to physical and chemical properties of the water. The guidelines discuss the indicator organisms – enterococci, ***Escherichia coli,*** other fecal coliforms, and coliphages – as well as health risks related to exposure to waterborne pathogenic bacteria, viruses, protozoa, and toxic blue-green algae. Sampling of recreational waters is also addressed.

Secondary Prevention
A team of public health members handles the follow-up of individuals with enteric diseases and enteric disease outbreaks. Information is collected from the infected individuals to determine exposures that may be related to common vehicle of transmission and for information regarding occupational/other settings where increased transmission could occur and is examined to identify trends in disease patterns and pockets of diseases. This is useful in determining additional measures that may be required and should be implemented to control the disease.

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

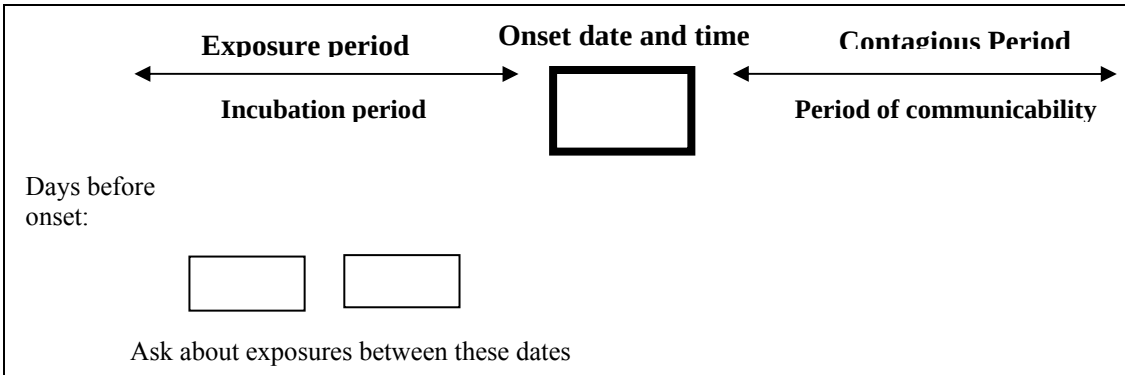
General Guidelines for Investigating Enteric Illnesses

These guidelines aim to assist in the collection of information and define control measures for enteric organisms. Refer to General Information – Roles of Stakeholders in Section 1of the manual and Appendix C – Major Legislation for additional information that is applicable to Communicable Disease Control in Saskatchewan.

The following points and questions[2] can assist in determining the approach for follow up and help to prevent and control the disease.

1. What is the potential impact of the disease for the individual? Their household/family? Their community? Is this an outbreak?
2. 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.
3. 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.

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



Enter onset date and time in heavy box. Incorporate incubation period and period of communicability information for the identified organism to determine probable source exposure and transmission periods.

Key considerations include:

- Recent exposure to someone else who is ill with similar symptoms.
- Travel history (local, interprovincial and/or international) – standards of hygiene vary with location and levels of economic development.
- Attendance in childcare, school, daycare, healthcare settings.
- Animals**,** especially pets such as dogs, cats, aquarium fish, reptiles, and farm animals. Pet treats may also serve as a source of infection or contamination.
- Occupation, involvement in community service.
- All food consumed, regardless of setting**,** within the incubation period for the organism (typically this is a 3-day food history):
  - obtain the name and location of all restaurants and other public eating establishments visited. Group meals attended (conferences, community meals/potlucks, family gatherings etc.) should also be inquired about.
- Water or ice consumed within the incubation period for the organism. Water sources could include public water sources, private water sources, beverages that are mixed with water, bottled water (brand name), natural water sources (e.g., river, stream, lake, pond), and recreational water sources (swimming pools, spas, lakes, etc.).

4. Is there a high risk for transmission to others (e.g., highly communicable agent, etc.)? Determine if this individual is in a situation where there is a high risk of transmitting the organism (refer to Special Considerations below). Is exclusion of the case and contacts advisable (refer to Exclusion of Infected Individuals below)?
5. Is there a population who is more likely to be susceptible to the infection? Are there people who are more likely to develop symptoms or serious manifestations of the infection (refer to Special Considerations below)?
6. What interventions are available to prevent the transmission of the infection? Refer to disease specific measures and implement necessary activities.
7. 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 contacts that have been identified. See Exclusion of Infected Individuals.
8. Educate case and contacts regarding:
    - The nature of the disease including such aspects as the incubation period, period of communicability, mode of transmission, etc.
    - Self-care measures.
    - Personal protective measures should always include hand washing, not sharing personal items (e.g., dishware and drinking containers, towels, lip balms).
    - Disease control measures they must follow:
        - hand washing – see Attachment – Hand Washing;
        - cleaning (kitchen and bathrooms);
        - safe sources of drinking water or appropriate measures to make drinking water safe;
        - avoiding consumption of hazardous foods;

- food handling and storage – see Attachment – Safe Food Handling Tips;
- non-recommended sharing of toys, towels, eating utensils and food items;
- publicly funded immunoprophylaxis or treatment may be indicated for certain diseases such as hepatitis A.

9. Obtain an immunization history from case and all 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.
10. Document case management and follow-up information on the electronic case management and surveillance system.
11. Communication with other stakeholders (physicians, acute and long term care, schools, daycares, etc.) is vital for a coordinated and efficient response to a single communicable disease case or an outbreak. Of special note is the importance to maintain confidentiality according to the corresponding legislation.

Exclusion of Infected Individuals

If the individual case is in one of the high-risk groups (e.g., increased risk of transmission or an occupational setting with high-risk contacts), exclusion from work/child care or some other intervention may be warranted. It is the responsibility of the designated public health officer (medical health officer) to recommend the exclusion. Advise the medical health officer (MHO) and obtain the order in writing if voluntary compliance does not occur.

1. **Exclusion criteria are listed for each disease under the specific disease section of the manual.**
2. **Inform the cases/contacts of the need to comply with exclusion criteria.** The investigator will inform parent of children under the age of consent of the need for exclusion.

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

3. **Work with case to inform place of employment/child-care center of the name of the disease and the exclusion criteria.** A balance must be maintained in protecting the health of the public and protecting the privacy of affected individuals. *The Public Health Act, 1994* and *The Health Information Protection Act* should be referred to guide disclosure of information.
4. If voluntary compliance with exclusion is not obtained, the MHO may issue a written order for exclusion under *The Public Health Act, 1994.*
5. Terms for return to work/child care are listed under the specific diseases.

Communication with Primary Care Provider (physician)
Ongoing communication is not always necessary; however certain aspects may need to be discussed such as:

1. **Case history and management details.**
2. **Client follow-up.**
3. **Specimen collection of cases or contacts. If a special-risk index case is excluded from work/child care, the physician may work with the investigator and health region to facilitate the collection of stool specimens. See specific disease for details.**
4. **Role of Public Health.**

Special Considerations

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

Food Industry Workers
Those involved in processing, preparing, handling, cooking, or serving food products. The investigator should specifically ensure Public Health Officers are involved if a food handler/food processor is diagnosed with an enteric disease.

Health Care and Child Care Workers
Those who have direct contact, or contact through food preparation or food service, with susceptible vulnerable patients or persons in whom an intestinal infection would have serious consequences (e.g., immunocompromised persons, surgical and medical patients, the elderly, and infants).

Children below the Age of Five Years
Particularly those attending day care, play groups, schools, or other similar groups.

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.

Public Eating Establishments
This includes the spectrum from restaurants, cafeterias, to temporary functions where food is served. This may be implicated as a common source.

Community Gatherings Where Food is Served
This may include such events as potlucks or catered meals.

Other Settings That May Not Have Adequate Water and Plumbing Facilities
Some examples of this may include work camps (temporary or permanent), summer camps, fishing camps or other events relying on temporary bathroom facilities (i.e., temporary mass gatherings).

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 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.

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

Health Care Facilities and Institutional Settings

Health care facilities present as a high-risk environment for 2 reasons:

1. Typically the clients/patients within the facility are there because they either 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.

If any of these facility settings are believed to be the initial source of the case, inform Public Health, if they are not already involved, so follow-up investigation of the facility can be done.

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Enteric Illness

Amoebiasis

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 (Alberta Communicable Disease Management Guidelines, 2011)

Confirmed Case	Laboratory confirmation of infection with or without clinical illness:[1] • microscopic demonstration of trophozoites or cysts in fecal specimens, smears of aspirates or scrapings obtained by proctoscopy, or aspirates of abscess or sections of tissue[2] **OR** • positive stool antigen detection test **OR** • positive serology.[3]

[1] Clinical illness varies from mild abdominal discomfort with diarrhea (+/− blood, mucus) alternating with periods of constipation and/or remission to amoebic dysentery (fever, chills, bloody/mucoid diarrhea). Rarely, disseminated disease may occur causing liver (most common), lung or brain abscess.
[2] The organism must be differentiated from non-pathogenic amoebae and macrophages.
Note: Morphological (microscopical) diagnosis alone is unable to differentiate between pathogenic *E. histolytica* and non-pathogenic *E. dispar.*
[3] Antibody response in amoebiasis is only seen when tissue invasion has occurred and may represent past or present disease. Serology is almost always negative in asymptomatic shedders.

Causative Agent (Heymann, 2008)

- *Entamoeba histolytica*, a protozoan parasite.
- *E. dispar,* which is non-pathogenic, is morphologically identical to *E. histolytica.*

Symptoms (Heymann, 2008)

- Most infections are asymptomatic.
- Symptoms vary from mild abdominal discomfort with diarrhea containing blood or mucus, alternating with periods of constipation or remission to acute dysentery with bloody mucoid stools and amebic dysentery.
- Other symptoms include chronic abdominal pain and irregular bowel pattern, amebic granulomata (ameboma) in the wall of the large intestine, and ulceration of the skin (usually in the perianal region).
- In a small proportion of patients, extraintestinal disease may occur and produce abscesses of the liver, less commonly of the lung or brain.
- Penile lesions may occur in men after insertive anal intercourse.

Incubation Period (American Academy of Pediatrics, 2009)
Variable from a few days to several months or years, but commonly 2-4 weeks.

Reservoir/Source (Heymann, 2008)
Humans, usually a chronically ill or asymptomatic cyst passer.

Mode of Transmission (Heymann, 2008)
Transmission occurs by:

- the fecal-oral route, through fecal contamination of food or drink;
- unwashed hands of a food handler;
- fresh vegetables contaminated by human excrement (e.g., washed with sewage-polluted water). Cysts are relatively chlorine resistant and may survive in moist environmental conditions for weeks to months.

Transmission may also occur through:

- sexual contact (oral-anal contact) with a chronically ill or asymptomatic cyst passer;
- flies may also act as vectors of cyst-laden feces;
- unwashed hands in institutions where hygiene is poor.

Individuals with acute amoebic dysentery are less communicable because dysenteric stools do not contain cysts and the trophozoites are fragile.

Period of Communicability (Heymann, 2008)
During the period of passing cysts, which may continue for years.

Specimen Collection and Transport

- Submit stool specimens in SAF container. Fill specimen container to the line on the container, do not over or under fill. Mix stool well with preservative using spoon provided, before submitting.
- Specimens are referred to Saskatchewan Disease Control Laboratory (SDCL) for microscopic examination. *E. histolytica* and *E. dispar* cannot be differentiated by microscopy. Report will indicate presence and quantity of trophozoites.

Refer to the Saskatchewan Disease Control Laboratory Compendium of Tests for details at http://sdcl-testviewer.ehealthsask.ca.

Methods of Control/Role of Investigator

Prevention and Education
Refer to the Enteric Illness 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.

- Provide prevention and education to case or caregiver, daycare or institution about personal hygiene.
- Educate about the sanitary disposal of feces and careful hand washing after defecation.
- Advise case to avoid food preparation.
- Advise case to avoid using public swimming pools until diarrhea has resolved.
- Include standard letters to schools, daycares, sports teams, etc.
- Educate food handlers about proper food and equipment handling and hygiene, especially in avoiding cross-contamination from raw meat products, and thorough hand washing.
- Educate about the risk of sexual practices that permit fecal-oral contact.

Management

I. Case

History

Obtain history of:

- international travel (especially to areas with inadequate water/sewage) or to recreational/rural areas within Saskatchewan/Canada;
- institutionalization.

Determine water source and sewage disposal if not on a municipal system.

Immunization

Not applicable.

Treatment/Supportive Therapy

Treatment involves the elimination of the tissue-invading trophozoites as well as the cysts in the intestinal lumen. There are several regimens to choose from. Refer to the Medical Health Officer (MHO) or infectious disease specialist for specific treatment regimes. Refer to Appendix H - Sources for Clinical Treatment Guidelines.

Exclusion

The following individuals should be excluded:

- Food handler, health care/childcare or other staff involved with personal care, child below the age of 5 years in childcare.
- Individuals who are unable to maintain standards of personal hygiene (i.e., mentally or physically handicapped) from activities or programs they may be enrolled or participating in.
  - For individuals living in an institution, follow contact precautions until diarrhea has resolved.

When exclusion is recommended, it should continue until one of the following criteria is met:

- treatment with an appropriate antibiotic has been completed OR
- diarrhea is resolved (when stools have been normal for that individual for 48 hours).

Referrals
None.

II. Contacts/Contact Investigation

Contact Definition
Contacts include:

- persons living in the same household;
- children and childcare workers in a daycare/dayhome;
- individuals exposed to the same source (if it is identified).

Testing
All household members should submit stool samples. Symptomatic childcare workers and attendees and contacts should be tested and treated.

Prophylaxis/Immunization
None.

Exclusion
Symptomatic contacts in special-risk groups should be excluded until diarrhea has resolved.

III. Environment

Child Care Centre Control Measures/Institutional Control Measures

- For hospitalized patients, use contact precautions in the handling of feces, contaminated clothing and bed linen.
- Contact precautions should be used while case is symptomatic. In the event of a cluster of cases in the institution, food handlers, water source, other attendees and staff may need to be examined.
- Investigate/assess for and ensure the provision of safe water supplies.
- Boil untreated water since chlorination is ineffective against cysts.
- Ensure adequate disposal of sewage.

Epidemic Measures

Any group of possible cases requires prompt laboratory confirmation to exclude false-positive identification of *E. histolytica* or other causal agents and epidemiological investigation to determine source of infection and mode of transmission. If a common vehicle is indicated, such as water or food, appropriate measures should be taken to correct the situation.

References

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Enteric Illness

Botulism

Notification Timeline:

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

Public Health Follow-up Timeline: Immediate.

Information

Case Definition (Public Health Agency of Canada, 2008**)**
A confirmed case requires laboratory definitive evidence with clinical evidence **or, in the case of foodborne botulism,** clinical evidence and consumption of the same suspect food as an individual who has laboratory-confirmed botulism.

Foodborne Botulism[1] (Either 1 or 2)	1. Laboratory confirmation of intoxication with clinical evidence:[1] • detection of botulinum toxin in serum, stool, gastric aspirate or food **OR** • isolation of *Clostridium botulinum* from stool or gastric aspirate. 2. Clinical evidence[1] and indication that the client ate the same suspect food as an individual with laboratory-confirmed botulism.
Wound Botulism[2]	Laboratory confirmation of infection: • laboratory detection of botulinum toxin in serum **OR** • isolation of *C. botulinum* from a wound **AND** • presence of a freshly infected wound in the 2 weeks before symptoms and no evidence of consumption of food contaminated with *C. botulinum.*
Infant Botulism[3]	Laboratory confirmation with symptoms[3] compatible with botulism in a person less than one year of age: • detection of botulinum toxin in stool or serum **OR** • isolation of *C. botulinum* from the patient's stool or at autopsy.

Colonization Botulism	Laboratory confirmation with symptoms compatible with botulism in a patient aged 1 year or older with severely compromised gastrointestinal tract functioning (i.e., abnormal bowel) due to various diseases, such as colitis, or intestinal bypass procedures, or in association with other conditions that may create local or widespread disruption in the normal intestinal flora: • detection of botulinum toxin in stool or serum **OR** • isolation of *C. botulinum* from the patient's stool or at autopsy.
Probable Case Foodborne	A probable case requires clinical evidence[1] and consumption of a suspect food item in the incubation period (12-48 hours).

Clinical Evidence

[1]**Foodborne:** Clinical illness is characterized by blurred vision, dry mouth and difficulty swallowing and speaking. Descending and symmetric paralysis may progress rapidly, often requiring respiratory support.

[2]**Wound:** Clinical illness is characterized by diplopia, blurred vision and bulbar weakness. Symmetric paralysis may progress rapidly.

[3]**Infant:** Clinical illness in infants is characterized by constipation, loss of appetite, weakness, altered cry and loss of head control.

Causative Agent

The causative agent is *Clostridium botulinum* which is a spore-forming bacterium. It is a Gram-positive anaerobic bacillus. There are several strains of *C. botulinum* classified into types A-G based on the properties of the toxin formed. Most human cases of botulism are caused by types A, B, E and rarely F (Heymann, 2008).

Symptoms

Botulism is a neuroparalytic progressive disorder caused by the toxins produced by *Clostridium botulinum* (Heymann, 2008).

- The characteristic early symptoms and signs are marked fatigue, weakness and vertigo, usually followed by blurred vision, dry mouth, and difficulty in swallowing and speaking.
- Neurological symptoms always descend through the body: shoulders are first affected, then upper arms, lower arms, thighs, calves, etc. Paralysis is symmetric and may progress rapidly, often requiring respiratory support.

- Nausea, vomiting, constipation and abdominal swelling, and less commonly diarrhea, may occur.
- Symptoms of classic infant botulism (predominates in infants less than 6 months but can occur up to 12 months or age) include decreased movement, loss of facial movements and head control, poor feeding, weak cry, diminished gag reflex, ocular palsies, and progressive descending generalized weakness and decreased muscle tone (American Academy of Pediatrics, 2009).

Incubation Period

- Neurological symptoms usually appear within 12 to 36 hours, but sometimes occur several days after eating contaminated food.
- The shorter the incubation period, the more severe the disease and the higher the case-fatality rate.

Reservoir/Source

- *C. botulinum* spores are ubiquitous in soil including sediments in streams, lakes and coastal waters throughout the world and in the intestinal tract of animals, including fish (Heymann, 2008). Outbreaks of avian botulism have also occurred in wild fowl (Lindstrom, 2006).
- Spores are often found in agricultural products and honey (Heymann, 2008).
- The *C. botulinum* toxin is produced in anaerobic, low-acid environments like in improperly canned or processed foods held without refrigeration.
- Recently identified sources include: homemade salsa, uneviscerated fish, baked potatoes wrapped in aluminum foil, cheese sauce, improperly handled commercial potpies, sautéed onions, minced garlic in oil, home-prepared pickled eggs and home-prepared fermented tofu (Heymann, 2008).

Mode of Transmission (Heymann, 2008)

- Ingestion of foods in which the toxin is present.
- Wound botulism is acquired through the contamination of wound, most commonly associated with severe trauma or injection drug use.
- Intestinal botulism is through the ingestion of spores which germinate then release toxin.

Risk Groups/Risk Factors (Heymann, 2008)

- Individuals > 1 of age with severely compromised gastrointestinal function.
- Injection drug users are at increased risk for wound botulism.

Period of Communicability

There have been no reported cases of person-to-person transmission.

Specimen Collection and Transport

- Sera, gastric aspirate and/or stool samples should be collected from patients and if necessary, from others who were exposed but are not ill.
- Food samples should be packaged in a sterile, wide mouth, screw-capped container and forwarded immediately to the Saskatchewan Disease Control Laboratory (SDCL) under refrigerated or cooled conditions. Samples should arrive at the lab within 24 hours of collection and should not be frozen. Food samples should be collected but will not be tested by the lab until there is a positive result from a stool sample.
- Stool samples should be collected by holding a clean disposable plastic bag or container underneath or by covering the toilet bowl loosely with plastic wrap so that it sags in the middle or by filling the bottom of the bowl with plenty of clean toilet paper. A portion of the fecal matter about the size of a cherry should be transferred to a sterile specimen container without transport medium or preservative and the lid should be screwed on tightly. Hands should be washed after this procedure. The container should be labelled with name and health services number or birth date plus the date and time that the sample was collected. Sample should be kept cool and delivered to the lab as soon as possible.

Refer to the Saskatchewan Disease Control Laboratory Compendium of Tests for details available at http://sdcl-testviewer.ehealthsask.ca.

Methods of Control/Role of Investigator

Prevention and Education

Refer to the Enteric Illness 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

- Honey should not be given to children under one year of age.
- Education of the public in safe handling of food. For example:
  - Do not use food from damaged or bulging containers.
  - Foods with unusual odours and tastes should not be eaten or "taste-tested."
  - Proper storage is one of the keys to food safety. Refrigeration slows down most bacterial growth. Set the refrigerator temperature at or below 4°C/40°F. (Type E toxin can be produced slowly at temperatures as low as 3°C/374°F.)
  - Storing food in non-airtight containers and at 4°C or lower will prevent or slow the growth of the bacterium.
- Educate those concerned with home canning regarding the proper time, pressure and temperature required to destroy spores.
- Take precautions with home-prepared foods stored in oil (e.g., vegetables, herbs and spices). If these products are prepared using fresh ingredients, they must be kept refrigerated (<4°C) and for no more than 10 days.
  - If the above products are purchased from fairs, farmers' markets, roadside stands or have been received as a gift and prepared more than a week ago, discard them.

Management

I. Case

History

- Suspect foodborne exposure for adult and intestinal botulism. Food histories should include:
  - consumption of home canned or preserved items;
  - consumption of processed foods in which containers may have been bulging or had strange odours or tastes;
  - consumption of smoked wild meat (e.g., bear, moose); smoked fish, whale and seal meat;
  - homemade salsa, uneviscerated fish, baked potatoes wrapped in aluminum foil, cheese sauce, improperly handled commercial potpies, sautéed onions, minced garlic in oil, home-prepared pickled eggs and home-prepared fermented tofu.
- Collect all suspected foods for appropriate testing and disposal.
- Inquire about recent trauma/wounds (within 2 weeks) or history of injection drug use.

- For infant botulism, inquire specifically about history of ingestion of honey.
- Medical history related to gastrointestinal system function.
- All probable cases should be investigated to determine the source.

Immunization

- Vaccination against botulism is not routinely recommended or provided in Canada at this time.

Treatment/Supportive Therapy

- Persons with botulism require immediate treatment. Treatment must not await laboratory confirmation.
- Antitoxin for foodborne and wound botulism – treatment with equine-derived botulism antitoxin heptavalent (BAT) is recommended as soon as possible as it blocks the action of the toxin circulating in the blood and arrests the progression of paralysis. Refer to Attachment – Botulism Case Management and Reporting and Appendix D – Publicly Funded Medications for Chemoprophylaxis/ Treatment on how to access botulism antitoxin. Access to antitoxin should be initiated as soon as botulism is suspected.
- Antitoxin for infant botulism – BabyBIG® is a human-derived botulism immune globulin indicated in the treatment of infant botulism for babies up to one year of age. It is deemed to be safer than equine-derived antitoxin because there are lower rates of hypersensitivity reactions and serum sickness associated with its administration. Refer to Attachment – Botulism Case Management and Reporting which outlines the process that must be followed for timely acquisition of the BabyBIG® product.
- Removal of contaminated food which may still be in the patient's system (e.g., induced vomiting or use of enemas can be considered).
- Supportive therapy including the use of ventilators may be necessary if the paralysis associated with the disease causes respiratory failure. Paralysis will slowly improve over several weeks.

Exclusion

Because there is no person-to-person transmission exclusion is not necessary.

Referrals
Not applicable.

II. Contacts/Contact Investigation

Contact Definition

- Botulism contacts only include persons with the same food history.
- All symptomatic contacts should be investigated to determine the source.

Testing
No specific tests for contacts.

Prophylaxis/Immunization

- Those people known to have eaten the suspected food should be referred to a physician for assessment, observation and consideration of gastric lavage if indicated.
- Preventative antitoxin given within one to two days of ingestion may prevent development of symptoms but there may be a larger risk of associated hypersensitivity to horse serum.

Exclusion
As with cases, contacts do not have to be excluded.

III. Environment

Child Care Centre Control Measures/Institutional Control Measures

- Care should be taken to reduce the possibility of ingesting improperly canned or preserved food.
- Proper refrigeration techniques should be followed. Set refrigerator at or below 4°C/40°F. Don't overload the fridge. After grocery shopping, immediately refrigerate or freeze foods as indicated on the label.
- Once a potential botulism case is identified all remaining food from the same source should be immediately collected, stored in sealed containers and submitted for testing.
  - the implicated food(s) should be detoxified by boiling before discarding or the containers broken and buried deeply in soil to prevent ingestion by animals.

- Contaminated utensils should be sterilized by boiling or by chlorine disinfection to inactivate any remaining toxin.

Epidemic Measures

- In the case of a botulism outbreak there should be an immediate recall of implicated food and an immediate search for people who shared the suspected food (Government of Manitoba, 2001). If it is a commercially produced food, the Canadian Food Inspection Agency (CFIA) should be informed and possibly the Ministry of Agriculture, depending on the implicated food.
- Stool and food samples should be collected according to the procedure outlined in the specimen collection section and send to SDCL for testing. All other suspected food should be disposed of immediately.

Bioterrorism Considerations

Bioterrorism might be considered in any outbreak of botulism. The following features would be particularly suggestive:

- outbreak of a large number of cases of acute flaccid paralysis with prominent bulbar palsies;
- outbreak with an unusual botulinum toxin type (i.e., type C, D, F, or G, or type E toxin not acquired from an aquatic food);
- outbreak with a common geographic factor among cases (e.g., airport, work location) but without a common dietary exposure (i.e., features suggestive of an aerosol attack);
- multiple simultaneous outbreaks with no common source.

Note: A careful travel and activity history, as well as dietary history, should be taken in any suspected botulism outbreak. Patients should also be asked if they know of other persons with similar symptoms. Where no common dietary exposure can be identified in cases that are temporally clustered, the possibility of inhalational botulism may be considered.

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Section 1 – Initial Notification:

Attending Physician Immediately notifies the Local Medical Health Officer (MHO)

- Botulism is a Reportable Disease in Saskatchewan under the Disease Control Regulations of *The Public Health Act, 1994*
- Botulism (suspected and confirmed cases) must be reported immediately to the local MHO. See Appendix E - Contact Information for Regional Health Authorities and First Nations Inuit Health and Northern Inter-Tribal Health Authority.
- The MHO must be also advised if a food item is the suspected source of the illness.

Local MHO must notify the Saskatchewan Ministry of Health within 24 hours

Botulism (suspected and confirmed cases) must be reported within 24 hours.

During Work Hours (Mon-Fri 8:00 - 5:00): 306-787-4722
After-Hours, Weekends and Holidays: 1-306-337-1676
Follow-up e-mail to: cdc@health.gov.sk.ca

The following information must be reported immediately to the Ministry of Health:

a. name of the patient
b. date of birth (or age if DOB is not known),
c. onset date
d. address and current location of the case
e. current health status of the case

Additional information is to be shared with the Ministry as details become available.

Attending Physician notifies Botulism Reference Service (BRS) for Canada to:

- discuss the clinical presentation of the suspect case in order to support the diagnosis;
- obtain advice on the appropriate submission of laboratory specimens (see Section 2 - Specimen Collection) prior to administering treatment.

During Work Hours: 613-957-0902
After-Hours, Weekends and Holidays: 613-296-1139

The local MHO should follow-up with the BRS and the physician to facilitate coordinated communication and follow-up.

Section 2 – Specimen Collection:

The BRS will provide recommendations of specimen collection (clinical and food).

Obtain the Appropriate Laboratory Specimens and Forward the Specimens to the BRS for Canada in Ottawa (refer to address below).

- A good case history should be obtained to support the diagnosis.
- Public Health coordinates:
  - Food specimens- may include leftovers or unopened containers of food. When commercial foods are involved, it is important to retrieve the label, the manufacturer's lot number, and codes embossed on the can or package.
- Attending physician coordinates:
  - Clinical specimens - Suitable clinical specimens for analyses include fecal samples (approximately 10 g) or enema fluid, gastric contents (adjusted to approximately a pH of 6.0 with 1N NaOH, if possible) and serum (from 20 ml of blood collected before administration of antitoxin).
  - When infant botulism is suspected, the essential material for analysis is the infant's feces. If necessary, soiled parts of diapers may be submitted.

Prior to sending clinical specimens, the attending physician must call the BRS to make arrangements for transporting clinical specimens for laboratory analysis.

During Work Hours: 613-957-0902
After-Hours, Weekends and Holidays: 613-296-1139

Samples must be sent by courier (not Canada Post) to:

Dr. John W. Austin or Mr. Greg Sanders
Botulism Reference Service
Health Canada
Room D457, Sir Frederick G. Banting Building
Building 22, Tunney's Pasture, PL2204E
251 Sir Frederick Banting Driveway
Ottawa ON K1A 0K9
Telephone: 613-957-0902
Fax: 613-941-0280

Specimens should be handled according to routine practices and additional precautions, and packaged for transport to the BRS. For safe shipment, the specimens must be in a watertight primary receptacle, in a watertight secondary container, with sufficient absorbent material between the two containers to absorb the entire contents of the primary receptacle. The preferred method of preserving the material during shipment is by cooling rather than freezing (i.e., by including commercial cooling packs in the parcel). In urgent cases, the parcels are picked up immediately upon arrival.

Samples need to be sent following the Transportation on Dangerous Goods instruction TC-125-1B[1] packing instruction.

NOTE – Specimens should be forwarded to the Saskatchewan Disease Control Laboratory (SDCL) who will forward the specimens to the BRS and will ensure specimens meet transporting standards prior to shipment. Please contact SDCL for additional information on shipping of specimens.

[1] http://www.tc.gc.ca/eng/tdg/moc-infectious-type1b-471.html

Section 3 – Accessing Botulism Antitoxin (BAT)

For Botulism cases IN THOSE 1 YEAR OF AGE AND OLDER, obtain botulism antitoxin (BAT) from the Ministry of Health as outlined in Appendix D – Publicly Funded Medications for Chemoprophylaxis/Treatment. Consultation must occur with the local MHO who will require authorization by the provincial Chief Medical Health Officer. This is accommodated via completion and submission of Special Access Request Form A to the Ministry of Health prior to the release of BAT.

The Ministry of Health requires the following information immediately:

a. the name of the physician to which the antitoxin should be sent
b. the address to which the antitoxin should be sent
c. the physician's contact telephone number
d. the name of the Health Unit in which the hospital is located

The Ministry must submit Form A to Special Access Programme (SAP).

NOTE: A blood sample (as suggested by the BRS) should be collected to identify the *C. botulinum* type before antitoxin is administered; **antitoxin should not be withheld pending test results however.**

- One vial of BAT should be administered as soon as possible.
- Ministry of Health staff will arrange for the shipment of the product.
- A product monograph and directions for administration will be included with the product.

After treatment with BAT, the attending physician must complete Special Access Request Form C – Patient Follow-up Form[2] and fax or e-mail to 306-787-9576 or cdc@health.gov.sk.ca.

The Ministry of Health must forward the information provided on Form C to the Health Canada Special Access Programme for the purpose of notifying Health Canada of the product administration.

[2] http://www.hc-sc.gc.ca/dhp-mps/acces/drugs-drogues/sapf3_pasf3-eng.php

Section 4 – Accesssing BabyBIG®

For Botulism cases IN INFANTS LESS THAN 1 YEAR OF AGE, obtain infant botulism immune globulin (BabyBIG®).
BabyBIG® is a human-derived botulism immune globulin indicated in the treatment of infant botulism for infants less than one year of age. It is deemed to be safer than equine-derived BAT because there are lower rates of hypersensitivity reactions and serum sickness associated with its administration.

The Ministry of Health will reimburse the Regional Health Authority (RHA) for the USA fees for the product, as well as the transportation cost from California.

- Access to BabyBIG® is authorized only by one of the Infant Botulism Treatment and Prevention Program (IBTPP) on-call physicians, who must be contacted by the patient's attending physician to discuss the clinical situation before BabyBIG® can be shipped. An IBTPP on-call physician can be reached 24 hours a day, 7 days a week at **510-231-7600**.
- The producers of BabyBIG® do not permit pre-orders of their product; therefore, the attending physician must place a request with Health Canada for the SAP to gain access.
- The attending physician must complete the Special Access Request Form A and **fax it to the SAP immediately at: 613-941-3194**. To avoid delays, all sections of the form must be completed accurately and it is recommended to follow-up with a phone call to the SAP office at 613-941-2108.
- If the case presents on a weeknight, weekend or holiday, the SAP on-call officer can be reached by telephone at 613-941-2108 (press 0). The attending physician should be prepared to provide the information required on the Special Access Request Form A to the on-call officer and then follow-up on the next business day with a copy of the completed form.

The SAP will then authorize the California Department of Health Services, IBTPP to ship the BabyBIG® to the hospital. For further information on the SAP, please consult their website at http://www.hc-sc.gc.ca/dhp-mps/acces/drugs-drogues/sapf1_pasf1-eng.php.

For additional information on BabyBIG® and the requirements prior to shipment of BabyBIG®, contact the IBTPP at 510-231-7600. Additional information can be obtained at Infant Botulism Treatment and Prevention Program[3]. The International Inquiries portion of the website outlines further details.

[3] http://infantbotulism.org/

After treatment with BabyBIG®, the attending physician must complete Special Access Request Form C – Patient Follow-up Form[4] and fax or e-mail to 306-787-9576 or cdc@health.gov.sk.ca.

For reimbursement for the payment of BabyBIG®, the RHA shall submit and invoice with the following attached to the address noted below:

- Invoice and Purchase Agreement for BabyBIG® - State of California – Health and Human Services Agency
- Completed SAP Form C

Director of Surveillance and Central Support
Population Health Branch
3475 Albert Street
Regina SK S4S 6X6
306-787-9576
cdc@health.gov.sk.ca

[4] http://www.hc-sc.gc.ca/dhp-mps/acces/drugs-drogues/sapf3_pasf3-eng.php

References

Please note that this information is subject to change. The following sources contain additional information:

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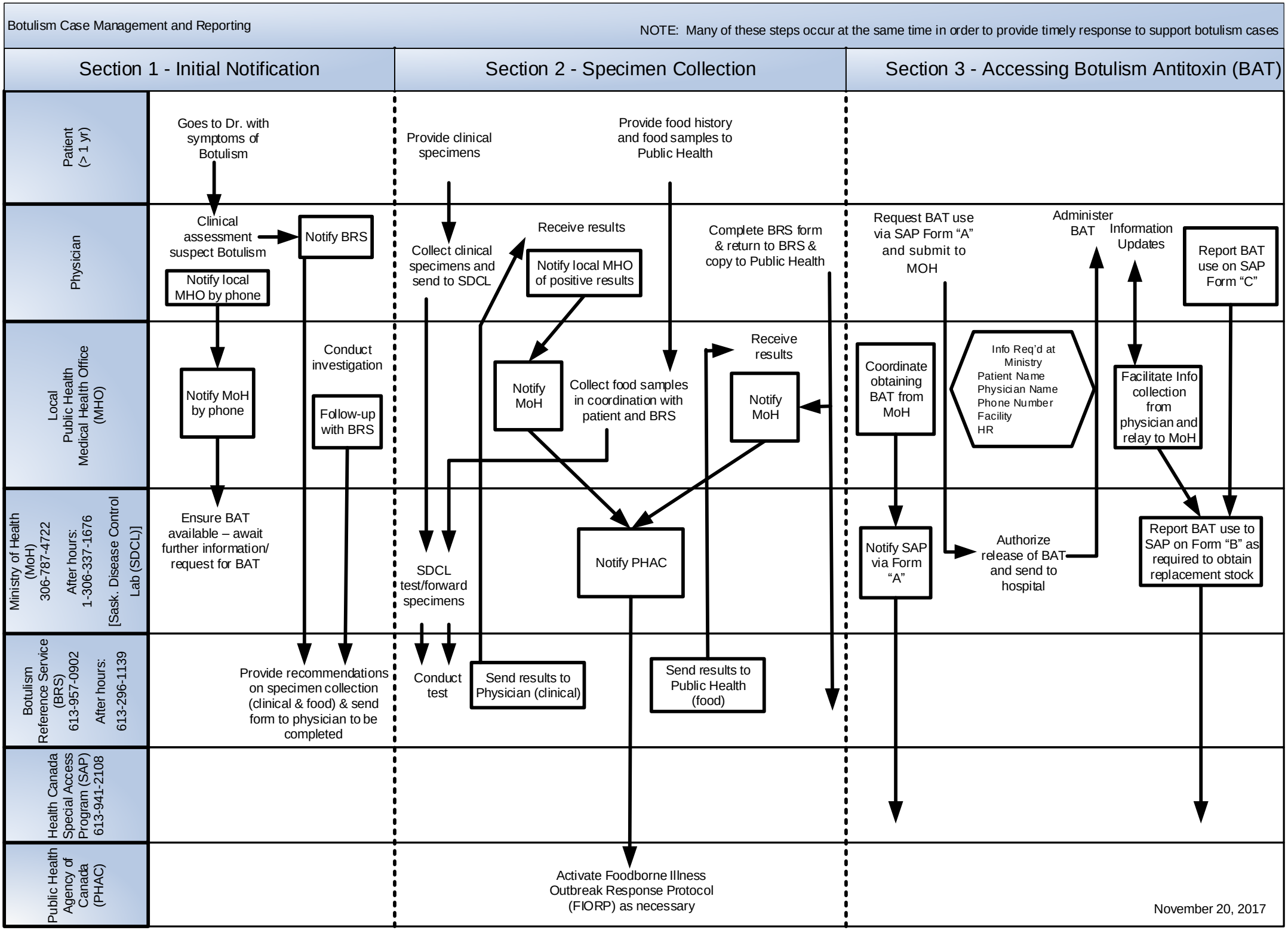
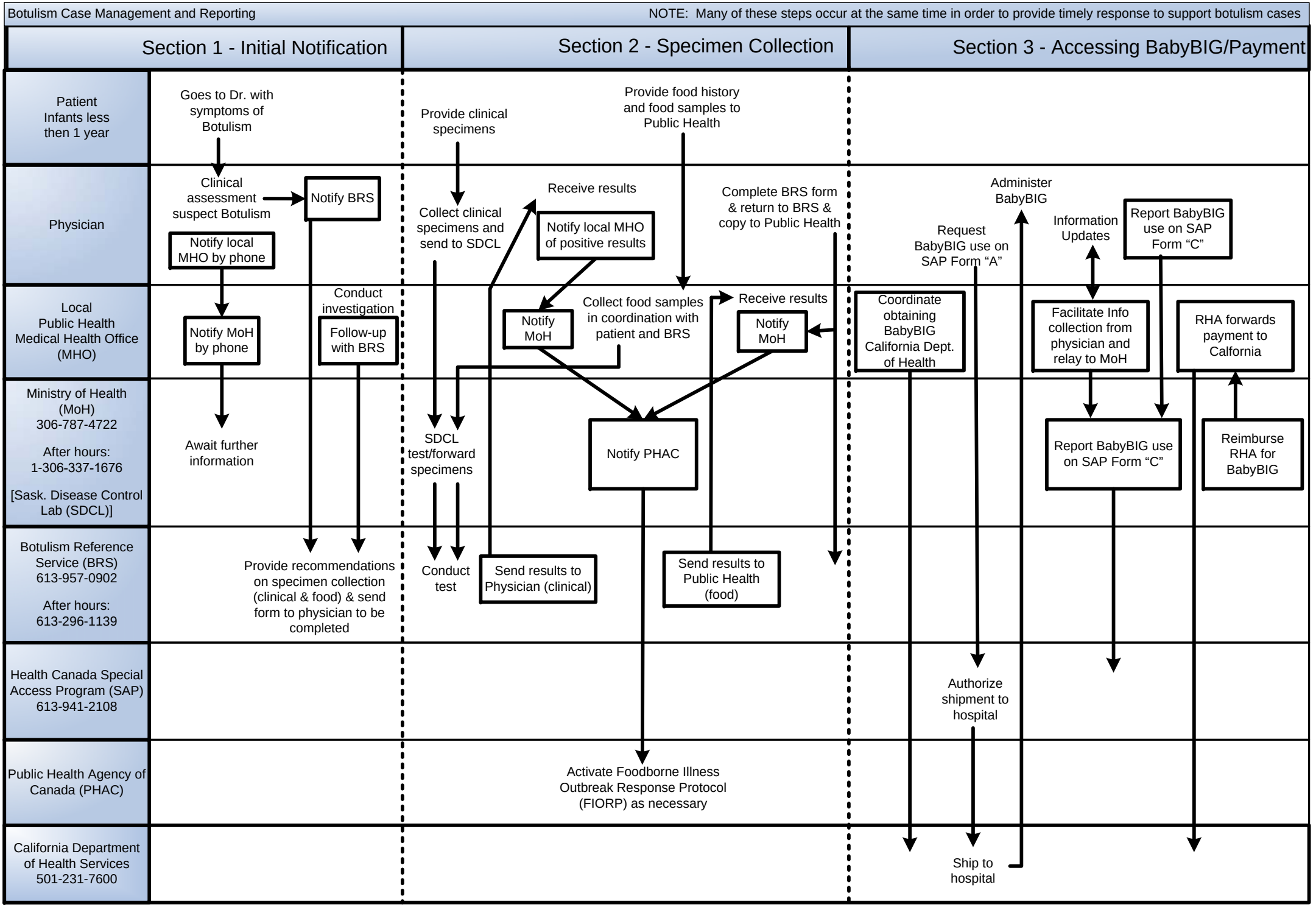

Botulism Case Management and Reporting
NOTE: Many of these steps occur at the same time in order to provide timely response to support botulism cases
Section 1 - Initial Notification
Section 2 - Specimen Collection
Section 3 - Accessing Botulism Antitoxin (BAT)
Patient (> 1 yr)
Physician
Local Public Health Medical Health Office (MHO)
Ministry of Health (MoH) 306-787-4722 After hours: 1-306-337-1676 [Sask. Disease Control Lab (SDCL)]
Botulism Reference Service (BRS) 613-957-0902 After hours: 613-296-1139
Health Canada Special Access Program (SAP) 613-941-2108
Public Health Agency of Canada (PHAC)
Goes to Dr. with symptoms of Botulism
Clinical assessment suspect Botulism
Notify BRS
Notify local MHO by phone
Notify MoH by phone
Ensure BAT available – await further information/ request for BAT
Conduct investigation
Follow-up with BRS
Provide recommendations on specimen collection (clinical & food) & send form to physician to be completed
Provide clinical specimens
Collect clinical specimens and send to SDCL
SDCL test/forward specimens
Conduct test
Receive results
Notify local MHO of positive results
Notify MoH
Collect food samples in coordination with patient and BRS
Send results to Physician (clinical)
Provide food history and food samples to Public Health
Notify PHAC
Activate Foodborne Illness Outbreak Response Protocol (FIORP) as necessary
Receive results
Notify MoH
Send results to Public Health (food)
Complete BRS form & return to BRS & copy to Public Health
Request BAT use via SAP Form "A" and submit to MOH
Coordinate obtaining BAT from MoH
Notify SAP via Form "A"
Info Req'd at Ministry
Patient Name
Physician Name
Phone Number
Facility
HR
Authorize release of BAT and send to hospital
Administer BAT
Information Updates
Facilitate Info collection from physician and relay to MoH
Report BAT use on SAP Form "C"
Report BAT use to SAP on Form "B" as required to obtain replacement stock
November 20, 2017


Botulism Case Management and Reporting
NOTE: Many of these steps occur at the same time in order to provide timely response to support botulism cases
Section 1 - Initial Notification
Section 2 - Specimen Collection
Section 3 - Accessing BabyBIG/Payment
Patient Infants less then 1 year
Physician
Local Public Health Medical Health Office (MHO)
Ministry of Health (MoH) 306-787-4722
After hours: 1-306-337-1676
[Sask. Disease Control Lab (SDCL)]
Botulism Reference Service (BRS) 613-957-0902
After hours: 613-296-1139
Health Canada Special Access Program (SAP) 613-941-2108
Public Health Agency of Canada (PHAC)
California Department of Health Services 501-231-7600
Goes to Dr. with symptoms of Botulism
Clinical assessment suspect Botulism
Notify BRS
Notify local MHO by phone
Notify MoH by phone
Await further information
Conduct investigation
Follow-up with BRS
Provide recommendations on specimen collection (clinical & food) & send form to physician to be completed
Provide clinical specimens
Collect clinical specimens and send to SDCL
SDCL test/forward specimens
Conduct test
Receive results
Notify local MHO of positive results
Notify MoH
Send results to Physician (clinical)
Collect food samples in coordination with patient and BRS
Notify PHAC
Activate Foodborne Illness Outbreak Response Protocol (FIORP) as necessary
Provide food history and food samples to Public Health
Receive results
Notify MoH
Send results to Public Health (food)
Complete BRS form & return to BRS & copy to Public Health
Coordinate obtaining BabyBIG California Dept. of Health
Request BabyBIG use on SAP Form "A"
Authorize shipment to hospital
Ship to hospital
Administer BabyBIG
Information Updates
Facilitate Info collection from physician and relay to MoH
Report BabyBIG use on SAP Form "C"
Report BabyBIG use on SAP Form "C"
RHA forwards payment to Calfornia
Reimburse RHA for BabyBIG

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 24-48 hours.

Public Health Purpose for Notification of Campylobacteriosis (adapted from Massachusetts Department of Public Health, 2016)

- To identify whether the case may be a source of infection for other persons (e.g., a diapered child, daycare attendee, or food handler), and if so, to prevent further transmission.
- To identify transmission sources of public health concern (e.g., a restaurant or a commercially distributed food product), and to stop transmission from such sources;
- To monitor the effectiveness of prevention and control measures;
- To make timely and evidence informed actions on outbreaks;
- To track trends of the epidemiology of campylobacteriosis in Saskatchewan including risk factors and
- To inform the public and medical community about campylobacteriosis.

Surveillance Case Definition[1] (Saskatchewan-specific case definition, adapted from Public Health Agency of Canada, 2008)

Confirmed Case	Laboratory confirmation of infection with or without symptoms: • isolation of *Campylobacter sp.* from an appropriate clinical specimen [a] OR • Detection of *Campylobacter spp*. by nucleic acid amplification testing (NAAT) from an appropriate clinical specimen
Probable Case	Clinical illness [b] in a person who is epidemiologically linked to a confirmed case.
[a] See Specimen Collection and Transport [b] Clinical illness is characterized by diarrhea, abdominal pain, malaise, fever, nausea and/or vomiting.	

[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

- *Campylobacter jejuni* and *C. coli* are the most common. Other *Campylobacter* species include *C. fetus, C. lari, C. upsaliensis and C. hyointesinalis.* Subtyping can be useful in epidemiological investigations.
- *Campylobacter* species are motile, comma-shaped, gram-negative bacilli (American Academy of Pediatrics, 2015).
- Infection with *Campylobacter* confers lasting immunity to that strain (Heymann, 2015).

Symptoms

- Many infections are asymptomatic and most are self-limited.
- Severity of symptoms vary.
- Symptoms include diarrhea, abdominal pain, fever, nausea, vomiting, malaise, and frequently, bloody stool.
- Mild infections may last 1-2 days, resembling viral gastroenteritis.
- May mimic acute appendicitis or inflammatory bowel disease (Heymann, 2015).
- Bacteremia, although uncommon, may occur in children and neonates. Less common is typhoid-like syndrome, febrile convulsions or a meningitis (American Academy of Pediatrics, 2015).
- Prolonged illness and/or relapses may occur in adults.
- Post-infectious complications, though rare, include reactive arthritis (approximately 1% of cases), urticaria, erythema nodosum, febrile convulsions or Guillain-Barré syndrome (approximately 0.1% of cases) (Heymann, 2015).

Reservoir/Source (American Academy of Pediatrics, 2015)

- Feces of an infected animal or human. The gastrointestinal tract of animals and birds (especially cattle, chickens, turkey, and water fowl) can be a reservoir. Puppies, kittens, rodents and other domestic animals can also be a reservoir.
- Raw poultry or meat, often contaminated through the slaughter process, and unpasteurized milk are frequently identified as sources of infection.
- Optimal growth temperature is at 42°C.

- *Campylobacter* is susceptible to many disinfectants and heat. The bacteria survive in moist environments (including droplets) especially at lower temperatures, but do not tolerate drying or freezing. These characteristics limit transmission. *Campylobacter* may survive in water for 2 to 5 days, in milk for 3 days, and in feces for up to 9 days.

Incubation Period
Usually 2-5 days, ranges from 1-10 days, depending on dose ingested (Heymann, 2015). A standardized case investigation including timeline of inquiry is outlined in the User Defined Form.

Period of Communicability
Usually ends 2-3 days after administration of antibiotics (American Academy of Pediatrics, 2015). Individuals not treated with antibiotics may excrete organisms for 2-7 weeks, however person to person transmission is uncommon (Heymann, 2015). A long-term carrier state of more than 7 weeks is not known to occur.

Mode of Transmission (Heymann, 2015)
- Ingestion of organisms in improperly cooked food, unpasteurized milk, or other contaminated food or drinking water.
- Direct contact with fecal material from infected animals or persons, especially young children, and young pets (puppies and kittens).
- Most raw chicken is contaminated with *C. jejuni*. Cross-contamination may occur from improperly cleaned counters or equipment (for example, knives and cutting boards) that have been exposed to contaminated meat or poultry products.
- Person-to-person transmission with *C. jejuni* appears uncommon.
- The infective dose is often low, typically fewer than 500 organisms.

Specimen Collection and Transport
Stool specimens should be taken early in the course of the illness, when the causative agent is likely to be found in largest numbers. Freshly passed stool is better than rectal swabs, since there is less chance for improper collection, and mucus and blood stained portions can be selected for culture. Use the Cary-Blair transport media. Submit three or four spoonfuls (using the built-in spoon) of liquid stool and mix thoroughly with the semi-solid Cary-Blair transport media. The final mixture should not fill the Cary-Blair container to more than three-quarters full.

Refer to the Roy Romanow Provincial Laboratory Compendium of Tests for details at https://rrpl-testviewer.ehealthsask.ca/.

Public Health Investigation

I. Case

Refer to Attachment – Campylobacteriosis Data Collection Worksheet to assist.

History

- Onset of illness - to determine incubation period and period of communicability, which helps to identify the possible source and contacts to be followed.
- In the ten days prior to onset of illness inquire about:
  - Exposure to animals including pets with recent illness, farm animals, young animals or recently acquired puppies or kittens (refer to reservoir);
  - Ingestion of potentially contaminated foods such as undercooked poultry, ground beef products or water, or unpasteurized milk. (complete the User Defined Form);
  - contact with individuals with similar symptoms or confirmed cases;
  - history of travel outside of Saskatchewan, especially to areas with inadequate sanitation, water and sewage treatment;
  - assess for safe food handling procedures (e.g. possible cross-contamination such as shared food surfaces and equipment);
  - assess for history of similar symptoms in visitors or other members of the household.
  - determine history of daycare or hospital exposure;
  - identify potentially contaminated drinking and recreational water sources;
  - occupational exposure (e.g., animal or meat handling).
- Assess for health conditions that may render the individual more susceptible to invasive disease (e.g. immunocompromising conditions).
- Identify others who may have been exposed to the same source.
- Occupational considerations exist for food handlers, health care and child care workers.
- Assess for transmission risk through oral-anal sex.

Public Health Interventions

Assessment

- Assess for contacts paying particular attention individuals that have had exposure to the same source or are a risk for further transmission. This is of importance in detecting outbreaks.

Communication

- Letters can be used to inform contacts of the exposure, symptom monitoring and when to seek medical attention (see Sample letter).
- Letters can also be used when exclusion from school or work settings are required as a public health intervention.

Education

- All cases should be provided information on prevention and control measures including safe food handling and handwashing (refer to Education)

Environmental Health

- In the case of an ill food handler, a restaurant inspection may be warranted to review safe food handling requirements.

Exclusion

Exclusion is warranted for cases as follows:

- Food handler, health care worker, childcare, or other staff involved with personal care and children below the age of five years in childcare: exclude until diarrhea has resolved (American Academy of Pediatrics, 2015).
- Individuals unable to maintain adequate standards of personal hygiene (i.e., mentally or physically handicapped): exclude until diarrhea has resolved. If the individual is living in an institution, follow contact precautions for same time period.
- Diarrhea is considered resolved when stools have been normal for that individual for 48 hours.
- Exclusion of asymptomatic infected persons is indicated for those with questionable handwashing habits (Heymann, 2015).

Public Health Order

- If a food handler, the case should be excluded from work and order used if necessary.

Referral

- To primary care provider for treatment recommendations if experiencing more than 6 diarrheal episodes per day; bloody diarrhea; persistent diarrhea with or without fever (Blondel-Hill and Fryters, 2006).
- When a food that is commercially available is implicated, a referral to Canadian Food Inspection Agency may be warranted. Likewise, when a public water source is implicated, a referral to the Saskatchewan Water Security Agency may be warranted.

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 therapy includes oral rehydration solution to replace fluids and electrolytes.*
- *In most cases, infection is self-limited and treatment with antibiotics is not indicated (Heymann, 2015).*
- *Antibiotic resistance is increasing. Antibiotic treatment, if indicated (e.g., those with severe or prolonged illness), should be based on antimicrobial susceptibility testing. The public health practitioner should direct any questions regarding the current treatment protocols to the primary care provider.*
- *C. jejuni or C. coli are susceptible to many antimicrobial agents. Taking antibiotics will shorten the period of excretion and communicabiliy.*
- *Antibiotics shorten the duration of illness and prevent relapse when given early during gastrointestinal tract infection.*

II. Contacts/Contact Investigation

Contact Definition

Contacts include:

- persons living in the household;
- children and childcare workers in a day care/day home;
- individuals exposed to the same source (if it is identified).

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.

Education

- All contacts should be provided information on prevention and control measures including safe food handling and handwashing.

Environmental Health

- If a common exposure is identified through the case and contact investigations, environmental health assessments may be required.

Exclusion

- Symptomatic contacts should follow the same exclusion criteria as cases.
- Asymptomatic contacts are not excluded from work or day care.

Referral

- Symptomatic contacts should be referred to their primary care provider for assessment.

III. Environment

Child Care Centre Control Measures

- Refer to the Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities. [2] A Public Health Inspector should inspect the facility to ensure adequate infection control measures are implemented.
- For one case:
  - no action is recommended for other children or employees in a day care setting.
- For two cases or more:
  - if there are epidemiologically linked cases in attendees or employees, diapered attendees and food handlers should be screened for *Campylobacter*.
- Educate parents and staff about campylobacteriosis and proper handwashing.
- Instruct parents and staff to watch for symptoms of diarrhea.

Institutional Control Measures

For infection control measures refer to your Health Authority Infection Control Manual.

- Contact precautions for hospitalized patients and residents of an institution.
  - For residents of an institution with a case of campylobacteriosis, institute contact precautions for that case. No action is recommended for other residents.
  - If there are epidemiologically linked cases of campylobacteriosis in the institution's residents or employees, employees and food handlers should be screened for *Campylobacter*. Investigate as an outbreak.

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

IV. Epidemic Measures

Investigate outbreaks to identify implicated food, water or raw milk to which others may have been exposed. Groups of cases should be investigated for vehicle and mode of transmission.

Prevention Measures

Refer to the Enteric 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

- Provide prevention and education to case or caregiver, day care or institution about personal hygiene.
- Highlight the importance of avoiding cross-contamination of cooked food with uncooked food, especially poultry. Emphasize that poultry carcasses are often contaminated with *Campylobacter*.
- Thoroughly cook all food derived from animal sources, particularly poultry and eggs.
- Avoid using common cutting boards for raw and cooked products *unless* sanitizing between uses.
- Educate food handlers about proper food and equipment handling and hygiene.
- Pasteurize or boil milk.
- Ensure water supplies are potable.
- Wash hands thoroughly after touching feces or animals, especially chickens.
- Consider pets with diarrhea as a possible source of *Campylobacter*.
- Educate about the risk of sexual practices that permit fecal-oral contact.

Immunization

Not applicable.

Revisions

Date	Change
September 2018	• Clarified the purpose for notification of cases to public health • Updated case definition to include PCR and NAAT tests. • Incorporated standardized Campylobacteriosis Data Collection Worksheet and User Defined Form. • Clarified the exlusion and removed reference to completion of antibiotics. • Rearranged and updated the style into the new format of the Manual to align with Panorama. • References reaffirmed or updated as necessary.

References

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United States Food and Drug Administration, Center for Food Safety and Applied Nutrition. (2004). *Bad bug book: Foodborne pathogenic microorganisms and natural toxins handbook.* McLean, VA: International Medical Publishing, Inc.

Campylobacteriosis 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 same:	

B) INVESTIGATION INFORMATION

LHN-> SUBJECT SUMMARY-> ENTERIC 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

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:

☐ *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_____

Campylobacteriosis Data Collection Worksheet

Please complete **all** sections

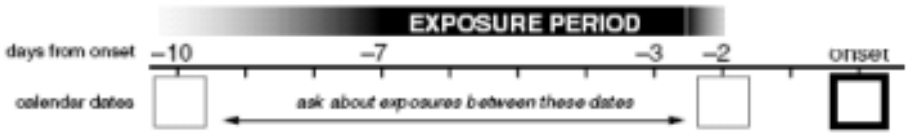
Panorama Client ID: _____
Panorama Investigation ID: _____

C) SIGNS & SYMPTOMS

INVESTIGATION->SIGNS & SYMPTOMS

Description	Yes Date of onset	Date of recovery	Description	Yes Date of onset	Date of recovery
Asymptomatic	YYYY / MM / DD	YYYY / MM / DD	Nausea	YYYY / MM / DD	YYYY / MM / DD
Diarrhea - bloody	YYYY / MM / DD	YYYY / MM / DD	Pain – abdominal	YYYY / MM / DD	YYYY / MM / DD
Diarrhea - mucousy	YYYY / MM / DD	YYYY / MM / DD	Sepsis (e.g. bactremia, septicemia, etc.)	YYYY / MM / DD	YYYY / MM / DD
Diarrhea - watery	YYYY / MM / DD	YYYY / MM / DD	Stool - bloody	YYYY / MM / DD	YYYY / MM / DD
Headache	YYYY / MM / DD	YYYY / MM / DD	Vomiting	YYYY / MM / DD	YYYY / MM / DD
Malaise	YYYY / MM / DD	YYYY / MM / DD		YYYY / MM / DD	YYYY / MM / DD
Other Signs & Symptoms if applicable					

Enter onset date in heavy box. Count back to figure the probable exposure period.



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

N – NO, NA – Not Asked, U – Unknown

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes	N, NA, U	Add'l Info
Animal Exposure – Farms (Add'l Info)			
Animal Exposure – Other (Add'l Info)			
Animal Exposure – Pet treats and raw food (Add'l Info)			
Animal Exposure – Pets (including reptiles) (Add'l Info)			
Animal Exposure – Rodents/rodent excreta			
Animal Exposure – Wild animals (other than rodents) (Add'l Info)			
Behaviour – Camping/hiking	YYYY / MM/DD		
Contact – Persons with diarrhea/vomiting	YYYY / MM/DD		
Contact to a known case (Add'l Info)	YYYY / MM/DD		
Immunocompromised – Related to underlying disease or treatment			
Occupation – Child Care Worker	TE		
Occupation – Farmer			
Occupation – Food Handler	TE		
Occupation – Health Care Worker – IOM Risk Factor	TE		

Campylobacteriosis Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

DESCRIPTION	Yes	N, NA, U	Add'l Info
Occupation – Veterinarian or related worker			
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		
Water – Bottled water (Add'l Info)			
Water – Private well or system (Add'l Info)			
Water – Public water system (Add'l Info)			
Water – Untreated water (Add'l Info)	AE		
Water (Recreational) – Pond, stream, lake, river, ocean (Add'l Info)	AE		
Water (Recreational) – Private (swimming pool/whirl pool)	TE		
Water (Recreational) – Public (swimming/paddling pool/whirl pool)			
Other risk factor (Add'l Info)			

F) USER DEFINED FORM (SEE ATTACHED) LHN-> INVESTIGATION-> INVESTIGATION DETAILS -> LINKS AND ATTACHMENTS -> CAMPYLOBACTERIOSIS FORM

G) TREATMENT LHN-> INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication *(to intercept transmission)Panorama = Other Meds) :* _____

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

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

Intervention Type and Sub Type:

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

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

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

Public Health Order:
☐ Other (specify) 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: Investigator name
☐ Canadian Food Inspection Agency YYYY/ MM / DD
☐ Primary Care Provider YYYY/ MM / DD
☐ Saskatchewan Water Security Agency YYYY/ MM / DD

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

Other Investigation Findings:
☐ Investigator Notes
☐ Document Management

Environmental health: YYYY/ MM / DD
☐ Restaurant Inspection ☐ Facility Inspection
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	

Campylobacteriosis Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

I) OUTCOMES *(optional except for severe influenza)*

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) 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

Transmission Events

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

Transmission Event ID	Exposure Name	Setting type	Date/Time	# of contacts
		☐Food service establishment ☐Health Care setting ☐Public facilities ☐ Household Exposure		
		☐Food service establishment ☐Health Care setting ☐Public facilities ☐ Household Exposure		
		☐Food service establishment ☐Health Care setting ☐Public facilities ☐ Household Exposure		
		☐Food service establishment ☐Health Care setting ☐Public facilities ☐ Household Exposure		
	Campy 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 exposed)

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

PANORAMA

Campylobacteriosis Food Exposure Questionnaire

Loading...

Record type: Investigation
Record ID: 146
Record Name: UDF Investigation

In this form the answers (Yes, Probably, No, and Don't know) are from the perspective of the person being interviewed. "Probably" can be used if the client thinks he/she may have eaten this food or usually eats this food, but is unsure if it was eaten during the period in question.

Diet and Allergies

Show/Hide

Are you a vegetarian?
- ○ Yes
- ○ No
- ○ Don't know
- ○ Not asked

Do you have any food Allergies / avoidances / special diet?
- ○ Yes
- ○ No
- ○ Don't know
- ○ Not asked

If yes, specify details

Food Exposures

Show/Hide

In the 10 days prior to onset did you eat…

Any chicken meat?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, was the chicken undercooked?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any eggs or food contain eggs (from any bird species)?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any pork?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any beef?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any fish?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any raw vegetables?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any raw fruits?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any Unpasteurized dairy (e.g. milk, cheese)?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know

PANORAMA

○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Social Functions Show/Hide

In the 10 days prior to onset did you attend any social functions (e.g. parties, weddings, showers, potlucks, community events)?

○ Yes
○ No
○ Don't know
○ Not asked

Click the Add button to add social event/function details

Add

Restaurants Show/Hide

In the 10 days prior to onset did you attend any restaurants (including take-out, cafeteria, bakery, deli, kiosk)?

○ Yes
○ No
○ Don't know
○ Not asked

Click the Add button to add restaurant details

Add

Grocery Stores Show/Hide

In the 10 days prior to onset did you attend any grocery stores for food consumed during the incubation period?

○ Yes
○ No
○ Don't know
○ Not asked

Click the Add button to add grocery store details

Add

Loyalty card/store issued card (for outbreak investigation only) Show/Hide

This section is only for use in some specific outbreak situations, with client consent. It is not a routine question for sporadic cases.

Has the client given consent (written or verbal)?

○ Yes
○ No
○ Not applicable

Loyalty card details (names and numbers)

Interviewer Details and Notes Show/Hide

Interviewer Name	
Interview date	8/22/2018
Any special notes regarding this interview	

Save as Draft Submit Clear

Orbeon Forms Orbeon Forms 4.9.0.201505052329 CE

Enteric Illness

Cryptosporidiosis

Notification Timeline:

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

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

Information

Case Definition (Public Health Agency of Canada, 2008)

Confirmed Case	Laboratory confirmation of infection with or without symptoms from an appropriate clinical specimen (e.g., stool, intestinal fluid or small bowel biopsy): • demonstration of *Cryptosporidium* oocysts **OR** • detection of *Cryptosporidium* DNA **OR** • demonstration of *Cryptosporidium* antigen by an approved method (e.g., EIA, immunochromatographic – ICT).
Probable Case	Clinical illness[1] in a person who is epidemiologically linked to a confirmed case.
[1] Clinical illness is characterized by diarrhea (often profuse and watery), abdominal cramps, anorexia, fever, nausea, general malaise and vomiting.	

Causative Agent

Cryptosporidium species are oocyst-forming coccidian protozoa. *Cryptosporidium parvum* is the most common species that causes clinical disease in humans. The other species that may cause disease in humans is *Cryptosporidium hominis* (American Academy of Pediatrics, 2009).

Symptoms (Heymann, 2008)

- The major symptom is diarrhea, which may be profuse and watery, preceded by anorexia and vomiting in children. The diarrhea is associated with cramping abdominal pain.
- General malaise, fever, anorexia, nausea and vomiting occur less often.
- Symptoms often wax and wane but remit in less than 30 days in most immunologically healthy people.

- Asymptomatic infections are common and represent a source of infection for others.
- In immunodeficient persons, especially those infected with HIV, who may be unable to clear the parasite, the disease has a prolonged and fulminant clinical course contributing to death.

Incubation Period (American Academy of Pediatrics, 2009)
1-12 days is the likely range, with an average of about 7 days.

Reservoir/Source
Humans, cattle and other domestic animals, including birds and reptiles and occasionally wild animals (American Academy of Pediatrics, 2009).

Mode of Transmission (Heymann, 2008)

- Fecal-oral, including person-to-person, animal-to-person, waterborne and foodborne.
- Oocysts are highly resistant to chemical disinfectants (e.g., chlorine). The parasite infects the intestinal epithelial cells, resulting in oocysts in feces that can survive under adverse environmental conditions for long periods of time.
- Outbreaks in North America and Europe have been associated with contaminated drinking water, bathing in contaminated swimming pools, water parks and lakes, and drinking unpasteurized apple cider that has been contaminated with cow manure.

Risk Groups
Heymann (2008) identifies the following as being prone to infection:

- children under 2 years of age;
- animal handlers;
- travellers;
- men who have sex with men;
- close personal contacts of infected individuals (families, health care workers and day care workers).

Period of Communicability (Heymann, 2008)

- Oocysts appear in the stool at the onset of symptoms and are immediately infectious upon excretion and continue to be excreted in the stool for several weeks after symptoms subside. Oocysts can remain infective outside the body in a moist environment for 2-6 months.
- In most people, shedding of *C. parvum* stops within 2 weeks, but in immunocompromised individuals, shedding can continue for up to 2 months.

Specimen Collection and Transport

Submit stool in container with SAF preservative. Fill specimen to the line of the container, do not over or under fill. Mix stool well with preservative using spoon provided before sending.

Refer to the Saskatchewan Disease Control Laboratory Compendium of Tests for details at http://sdcl-testviewer.ehealthsask.ca.

Methods of Control/Role of Investigator

Prevention and Education

Refer to the Enteric 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.

- Educate the public about personal hygiene.
- Ensure adequate sanitation facilities.
- Educate food handlers about proper food and equipment handling and hygiene, especially in avoiding cross-contamination of food products, and emphasize thorough hand washing.
- Ensure drinking water supplies are safe. Avoid drinking untreated and inadequately filtered surface water when camping or traveling in developing countries. Chemical disinfectants are not effective; therefore drinking water supplies should be boiled for one minute.
- Educate about the risk of sexual practices that permit fecal-oral contact.
- Contact precautions are recommended for diapered or incontinent children.
- Because cattle are a common source, wash hands thoroughly after contact with cattle or other farm or domestic animals.

- Do not eat or drink unpasteurized milk products.
- Avoid swallowing water when swimming (Heymann, 2008).

Management

I. Case

History

Obtain:

- history of contact with pets, cattle, sheep or domestic animals (including visits to farms or petting zoos);
- history of recent travel and travel to areas with inadequate water or sewage systems;
- history of recent exposure to recreational water (treated or untreated);
- food history including consumption of contaminated food or water, or unpasteurized milk.

Determine:

- water source and sewage disposal if not on a municipal system;
- history of high-risk sexual practices, especially contact with feces;
- history of exposure to day care or institutions.

Immunization

None.

Education

- Provide prevention information and education to case or caregiver, day care or institution workers about personal hygiene.
- Educate about disinfecting diaper changing areas after use by child with diarrhea.
- Advise case to avoid food preparation.
- Advise case to avoid using public swimming pools and other recreational waters for 2 weeks after symptoms resolve (American Academy of Pediatrics, 2009).
- Long-term asymptomatic carriers should be educated as to proper prevention activities (handwashing techniques, proper fecal disposal), but do not need to be excluded from risk activities.

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 (MHO). See Appendix H - Sources for Clinical Treatment Guidelines.

- Supportive measures include management of fluid and electrolyte balance and rest.
- If the individual is taking immunosuppressive drugs, these should be stopped or reduced wherever possible. The patient is advised to consult with their physician to determine if any change in immunosuppressive drug regime is indicated.

Exclusion

- Food handler, health care, childcare or other staff involved with personal care: exclude until diarrhea is considered to resolved (when stools have been normal for that individual for 48 hours).
- Children below the age of five years in childcare and individuals unable to maintain adequate standards of personal hygiene (i.e., mentally or physically handicapped): exclude until diarrhea has resolved.
- Use of recreational water (e.g., swimming pools, paddling pools, hot tubs): exclude until 2 weeks after symptoms resolve.
- Asymptomatic persons: exclusion is not warranted.

Referrals

- None for healthy individuals.
- Immunocompromised people, especially HIV patients, should be followed by their infectious disease specialist.

II. Contacts/Contact Investigation

Contact Definition

Contacts include:

- persons living in the household;
- children and childcare workers in a day care/day home;
- individuals exposed to the same source (if it has been identified).

Testing

Symptomatic household members, children and childcare workers in a day care/day home may be required to submit stool samples as part of an outbreak investigation (Heymann, 2008).

Prophylaxis/Immunization

None.

Exclusion

Symptomatic contacts working in high risk occupations should be excluded until diarrhea has resolved. Children and childcare workers in a daycare/dayhome should be excluded from these settings until diarrhea has resolved. Individuals with diarrhea should not use public recreational waters (e.g., swimming pools, lakes, etc.) (American Academy of Pediatrics, 2009). Exclusion is not warranted for asymptomatic persons.

III. Environment

Child Care Centre Control Measures

Strict enforcement of infection control measures. Refer to Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[1]

Institutional Control Measures

- Strict enforcement of infection control measures. Refer to your Health Authority Infection Control Manual.
- If the patient is in an institution, hospital or day care/day home, contact precautions in the handling of feces, contaminated clothing and bed linen are to be followed until diarrhea has resolved.
- Contact precautions should be used while case is symptomatic. In the event of a cluster of cases in the institution, food handlers, water source and staff and other attendees may need to be examined (Heymann, 2008).

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

Epidemic Measures

Epidemiological investigation of clustered cases in an area or institution to:

- determine source of infection and mode of transmission;
- search for common vehicle, such as recreational water, drinking water, raw milk or other potentially contaminated food or drink;
- institute applicable prevention or control measures. Control of person-to-person or animal-to-person transmission requires emphasis on personal cleanliness and safe disposal of feces (Heymann, 2008).

References

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Enteric Illness

Cyclosporiasis

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 24-48 hours.

Information

Case Definition (Public Health Agency of Canada, May 2008)

Confirmed Case	Laboratory confirmation of infection in a person with or without clinical illness:* • demonstration of *Cyclospora cayetanensis* oocysts in stool, duodenal/jejunal aspirate or small bowel biopsy.
Probable Case[1]	Clinical illness* in a person with evidence of: • an epidemiologic link to a confirmed case either by consumption of the same food or exposure to food known to be handled by a confirmed case **OR** • a history of travel to a cyclospora-endemic area who is epidemiologically linked to a confirmed case.
*Clinical illness is characterized by watery diarrhea, loss of appetite, weight loss, abdominal bloating and cramping, increased flatus, nausea, fatigue and low-grade fever. Vomiting may also be noted. Relapses and asymptomatic infections can occur. Some evidence suggests that symptoms may be more severe and long-lasting in immunocompromised individuals.	

Causative Agent

Cyclospora cayetanensis is a sporulating coccidian protozoan infecting the upper small intestine (Heymann, 2008). *Cyclospora* is resistant to chlorination.

Symptoms (American Academy of Pediatrics, 2009)

- Watery diarrhea is the most common symptom.
- Nausea, anorexia, abdominal cramps or bloating, prolonged fatigue and substantial weight loss can also occur. Approximately 50% if individuals will have low grade fever.
- Diarrhea can alternate with constipation.

[1] Probable case definitions are provided as guidelines to assist with case finding and public health management, and are not for national notification purposes.

- Infection is usually self-limited, but diarrhea and systemic symptoms can vary in intensity for weeks to months.
- Relapse and persistence of symptoms is common in untreated people, even in immunocompetent persons.
- In the immunocompromised, diarrhea can last for months in some patients.
- Some infected persons are asymptomatic.

Incubation Period
Range of 2-14 days, usually 1 week (American Academy of Pediatrics, 2009).

Reservoir/Source
- Humans are the only known hosts (American Academy of Pediatrics, 2009).
- Infected persons excrete the occyst stage of *Cyclospora* in their feces.
- Outbreaks have occurred from ingestion of contaminated imported raspberries, basil and lettuce.
- Cyclosporiasis is most common in tropical and subtropical countries and is endemic in many developing countries (Heymann, 2008).

Mode of Transmission
- Transmission usually occurs through the ingestion of contaminated food (usually fresh produce like fruits and vegetables) or water, or swimming in contaminated water.
- Person-to-person and animal-to-person transmissions have not been documented.
- *Cyclospora* oocysts in freshly excreted stool are not infectious. They require days to weeks outside the host to sporulate and become infectious. Indirect transmission can occur if an infected person contaminated the environment and oocysts have sufficient time, under appropriate conditions, to become infectious (American Academy of Pediatrics, 2009).

Period of Communicability
The disappearance of symptoms and oocysts usually occurs simultaneously. The mean duration of organism shedding is 23 days (Alberta Health and Wellness, 2008).

Specimen Collection and Transport
Cyclospora oocysts may be shed intermittently and at low levels, even by persons with profuse diarrhea. A single negative stool specimen does not exclude the diagnosis; several specimens that are processed and examined with sensitive methods may be required.

Submit stool in container with SAF preservative. Fill specimen to the line of the container, do not over or under fill. Mix stool well with preservative using spoon provided before sending.

Refer to the Saskatchewan Disease Control Laboratory Compendium of Tests for details at http://sdcl-testviewer.ehealthsask.ca.

Methods of Control/Role of Investigator

Prevention and Education
Refer to the Enteric 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.

- Educate about personal hygiene, especially the sanitary disposal of feces and careful hand washing after defecation.
- Educate food handlers about proper food handling, preparation, and hygiene.
- Avoid food or water that may be contaminated with sewage.
- Encourage thorough washing of fresh produce prior to consumption, although this is not always effective.
- Travellers should be advised regarding water treatment techniques – refer to Saskatchewan International Travel Manual.

Management

I. Case

History

- Obtain food history, especially recent consumption of fresh produce – e.g., raspberries, basil or lettuce (Heymann, 2008).

- Determine history of recent travel in areas with poor sanitation including improper water treatment and sewage disposal.
- Determine history of recent immigration.

Immunization
None.

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 (MHO). See Appendix H - Sources for Clinical Treatment Guidelines.

Supportive measures include management of fluid and electrolyte balance, and rest. In patients who are not treated, illness can be protracted, with remitting and relapsing symptoms (Heymann, 2008).

Exclusion (work, school, daycare, and other public environments)
Symptomatic and asymptomatic individuals are generally not excluded from work or daycare.

Referrals
None.

II. Contacts/Contact Investigation

Contact Definition
Contacts include:

- individuals exposed to the same source (if it is identified).

Testing
None.

Prophylaxis/Immunization
None.

Exclusion
None.

III. Environment

Child Care Centre Control Measures
Strict enforcement of infection control measures. Refer to Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities available at http://www.saskatchewan.ca/live/births-deaths-marriages-and-divorces/starting-a-family/early-learning-and-child-care/child-care.

Health Facilities Control Measures
Refer to your Health Authority Infection Control Manual. In addition to standard precautions, contact precautions are recommended for diapered or incontinent children.

References

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Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.

From Public Health to Ministry of Health: Within 3 days (or immediate if an outbreak is suspected or anticipated).

Public Health Follow-up Timeline: Immediate.

Public Health Purpose for Notification of verotoxigenic *E. Coli* (adapted from Massachusetts, 2018)

- To identify whether the case may be a source of infection for other persons (e.g., a diapered child, daycare attendee, or food handler), and if so, to prevent further transmission.
- To identify transmission sources of public health concern (e.g., a restaurant or a commercially distributed food product), and to stop transmission from such sources.
- 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 verotoxigenic *E. Coli.*

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

Confirmed Case	Laboratory confirmation of infection with or without clinical illness: • isolation of verotoxin producing *E. coli* from an appropriate clinical specimen (e.g., feces, urine, blood) **OR** • detection of verotoxin antigen or nucleic acid.
Probable Case	Clinical illness[1] in a person who is epidemiologically linked to a confirmed case, which would include persons with haemolytic uremic syndrome (HUS).
[1]Clinical illness is characterized by diarrhea (often bloody) and abdominal cramps; fever is often absent. Illness may be complicated by haemolytic uremic syndrome (HUS), thrombocytopenic purpura (TTP) or pulmonary edema. Asymptomatic infections may also occur and the microorganism may cause extra-intestinal infections.	

[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 CONSTRUCTION

Additional Background Information

Causative Agent

- Verotoxigenic *E. coli* is also referred to as verotoxin-producing *E. coli*, enterohemorrhagic *E. coli* (EHEC), Shiga toxin-producing *E. coli* (STEC) and verocytotoxin-producing *E. coli*.
- The main enterohemorrhagic (EHEC) serotype is *Escherichia coli* O157:H7; this serotype is thought to cause over 90% of cases of diarrhea-associated haemolytic uremic syndrome (HUS) in North America. The other most common serogroups in the US, serotypes such as O26, O111, O103, O45, and O121, have been implicated (Heymann, 2015).
- The infective dose is very low. It may be similar to *Shigella* spp. (as few as 10 organisms by ingestion).

Symptoms

- The illness is characterized by severe cramping, abdominal pain and diarrhea which is initially watery becoming grossly bloody. Occasionally vomiting occurs. Fever is either low-grade or absent.
- The illness is usually self-limited lasting for an average of eight days. Some individuals exhibit watery diarrhea only.
- Some, particularly the very young have developed hemolytic uremic syndrome (HUS), characterized by renal failure, hemolytic anemia and thrombocytopenia. From 8% to 15% of children with *E. coli* O157 exhibit diarrhea and a much smaller proportion of adults develop HUS. HUS develops during the 2 weeks after onset of diarrhea. Fifty per cent of patients require dialysis, and 3% to 5% die.
- Children with diarrhea-associated HUS should be observed for diabetes mellitus during their acute illness, and consideration should be given to long-term screening of survivors for diabetes.

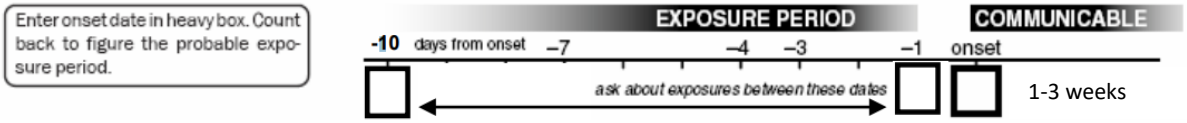
Incubation Period

Typically ranges from 2 to 10 days with a median of 3-4 days (Heymann, 2015).

Period of Communicability

The duration of the excretion of the pathogen is typically a week or less in adults and three weeks in one third of children. Prolonged carriage is uncommon (Heymann, 2015).

Figure 1. Calculating Incubation and Communicability (adapted from British Columbia Center for Disease Control, 2018)



Mode of Transmission

- Through ingestion of contaminated foods, most often inadequately cooked beef (especially ground beef) and also raw (unpasteurized) milk.
- Person-to-person from symptomatic people or carriers.
- Through ingestion of other contaminated foods such as melons, lettuce, fresh spinach, coleslaw, apple cider, alfalfa sprouts, dry-cured salami, game meat, and cheese curds.
- Water-borne transmission has been demonstrated by consuming contaminated drinking water and swimming in contaminated recreational water.
- Petting zoos can be a source of transmission.

Reservoir/Source

- Cattle are the main reservoir of EHEC. Other ruminants including sheep, pigs, goats and deer may also carry the organism. These bacteria can survive for several months in manure and water trough sediments.
- Humans may also serve as a reservoir for person-to-person transmission.
- Undercooked or raw hamburger has been implicated in many documented outbreaks and sporadic cases.
- Contaminated fruits and vegetables (e.g., unpasteurized apple cider, melons, lettuce, and fresh spinach).
- Raw milk has been identified as a vehicle of transmission.

Risk Groups

Individuals most vulnerable to the disease include (Heymann, 2015):

- Children between the ages of 1-4 have the greatest risk of developing HUS;
- Older adults are at greatest risk of death.

Those at highest risk of transmitting the infection to others include (Heymann, 2015):

- food handlers;
- health care, child care and other staff involved in personal care;
- children below the age of five years in childcare.

Specimen Collection and Transportation

Stool specimens should be taken early in the course of the illness, when the causative agent is likely to be found in largest numbers. Freshly passed stool is better than rectal swabs, since there is less chance for improper collection, and mucus and blood stained portions can be selected for culture. Use the Cary-Blair transport media. Submit three or four spoonfuls (using the built-in spoon) of liquid stool and mix thoroughly with the semi-solid Cary-Blair transport media. The final mixture should not fill the Cary-Blair container to more than three-quarters full.

Refer to the Roy Romanow Provincial Laboratory Compendium of Tests for details at https://rrpl-testviewer.ehealthsask.ca/.

Public Health Investigation

I. Case

Refer to Attachment – Verotoxigenic *E. Coli* Infection Data Collection Worksheet to assist in follow-up.

History

- Onset of illness – to determine incubation period and period of communicability which helps to identify the possible source and contacts to be followed.
- In the 10 days prior to onset of illness:
  - Identify history of travel (during the incubation period).
  - Exposure to someone else with similar symptoms.
  - Identify potentially contaminated swimming pools and other recreational waters or contaminated drinking water sources.
  - Exposure to farm animals (cattle and other ruminants including sheep, goats and deer) and pets including reptiles and amphibians or pet foods and treats, a petting zoo.
  - Obtain a detailed food history (taking into consideration the incubation period) focusing on foods such as ground beef, unpasteurized cow's milk, grocery produce including melons, lettuce, fresh spinach, coleslaw, apple cider, alfalfa sprouts.
  - Identify others who may have been exposed to the same source.

- Assess for safe food handling procedures (e.g. possible cross-contamination such as cutting boards).
- Determine history of daycare or hospital exposure.
- Determine history of high-risk sexual practices, particularly activities that result in contact with feces.

- Identify others who may have been exposed to the same source.
- Assess for history of similar symptoms in visitors or other members of the household.
- Occupational considerations exist for food handlers, health care and childcare workers.

Public Health Interventions

Assessment

- Assess for contacts paying particular attention individuals that have had exposure to the same source or are a risk for further transmission.

Communication

- Letters can be used to inform contacts of the exposure, symptom monitoring and when to seek medical attention (see Sample letter)
- Letters can also be used when exclusion from school or work settings are required as a public health intervention.

Education

- All cases should be provided information on prevention and control measures including safe food handling and handwashing.

Exclusion

- Food handlers, health care workers, childcare or other staff involved with personal care: Exclude until diarrhea has resolved **and** two consecutive negative stool cultures are obtained at least 24 hours apart and at least 48 hours after discontinuation of antibiotics (if treatment was provided) (Heymann, 2015).
- Older children and adults unable to maintain adequate standards of personal hygiene (i.e., mentally or physically handicapped): Exclude until 2 negative stool specimens have been obtained. If individual is living in an institution, follow contact precautions until 2 negative stool cultures have been obtained.
- Individuals should be excluded from using recreational water (e.g., swimming pools, whirlpools, etc.) until 2 weeks after symptoms resolve.
- Diarrhea is considered resolved when stools have been normal for that individual for 48 hours.

Public Health Order

- If a food handler, the case should be excluded from work and a Public Health Order issued if necessary.

Referral

- When a food that is commercially available is implicated and is from a federally inspected plant, the Ministry of Health would alert the CFIA. Likewise, when an agricultural source has been identified, the Ministry of Health would alert the Ministry of Agriculture.
- Refer to public health inspection if source cannot be identified and transmission continues.

Testing

- Two consecutive negative stool cultures are required before exclusion requirements can be removed for food handlers, health care and childcare workers or other staff involved with personal care. The specimens must be taken at least 48 hours after antibiotics have stopped and at least 24 hours apart.

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:

- *Fluid replacement is the cornerstone of treatment for shiga toxin-producing E. coli (STEC) diarrhea.*
- *Reasonable concern exists that some antimicrobial agents increase the risk of HUS, although proof is lacking. Most experts would not use an antimicrobial agent to treat persons with E. coli O157:H7.*

II. Contacts/Contact Investigation

Contact Definition

Contacts include:

- persons living in the household;
- children and childcare workers in a daycare/dayhome;
- individuals exposed to the same source (if it is identified).

Public Health Interventions

Assessment

- Assess for symptoms.

Communication

- Follow-up individual contacts in high risk settings and occupations.

Education

- All contacts should be provided information on prevention and control measures including safe food handling and handwashing.

Environmental Health

- If a common exposure is identified through the case and contact investigations, environmental health assessments may be required.

Exclusion

Contacts who are from risk groups:

- If symptomatic: Exclude from patient care, daycare, and food handling until a minimum of two successive negative stool samples are cultured for confirmation. If positive, handle as a case; if negative, allow back to work or daycare when diarrhea has resolved.
  - All symptomatic contacts should avoid handing food to be consumed by others and avoid caring for children in their home until two successive negative stool samples are cultured for confirmation (Heymann, 2015)
- If asymptomatic: Asymptomatic contacts who are from a risk group should be asked to submit one to two stool specimens. If positive, handle as cases. If a contact refuses to submit stool specimen, exclusion may be warranted. This must be evaluated case by case.

Referral

- Depending on the suspected source, investigation/management may involve local Medical Health Officer, Ministry of Health, Public Health Agency of Canada, Ministry of Agriculture, and/or Canadian Food Inspection Agency.

Symptom monitoring

- Contacts should be asked to monitor symptoms during the incubation period and be advised on testing and exclusion if symptoms develop.

Testing

- Symptomatic contacts should be assessed by a physician.
- Submit stool specimens on symptomatic contacts based on risk groups:
  - food handler;
  - health care, childcare or other staff involved with personal care;
  - children below the age of five years in childcare.

- Two consecutive negative stool cultures are required before exclusion requirements can be removed. The specimens must be taken at least 48 hours after antibiotics have stopped and at least 24 hours apart.

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.[2]
- For an isolated case, no action is recommended for other children or employees in a daycare. If there are epidemiologically linked cases of *E. coli* in children or employees, stool cultures may be done on all staff and attendees in order to identify positive individuals. Handwashing practices should be thoroughly reviewed. Additional prevention measures should be reviewed and reinforced with staff.

Health Facilities Control Measures

- Strict enforcement of infection control measures. Refer to your Health Authority Infection Control Manual.
- Contact precautions for hospitalized patients.
- For residents of an institution with a case of *E. coli*, institute contact precautions for that case. No action is recommended for other residents. If there are epidemiologically linked cases of *E. coli* in the institution's residents or employees, employees with direct contact and food handlers should be screened for *E. coli*. If cases continue, investigate as an outbreak.

IV. Epidemic Measures

When cases occur among a group of individuals that are known to each other, searching for possible exposures such as travel, or a history of food handling errors, use of unsafe raw ingredients, inadequate cooking, time-temperature abuses and cross-contamination may be the likely source.

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

When two or more cases are linked through genetic identification (such as PFGE or whole genome sequencing), but have not named each other as contacts, the risk of a common source is heightened. In such cases, further investigation is warranted into what and where the potential sources are. Environmental, food sampling and inspection of implicated public facilities (recreational water, restaurants, etc) may be warranted.

When laboratories identify interprovincial or international linkages, the Outbreak Incident Command Center may be activated to coordinate investigation. The Canadian Food Inspection Agency would become involved with the goal to identify the implicated source and implement appropriate interventions such as product recalls to reduce further spread.

- Report at once to the chief medical health officer any group of persons with acute bloody diarrhea, HUS, or thrombotic thrombocytopenic purpura, even in the absence of specific identification of the causal agent.
- Search intensively for the specific vehicle (food, water, animal contact, etc.) by which the infection was transmitted; evaluate potential for ongoing person-to-person transmission; and use the results of epidemiological investigations to guide specific control measures.
- Collaborate with relevant regulatory agencies (such as Canadian Food Inspection Agency) to trace the source of suspected food and recall any implicated product; in large common-source foodborne outbreaks, prompt recall may prevent many cases.
- If a waterborne outbreak is suspected, issue a boil water order and chlorinate suspected water supplies adequately under competent supervision, or do not use them.
- If a swimming-associated outbreak is suspected, close the public pool(s) until chlorinated or shown to be free of fecal contamination. For public beaches, close and collect bacteriological samples. Reopen if samples meet the Canadian Recreational Water Quality Guidelines.
- If a milk-borne outbreak is suspected, pasteurize or boil the milk.
- Education of the public of the importance of handwashing after defecation; provide equipment for proper handwashing with soap and individual paper towers in public venues.

Prevention Measures

Refer to the Enteric 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 and anyone at risk about proper hand washing after defecation and ensure soap and individual paper towels are available.
- Educate about disinfecting diaper changing areas after use by child with diarrhea.
- Advise people to avoid food preparation when experiencing diarrhea.
- Advise case to avoid using public swimming pools and other recreational waters for 2 weeks after symptoms resolve (American Academy of Pediatrics, 2015).
- Hands should be thoroughly washed after handling raw meat, especially hamburger and all surfaces and utensils should be thoroughly cleaned and sanitized (one ounce of bleach per gallon of water) after contact with raw meat to prevent cross contamination.
- Wash fruits and vegetables carefully, particularly if eaten raw. They should preferably be peeled.
- Cook beef adequately, especially ground beef, to an internal temperature of 71 C (160 F). Cooking until all pink colour is gone is not as reliable as using a meat thermometer.
- Protect, purify and chlorinate public water supplies; chlorinate swimming pools. When the safety of drinking water is in doubt, boil it.
- Strengthen control measures for exhibits which allow direct animal contact in public settings, such as fairs, farm tours, and petting zoos, and educate populations at risk about the risks associated with attending such events.
- Ensure adequate hygiene in childcare centres, and encourage frequent handwashing, with soap (Heymann, 2015).

Revisions

Date	Change
September 2018	• Clarified the purpose for notification of cases to public health • Incorporated an Epidemiology and Occurrence section to the chapter as a placeholder. • Incorporated standardized Verotoxigenic *E. Coli* Data Collection Worksheet. • Added graphic to help calculate incubation and communicability. • Rearranged and updated the style into the new format of the Manual. • References reaffirmed or updated as necessary.

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Verotoxigenic Escherichia Coli Infection Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

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

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: _____	Preferred Communication Method: (specify - i.e. home phone, text):
Phone #: ☐ Primary Home: ☐ Mobile contact: ☐ Workplace:	Health Card Number (PHN): _____	Email Address: ☐ Work ☐ Personal
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	YYYY / MM / DD	☐ *Not a Contact*	*YYYY / MM / DD*	*Specimen type:* ☐ *Blood* ☐ *Urine* ☐ *Stool*
☐ 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_____

Verotoxigenic Escherichia Coli Infection Data Collection Worksheet

Please complete **all** sections

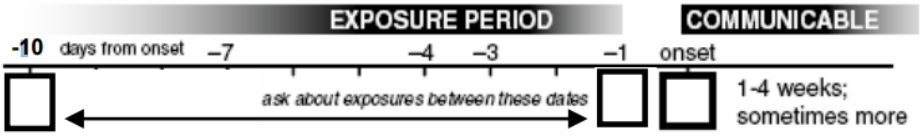
Panorama Client ID: _____
Panorama Investigation ID: _____

C) SIGNS & SYMPTOMS

LHN-> INVESTIGATION->SIGNS & SYMPTOMS

Description	Yes Date of onset	Date of recovery	Description	Yes Date of onset	Date of recovery
Abdominal - cramping	YYYY / MM / DD	YYYY / MM / DD	Hemolytic uremic syndrome (HUS)	YYYY / MM / DD	YYYY / MM / DD
Asymptomatic	YYYY / MM / DD	YYYY / MM / DD	Pain - abdominal	YYYY / MM / DD	YYYY / MM / DD
Dehydration	YYYY / MM / DD	YYYY / MM / DD	Stool - bloody	YYYY / MM / DD	YYYY / MM / DD
Diarrhea - bloody	YYYY / MM / DD	YYYY / MM / DD	Thrombotic thrombocytopenic purpura (TTP)	YYYY / MM / DD	YYYY / MM / DD
Diarrhea - watery	YYYY / MM / DD	YYYY / MM / DD	Vomiting	YYYY / MM / DD	YYYY / MM / DD
Fever	YYYY / MM / DD	YYYY / MM / DD		YYYY / MM / DD	YYYY / MM / DD
Other Signs & Symptoms if applicable					

Enter onset date in heavy box. Count back to figure the probable exposure period.



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 N—No, NA–Not asked, U–Unknown

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes	N, NA, U	Start date	Add'l Info
Animal Exposure - Farms (Add'l Info)			YYYY / MM/DD	
Animal Exposure - Other (Add'l Info)			YYYY / MM/DD	
Animal Exposure - Pet treats and raw food (Add'l Info)			YYYY / MM/DD	
Animal Exposure - Pets (including reptiles) (Add'l Info)			YYYY / MM/DD	
Animal Exposure - Petting zoos/zoos/special events/other (Add'l Info)			YYYY / MM/DD	
Contact – Persons with diarrhea/vomiting			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 - Child Care Worker	TE		YYYY / MM/DD	
Occupation - Food Handler	TE		YYYY / MM/DD	
Occupation - Health Care Worker - IOM Risk Factor	TE		YYYY / MM/DD	
Other risk factor (Add'l Info)			YYYY / MM/DD	
Special Population - Attends childcare	TE		YYYY / MM/DD	
Special Population - Attends school	TE		YYYY / MM/DD	
Travel - Outside of Canada (Add'l Info)	AE		YYYY / MM/DD	
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)	AE		YYYY / MM/DD	

Verotoxigenic Escherichia Coli Infection Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

DESCRIPTION	Yes	N, NA, U	Start date	Add'l Info
Water – Bottled water (Add'l Info)			YYYY / MM/DD	
Water - Private well or system (Add'l Info)			YYYY / MM/DD	
Water - Public water system (Add'l Info)			YYYY / MM/DD	
Water - Untreated water (Add'l Info)			YYYY / MM/DD	
Water (Recreational) - Pond, stream, lake, river, ocean (Add'l Info)			YYYY / MM/DD	
Water (Recreational) - Private (swimming pool/whirl pool)			YYYY / MM/DD	
Water (Recreational) - Public (swimming/paddling pool/whirl pool)			YYYY / MM/DD	

F) USER DEFINED FORM (SEE ATTACHED) LHN-> INVESTIGATION-> INVESTIGATION DETAILS -> LINKS AND ATTACHMENTS -> VEROTOXIGENIC E. COLI FORM

G) TREATMENT LHN-> INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication (Antibiotics are contraindicated – refer to physician if on Rx)
(Panorama = Other Meds) : _____

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

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

Intervention Type and Sub Type:

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

Outbreak Declared 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

Public Health Order:
☐ 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

Other Investigation Findings:
☐ Investigator Notes
☐ Document Management

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

Referral: Investigator name
☐ Canadian food inspection agency YYYY/ MM/DD
☐ Primary care provider YYYY/ MM/DD

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

Testing: Investigator name
☐ Stool testing recommended (e.g. for follow-up) YYYY/ MM/DD

Immunization:
☐ Eligible Immunization 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	

Verotoxigenic Escherichia Coli Infection Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

I) OUTCOMES *(optional except for severe influenza,* 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) 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

Transmission Events LHN -> INVESTIGATION-> EXPOSURE SUMMARY -> TRANSMISSION event SUMMARY -> QUICK ENTRY

Transmission Event ID	Exposure Name	Setting type		Date/Time	# of contacts
		☐ Food service establishment	☐ Health Care setting		
		☐ Public facilities	☐ Household Exposure		
		☐ Food service establishment	☐ Health Care setting		
		☐ Public facilities	☐ Household Exposure		
		☐ Food service establishment	☐ Health Care setting		
		☐ Public facilities	☐ Household Exposure		
		☐ Food service establishment	☐ Health Care setting		
		☐ Public facilities	☐ Household Exposure		
	VTEC 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 exposed)

Initial Report completed by:

Date initial report completed: YYYY / MM / DD

PANORAMA

VTEC Routine Questionnaire - August 2018

Record type:
Record ID:
Record Name:

In this form the answers (Yes, Probably, No, and Don't know) are from the perspective of the person being interviewed. "Probably" can be used if the client thinks he/she may have eaten this food or usually eats this food, but is unsure if it was eaten during the period in question.

Diet and Allergies

Show/Hide

Are you a vegetarian?
- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

Do you have any food Allergies / avoidances / special diet?
- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

If yes, specify details

Food Exposures

Show/Hide

In the 10 days prior to onset, did you eat…

Any beef (not including deli meat)?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

if yes, raw beef?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

PANORAMA

Any whole cut beef (e.g. steak, roast)
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., steak, roast, other, purchase location)

Any stewing beef?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any ground beef?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

if yes, any any home-made hamburgers?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any store-bought frozen beef patties?
- ◯ Yes
- ◯ Probably
- ◯ No

PANORAMA

- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any other (e.g. store-bought fresh)?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any other ground beef?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any ground beef consumed raw or undercooked?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any pork (not including deli-meat or bacon)?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify type (e.g. ham), purchase location.

Any prepared products containing pork (e.g. spring rolls, dumplings)?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify type (e.g. spring rolls), location purchased

Any deli-meat?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any sausage?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

Meat type (select all that apply):

- ☐ Beef
- ☐ Chicken
- ☐ Pork
- ☐ Turkey
- ☐ Other

Preparation type (select all that apply):

- ☐ Ready to eat
- ☐ Fermented
- ☐ Raw

Location purchased:

Any game or country meat (e.g. venison, bison)?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any sprouts including any sprouts on a sandwich or salad?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any lettuce?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify types (select all that apply)
- ☐ Iceberg
- ☐ Romaine
- ☐ Mesclun

If yes, specify details (E.g., where consumed, type, brand, location)

Any pre-packaged greens?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any spinach?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any fresh herbs?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any fresh parsley?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any other fresh herbs (e.g. oregano, dill, mint, rosemary,chives, or thyme)?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any melons (e.g. cantaloupe)?
- ◯ Yes
- ◯ Probably
- ◯ No

- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any berries?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

if yes, specify types (select all that apply)

- ☐ Strawberries
- ☐ Raspberries
- ☐ Blueberries
- ☐ Blackberries

If yes, specify details (E.g., where consumed, type, brand, location)

Any unpasteurized fruit juice (e.g. unpasteurized apple cidar)?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any nuts (on their own, in a granola bar, as a garnish, or as part of a dish)?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify type (e.g. almonds) purchase location

- ◯ Yes
- ◯ Probably

Any unpasteurized (raw) dairy milk (excluding cheese)?
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any cheese made with unpasteurized (raw) milk?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any raw flour used in the household?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Did you eat, taste, or lick any uncooked or unbaked dough or batter (e.g. cookie dough, cake or muffin batter)?
- ◯ Yes
- ◯ Probably
- ◯ no
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Food Handling

In the 10 days before onset, of illness did you handle or prepare...
- ◯ Yes
- ◯ Probably

Any raw beef?
- ◯ No
- ◯ Don't know
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Any raw pork?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't klnow
- ◯ None of the above

If yes, specify details (E.g., where consumed, type, brand, location)

Social Functions Show/Hide

In the 10 days prior to onset, did you attend any social functions (e.g. parties, weddings, showers, potlucks, community events)?
- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

Click the Add button to add social event/function details

Add

Restaurants Show/Hide

In the 10 days prior to onset, did you attend any restaurants (including take-out, cafeteria, bakery, deli, kiosk)?
- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

Click the Add button to add restaurant details

Add

Grocery Stores Show/Hide

◯ Yes

In the past 10 days prior to onset, did you visit grocery stores for foods consumed during the incubation period?	◯ No ◯ Don't know ◯ Not asked

Click the Add button to add grocery store details

Add

Loyalty card/store issued card (for outbreak investigation only)

Show/Hide

This section is only for use in some specific outbreak situations, with client consent. It is not a routine question for sporadic cases.

Has the client given consent (written or verbal)?	◯ Yes ◯ No ◯ Not applicable
Loyalty card details (names and numbers)	

Interviewer Details and Notes

Show/Hide

Interviewer Name	
Interview date	9/12/2018
Any special notes regarding this interview	

Enteric Illness

Giardiasis

Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.
From Public Health to Ministry of Health: Routine, within 2 weeks.

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

Information

Case Definition (Public Health Agency of Canada, 2008)

Confirmed Case	Laboratory confirmation of infection with or without symptoms from stool, duodenal fluid or small bowel biopsy specimen: • demonstration of *Giardia lamblia* **OR** • demonstration of *Giardia lamblia* antigen.
Probable Case	Clinical illness[1] in a person who is epidemiologically linked to a confirmed case.
[1]Clinical illness is characterized by diarrhea, abdominal cramps, bloating, weight loss, fatigue or malabsorption.	

Causative Agent

- *Giardia lamblia (G. intestinalis, G. Duodenalis)* – A flagellate protozoan (Heymann, 2015).
- Ingestion of one or more cysts may cause disease (U.S. Food and Drug Administration, 2012).

Symptoms

Heymann (2015) indicates that infection can be:

- asymptomatic;
- acute, self-limited diarrhea;
- a chronic condition consisting of diarrhea, steatorrhea, abdominal cramps, bloating, loose and pale greasy stools, fatigue, malabsorption of fats and weight loss.

Periods of diarrhea may alternate with constipation until treatment or resolution of symptoms.

Complications

Reactive arthritis may occur.

In severe giardiasis, duodenal and jejunal mucosal cells may be damaged (Heymann, 2015)

Incubation Period
Usually 3-25 days, may be longer. Median 7-10 days (Heymann, 2015).

Reservoir/Source
Humans. Wild and domestic animals (e.g. beavers, cats, dogs, and cattle) (Heymann, 2015).

Mode of Transmission (Heymann, 2015)
Transmission occurs by:

- the fecal-oral route, especially in day cares and institutions;
- ingesting water from unfiltered sources[1] or shallow wells;
- ingesting water from local streams, lakes and recreational pools contaminated by human or animal feces;
- anal sex.

Period of Communicability
During the entire course of infection which can last up to several months (Heymann, 2015). Long term shedding of cysts can occur with asymptomatic carriers.

Specimen Collection and Transport
Stool or small bowel specimens placed in a lab container with SAF preservative. Questionable results from stool specimens can be confirmed by examining duodenal fluid or mucosa for trophozoites.

Refer to the Saskatchewan Disease Control Laboratory Compendium of Tests for details at http://sdcl-testviewer.ehealthsask.ca.

[1]Concentrations of chlorine used in routine water treatment do not kill *Giardia* cysts, especially when the water is cold.

Methods of Control/Role of Investigator

Prevention and Education

Refer to the Enteric 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.

- Provide prevention information and education to case or caregiver, daycare or institution workers about personal hygiene.
- Educate about disinfecting diaper changing areas after use by child with diarrhea.
- Provide standard letters to schools, daycares, hockey teams, etc.
- Educate food handlers about proper food and equipment handling and hygiene, especially about the avoidance of cross-contamination of food products, and emphasize thorough hand washing.
- Advise to avoid swallowing water from ponds, lakes, or untreated pools.
- Educate about the risk of sexual practices that permit fecal-oral contact.
- Avoid drinking untreated and inadequately filtered surface water (e.g. camping, traveling or wells).

Management

I. Case

History

Investigate exposure to:

- bodies of water (natural and recreational);
- unfiltered, untreated drinking water.

Determine:

- water source and sewage disposal if not on a municipal system;
- history of high-risk sexual practices, especially involving contact with feces;
- history of exposure in daycare or institutional settings.

Education

- Advise case to avoid food preparation until diarrhea has resolved (when stools have been normal for that individual for 48 hours).

- Advise case to avoid using public swimming pools and other recreational waters for 2 weeks after symptoms resolve (American Academy of Pediatrics, 2012).

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/nurse practitioner or, in their absence to the Medical Health Officer. See Appendix H - Sources for Clinical Treatment Guidelines.

Symptomatic cases should be treated. Asymptomatic carriers generally do not need treatment.

Exclusion
- Food handlers, health care, childcare or other staff involved with personal care, children below the age of 5 years in childcare, individuals unable to maintain adequate standards of personal hygiene (e.g., mentally or physically challenged): Exclude until diarrhea has resolved.
- People with diarrhea should not use recreational water for 2 weeks after symptoms resolve. (American Academy of Pediatrics, 2012)
- Diarrhea is considered to be resolved when stools have been normal for that individual for 48 hours.
- Asymptomatic persons: exclusion is not warranted for asymptomatic persons.

Referrals
Refer to public health inspection if source cannot be identified and transmission continues or advice regarding drinking water treatment is required.

II. Contacts/Contact Investigation

Contact Definition
Contacts include:
- persons living in the same household;
- children and childcare workers in a daycare/dayhome;
- sexual contacts.

Testing

All symptomatic household contacts should be referred to their physician for appropriate follow-up.

Prophylaxis/Immunization

Not applicable.

Exclusion

Exclude symptomatic contacts as cases until diagnosis has been ruled out. Asymptomatic contacts, in general, are not excluded (American Academy of Pediatrics, 2012).

III. Environment

Child Care Centres/Institutional Control Measures

- Contact precautions for symptomatic institutionalized individuals (Heymann, 2015).
- Clustered cases in child care and institutional settings require epidemiological investigation to determine source of infection and mode of transmission.

Epidemic Measures

Institute an epidemiological investigation to determine source of infection and mode of transmission for cases clustered by location or institution. A common vehicle should be sought and appropriate measures should be taken to control the situation.

References

American Academy of Pediatrics. (2012). *Red Book: 2012 Report of the Committee on Infectious Diseases* (29th ed.). Elk Grove Village, IL: Author.

Heymann, D. L., (Ed.). (2015). *Control of Communicable Diseases Manual* (20th 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 April, 2015 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Giardi-eng.php.

United States Food and Drug Administration. (2012). *Bad bug book: Foodborne pathogenic microorganisms and natural toxins handbook: Giardia lamblia.* Retrieved April, 2015 from http://www.fda.gov/downloads/Food/FoodSafety/FoodborneIllness/FoodborneIllnessFoodbornePathogensNaturalToxins/BadBugBook/UCM297627.pdf.

Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.
From Public Health to Ministry of Health: Within 2 weeks.
Immediate if an outbreak is anticipated.

Public Health Follow-up Timeline: Immediate.

Public Health Purpose for Notification of Hepatitis A

- To provide an early detection system of outbreaks;
- To implement prevention and control measures including contact tracing and post-exposure **Immunoprophylaxis**
- To make timely and evidence informed actions on outbreaks;
- To monitor the effectiveness of prevention and control measures;
- To track epidemiology trends of hepatitis A in Saskatchewan including risk populations and distribution;
- To identify locations where increased transmission of hepatitis A may be occurring in order to inform other interventions; and
- To inform the public and medical community about hepatitis A.

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

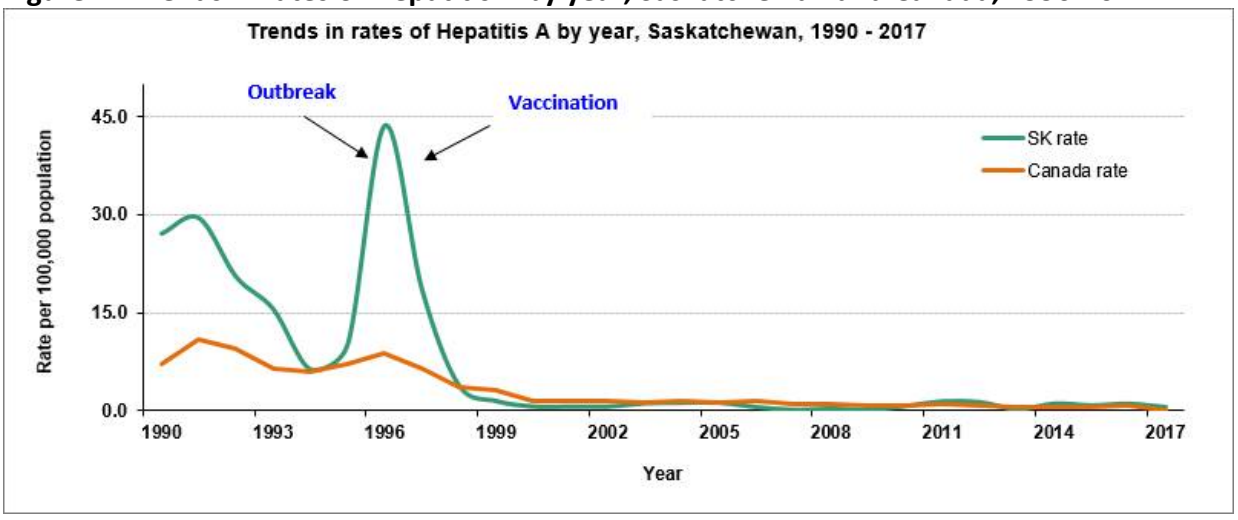
Confirmed Case	• detection of immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) in the absence of recent hepatitis A vaccination; **AND** • acute clinical illness* **OR** • an epidemiological link to a person with laboratory-confirmed hepatitis A infection.
Probable Case	Acute clinical illness* in a person without laboratory confirmation of infection who is epidemiologically linked to a confirmed case.
*Acute clinical illness is characterized by discrete onset of symptoms including fever, malaise, anorexia, nausea, and abdominal pain followed by jaundice or elevated aminotransferase levels with a few days.	

[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

- Geographically, endemic rates of hepatitis A virus (HAV) have varying levels that can be deemed high, intermediate, or low.
- Higher endemic rates tend to be found in areas where basic sanitation and hygiene is poor; epidemics in these areas are rare due to acquired immunity in adults.
- A large outbreak of hepatitis A was detected in 1996 that lasted for about two years before declining due to implementation of mass immunization, public education and routine Hepatitis A immunization program in northern communities in 1997[2].
- The Saskatchewan rate has been lower or comparable to Canada rate since 1999.
- The average incidence rate of hepatitis A in Saskatchewan was 0.7 case per 100,000 population (2013-2017) and the majority of cases are related to travel to endemic countries;
- Over the past 15 years, an average number of hepatitis A cases was higher in February and March; this corresponds with peak travel times to tropical countries; and,
- Males and females were affected almost equally, and most cases were reported in children between 5 and 14 years of age during the same period of time.

Figure 1. Trends in rates of Hepatitis A by year, Saskatchewan and Canada, 1990-2017



[2] Routine Hepatitis A immunization was introduced for children 1-15 years living in northern health regions or reserves in Saskatchewan (excluding Creighton, Air Ronge, La Ronge) in 1997

Additional Background Information

Causative Agent

Hepatitis A virus (HAV), a non-enveloped, positive stranded RNA virus of the Picornoviridae family. HAV is comparatively heat stable, retains infectivity in feces for up to 2 weeks, resistant to a pH of 3, and remains viable for years at -20ºC. It is completely inactivated by formalin or by heating to 100ºC for 5 minutes. HAV shows some resistance to inactivation by hypochlorite and can withstand 60ºC for 1 hour (Margolis, 1992).

Reservoir/Source

- Main reservoir is humans, and rarely chimpanzees and other primates. Virus is shed in feces of infected humans for up to 2 weeks.

Symptoms

- Although the disease is self-limited, clinical manifestation and expression of illness is age-dependent:
    - Children under 6 years are generally asymptomatic or exhibit mild, non-specific symptoms including nausea, vomiting, malaise, diarrhea, fever, and dark urine.
    - Adolescents and adults infected with HAV tend to develop more classic symptoms of malaise, nausea, vomiting, and loss of appetite, with 50% to 90% having either dark urine, jaundice or both.
- Recovery from illness often takes 4-6 weeks but may take months. Prolonged, relapsing hepatitis lasting for up to a year occurs in 15% of cases, but chronic infection is not known to occur.
- Twenty-five percent of adult cases require hospitalization. Fulminant hepatitis (i.e. an acute liver failure) disease with liver necrosis is rare and tends to occur when a pre-existing chronic liver disease is present.
- IgM antibodies against HAV found in serum of recently or acutely ill individuals will establish the diagnosis. Antibodies will appear 5-10 days after exposure and can be detected 1 week prior to symptoms and 3-6 months after infection.

Incubation Period

Average 28 to 30 days (range 15 to 50 days) (Heymann, 2015).

Period of Communicability

- Persons with HAV are most infectious during the 1-2 weeks before onset of jaundice. Risk of transmission diminished and is minimal by one week after onset of jaundice (American Academy of Pediatrics, 2015).
- Hepatitis A virus can be detected in stool of infants and children for longer periods (up to 6 months), (Heymann, 2015).

Mode of Transmission

- Person-to-person via fecal-oral route including food and water contaminated by infected food handlers or by sewage.
- Outbreaks have been associated with raw or undercooked shellfish; contaminated produce; and ready-to-eat foods prepared by infected food handlers.
- Transmission via household and sexual contact (particularly in heterosexual relationships, unless sexual contact involves anus/oral route) is rare.
- Outbreaks have also been associated with injecting and non-injecting drug use (American Academy of Pediatrics, 2015).

Risk Factors

Risk factors are associated with individual susceptibility and settings or exposures that create opportunities for acquisition or transmission to others. Groups at increased risk of *acquiring* hepatitis A as identified by the American Academy of Pediatrics (2015) and Heymann (2015) include:

- close personal contact (household or sexual) with an person infected with HAV;
- international travellers (particularly to developing countries);
- close contacts of newly arriving international adoptees;
- daycare employees or attendees;
- men who have sex with men;
- oral/anal sex; and
- users of injection and non-injection drugs.

Those at increased risk for *transmitting* infection include:

- food handlers;
- health care/day care workers;
- childcare workers;
- staff involved with personal care;
- children below the age of 5 years in childcare; and

- individuals who are unable to maintain standards of personal hygiene (e.g., mentally or physically challenged).

Specimen Collection and Transport

- Test: hepatitis A Virus IgM antibody (HAV IgM).
- Specimen: 2mL serum.

Refer to the Roy Romanow Provincial Laboratory Compendium of Tests for details at https://rrpl-testviewer.ehealthsask.ca/.

Public Health Investigation

I. Case

Refer to Attachment – Hepatitis A Data Collection Worksheet to assist.

History

- Key elements to inquire about include:
  - Onset of illness – to determine incubation period and period of communicability which helps to identify the possible source and contacts to be followed.
  - Hepatitis A immunization history including number of doses and date(s) administered
- Determine if there is an opportunity for exposure through:
  - Travel, particularly to areas where HAV is endemic (provincially, nationally or internationally);
  - Consumption of water from inadequately treated water supplies;
  - Consumption of contaminated foods (obtain food history);
  - If children in the household attend a childcare facility since asymptomatic children may be the source of illness (Heymann, 2015; American Academy of Pediatrics, 2015).
- Identify household and other potential close contacts. See Contact Definition.
- Identify opportunities for transmission events and contacts exposed during the infectious period:
  - If case employed as a food handler - determine if they prepared or shared food with others 2 weeks prior to becoming symptomatic. Obtain locations, dates, and times of food preparation details.

Public Health Interventions

Assessment

- Assess for contacts paying particular attention to those who may receive post-exposure vaccination to prevent illness.

Communication

- Letters or public communication may be required in the case of food handlers that serve in a public setting.

Education

- All cases should be provided disease information including period of communicability and information on prevention and control measures.
    - the importance of hand washing should be stressed;
    - the case must not prepare food for others during the period of communicability;
    - the case may be excluded from work – see Exclusion;
    - the case should be informed of safer sex practices.

Environmental Health

In the case of an ill food handler, a restaurant inspection may be warranted to review safe food handling requirements. If water is the suspected source, inspection of a private water supply may also be required.

Exclusion

- Exclude food handlers, health care, childcare or other staff involved with personal care, children below the age of 5 years in childcare and individuals who are unable to maintain standards of personal hygiene (e.g. mentally or physically challenged) as follows:
    - if jaundiced, until 1 week after the onset of jaundice;
    - if symptomatic but not jaundiced, for 2 weeks after onset of illness;
    - if asymptomatic with a positive IgM, until 1 week after the IgM test was drawn.

Immunization

- Immunization of cases is not required as HAV infection induces life-long protection against re-infection (Alberta Health and Wellness, August 2011).

Public Health Order

- If a food handler, the case should be excluded from work and order used if necessary.

Referral

- When cases are linked to an outbreak or a food item is highly suspected, consultation with the Medical Health Officer and potentially Canadian Food Inspection Agency may be warranted.

II. Contacts/Contact Investigation

Use the Contact Investigation Worksheet to support investigation.

Table 2. Definitions of Contacts	
Contact	Individuals who have been in contact with the case during their period of communicability as follows: • persons living in the same household as the case; • sexual contacts of the case including men who have sex with men (MSM); • persons who have shared drugs with the case; • persons who have spent 24 hours or more in the same household as the case; • persons who have spent less than 24 hours but consumed food in the house of the case; • persons who have eaten food prepared by the case during the period of communicability; • persons who have attended events where food was shared with the case (e.g., potluck); • others who may have had contact with the feces of the case (e.g., diapered children, incontinent persons) where good standards of hygiene have not been met or proper personal protective equipment (PPE) was not used.
Susceptible Contact	Individuals who have **not** had: • history of confirmed hepatitis A disease; • complete immunization series of hepatitis A vaccine; • one dose of hepatitis A vaccine in the 6-11 months prior to the date of exposure; • history of immune globulin (Ig) within the last 3-5 months prior to the date of exposure. Length of protection varies with the dose received (0.02 ml/kg is effective for approximately 3 months; 0.06 ml/kg is effective for approximately 3-5 months).

Public Health Interventions

Testing

- Testing for IgM and total antibodies should be conducted as soon as possible on all contacts that are symptomatic. **NOTE**: the requisition must indicate contact and symptomatic. Follow all individuals with confirmed disease as a case.
- Serology for hepatitis A immunity prior to immunoprophylaxis can be considered for contacts in the following categories if time permits (Alberta Health and Wellness, 2011):
  - persons born prior to 1945;
  - persons from endemic country;
  - individuals who are hepatitis B and/or C positive.

Immunoprophylaxis

- All HAV vaccines have shown high levels of immunogenicity and at least 90% to 97% efficacy in preventing clinical illness when given as pre-exposure and approximately 80% efficacy when given as post-exposure (Public Health Agency of Canada, 2016).
- Provide immunoprophylaxis with *hepatitis A vaccine*[3] to all susceptible contacts if the most recent exposure was within the past two weeks.
- In addition, if the case is a food handler:
  - offer hepatitis A vaccine to other food handlers in the establishment (American Academy of Pediatrics, 2015);
  - patrons of the establishment should ***not routinely*** be offered hepatitis A vaccine **unless**:
    - the worker directly handled food during the period of communicability **AND** if prophylaxis can be provided within 2 weeks of exposure.

Immune globulin[4] (Ig) should be provided to susceptible contacts as follows:

- Infants under six months of age because they are too young to receive hepatitis A vaccine;

[3] One dose of hepatitis A vaccine is provided free of charge to individuals who were exposed to HAV. The second dose of the vaccine series will be provided free of charge to individuals who are eligible for publicly funded hepatitis A vaccine. Individuals who are not considered high risk can purchase the second dose from their health care provider in order to induce long-term immunity.

[4] For post-exposure prophylaxis, dosage for Ig is 0.02 mL/kg (Product Monograph, 2014). Please refer to the product monograph or the Canadian Immunization Guide to verify the appropriate dose for Hepatitis A exposures. A link to the most current monograph can be found in the Saskatchewan Immunization Manual – Chapter 10.

- Individuals with contraindications to hepatitis A vaccine; and
- Immunocompromised individuals (to provide immediate passive protection until they actively respond to vaccination).
- Within 14 days of exposure to individuals with chronic liver disease, in addition to HA vaccine.

Ig may be *considered* as a supplement to HA vaccine for susceptible household or close contacts who are 60 years of age and older, provided it is given within 14 days of the last exposure.

Exclusion

Symptomatic contacts that are food handlers, health care, childcare, or other staff involved with personal care, children below the age of 5 years in childcare and individuals who are unable to maintain standards of personal hygiene (e.g., mentally or physically challenged) should be excluded as and treated as a case.

Have IgM blood work done to confirm the diagnosis.

III. Environment

Child Care Centre Control Measures

- Advise parents of childcare attendees of the illness and instruct them to inform public health if any family members develop symptoms. A standard letter can support this education.
- A Public Health Inspector should inspect the facility to ensure adequate infection control measures are implemented. Refer to the Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[5]
- As illness can go undetected in many children, children in these settings should avoid contact with individuals who have not yet been exposed for six weeks.
- Hepatitis A vaccine should be provided to susceptible staff and attendees in childcare facilities if (American Academy of Pediatrics, 2015):
  - one or more cases of hepatitis A occur in staff or attendees OR
  - cases occur in two or more households of centre attendees.
  - **NOTE**: if there are no diapered children in the facility, only the children in the classroom of the index care require immunoprophylaxis. If there are two or more households affected, the household members of childcare attendees who are diapered should also be provided hepatitis A vaccine.

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

- cases should be excluded as per Exclusion or until the immunoprophylaxis program has been completed.

Food Services Establishments

- If the case is a food handler, discuss with the Medical Health Officer to determine if post-exposure prophylaxis should be offered to staff and patrons.

Institutional Control Measures

School/Office: contacts in elementary and secondary schools as well as workplace settings do not require post-exposure prophylaxis, unless an outbreak is suspected.

Residential Facilities

Immunuprophylaxis is not routinely recommended. Individuals in these institutions should be managed based on their direct contact with the case.

IV. Epidemic Measures

- Determine mode of transmission, identify exposed populations, and eliminate common sources of exposure.
- Outbreak Control: HAV vaccine should be considered as an important control measure in a coordinated public health response to hepatitis A outbreaks in the community and in institutions.

Prevention Measures

Refer to the Enteric 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

- Offer immunizations to eligible individuals as per the Saskatchewan Immunization Manual Chapter 5 – Immunization Schedules[6] and Chapter 7 – Immunization of Special Populations[7];

[6] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter5.
[7] http://www.ehealthsask.ca/services/manuals/Documents/sim-chapter7

- Considering the majority of cases in Saskatchewan are travel related, referral of individuals to an appropriate travel health consultant is advisable as part of planning for international trips.

Education

- Education should be provided regarding safe food handling and the importance of hand washing.
- Public education regarding personal hygiene practices including handwashing and sanitary disposal of feces.
- Education of food handlers.
- Safer sex practices.
- Counselling of susceptible individuals traveling to intermediate or high endemic areas regarding safeguarding themselves from infection.

Environmental Health Measures

- Sanitary disposal of sewage.
- Proper water treatment and protected water distribution systems.

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 to the chapter. • Rearranged and updated the style into the new format of the Manual. • References reaffirmed or updated as necessary.
Nov 2017	Updated recommendation on use of Ig to include use among susceptible contacts with chronic liver disease in alignment with April 2016 NACI Statement.
Sept 2017	Updated recommendations on use of Ig based on April 2016 NACI Statement. Updated into new format of manual and reviewed/updated references.

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Government of Saskatchewan

Hepatitis A 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

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:* YYYY / MM / DD
☐ Does Not Meet Case	YYYY / MM / DD	☐ *Not a Contact*	YYYY / MM / DD	*Specimen type:* ☐ *Blood* ☐ *Stool*
☐ 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_____

Hepatitis A Data Collection Worksheet

Please complete **all** sections

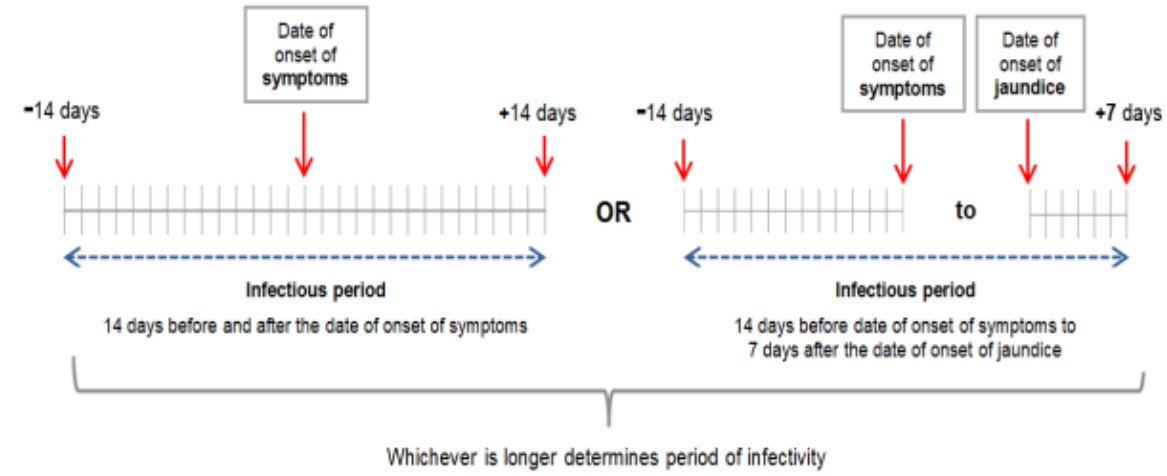
Panorama Client ID: _____
Panorama Investigation ID: _____

C) SIGNS & SYMPTOMS (Bold supports confirmed case definition)

LHN-> INVESTIGATION->SIGNS & SYMPTOMS

Description	No	Yes – Date of onset	Description	No	Yes - Date of onset
Asymptomatic		YYYY / MM / DD	**Loss of appetite (anorexia)**		YYYY / MM / DD
Fever		YYYY / MM / DD	**Malaise**		YYYY / MM / DD
Jaundice		YYYY / MM / DD	**Nausea**		YYYY / MM / DD
Lab - liver enzymes - elevated		YYYY / MM / DD	**Pain – abdominal**		YYYY / MM / DD
Other signs and symptoms if applicable			Urine - dark		YYYY / MM / DD

Figure 6-1. Determining period of infectivity



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 (during risk period) *(continued on next page)*

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	YES	N – No NA – not asked U - Unknown	DESCRIPTION	YES	N – No NA – not asked U - Unknown
Contact - At risk population (international travellers or immigrants)	YYYY / MM / DD		**Special Population** - Attends childcare	TE	
Contact - Persons with similar symptoms	YYYY / MM / DD		**Special Population** - From or residence in an endemic country (Add'l Info)	YYYY / MM / DD	
Contact to a known case (Add'l Info)	YYYY / MM / DD		**Travel** - Outside of Canada (Add'l Info)	YYYY / MM / DD AE	
Immunocompromised - Related to underlying disease or treatment			**Travel** - Outside of Saskatchewan, but within Canada (Add'l Info)	YYYY / MM / DD AE	
Occupation - Child Care Worker	TE		**Water** - Bottled water (Add'l Info)		
Occupation - Food Handler	TE		**Water** - Private well or system (Add'l Info)		

Hepatitis 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
Occupation - Health Care Worker IoM Risk Factor	TE		**Water** - Public water system (Add'l Info)		
Occupation - Personal Care Worker	TE		**Water** - Untreated water		
Sexual Behaviour - MSM	YYYY / MM / DD		**Water (Recreational) -** Pond, stream, lake, river, ocean		
Sexual Behaviour - Oral-anal	YYYY / MM / DD		**Water (Recreational) –** Private (swimming pool/whirlpool	TE	
Sexual Behaviour - Sex with a person from endemic Country (Add'l Info)	YYYY / MM / DD		**Water (Recreational)** - Public (swimming/paddling pool/whirl pool)	TE	

F) USER DEFINED FORM (SEE ATTACHED) LHN-> INVESTIGATION-> INVESTIGATION DETAILS -> LINKS AND ATTACHMENTS -> HEPATITIS A FORM

G) COMPLICATIONS LHN-> INVESTIGATION->COMPLICATIONS

Description	Yes Date of onset	Description	Yes Date of onset
Hepatitis - fulminant	YYYY / MM / DD	Other complications	YYYY / MM / DD

H) 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

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

Intervention Type and Sub Type:

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

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

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

Public Health Order: YYYY / MM / DD
☐ Other (specify)
Investigator name

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

Referral: YYYY / MM / DD
☐ Canadian food inspection agency
☐ Consultation with MHO
☐ Primary care provider
Investigator name

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

Symptom monitoring: YYYY / MM / DD
☐ Symptom monitoring indirect, passive – (contacts as well as cases)
Investigator name

Environmental health: YYYY / MM / DD
☐ Restaurant Inspection ☐ Water system inspection
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
☐ Immunization nurse notified 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				

Hepatitis A Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

J) OUTCOMES *(optional except for severe influenza*, 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) 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

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 settings ☐ Food service establishment ☐ Health care setting ☐ Household ☐ Private Function (Food prep) ☐ Sexual Exposure ☐ Type of Community Contact ☐ Travel		
		☐ Congregate/Communal Living settings ☐ Food service establishment ☐ Health care setting ☐ Household ☐ Private Function (Food prep) ☐ Sexual Exposure		
		☐ Congregate/Communal Living settings ☐ Food service establishment ☐ Health care setting ☐ Household ☐ Private Function (Food prep) ☐ Sexual Exposure ☐ Type of Community Contact ☐ Travel		
	Hep A Contacts – Invest 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

PANORAMA

Hepatitis A Routine Questionnaire - August 2018

Loading...

Record type: Investigation
Record ID: 134
Record Name: UDF Investigation

If the case traveled outside of Canada during the entire incubation period (15-50 days before the onset of the first symptom) do not fill out this section. If the case traveled outside of Canada for part of the incubation period, fill out the section below for only that part of the incubation period in which he/she was in Canada.

Food Exposures

Show/Hide

During the incubation period 15-50 days prior to onset, did you eat…

Any strawberries?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any blueberries?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any raspberries?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any blackberries?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any other raw fruits (e.g. pineapple chunk etc.)?	○ Yes ○ Probably ○ No ○ Don't know ○ None of the Above
If yes, specify details (E.g., where consumed, type, brand, location)	
Any ready to eat, pre-washed packaged salad?	○ Yes ○ Probably ○ No ○ Don't know ○ None of the Above
If yes, specify details (E.g., where consumed, type, brand, location)	
Any lettuce on a sandwich, burger, or taco from a restaurant or a fast food establishment?	○ Yes ○ Probably ○ No ○ Don't know ○ None of the Above
If yes, specify details (E.g., where consumed, type, brand, location)	
Any raw vegetables (e.g., green onions)?	○ Yes ○ Probably ○ No ○ Don't know ○ None of the Above
If yes, specify details (E.g., where consumed, type, brand, location)	
Any raw/undercooked shellfish?	○ Yes ○ Probably ○ No ○ Don't know ○ None of the Above
If yes, specify details (E.g., where consumed, type, brand, location)	

Restaurants Show/Hide

Complete this section only if no clear exposure has been identified. In the period between 15 and 50 days before

onset of the first symptom, did you attend any restaurants (including take-out, cafeteria, bakery, deli, kiosk).

During the incubation period 15-50 days prior to onset, did you attend any restaurants (including take-out, cafeteria, bakery, deli, kiosk)?

- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

Click the Add button to add restaurant details

Add

Loyalty card/store issued card (for outbreak investigation only)

Show/Hide

This section is only for use in some specific outbreak situations, with client consent. It is not a routine question for sporadic cases.

Has the client given consent (written or verbal)?

- ◯ Yes
- ◯ No
- ◯ Not applicable

Loyalty card details (names and numbers)

Interviewer Details and Notes

Show/Hide

Interviewer Name

Interview date 8/22/2018

Any special notes regarding this interview

Save as Draft Submit Clear

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.

Public Health Purpose for Notification of Listeriosis (adapted from British Columbia Centre for Disease Control, 2017)

- To provide an early detection system of outbreaks;
- To identify potential sources of high-risk exposures in order to prevent or control the risk of disease transmission;
- To make timely and evidence informed actions on outbreaks;
- To monitor the effectiveness of prevention and control measures;
- To track epidemiology trends of listeriosis in Saskatchewan including risk populations and distribution;
- To inform the public and medical community about listeriosis.

Surveillance Case Definition[1] (Saskatchewan-specific case definition, adapted from Public Health Agency of Canada, 2008)

Confirmed Case	Laboratory confirmation of infection with symptoms:[a] • isolation of *Listeria monocytogenes* from a normally sterile site (e.g., blood, cerebrospinal fluid, joint, pleural or pericardial fluid) **OR** • in the setting of miscarriage or stillbirth, isolation of *L. monocytogenes* from placental or fetal tissue (including amniotic fluid and meconium). **OR** The biological mother[b] (symptomatic or asymptomatic), of a laboratory-confirmed neonatal case is considered an epidemiologically linked case[c].
[a]Invasive clinical illness is characterized by meningitis or bacteremia. [b]Infection during pregnancy may result in fetal loss through miscarriage, stillbirth, neonatal meningitis or bacteremia. [c]In this case, create IOM record for mother and baby separately.	

[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 (Heymann, 2015)
Listeria monocytogenes is a Gram-positive rod-shaped bacterium; human infections are usually caused by serotypes 1/2a, 1/2b, 1/2c, and 4b.

Reservoir/Source (Heymann, 2015)

- The organism mainly occurs in soil, forage, water, mud, livestock food, and silage.
- Other reservoirs include infected domestic and wild mammals, fowl, and people.
- Listeria can multiply in refrigerated foods that are contaminated.

Symptoms
Usually a mild febrile illness, but can cause meningoencephalitis and/or septicaemia in newborns and adults.

- **Pregnant women:** may be asymptomatic or may be mild and nonspecific: fever, headache, myalgia or gastrointestinal symptoms, and back pain. Infection may cause preterm delivery and fetal infection (American Academy of Pediatrics, 2015; Heymann, 2015).
- **Neonates:** may be stillborn or born with septicemia, or may develop meningitis in the neonatal period even though the mother may be asymptomatic at delivery. Neonatal illnesses have early-onset and late-onset syndromes similar to those of group B streptococcal infections (American Academy of Pediatrics, 2015).
    - Early-onset disease – prematurity, pneumonia and septicemia are common. The case fatality rate ranges between 14% to 56% and is closer to 50% when onset occurs in the first 4 days (American Academy of Pediatrics, 2015; Heymann, 2015)
    - Late-onset infections occur between 8-30 days following delivery and usually result in meningitis with fatality rates of approximately 25% (American Academy of Pediatrics, 2015).
- **Elderly, immunocompromised persons**: frequently present with sepsis, meningitis, or meningoencephalitis. The onset of meningoencephalitis can be sudden – with fever, intense headache, nausea, vomiting and signs of meningeal irritation. Delirium and coma may appear early; occasionally there is collapse and shock.

Endocarditic, glaucomatous lesions in the liver and other organs, localized internal or external abscesses, and pustule or papular cutaneous lesions may occur (Heymann, 2015).

- **Other healthy individuals**: may exhibit only an acute, mild, febrile illness. May present as febrile gastroenteritis.

Incubation Period

Variable, ranges from 3 to 70 days, with the median (middle) incubation period estimated to be 3 weeks; data from outbreaks suggests the median may be longer in pregnant women (Heymann, 2015)

Period of Communicability

- Mothers of infected newborns can shed the infectious agent in vaginal discharges and urine for 7 to 10 days.
- Infected individuals can shed the organisms in their stools for several months.

Mode of Transmission

- A substantial proportion of sporadic infections results from foodborne transmission such as ingestion of raw or contaminated milk, soft cheeses, vegetables, and ready-to-eat meats such as hot dogs, pate, and deli meats.
- In-utero or perinatal transmission can occur. There are rare reports of nursery outbreaks attributed to contaminated equipment or materials.
- Papular lesions on hands and arms may result from direct contact with infectious material such as aborted animal fetuses.
- Person-to-person transmission rarely occurs.

Risk Groups/Risk Factors

Those at highest risk include (Heymann, 2015):

- neonates;
- the elderly: case-fatality rate higher among patients ≥ 50 years old;
- immunocompromised individuals such as those with HIV, organ transplants, on corticosteroids, or having a malignancy;
- alcoholics;
- pregnant women;
- cirrhotic adults;
- diabetic adults;
- those with conditions such as renal disease and heart disease.

Specimen Collection and Transport
Selection of specimens is dependent on clinical signs and symptoms and may include the following: Cerebrospinal fluid, blood for culture.

Amniotic fluid, placenta, meconium, lochia, gastric washings, and other sites of infection may be collected if listeria stillbirth is suspected.

Refer to the Roy Romanow Provincial Laboratory (RRPL) Compendium of Tests for details at https://rrpl-testviewer.ehealthsask.ca/.

Strain characteristics must be documented in the provincial surveillance system in a timely manner as this allows for provincial monitoring of clusters.

Public Health Investigation

I. Case

The Public Health Agency of Canada (PHAC) established the Enhanced National Listeriosis Surveillance Program in 2010 as part of the National Enteric Surveillance Program (NESP). Because of the relative infrequent number of cases and long incubation periods, identifying outbreaks can be difficult. It is therefore important that prompt and thorough investigation of all cases be completed. Saskatchewan has adjusted the national surveillance form into the standard data collection worksheet and user defined form.

History

- Key elements to inquire about include:
  - Onset of illness – to determine incubation period and presentation.
  - Complete the Attachment – Listeriosis Data Collection Worksheet and User Defined Form.

Public Health Interventions

Assessment

- Assess for other individuals that may have been exposed to the same source.

Communication

- Letters or public communication may be required in the case of food handlers that serve in a public setting.

Education

- All cases should be provided disease information and safe food handling.

Environmental Health

In the case of an ill food handler, a restaurant inspection may be warranted to review safe food handling requirements.

Exclusion

Not applicable.

Immunization

Not applicable.

Public Health Order

Not applicable for isolated cases.

Referral

Depending on the suspected source, investigation/management may involve local Medical Health Officer, Ministry of Health, Public Health Agency of Canada, Ministry of Agriculture, and/or Canadian Food Inspection Agency.

Treatment/Supportive Therapy

Treatment for clinical management is under the direction of the primary care provider. Appropriate antibiotic treatment of cases is recommended.

II. Contacts/Contact Investigation

Contact Definition

Contacts would include others who may have been exposed to the same source.

Public Health Interventions

Testing

Testing may be considered for symptomatic contacts in the risk groups.

Prophylaxis

Not applicable.

Exclusion

Not applicable.

III. Environment

Child Care Centre/Schools Control Measures

For infection control measures refer to Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[2]

Health Facilities Control Measures

- For infection control measures refer to your Health Authority Infection Control Manual.
- Contact precautions for hospitalized patients.

IV. Epidemic Measures

When laboratories identify interprovincial or international linkages, the Outbreak Incident Command Center may be activated to coordinate investigation. The Canadian Food Inspection Agency would become involved with the goal to identify the implicated source and implement appropriate interventions such as product recalls reduce further spread.

Communication

- Communication with other stakeholders is important during outbreaks.
- Public communication may be required in partnership with other stakeholders such as Canadian Food Inspection Agency and Public Health Agency of Canada.

Environmental Health

- Depending on the suspected source coordination among inspectors from Health, Canadian Food Inspection Agency and the Ministry of Agriculture may be necessary.

Public Health Order

- In the case of a provincially regulated food production or food processing facility a public health order may be considered, if necessary, to control a health hazard.

Prevention Measures

Refer to the Enteric 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. Heymann (2015) and the American Academy of Pediatrics (2015) identify the following as general guidelines in preventing listeriosis:

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

- Thoroughly wash raw vegetables and fruit before eating.
- Wash, rinse, and sanitize knives and cutting boards after handling and preparing uncooked foods.
- Thoroughly cook raw food from animal sources (e.g., ground beef, pork, and poultry).
- Avoid consumption of unpasteurized milk or foods made from raw milk.
- Wash hands thoroughly using soap and water after handling uncooked or high-risk food items.
- Educate veterinarians and farmers to take proper precautions in handling aborted fetuses, and sick or dead animals.
- Avoid the use of untreated manure on vegetable crops.
- Pregnant women and immunocompromised individuals should (American Academy of Pediatrics, 2015):
    - avoid soft cheeses;
    - avoid raw or unpasteurized milk, including goat's milk, or milk products or foods that contain unpasteurized milk or milk products;
    - cook leftover foods to an internal temperature of 74ºC or ready-to-eat foods (e.g., hot dogs) to an internal temperature of 71ºC before eating.

Refer to the following website for additional information on Listeria and Food Safety: https://www.canada.ca/en/public-health/services/diseases/listeriosis.html.

Environmental Health Measures
Inspection of food facilities to assess safe food handling practices.

Revisions

Date	Change
September 2018	• Incorporated public health purpose for notification. • Aligned with Panorama and incorporated standard data collection worksheet and user defined form; removed link to Enhanced National Listeriosis Questionnaire. • Specified public health measures for epidemic measures.
May 2017	• Updated Case definition to include biological mothers of neonates a confirmed case. • Incorporated reference to the Enhanced National Listeriosis Surveillance Program and the Enhanced National Listeriosis Questionnaire. • Updated references and applied new formatting template.

References

American Academy of Pediatrics. (2015). *Red book: 2012 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. Retrieved August, 2018 from http://www.bccdc.ca/Communicable-Disease-Control-Manual/Documents/Objectives%20of%20Surveillance.pdf

Heymann, D. L. (Ed.). (2015). *Control of communicable diseases manual* (20th 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, 2018 from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/Listeri-eng.php.

Government of Saskatchewan

PANORAMA

Listeriosis, 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 same:	

B) INVESTIGATION INFORMATION

LHN -> SUBJECT SUMMARY->ENTERIC GROUP->CREATE INVESTIGATION

Disease Summary Classification: CASE:	**Date**		**Date**
☐ Confirmed	YYYY / MMM / DD	☐ Does Not Meet Case	YYYY / MMM / DD
☐ Person Under Investigation	YYYY / MMM / DD		

LAB TEST INFORMATION:
Date specimen collected:
YYYY / MMM / DD
Specimen Type

Disposition:
FOLLOW UP:

☐ In progress	YYYY / MMM / DD	☐ Complete	YYYY / MMM / DD
☐ Incomplete - Declined	YYYY / MMM / DD	☐ Not required	YYYY / MMM / DD
☐ Incomplete – Lost contact	YYYY / MMM / DD	☐ Referred – Out of province (Specify where)	YYYY / MMM / DD
☐ Incomplete – Unable to locate	YYYY / MMM / 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 Description: ☐ Congenital Listeriosis ☐ Meningitis ☐ Sepsis ☐ Other ☐ Unknown

Listeriosis, 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
Abortion - spontaneous (miscarriage)		YYYY / MMM / DD	**Meningoencephalitis**		YYYY / MMM / DD
Birth of infected infant		YYYY / MMM / DD	Myalgia (muscle pain)		YYYY / MMM / DD
Chills		YYYY / MMM / DD	Neurologic - delerium		YYYY / MMM / DD
Fetal death - stillbirth		YYYY / MMM / DD	Pain - back		YYYY / MMM / DD
Fever		YYYY / MMM / DD	Pneumonia		YYYY / MMM / DD
Gastrointestinal symptoms		YYYY / MMM / DD	Premature delivery (mother)		YYYY / MMM / DD
Headache		YYYY / MMM / DD	Premature labour (may not mean premature delivery)		YYYY / MMM / DD
Meningeal irritation *(severe unrelating headaches, irritability, nausea and vomiting, fever and chills and generalized muscle aches and pains)*		YYYY / MMM / DD	Prematurity (infant)		YYYY / MMM / DD
Meningitis		YYYY / MMM / DD	**Sepsis (e.g. bactremia, septicemia, etc.)**		YYYY / MMM / DD

E) INCUBATION

LHN-> INVESTIGATION->INCUBATION & COMMUNICABILITY

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

Exposure Calculation details:

F) RISK FACTORS (provide a response for ALL Risk Factors)

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes	N, NA, U	Add'l Info
Chronic Medical Condition Cardiac Disease			
Chronic Medical Condition Liver disease			
Chronic Medical Condition Lung disease			
Chronic Medical Condition Malignancies/Cancer			
Chronic Medical Condition Other (Add'l Info)			
Chronic Medical Condition Renal disease			
Immunocompromised due to underlying disease or treatment (Add'l Info)			
Special Population Infant born to an infected mother			
Special Population Pregnancy			
Travel – Outside of Canada (Add'l Info)	YYYY / MM/DD		
Travel –Outside of Saskatchewan, but within Canada (Add'l Info)	YYYY / MM/DD		

G) USER DEFINED FORM (SEE ATTACHED)

LHN-> INVESTIGATION-> INVESTIGATION DETAILS -> LINKS AND ATTACHMENTS -> LISTERIOSIS FORM

Listeriosis, invasive Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

H) COMPLICATIONS

LHN-> INVESTIGATION->COMPLICATIONS

Description	Yes Date of onset	Description	Yes Date of onset
Abscesses	YYYY / MMM / DD	Coma	YYYY / MMM / DD
Cardiac - endocarditis	YYYY / MMM / DD	Granulomatosis infantisepticum	YYYY / MMM / DD
Other complications			

I) TREATMENT

LHN-> INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication *(Panorama = Other Meds) :* _____

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

J) INTERVENTIONS

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

Intervention Type and Sub Type:

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

Environmental Health: YYYY / MM / DD
☐ Environmental sampling ☐ Restaurant inspection
☐ Food/Water sampling
Investigator name

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
☐ Document Management Notes YYYY / MM / DD

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

Referral:
☐ Canadian food inspection agency YYYY / MM / DD
☐ Consultation with MHO YYYY / MM / DD
☐ Physician YYYY / MM / DD

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

K) OUTCOMES *(optional except for severe influenza,*

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) _____

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

PANORAMA

Listeriosis Routine Questionnaire - August 2018

Record type:
Record ID:
Record Name:

In this form the answers (Yes, Probably, No, and Don't know) are from the perspective of the person being interviewed. ”Probably” can be used if the client thinks he/she may have eaten this food or usually eats this food, but is unsure if it was eaten during the period in question.

Diet and Allergies

Show/Hide

Are you a vegetarian?
- ○ Yes
- ○ No
- ○ Don't know
- ○ Not asked

Do you have any food Allergies / avoidances / special diet?
- ○ Yes
- ○ No
- ○ Don't know
- ○ Not asked

If yes, specify details

Food Exposures

Show/Hide

In the 4 weeks prior to onset, did you eat…

Any turkey deli meat?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

Was it prepackaged or sliced at the deli counter?
- ☐ Prepackaged
- ☐ Sliced at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Any chicken deli meat?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

Was it prepackaged or sliced at the deli counter?

- ☐ Prepackaged
- ☐ Sliced at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Any beef deli meat?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

Was it prepackaged or sliced at the deli counter?

- ☐ Prepackaged
- ☐ Sliced at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Any ham deli meat?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

Was it prepackaged or sliced at the deli counter?

- ☐ Prepackaged
- ☐ Sliced at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Any bologna deli meat?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

Was it prepackaged or sliced at the deli counter?

- ☐ Prepackaged
- ☐ Sliced at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Any pastrami deli meat?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

Was it prepackaged or sliced at the deli counter?

- ☐ Prepackaged
- ☐ Sliced at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Any Salami deli meat?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

Was it prepackaged or sliced at the deli counter?

- ☐ Prepackaged
- ☐ Sliced at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Any Pepperoni?

- Yes
- Probably
- No
- Don't know
- None of the Above

Was it prepackaged or sliced at the deli counter?

- Prepackaged
- Sliced at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Other deli meat (e.g. corned beef, kielbasa, prosciutto, mortadella)?

- Yes
- Probably
- No
- Don't know
- None of the Above

Was it prepackaged or sliced at the deli counter?

- Prepackaged
- Sliced at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Any prepackaged sandwiches/wraps (purchased from vending machine, cafeteria, gas station, grocery store etc.)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any pate/meat spread?

- yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any hot dogs?

- Yes
- Probably
- No
- Don't know
- None of the above

If yes, heated before eating?

- Yes
- No
- Don't know

Please specify details (E.g., where consumed, type, brand, location)

Any cured or dried meats (e.g. Jerky or Pepperettes)?

- Yes
- Probably
- No
- Don't know
- None of the above

If yes, was it prepackaged or unpackaged at the deli counter?

- Prepackaged
- Unpackaged at the deli counter

Please specify details (E.g., where consumed, type, brand, location)

Any chicken eaten cold (e.g. ready to eat chicken pieces or strips, left over cooked chicken, cold chicken in salads)?

- Yes
- Probably
- No
- Don't know
- None of the above

if yes, was it purchased cooked, ready to eat or cooked at home and later ate cold?

- Purchased cooked, ready to eat
- Cooked at home and later ate cold

Please specify details (E.g., where consumed, type, brand, location)

Any ham eaten cold?

- Yes
- Probably
- No
- Don't know
- None of the above

if yes, was it purchased cooked, ready to eat or cooked at home and later ate cold?

- Purchased cooked, ready to eat
- Cooked at home and later ate cold

Please specify details (E.g., where consumed, type, brand, location)

Any turkey eaten cold?

- Yes
- Probably
- No
- Don't know
- None of the above

if yes, was it purchased cooked, ready to eat or cooked at home and later ate cold?

- Purchased cooked, ready to eat
- Cooked at home and later ate cold

Please specify details (E.g., where consumed, type, brand, location)

Any sausage eaten cold (e.g. ham sausage, breakfast sausage, frankfurters, cured sausages, left overs)?

- Yes
- Probably
- No
- Don't know
- None of the above

if yes, was it purchased cooked, ready to eat or cooked at home and later ate cold?

- Purchased cooked, ready to eat
- Cooked at home and later ate cold

Please specify details (E.g., where consumed, type, brand, location)

Any ground beef?

- yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any Brie?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any Camembert?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any Blue cheese (e.g. Roquefort, Gorgonzola, Stilton etc.)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any Feta?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any Goat cheese?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any Mexican - or Latin-style cheese (e.g. queso fresco, queso blanco)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any other soft/semi soft cheese (e.g. havarti, bocconcini, goat cheese)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any other cheese, all types (e.g. cottage cheese, ricotta gouda, cheese sold as a block)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any unpasteurized cheese?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any unpasteurized(raw) milk?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any pasteurized milk (e.g. whole, skim, 1%,2%, flavoured)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any ice cream/frozen yogurt/gelato (including milkshakes, frozen dairy bars and sandwiches and other novelties)?

- Yes
- Probably
- No
- Don't know
- None of the above

If yes, was it soft serve from a machine?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any other dairy (e.g. butter, yogurt, sour cream, whipped cream)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any raw fish (e.g. sushi, sashimi)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any smoked or cured fish (not from a can e.g. smoked salmon or lox)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any pre-cooked shrimp or prawns eaten cold (e.g. shrimp ring, shrimp cocktail, in a salad, leftovers eaten cold)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any pre-cooked crab eaten cold (including imitation crab meat)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any other ready to eat shellfish eaten cold (e.g. mussels, oysters, clams)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any prepared green salad (e.g. garden, Greek, Caesar purchased in a store, restaurant or cafeteria)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any potato salad?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the above

if yes, was it homemade or purchased?

- ☐ Home made
- ☐ Purchased

Please specify details (E.g., where consumed, type, brand, location)

Any pasta salad?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the above

if yes, was it homemade or purchased?

- ☐ Home made
- ☐ Purchased

Please specify details (E.g., where consumed, type, brand, location)

Any bean salad?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the above

if yes, was it homemade or purchased?

- ☐ Home made
- ☐ Purchased

Please specify details (E.g., where consumed, type, brand, location)

Any cole slaw?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the above

if yes, was it homemade or purchased?

- ☐ Home made
- ☐ Purchased

Please specify details (E.g., where consumed, type, brand, location)

Any hummus?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the above

if yes, was it homemade or purchased?

- ☐ Home made
- ☐ Purchased

Please specify details (E.g., where consumed, type, brand, location)

Any other salads/dips (e.g. chicken salad, egg salad, tuna salad, seafood salad, tabouli)? ?

- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the above

if yes, was it homemade or purchased?

- ☐ Home made
- ☐ Purchased

Please specify details (E.g., where consumed, type, brand, location)

Vegetables (Not Cooked)

Any alfalfa sprouts?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any bean sprouts?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any lettuce and/or salad purchased pre-packaged in a bag or plastic container?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any whole lettuce?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any spinach, purchased loose or in bag or plastic container?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any mushrooms?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any fresh herbs?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any packaged pre-cut vegetables (e.g. in a platter or tray, diced onions, celery etc.)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any honeydew melons?

- Yes
- Probably
- No
- Don't know
- None of the above

If yes, was it whole, cut at home or pre-cut?

- Whole, cut at home
- Pre-cut

Please specify details (E.g., where consumed, type, brand, location)

Any cantaloupe?

- Yes
- Probably
- No
- Don't know
- None of the above

If yes, was it whole, cut at home or pre-cut?

- Whole, cut at home
- Pre-cut

Please specify details (E.g., where consumed, type, brand, location)

Any watermelon?

- Yes
- Probably
- No
- Don't know
- None of the above

If yes, was it whole, cut at home or pre-cut?

- Whole, cut at home
- Pre-cut

Please specify details (E.g., where consumed, type, brand, location)

Any packaged pre-cut fruit (e.g. in a platter or tray, applce slices, fruit salad etc.)?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Any unpasteurized fruit/vegetable juice?

- Yes
- Probably
- No
- Don't know
- None of the above

Please specify details (E.g., where consumed, type, brand, location)

Social Functions

Show/Hide

In the 4 weeks prior to onset, did you attend any social functions (e.g. parties, weddings, showers, potlucks, community events)?

- Yes
- No
- Don't know
- Not asked

Click the Add button to add social event/function details

Add

Restaurants

Show/Hide

In the 4 weeks prior to onset, did you attend any restaurants (including take-out, cafeteria, bakery, deli, kiosk)?

- Yes
- No
- Don't know
- Not asked

Click the Add button to add restaurant details

Add

Grocery Stores

Show/Hide

In the past 4 weeks prior to onset, did you visit grocery stores for foods consumed during the incubation period?

- Yes
- No
- Don't know
- Not asked

Click the Add button to add grocery store details

Grocery store name

Location

Foods purchased

Brands/other details

Delete

Add

Loyalty card/store issued card (for outbreak investigation only)

Show/Hide

This section is only for use in some specific outbreak situations, with client consent. It is not a routine question for sporadic cases.

Has the client given consent (written or verbal)?

- Yes
- No
- Not applicable

Loyalty card details (names and numbers)

Interviewer Details and Notes

Show/Hide

Interviewer Name	
Interview date	8/23/2018
Any special notes regarding this interview	

Notification Timeline:

From Lab/Practitioner to Public Health: Within 48 hours.

From Public Health to Saskatchewan Ministry of Health: Within 2 weeks (or immediate if an outbreak is suspected or anticipated).

Public Health Follow-up Timeline: Within 24-48 hours.

Public Health Purpose for Notification of Salmonellosis (adapted from Massachusetts, 2016)

- To identify whether the case may be a source of infection for other persons (e.g., a diapered child, daycare attendee, or food handler), and if so, to prevent further transmission.
- To identify transmission sources of public health concern (e.g., a restaurant or a commercially distributed food product), and to stop transmission from such sources.
- 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 salmonellosis.

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

Confirmed Case	Laboratory confirmation of infection with or without clinical illness: • isolation of *Salmonella* sp. (excluding *Salmonella* typhi or paratyphi) from an appropriate clinical specimen (e.g., sterile site, deep tissue wounds, stool, vomit or urine).
Probable Case	Clinical illness* in a person who is epidemiologically linked to a confirmed case.
*Clinical illness is characterized by headache, diarrhea, abdominal pain, nausea, fever and sometimes vomiting. Asymptomatic infections may occur, and the organism may cause extra-intestinal infections.	

[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 CONSTRUCTION

Additional Background Information

Causative Agent

- *Salmonella* organisms are gram-negative bacilli that belong to the *Enterobacteriaceae* family.
- The genus *Salmonella* has three recognized species: *S. enterica, S. bongori*, and *S. subterranean* with six main subspecies: *enterica* (I), *salamae* (II), *arizonae* (IIIa), *diarizonae* (IIIb), *houtenae* (IV), and *indica* (VI) (US Food and Drug Administration, 2012).
- There are over 2500 serotypes identified. Typhimurium and Enteritidis are the most commonly identified serotypes in Canada. A small number of serotypes account for the majority of confirmed cases in Saskatchewan.
- The infective dose of *S. enterica*, especially for children, is not necessarily high. The probability model suggests that a 10-20% probability for infection with a dose of 100 organisms, and a 60-80% probability for infection at 1,000,000 organisms (Heymann, 2015).

Reservoir/Source

The principal reservoirs include poultry (including chicks and other baby poultry), swine, cattle, reptiles (e.g., iguanas, turtles, and snakes), dogs, cats, hamsters, hedgehogs, frogs, and salamanders (Heymann, 2015).

Symptoms

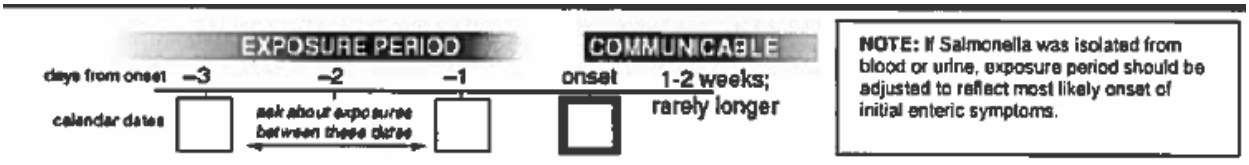
- Generally, causes an inflammation of the small intestine.
- Severity of symptoms may vary; depends upon age and health of host, ingested dose and serotype of organism.
- Sudden onset of headache, abdominal pain, diarrhea, fever, nausea and sometimes vomiting.
- Acute symptoms may last for 1-2 days or may be prolonged, depending on host factors, and ingested dose and strain characteristics of organism. Generally, symptoms will resolve within 4-7 days.
- Dehydration and electrolyte imbalances which may lead to death in the very young, the elderly and immunocompromised individuals.

- Bacteremia (presence of viable bacteria in the circulating blood) and septecemia (bacteria in the blood that often occurs with severe infections) may occur.
- Septecemia in people with sickle-cell disease increases the risk of focal systemic infections, e.g., osteomyelitis.

Complications
- Occasionally, the organism may localize in any tissue of the body, produce abscesses, and cause septic arthritis, cholecystitis, endocarditis, meningitis, pericarditis, pneumonia, pyoderma, or pyelonephritis (Heymann, 2008).
- Reactive arthritis (an autoimmune response) may follow 3-4 weeks after onset of acute symptoms (U.S. Food and Drug Administration, 2012).

Incubation Period
Usually 12-36 hours, but ranges from 6-72 hours. Longer incubation periods of up to 16 days have been documented, and may not be uncommon following low dose ingestion (Heymann, 2015).

Period of Communicability
- Throughout the course of infection; extremely variable, usually several days to several weeks.
- Asymptomatic carrier state may continue for months, especially in infants.
- Depending on the serotypes, approximately 1% of infected adults and 5% of children under 5 may excrete the organism for 1 year (Heymann, 2015).



Mode of Transmission
- Ingestion of organisms in improperly cooked food (including undercooked eggs/egg products), unpasteurized milk or contaminated drinking water.
- Contact with infected pets and/or their environment as well as contaminated pet treats.
- Person-to-person via fecal-oral transmission is possible, especially when diarrhea is present (Heymann, 2015).

Risk Groups/Risk Factors

Individuals most vulnerable to the disease include (Heymann, 2015):

- achlorhydria (low stomach acid);
- current medication (e.g. antacid treatment, broad-spectrum antibiotics)
- gastrointestinal surgery;
- neoplastic disease;
- malnutrition;
- sickle-cell disease;
- individuals with weakened immune systems due to age (e.g., very young, elderly), medical conditions (e.g., HIV) or medications (e.g., chemotherapy or immunosuppressive treatment) (U.S. Food and Drug Administration, 2012).

Specimen Collection and Transport

- Stool specimen in Cary-Blair transport medium.
- Blood culture if symptoms of septicaemia present.

Refer to the Roy Romanow Provincial Laboratory Compendium of Tests for details at https://rrpl-testviewer.ehealthsask.ca/.

Public Health Investigation

I. Case

Refer to Attachment – Salmonellosis Data Collection Worksheet to assist in follow-up.

History

- Onset of illness – to determine incubation period and period of communicability which helps to identify the possible source and contacts to be followed.
- In the three days prior to onset of illness:
  - Identify history of travel (during the incubation period), especially to areas with inadequate sanitation, water and sewage treatment.
  - Exposure to someone else with similar symptoms.
  - Exposure to farm animals and pets including reptiles and amphibians or pet foods and treats, a petting zoo. Consider pets with diarrhea as a possible source of *Salmonella*. Pets may also have fecal matter on their hair, fur, feathers, or skin that is transferred to hands when they are touched.

  - Obtain a detailed food history including recent ingestion of potentially contaminated food such as raw or undercooked eggs, unpasteurized milk, grocery produce including tomatoes, melons, apple cider, alfalfa sprouts, peanut butter or unpasteurized milk (complete the User Defined Form).
  - Assess for safe food handling procedures (e.g. possible cross-contamination such as cutting boards).
  - Determine history of daycare or hospital exposure.
  - Identify potentially contaminated drinking and recreational water sources.
  - Determine history of high-risk sexual practices, particularly activities that result in contact with feces.
- Identify others who may have been exposed to the same source.
- Assess for history of similar symptoms in visitors or other members of the household.
- Occupational considerations exist for food handlers, health care and childcare workers.

Public Health Interventions

Assessment

- Assess for contacts paying particular attention individuals that have had exposure to the same source or are a risk for further transmission.

Communication

- Letters can be used to inform contacts of the exposure, symptom monitoring and when to seek medical attention (see Sample letter)
- Letters can also be used when exclusion from school or work settings are required as a public health intervention.

Education

- All cases should be provided information on prevention and control measures including safe food handling and handwashing.

Environmental Health

- In the case of an ill food handler, a restaurant inspection may be warranted to review safe food handling requirements.

Exclusion

- Food handlers, health care workers, childcare or other staff involved with personal care: Exclude until diarrhea has resolved **and** two consecutive negative stool cultures are obtained at least 24 hours apart and at least 48 hours after discontinuation of antibiotics (if treatment was provided) (Heymann, 2015).

- Children below the age of five years in childcare, and older children and adults unable to maintain adequate standards of personal hygiene (i.e., mentally or physically handicapped): Exclude until diarrhea has resolved. If the individual is living in an institution, follow contact precautions until diarrhea has resolved.
- Diarrhea is considered resolved when stools have been normal for that individual for 48 hours.
- Exclusion may be warranted where transmission from the infected individual to another person is demonstrated or considered very likely in an occupational setting. This may be evaluated on a case-by-case basis by the MHO.

Public Health Order

- If a food handler, the case should be excluded from work and order used if necessary.

Referral

- When a food that is commercially available is implicated and is from a federally inspected planta referral to the Canadian Food Inspection Agency is warranted. Likewise, when an agricultural source has been identified, a referral to the Ministry of Agriculture may be warranted.

Testing

- Two consecutive negative stool cultures are required before exclusion requirements can be removed for food handlers, health care and childcare workers or other staff involved with personal care. The specimens must be taken at least 48 hours after antibiotics have stopped and at least 24 hours apart.

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 therapy includes oral rehydration solution to replace fluids and electrolytes.*
- *Antibiotics are not usually recommended, as they may not eliminate the carrier state and may lead to prolonged excretion, resistant strains or more severe infections.*
- *Individuals that should receive antibiotics include infants less than 2 months, the elderly, the debilitated, those with sickle-cell disease, persons infected with HIV and/or persons with continued/high fever or manifestations of extra-intestinal infections (Heymann, 2015).*
- *Antibiotic treatment, when indicated should be based on antimicrobial susceptibility testing.*

II. Contacts/Contact Investigation

Contact Definition

Contacts include:

- persons living in the same household;
- children and childcare workers in a daycare/day home;
- persons who have eaten food prepared by the case during the period of communicability;
- persons who have attended events where food was shared with the case (e.g., potluck);
- individuals exposed to the same source (if it is identified).

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.

Education

- All contacts should be provided information on prevention and control measures including safe food handling and handwashing.

Environmental Health

- If a common exposure is identified through the case and contact investigations, environmental health assessments may be required.

Exclusion

- Contacts who are symptomatic should be managed as cases.

Referral

- Depending on the suspected source, investigation/management may involve local Medical Health Officer, Ministry of Health, Public Health Agency of Canada, Ministry of Agriculture, and/or Canadian Food Inspection Agency.

Symptom monitoring

- Contacts should be asked to monitor symptoms during the incubation period and be advised on testing and exclusion if symptoms develop.

Testing

- Symptomatic contacts should be assessed by a physician.
- Follow-up testing is required for food handlers, food handlers, health care workers, childcare or other staff involved with personal care (Heymann, 2015):
  - Two consecutive negative stool cultures are required before exclusion requirements can be removed. The specimens must be taken at least 48 hours after antibiotics have stopped and at least 24 hours apart.

III. Environment

<u>Child Care Centres Control Measures</u>

- For infection control measures refer to the Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[2]
- For one case: No action is recommended for other children or employees in a day care setting.
- For two cases or more: If there are epidemiologically linked cases in attendees or employees, diapered attendees and food handlers should be assessed for illness. Testing is not required. Educate parents and staff about salmonellosis and proper handwashing. Instruct parents and staff to watch for symptoms of diarrhea. Symptomatic individuals should be excluded as cases.

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

Institutional Control Measures

- For infection control measures refer to your Health Authority Infection Control Manual.
- Contact precautions for hospitalized patients and residents of an institution. No action is recommended for other residents. If there are epidemiologically linked cases of salmonellosis in the institution's residents or employees then employees and food handlers should be screened for salmonellosis. Investigate as an outbreak in consultation with the MHO.

IV. Epidemic Measures

When cases occur among a group of individuals that are known to each other, searching for possible exposures such as travel, or a history of food handling errors, use of unsafe raw ingredients, inadequate cooking, time-temperature abuses and cross-contamination may be the likely source.

When two or more cases are linked through genetic identification (such as PFGE or whole genome sequencing), but have not named each other as contacts, the risk of a common source is heightened. In such cases, further investigation is warranted into what and where their food sources are. Food sampling and inspection of implicated restaurants may be warranted.

When laboratories identify interprovincial or international linkages, the Outbreak Incident Command Center may be activated to coordinate investigation. The Canadian Food Inspection Agency would become involved with the goal to identify the implicated source and implement appropriate interventions such as product recalls to reduce further spread.

Prevention Measures

Refer to the Enteric 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

- Provide prevention information and education to case or caregiver, daycare or institution workers about personal hygiene.
- Educate food handlers about proper food and equipment handling and hygiene, especially in avoiding cross-contamination of food products, and emphasize thorough hand washing.
- Educate eating establishment owners regarding safe food handling and management and cleaning of equipment and to monitor practice within their establishments frequently.
- Avoid using dirty or cracked eggs, thoroughly cook all food derived from animal sources, particularly poultry and eggs.
- Advise individuals to avoid food preparation and care of hospitalized patients, the elderly and children when ill with diarrhea.
- Educate about the risk of sexual practices that permit fecal-oral contact.
- Ensure water supplies are treated properly.
- Wash hands thoroughly after handling animals and pet foods and after cleaning animal enclosures.

Revisions

Date	Change
September 2018	• Clarified the purpose for notification of cases to public health • Incorporated an Epidemiology and Occurrence section to the chapter. • Incorporated standardized Salmonellosis Data Collection Worksheet. • Added graphic to help calculate incubation and communicability. • Rearranged and updated the style into the new format of the Manual. • Updated exclusion and follow-up testing for cases and contacts to align with current recommendations outlined in Heymann (2015) • References reaffirmed or updated as necessary.

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Heymann, D. L. (Ed.). (2015). *Control of communicable diseases manual* (20th ed.). Washington, DC: American Public Health Association.

Massachusetts Department of Public Health (2016). Bureau of Infectious Disease and Laboratory Sciences Retrieved August, 2018 from http://www.mass.gov/eohhs/docs/dph/disease-reporting/guide/salmonellosis.pdf

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Salmonellosis 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: _____ Phone #: ☐ Primary Home: ☐ Mobile contact: ☐ Workplace:	Health Card Province: _____ Health Card Number (PHN): _____	Preferred Communication Method: (specify - i.e. home phone, text): Email Address: ☐ Work ☐ Personal
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:*
☐ 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_____

Salmonellosis Data Collection Worksheet

Please complete **all** sections.

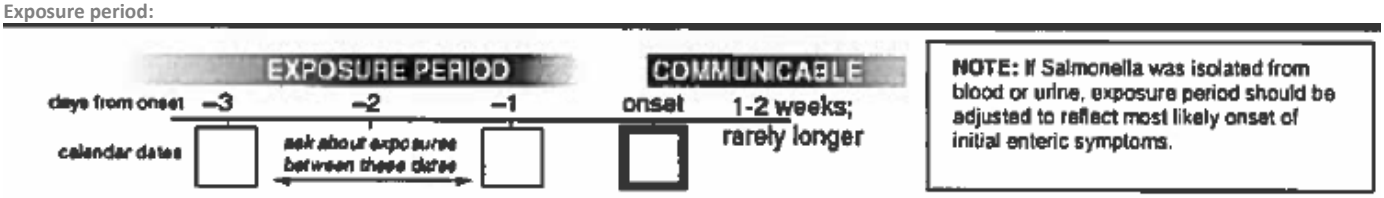
Panorama Client ID: _____
Panorama Investigation ID: _____

C) SIGNS & SYMPTOMS

LHN-> INVESTIGATION-> SIGNS & SYMPTOMS

Description	Yes Date of onset	Date of recovery	Description	Yes Date of onset	Date of recovery
Abdominal – cramping	YYYY / MM / DD	YYYY / MM / DD	Headache	YYYY / MM / DD	YYYY / MM / DD
Asymptomatic	YYYY / MM / DD	YYYY / MM / DD	Myalgia (muscle pain)	YYYY / MM / DD	YYYY / MM / DD
Dehydration	YYYY / MM / DD	YYYY / MM / DD	Nausea	YYYY / MM / DD	YYYY / MM / DD
Diarrhea	YYYY / MM / DD	YYYY / MM / DD	Pain – abdominal	YYYY / MM / DD	YYYY / MM / DD
Diarrhea – bloody	YYYY / MM / DD	YYYY / MM / DD	Sepsis (e.g. bacteremia, septicemia, etc.)	YYYY / MM / DD	YYYY / MM / DD
Fever	YYYY / MM / DD	YYYY / MM / DD	Vomiting	YYYY / MM / DD	YYYY / MM / DD
Other Signs & Symptoms if applicable					

Exposure period:



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 N—No, NA–Not asked, U–Unknown

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes	N, NA, U	Start date	Add'l Info
Animal Exposure- Pet treats and raw food (Add'l Info)			YYYY / MM/DD	
Animal Exposure - Pets (including reptiles) (Add'l Info)			YYYY / MM/DD	
Animal Exposure - Rodents/rodent excreta			YYYY / MM/DD	
Animal Exposure - Wild animals (other than rodents) (Add'l Info)			YYYY / MM/DD	
Animal Exposure - Other Animal Exposure (Add'l Info)			YYYY / MM/DD	
Chronic Medical Condition - Other (Add'l Info)			YYYY / MM/DD	
Contact - Persons with diarrhea/vomiting			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 - Child Care Worker	TE		YYYY / MM/DD	
Occupation - Food Handler	TE		YYYY / MM/DD	
Occupation – Health Care Worker IOM Risk Factor			YYYY / MM/DD	
Occupation - Personal Care Worker	TE		YYYY / MM/DD	
Travel - Outside of Canada (Add'l Info)	AE		YYYY / MM/DD	

Salmonellosis Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

DESCRIPTION	Yes	N, NA, U	Start date	Add'l Info
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)	AE		YYYY / MM/DD	
Water - Bottled water (Add'l Info)			YYYY / MM/DD	
Water – Public water system (Add'l Info)			YYYY / MM/DD	
Water - Private well or system (Add'l Info)			YYYY / MM/DD	
Water - Untreated water (Add'l Info)			YYYY / MM/DD	
Water (Recreational) – Pond, stream, lake, river, ocean			YYYY / MM/DD	
Water (Recreational) – Private (swimming pool/whirl pool)			YYYY / MM/DD	
Water (Recreational) – Public (swimming/paddling pool/whirl pool)			YYYY / MM/DD	

F) USER DEFINED FORM LHN-> INVESTIGATION-> INVESTIGATION DETAILS -> LINKS AND ATTACHMENTS -> SALMONELLA FORM
(SEE ATTACHED)

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

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

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

Outbreak Declared 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

Public Health Order:
☐ Order (specify)_____ YYYY / MM / DD
Investigator name

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

Referral:
☐ Canadian food inspection agency YYYY / MM / DD
Investigator name

Environmental Health: YYYY / MM / DD
☐ Restaurant inspection
Investigator name

Testing: Investigator name
☐ Stool testing recommended (e.g. for follow-up) YYYY / MM / DD
☐ Laboratory testing recommended YYYY / MM / DD

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

Other Investigation Findings:
☐ Investigator Notes
☐ Document Management Notes

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	

Salmonellosis Data Collection Worksheet

Please complete **all** sections.

Panorama Client ID: _____
Panorama Investigation ID: _____

I) OUTCOMES *(optional except for severe influenza)*

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) 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

TRANSMISSION Events

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

Transmission Event ID	Exposure Name	Setting type		Date/Time	# of contacts
		☐ Food service establishment ☐ Public facilities	☐ Health Care setting ☐ Household Exposure		
		☐ Food service establishment ☐ Public facilities	☐ Health Care setting ☐ Household Exposure		
		☐ Food service establishment ☐ Public facilities	☐ Health Care setting ☐ Household Exposure		
		☐ Food service establishment ☐ Public facilities	☐ Health Care setting ☐ Household Exposure		
	Salmonella 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 exposed)

Initial Report completed by:

Date initial report completed: YYYY / MM / DD

PANORAMA

Salmonellosis Routine Questionnaire - August 2018

Record type:
Record ID:
Record Name:

In this form the answers (Yes, Probably, No, and Don't know) are from the perspective of the person being interviewed. "Probably" can be used if the client thinks he/she may have eaten this food or usually eats this food, but is unsure if it was eaten during the period in question.

Diet and Allergies

Show/Hide

Are you a vegetarian?
- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

Do you have any food Allergies / avoidances / special diet?
- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

If yes, specify details

Food Exposures

Show/Hide

In the 3 days prior to onset, did you eat...

Any chicken meat?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any whole chicken pieces/parts (e.g.whole chicken, breasts, wings, thighs, in soups or as part of a dish, not including deli-meal)?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know

PANORAMA

- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any breaded chicken (e.g. chicken nuggets, strips or burgers)?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any other chicken or poultry meat (e.g. deli meat, ground chicken, turkey, quail, etc.)?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any eggs?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

Were the eggs raw, soft or undercooked?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any foods or beverages that contain raw, soft, undercooked

- ◯ Yes
- ◯ Probably

eggs (raw cookie dough, desserts, drinks, dressings, stir fry, hot pot)?

- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any pork, including sausage?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any beef, including hamburger patties, other ground beef (meatballs, chili, spaghetti sauce), steak, roast, donair?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any seafood, including fish or shellfish (cooked / raw / smoked)?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any sprouts (e.g. bean or alfalfa or any other kind), including sprouts on a sandwich or salads?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any lettuce or leafy greens (including pre-packaged greens)?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any cucumbers?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any tomatoes?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any cantaloupe?

- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any papaya?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any fresh herbs (e.g. cilantro, parsley, basil)?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any nuts, (either on their own, in granola bar, as a garnish or as part of a dish)?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any peanut butter or other nut butter or spread?
- ◯ Yes
- ◯ Probably
- ◯ No
- ◯ Don't know
- ◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any seeds (e.g. sunflower, sesame, chia, flax, hemp, sprouted seeds)?
- ◯ Yes
- ◯ Probably
- ◯ No

◯ Don't know
◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any tahini, halva, or other products made from sesame seeds?

◯ Yes
◯ Probably
◯ No
◯ Don't know
◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any cheese made with unpasteurized (raw) milk?

◯ Yes
◯ Probably
◯ No
◯ Don't know
◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

In the 3 days prior to onset, did you handle or prepare…

Any eggs or foods containing raw eggs?

◯ Yes
◯ Probably
◯ No
◯ Don't know
◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Did you handle or prepare any raw chicken?

◯ Yes
◯ Probably
◯ No
◯ Don't know
◯ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Social Functions Show/Hide

In the 3 days prior to onset, did you attend any social functions (e.g. parties, weddings, showers, potlucks, community events)?

- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

Click the Add button to add social event/function details

Add

Restaurants Show/Hide

In the 3 days prior to onset, did you attend any restaurants (including take-out, cafeteria, bakery, deli, kiosk)?

- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

Click the Add button to add restaurant details

Add

Grocery Stores Show/Hide

In the past 3 days prior to onset, did you visit grocery stores for foods consumed during the incubation period?

- ◯ Yes
- ◯ No
- ◯ Don't know
- ◯ Not asked

Click the Add button to add grocery store details

Add

Loyalty card/store issued card (for outbreak investigation only) Show/Hide

This section is only for use in some specific outbreak situations, with client consent. It is not a routine question for sporadic cases.

Has the client given consent (written or verbal)?	◯ Yes ◯ No ◯ Not applicable
Loyalty card details (names and numbers)	

Interviewer Details and Notes Show/Hide

Interviewer Name	
Interview date	9/11/2018
Any special notes regarding this interview	

Notification Timeline:

From Lab/Practitioner to Public Health: Immediately.
From Public Health to Ministry of Health: Within 72 hours.

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

Public Health Purpose for Notification of Shigellosis (adapted from Massachusetts Department of Health, 2018)

- To identify whether the case may be a source of infection for other persons (e.g., a diapered child, daycare attendee, or food handler), and if so, to prevent further transmission.
- To identify transmission sources of public health concern (e.g., a restaurant or a commercially distributed food product), and to stop transmission from such sources.
- 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 shigellosis.

Information

Case Definition (Public Health Agency of Canada, May 2008)

Confirmed Case	Laboratory confirmation of infection with or without clinical illness: • isolation of *Shigella sp*. from an appropriate clinical specimen (e.g., sterile site, deep tissue wounds, stool, vomit or urine)
Probable Case	Clinical illness[1] in a person who is epidemiologically linked to a confirmed case
[1]Clinical illness is characterized by diarrhea, fever, nausea, vomiting cramps and tenesmus. Asymptomatic infections may occur.	

Epidemiology and Occurrence

UNDER CONSTRUCTION

Additional Background Information

Causative Agent

Shigella species are aerobic, gram negative bacilli. There are 4 species or serogroups: *S. dysenteriae* (Group A), *S. flexneri* (Group B), *S. boydii* (Group C), *and S. sonnei* (Group D). The infectious dose for humans; can be as low as10 to 100 bacteria.

Reservoir/Source

Humans are the only significant reservoir.

Symptoms

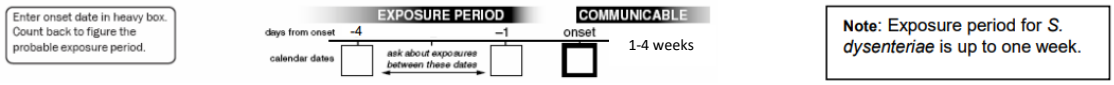
- An acute bacterial disease involving the large and distal small intestine, characterized by diarrhea which may contain blood and mucus or be watery, accompanied by fever, nausea, vomiting, cramps, tenesmus and sometimes toxemia.
- Convulsions may be an important complication in young children.
- Bacteremia is uncommon.
- Mild and asymptomatic infections occur.
- Illness is usually self-limited, lasting an average of 4 to 7 days.
  - *S. dysenteriae:* is often associated with serious disease and severe complications, including toxic megacolon and the haemolytic-uremic syndrome; case-fatality rates have been as high as 20% among hospitalized cases, even in recent years.
  - *S. sonnei*: often results in a short clinical course and an almost negligible case-fatality rate, except in immune-compromised hosts.
  - *S. flexneri*: Certain strains can often cause a reactive arthropathy (Reiter's syndrome) in persons who are genetically predisposed, although Reiter's syndrome can occur with any *Shigella* strain. Post-infectious arthritis can last for months or years, and can lead to chronic arthritis.
  - *S. boydii*: The clinical presentation ranges from watery, loose stools to severe symptoms such as fever, abdominal pain, tenesmus, and bloody diarrhea. However, symptoms generally often self-limited watery diarrhea.

Incubation Period

Usually 1 to 3 days, but may range from 12 to 96 hours; up to 1 week for *S. dysenteriae* type 1.

Period of Communicability

- During acute infection and until the infectious agent is no longer present in feces, usually for 4 weeks after illness.
- Asymptomatic carriers may transmit infection; very rarely, the carrier state may persist for months or longer.
- The duration of carriage may be reduced with the use of an appropriate antibiotic.



Mode of Transmission

Person-to-person, fecal-oral transmission:

- direct transmission is common in children and individuals who do not thoroughly clean their hands, including under their fingernails following defecation;
- indirect transmission is usually via ingestion of contaminated food or water.

Less commonly inanimate objects and houseflies act as vectors.

Risk Factors/Risk Groups

The elderly, the debilitated and the malnourished of all ages are particularly susceptible to severe disease and death.

Specimen Collection and Transport

Shigella remains viable outside the human body for only a short period of time hence, specimens must be processed rapidly after collection, preferable within 24 hours.

Stool specimens should be taken early in the course of the illness, when the causative agent is likely to be found in largest numbers. Freshly passed stool is better than rectal swabs, since there is less chance for improper collection, and mucus and blood stained portions can be selected for culture. Use the Cary-Blair transport media. Submit three or four spoonfuls (using the built-in spoon) of liquid stool and mix thoroughly with the semi-solid Cary-Blair transport media. The final mixture should not fill the Cary-Blair container to more than three-quarters full.

Refer to the Roy Romanow Provincial Laboratory Compendium of Tests for details at https://rrpl-testviewer.ehealthsask.ca/.

Public Health Investigation

I. Case

Refer to Attachment – Shigellosis Data Collection Worksheet to assist in investigation.

History

- Onset of illness – to determine incubation period and period of communicability which helps to identify the possible source and contacts to be followed.
  - Identify history of travel (during the incubation period), especially to areas with inadequate sanitation, water and sewage treatment.
  - Exposure to someone else with similar symptoms.
  - Obtain a detailed food history (complete the User Defined Form).
  - Assess for safe food handling procedures (e.g. possible cross-contamination such as cutting boards).
  - Determine history of daycare or hospital exposure.
  - Identify potentially contaminated drinking and recreational water sources.
  - Determine history of high-risk sexual practices, particularly activities that result in contact with feces.
- Identify others who may have been exposed to the same source.
- Assess for history of similar symptoms in visitors or other members of the household.
- Occupational considerations exist for food handlers, health care and childcare workers.
- Determine history of high-risk sexual practices, especially contact with feces.

Public Health Interventions

Assessment

- Assess for contacts paying particular attention individuals that have had exposure to the same source or are a risk for further transmission.

Communication

- Letters can be used to inform contacts of the exposure, symptom monitoring and when to seek medical attention (see Sample letter)
- Letters can also be used when exclusion from school or work settings are required as a public health intervention.

Education

- All cases should be provided information on prevention and control measures including safe food handling and hygiene, avoiding cross-contamination of food products and control of flies to decrease contamination of food, handwashing and risk of sexual practices that permit fecal-oral contact.

Exclusion

- Food handlers, health care workers, childcare or other staff involved with personal care, children below the age of five years in childcare, and older children and adults unable to maintain adequate standards of personal hygiene (i.e., mentally or physically handicapped): exclude until diarrhea has resolved **and** two consecutive negative stool cultures are obtained at least 24 hours apart and at least 48 hours after discontinuation of antibiotics.
- Use of recreational water (e.g., swimming pools, whirlpools, etc.): exclude until 2 weeks after symptoms resolve (American Academy of Pediatrics, 2015).

Public Health Order

- When the case poses an ongoing risk to the public, a public health order may be issued via a letter to the case.

Referral

- When a food that is commercially available is implicated, a referral to Canadian Food Inspection Agency may be warranted. Likewise, when an agricultural source has been identified, a referral to the Ministry of Agriculture may be warranted. These situations should be discussed with the MHO.
- Refer to public health inspection if source cannot be identified and transmission continues.

Testing

- Two consecutive negative stool cultures are required before exclusion requirements can be removed. The specimens must be taken at least 48 hours after antibiotics have stopped and at least 24 hours apart.

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:

- *Fluid and electrolyte replacement is important when diarrhea is watery or there are signs of dehydration.*
- *Antibiotic treatment, depending on the severity of the illness may be recommended.*
- *Multidrug resistance is common; therefore the choice of antibiotic will depend on the susceptibility of the isolated strain or on local antimicrobial susceptibility patterns. Use of antibiotics will shorten the duration and severity of illness and the duration of fecal excretion.*

II. Contacts/Contact Investigation

Contact Definition

Contacts include:

- persons living in the household;
- children and childcare workers in a daycare/dayhome;
- healthcare workers who have provided care for a case.

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

Education

- All contacts should be provided information on prevention and control measures including safe food handling and handwashing.

Environmental Health

- If a common exposure is identified through the case and contact investigations, environmental health assessments may be required.

Exclusion and Testing

Symptomatic contacts that fall into one of the following categories should be excluded until diarrhea has resolved and two consecutive negative stool cultures are obtained at least 24 hours apart:

- food handlers;
- health care, childcare or other staff involved with personal care who are symptomatic;
- children below the age of five years in childcare who are symptomatic;
- older children and adults unable to maintain adequate standards of personal hygiene (i.e., mentally or physically handicapped);
- contact precautions should be followed for individuals who live in an institution until two negative stool cultures have been obtained.

Symptomatic individuals should not use recreational water (e.g., swimming pools, whirlpools, etc.) until 2 weeks after symptoms resolve.

Asymptomatic contacts

Shigella sonnei – asymptomatic contacts (including high risk contacts) do not need to be excluded or tested. Rationale – treatment is not routinely recommended and return to work or daycare would be based on negative stool specimens which are an unreliable method for determining clearance of the bacteria (National Disease Surveillance Center, 2004, PHLS Advisory Committee on Gastrointestinal Infections, 2004, BC Centre for Disease Control, 2011, American Academy of Pediatrics, 2012)

S. flexneri, *S. dysenteriae* and *S. boydii* – high risk asymptomatic contacts may be excluded and tested with the MHO's discretion based on an assessment of:

- the risk of complications of the disease for the populations the individual interacts with (e.g., child care attendee, child care worker, health care worker, food handler in a long term care facility, food handler in a public restaurant, etc.)

If results return positive, treatment should be provided and the contact should be excluded until treatment is completed and other case exclusion criteria are met.

Referral

- Depending on the suspected source, investigation/management may involve local Medical Health Officer, Ministry of Health, Public Health Agency of Canada, Ministry of Agriculture, and/or Canadian Food Inspection Agency.

Symptom monitoring

- Contacts should be asked to monitor symptoms during the incubation period and be advised on testing and exclusion if symptoms develop.

III. Environment

Child Care Centre/Schools Control Measures

Strict enforcement of infection control measure. Refer to Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[1]

Health Facilities Control Measures

- Strict enforcement of infection control measures. Refer to your Health Authority Infection Control Manual.
- Contact precautions should be used while case is symptomatic.
- For hospitalized patients, contact precautions in the handling of feces, contaminated clothing and bed linen.

IV. Epidemic Measures

- Report at once to the Chief Medical Health Officer any group of cases of acute diarrheal disorder, even in the absence of specific identification of the causal agent using the Outbreak Notification Report and Summary Form.
- Investigate water, food, and milk supplies, and use general sanitation measures.
- Prophylactic administration of antibiotics is not recommended.
- Publicize the importance of handwashing after defecation; provide soap and individual paper towels in public venues if otherwise not available.

Prevention Measures

Refer to the Enteric 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.

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

Education

- Educate the public about the importance of personal hygiene including handwashing, safe food handling and safe drinking water.
- Educate about control of flies to decrease contamination of food.
- Encourage breastfeeding of infants and young children as breastmilk is protective.
- Educate parents about the importance of keeping children with diarrheal illness home from daycares.
- Educate about safe recreational water sources and the importance of avoiding swallowing water from ponds, lakes, or untreated pools.
- Educate about safe sexual practices and those that permit fecal-oral contact.

Revisions

Date	Change
September 2018	• Clarified the purpose for notification of cases to public health • Incorporated an Epidemiology and Occurrence placeholder into the chapter. • Incorporated standardized Shigellosis Data Collection Worksheet and User Defined Form. • Rearranged and updated the style into the new format of the Manual.

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Government of Saskatchewan

Shigellosis 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

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:*
☐ 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:* ☐ *Blood* ☐ *Urine* ☐ *Stool*
☐ 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

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

Staging: ☐ Acute ☐ Carrier

Shigellosis Data Collection Worksheet

Please complete **all** sections

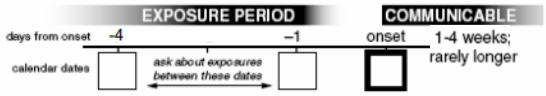
Panorama Client ID: _____
Panorama Investigation ID: _____

D) SIGNS & SYMPTOMS

INVESTIGATION->SIGNS & SYMPTOMS

Description	Yes Date of onset	Date of recovery	Description	Yes Date of onset	Date of recovery
Abdominal – cramping	YYYY / MM / DD	YYYY / MM / DD	Hemolytic uremic syndrome (HUS)	YYYY / MM / DD	YYYY / MM / DD
Asymptomatic	YYYY / MM / DD	YYYY / MM / DD	Nausea	YYYY / MM / DD	YYYY / MM / DD
Dehydration	YYYY / MM / DD	YYYY / MM / DD	Pain - abdominal	YYYY / MM / DD	YYYY / MM / DD
Diarrhea	YYYY / MM / DD	YYYY / MM / DD	Seizures	YYYY / MM / DD	YYYY / MM / DD
Diarrhea – bloody	YYYY / MM / DD	YYYY / MM / DD	Sepsis (e.g. bactremia, septicemia, etc.)	YYYY / MM / DD	YYYY / MM / DD
Diarrhea – mucousy	YYYY / MM / DD	YYYY / MM / DD	Tenesmus	YYYY / MM / DD	YYYY / MM / DD
Diarrhea – watery	YYYY / MM / DD	YYYY / MM / DD	Vomiting	YYYY / MM / DD	YYYY / MM / DD
Fever	YYYY / MM / DD	YYYY / MM / DD			
Other Signs & Symptoms if applicable					

Enter onset date in heavy box. Count back to figure the probable exposure period.



Note: Exposure period for *S. dysenteriae* is up to one week.

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 N—No, NA–Not asked, U–Unknown

LHN-> SUBJECT->RISK FACTORS

DESCRIPTION	Yes	N, NA, U	Start date	Add'l Info
Contact - Daycare			YYYY / MM/DD	
Contact - Persons with diarrhea/vomiting			YYYY / MM/DD	
Contact to a known case (Add'l Info)			YYYY / MM/DD	
Immunocompromised - Related to disease or treatment	TE		YYYY / MM/DD	
Occupation – Child care worker	TE		YYYY / MM/DD	
Occupation – Food handler	TE		YYYY / MM/DD	
Occupation – Health Care Worker – IOM Risk Factor	TE		YYYY / MM/DD	
Travel - Outside of Canada (Add'l Info)	AE		YYYY / MM/DD	
Travel - Outside of Saskatchewan, but within Canada (Add'l Info)	AE		YYYY / MM/DD	
Water - Bottled water			YYYY / MM/DD	
Water - Private well or system (Add'l Info)			YYYY / MM/DD	
Water - Public water system (Add'l Info)			YYYY / MM/DD	
Water - Untreated water (Add'l Info)			YYYY / MM/DD	
Water (Recreational) - Pond, stream, lake, river, ocean			YYYY / MM/DD	
Water (Recreational) - Private (swimming pool/whirl pool)			YYYY / MM/DD	
Water (Recreational) - Public (swimming/paddling pool/whirl pool)			YYYY / MM/DD	
Other risk factor (Add'l Info)			YYYY / MM/DD	

Shigellosis Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

G) USER DEFINED FORM (SEE ATTACHED) LHN-> INVESTIGATION-> INVESTIGATION DETAILS -> LINKS AND ATTACHMENTS -> SHIGELLOSIS FORM

H) TREATMENT LHN-> INVESTIGATION-> MEDICATIONS->MEDICATIONS SUMMARY

Medication *(Panorama = Other Meds) :* _____

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

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

Intervention Type and Sub Type:

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

Outbreak Declared 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

Public Health Order:
☐ 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

Other Investigation Findings:
☐ Investigator Notes
☐ Document Management

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

Referral: Investigator name
☐ Canadian food inspection agency YYYY/ MM/DD
☐ Primary care provider YYYY/ MM/DD

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

Testing: Investigator name
☐ Stool testing recommended (e.g. for follow-up) YYYY/ MM/DD

Immunization:
☐ Eligible Immunization 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	
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	

Shigellosis Data Collection Worksheet

Please complete **all** sections

Panorama Client ID: _____
Panorama Investigation ID: _____

J) OUTCOMES *(optional except for severe influenza,* 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) 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

Transmission Events LHN -> INVESTIGATION-> ESPOSURE SUMMARY -> TRANSMISSION EVENT SUMMARY -> QUICK ENTRY

Transmission Event ID	Exposure Name	Setting type	Date/Time	# of contacts
		☐ Health care setting ☐ Food service establishment ☐ Household ☐ Private Function (FOOD PREP)		
		☐ Health care setting ☐ Food service establishment ☐ Household ☐ Private Function (FOOD PREP)		
		☐ Health care setting ☐ Food service establishment ☐ Household ☐ Private Function (FOOD PREP)		
		☐ Health care setting ☐ Food service establishment ☐ Household ☐ Private Function (FOOD PREP)		
	Shigella 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 exposed)

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

PANORAMA

Shigellosis Routine Questionnaire - August 2018

Loading...

Record type:
Record ID:
Record Name:

In this form the answers (Yes, Probably, No, and Don't know) are from the perspective of the person being interviewed. "Probably" can be used if the client thinks he/she may have eaten this food or usually eats this food, but is unsure if it was eaten during the period in question.

Diet and Allergies

Show/Hide

Are you a vegetarian?
- ○ Yes
- ○ No
- ○ Don't know
- ○ Not asked

Do you have any food Allergies / avoidances / special diet?
- ○ Yes
- ○ No
- ○ Don't know
- ○ Not asked

If yes, specify details

Food Exposures

Show/Hide

In the 4 days (7 days for S. dysenteriae) prior to onset, did you eat…

Any raw oysters or shellfish?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any fresh herbs?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know
- ○ None of the Above

If yes, specify details (E.g., where consumed, type, brand, location)

Any raw vegetables?
- ○ Yes
- ○ Probably
- ○ No
- ○ Don't know

	○ None of the Above
If yes, specify details (E.g., where consumed, type, brand, location)	
Any lettuce or salad?	○ Yes ○ Probably ○ No ○ Don't know ○ None of the Above
If yes, specify details (E.g., where consumed, type, brand, location)	
Unpasteurized soft cheese?	○ Yes ○ Probably ○ No ○ Don't know ○ None of the Above
If yes, specify details (E.g., where consumed, type, brand, location)	

4 Day Food History Show/Hide

Please try to remember what you have eaten in the 4-day period before you started feeling sick. We will start with the day (or day before) you got sick and work backwards. (If a meal was eaten out, specify where they ate and what was eaten)

Please ask about: prepared in-home or eaten out; if in-home - variety/brand, how prepared, where bought/eaten, routine meals

Day 1

Day 1 date?	9/25/2018
Breakfast	
Home or out?	○ Home ○ Out
Details	
Lunch	
home or out?	○ Home ○ Out
Details	

Dinner

home or out?
- ○ Home
- ○ Out

Details

Snacks

home or out?
- ○ Home
- ○ Out

Details

Day 2

Day 2 date? 9/25/2018

Breakfast

home or out?
- ○ Home
- ○ Out

Details

Lunch

home or out?
- ○ Home
- ○ Out

Details

Dinner

home or out?
- ○ Home
- ○ Out

Details

Snacks

home or out?
- ○ Home
- ○ Out

Details

Day 3

Day 3 date? 9/25/2018

Breakfast

home or out? ○ Home ○ Out

Details

Lunch

home or out? ○ Home ○ Out

Details

Dinner

home or out? ○ Home ○ Out

Details

Snacks

home or out? ○ Home ○ Out

Details

Day 4

Day 4 date? 9/25/2018

Breakfast

home or out? ○ Home ○ Out

Details

Lunch

home or out? ○ Home

PANORAMA

Out

Details

Dinner

home or out?
- Home
- Out

Details

Snacks

home or out?
- Home
- Out

Details

Social Functions Show/Hide

In the 4 days (7 days for S. dysenteriae) prior to onset, did you attend any social functions (e.g. parties, weddings, showers, potlucks, community events)?
- Yes
- No
- Don't know
- Not asked

Click the Add button to add social event/function details

Add

Restaurants Show/Hide

In the 4 days (7 days for S. dysenteriae) prior to onset, did you attend any restaurants (including take-out, cafeteria, bakery, deli, kiosk)?
- Yes
- No
- Don't know
- Not asked

Click the Add button to add restaurant details

Add

Grocery Stores Show/Hide

In the past 4 days (7 days for S. dysenteriae) prior to onset, did you visit grocery stores for foods consumed during the incubation period?
- Yes
- No
- Don't know
- Not asked

Click the Add button to add grocery store details

Add

Loyalty card/store issued card (for outbreak investigation only) Show/Hide

This section is only for use in some specific outbreak situations, with client consent. It is not a routine question for sporadic cases.

Has the client given consent (written or verbal)?
- ○ Yes
- ○ No
- ○ Not applicable

Loyalty card details (names and numbers)

Interviewer Details and Notes Show/Hide

Interviewer Name

Interview date: 9/25/2018

Any special notes regarding this interview

Orbeon Forms Orbeon Forms 4.9.0.201505052329 CE

Enteric Illness

Trichinosis

Notification Timeline

From Lab/Practitioner to Public Health: Within 48 hours.

From Public Health to Saskatchewan Health: Within 2 weeks.

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

Information

Case Definition (Alberta Health and Wellness, 2011)

Confirmed Case	Clinical illness[1] with laboratory confirmation of infection: • demonstration of *Trichinella* species larvae in tissue obtained by muscle biopsy **OR** • positive serologic test for *Trichinella* sp. **OR** • demonstration of larvae in epidemiologically implicated food (meat).
Probable Case	Clinical illness[1] in a person who is epidemiologically linked to a confirmed case.
[1]Symptoms depend on the stage of the lifecycle. Adult worms in the intestine cause diarrhea, abdominal cramps and vomiting, while systemic invasion by larvae result in fever, myalgia/myositis, periorbital edema and eosinophilia. Systemic symptoms are more common.	

Causative Agent (Heymann, 2008)

- Infection caused by an intestinal nematode (roundworm), *Trichinella spiralis* whose larvae migrate from the small intestine and become encapsulated in skeletal muscle. There has been an outbreak in Saskatchewan due to the species *T. nativa* which is the causative organism in most of the arctic sources (such as bear, seal and walrus meat).
- Species for other specific geographic locations are *T. britovi* (Palaearctic), *T. nelsoni* (Africa) and *T. pseudospiralis* in other parts of the world.

Symptoms (Heymann, 2008)

- Depending on the number of larvae ingested, clinical spectrum of infection may range from asymptomatic to fulminant and fatal illness.

- Characteristic early signs include sudden muscle soreness and pain, fever, and edematous upper eyelids. These symptoms can be followed by periorbital edema which may be associated with subconjunctival, subungual and retinal haemorrhages, pain and photophobia. Ocular signs can be followed by thirst, profuse sweating, chills, weakness, prostration and rapidly escalating eosinophilia.
- Gastrointestinal symptoms, such as diarrhea may precede the ocular symptoms.
- Cardiac and neurological complications may appear and in the most severe cases, death due to myocardial failure.

Incubation Period
Systemic symptoms usually appear about 8 to 15 days after eating infected meat; may vary by as much as 5-45 days depending on number of larvae ingested (Heymann, 2008).

Reservoir/Source
Infected meat from swine, dogs, cats, horses. Wild animal sources include rats, moose, bear (black, brown, and polar), wild boar, fox, wolf, cougar and arctic marine mammals. Tropical animals such as lions, leopards, hyenas, jackals and crocodiles can also be sources of infected meat (Heymann, 2008).

Mode of Transmission
- Eating raw or insufficiently cooked meat from infected animals; the intestinal roundworm's larvae migrate from the small intestine and become encapsulated in skeletal muscle (Heymann, 2008).
- Not transmitted from person to person.

Period of Communicability
Animal hosts are infective for months. Larvae remain viable in meat unless it is cooked, irradiated or, for some species, frozen (Heymann, 2008).

Specimen Collection and Transport
Blood for serology. Skeletal muscle biopsy performed at least 10 days and preferably 4 to 5 weeks post infection frequently confirms diagnosis by showing uncalcified parasitic cysts.

Refer to the Saskatchewan Disease Control Laboratory Compendium of Tests for details at http://sdcl-testviewer.ehealthsask.ca.

Methods of Control/Role of Investigator

Prevention and Education

Refer to the Enteric Introduction and General Considerations section of the manual that highlights tops for client education that should be considered as well as provides information on high-risk groups and activities. Heymann (2008) identifies the following preventive measures:

- Educate the public regarding the need to thoroughly cook all pork products and meat from wild animals. All parts of the meat need to reach a temp of 71°C (160°F).
- Freezing infected meat, such as pieces of pork up to 15 cm (6 inches), at -15°C for 30 days or -25°C for 10 days will destroy the common types of cysts.
- Freezing wild game meats, unlike freezing pork products, even for long periods of time, may not effectively kill all worms. Arctic strains (*T. nativa* and possibly *T. britovi*) are unaffected by cold and need to be thoroughly cooked at more than 68°C (155°F) for a duration related to the thickness of the meat.
- Clean and sanitize meat grinders thoroughly if you prepare your own ground meats.
- Curing (salting), drying, smoking, or microwaving meat does not consistently kill infective worms.
- Feeding pigs or other wild animals uncooked meat/garbage perpetuates the cycle of infection.

Management

I. Case

History

- Determine history of ingestion of raw or undercooked meat, particularly pork or wild game.
- Dispose of any remaining suspected food.
- Determine where the infected food was purchased or obtained from.

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 (MHO). See Appendix H - Sources for Clinical Treatment Guidelines.

Treatment should begin as soon as possible with the decision to treat based upon symptoms, exposure to raw or undercooked meat, and laboratory test results.

Exclusion
Not required.

Referrals
None.

II. Contacts/Contact Investigation

Contact Definition
Individuals who consumed the infected meat.

Testing
As determined by the physician.

Prophylaxis
Persons known to have ingested the suspected contaminated meat should be referred to the physician for appropriate treatment.

Immunization
Not applicable.

Exclusion
Not required.

III. Environment

Child Care Centre Control Measures/Institutional Control Measures

Investigate possible sources of contaminated meats. Ministry of Health officials notify Canadian Food Inspection Agency when cases involve domestic pork.

Epidemic Measures

Large numbers of infected people requires epidemiological study to determine common food involved.

References

Alberta Health and Wellness. (2011). *Alberta public health notifiable disease management guidelines: Trichinosis.* Retrieved March, 2012 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.

Centers for Disease Control and Prevention. (2008). *Trichinosis - CDC fact sheet*. Retrieved March, 2012 from http://www.cdc.gov/parasites/trichinellosis/index.html.

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.

Wilson, W. R., & Sande, M. A. (2001). *Current diagnosis and treatment in infectious diseases.* New York, NY: Lange Medical Books/McGraw-Hill.

Enteric Illness

Typhoid Fever

Notification Timeline:

From Lab/Practitioner to Public Health: Immediate.
From Public Health to Ministry of Health: Within 2 weeks (or immediately if an outbreak is suspected).

Public Health Follow-up Timeline: Within 24-48 hours.

Information

Case Definition

Confirmed Case (Public Health Agency of Canada, 2009)	Clinical illness[1] with laboratory confirmation of infection: • isolation of *Salmonella enterica* serovar Typhi from an appropriate clinical specimen.
Probable Case	Clinical illness[1] in a person who is epidemiologically linked to a confirmed case.
Chronic Carrier (Health Protection Agency, 2012)	Individuals whose stool specimens continue to be positive for 12 months.
[1]Clinical illness is characterized by insidious onset of sustained fever, headache, malaise, anorexia, splenomegaly, constipation or diarrhea, and nonproductive cough. Relative bradycardia and rose spots (less than 25% of individuals) may be seen. Atypical presentations occur, and the severity of the illness varies. Chronic carrier state (< 5% of population) is usually linked to the biliary or urinary tract and should be distinguished from short-term fecal carriage.	

Causative Agent

Salmonella enterica serovar Typhi (commonly known as *S. typhi*) is a rod-shaped, non-sporeforming, gram-negative bacteria. Phage typing can further identify types of *S. typhi.*

Symptoms

- *S. typhi* can cause a protracted bacteremic illness.
- Typically, the onset of illness is gradual, with manifestations such as sustained fever, and constitutional symptoms (i.e., marked headache, malaise, anorexia, and lethargy).
- Additional manifestations include abdominal pain and tenderness, hepatomegaly, splenomegaly, non-productive cough in the early stage of the illness, relative bradycardia, rose spots on the trunk, and change in mental status.

- Enteric fever can manifest as a mild, nondescript febrile illness in young children, in whom sustained or intermittent bacteremia can occur.
- Constipation is more common than diarrhea in adults (Heymann, 2015).
- Unapparent or mild illnesses occur, especially in endemic areas; 60%-90% of patients with typhoid fever do not receive medical attention or are treated as outpatients. Mild cases show no systemic involvement; the clinical picture is that of a gastroenteritis. Non-sweating fevers, mental dullness, slight deafness and parotitis may occur (Heymann, 2015).
- Peyer patches in the ileum can ulcerate, with intestinal hemorrhage or perforation (about 3% of cases), especially late in untreated cases. Severe forms with altered mental status have been associated with high case-fatality rates (Heymann, 2015).
- Depending on the antimicrobials used, 15%-20% of patients may experience relapses (generally milder than the initial clinical illness) (Heymann, 2015).
- The case-fatality rate of 10%-20% observed in the pre-antibiotic era can fall below 1% with prompt antimicrobial therapy.

Incubation Period
The incubation period depends on the inoculum size and on host factors; from 3 to 60 days, typically between 8 to 14 days (Heymann, 2015).

Reservoir/Source
S. typhi is found only in humans. Although uncommon in Canada[1], typhoid fever is endemic in many countries. A carrier state may follow acute illness, mild or even sub-clinical infections.

- In most parts of the world, short-term fecal carriers are more common than urinary carriers. Family contacts may be transient or permanent carriers.
- The chronic carrier state is most common (2%-5%) among persons infected during middle age, especially women; carriers frequently have biliary tract abnormalities including gallstones, with *S. typhi* located in the gallbladder. The chronic urinary carrier state may occur with schistosome infections or kidney stones (Heymann, 2015).

Mode of Transmission (Heymann, 2015)

- Ingestion of food and water contaminated by feces and urine of patients and carriers.

[1] Usually in returning international travellers.

- Important vehicles in some countries include shellfish (particularly oysters) from sewage-contaminated waters, raw fruit and vegetables grown in soil fertilized with fecal material and contaminated milk/milk products (usually contaminated through hands of carriers), and untreated drinking water.
- Flies may contaminate foods in which the organism then multiplies to infective doses (although less than for paratyphoid bacteria).
- Epidemiological data suggest that waterborne transmission of *S. typhi* usually involves small inocula, however food-borne transmission is associated with large inocula and high attack rates over short periods.
- Sexual transmission of typhoid fever from an asymptomatic carrier has been documented.

Individuals and Occupations with High Risk of Transmission

- Food handlers whose work involves:
  - touching unwrapped food to be consumed raw or without further cooking; and/or
  - handling equipment or utensils that touch unwrapped food to be consumed raw or without further cooking.
- Healthcare, daycare or other staff who serve food to highly susceptible patients or persons, in whom an intestinal infection would have particularly serious consequences.
- Individuals involved in patient care or care of young children, elderly, or dependent persons.
- Children attending daycares (or similar facilities) who are diapered or unable to implement good standards of personal hygiene.
- Older children or adults who are unable to implement good standards of personal hygiene (e.g., mentally or physically challenged).

Period of Communicability

Typhoid is communicable as long as the bacilli appear in excreta, usually from the first week throughout convalescence; variable thereafter. About 10% of untreated typhoid fever patients will discharge bacilli for three months after onset of symptoms (Heymann, 2015). [2]

[2] Treated and untreated cases can become chronic carriers.

Specimen Collection and Transport
S. typhi can be isolated from the blood early in the disease, and from urine and feces after the first week. The sensitivity of blood culture may be less than 70%, particularly if antibiotics have been administered prior to collection of specimens (Farooqui et al, 1991; Gilman et al, 1975).

Bone marrow culture provides the best bacteriologic confirmation (90% to 95% recovery) even in persons who have already received antibiotics (Heymann, 2015). Culture of rose spots, if present, also has a higher diagnostic yield than blood culture (Gilman et al., 1975).

For stool samples, 2 gm (or 2 mL) of stool should be collected without contaminating with urine. It should immediately be added to Cary-Blair transport medium and mixed thoroughly.

Bloody and or/liquid stools collected within 48 hours of onset of symptoms have the highest yield of enteric pathogens (collection of stool beyond 6 days results in poor yields). One stool specimen for three consecutive days should be collected and submitted (Saskatchewan Disease Control Laboratory, 2009).

Serology is unreliable (Wain et al, 2015).

Refer to the Saskatchewan Disease Control Laboratory Compendium of Tests for details at http://sdcl-testviewer.ehealthsask.ca.

Methods of Control/Role of Investigator

Prevention and Education
Refer to the Enteric 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 importance of personal hygiene including handwashing, safe food handling and safe drinking water.

- Educate food handlers about the importance of hand washing, refrigeration, proper cooking practices, avoiding recontamination, maintaining a sanitary kitchen, and protecting prepared foods from contamination (including controlling contamination by flies).
- Safer sex practices.
- Educate about safe recreational water sources and the importance of not swallowing water from ponds, lakes, or untreated pools.
- Educate individuals about the importance of not going to work or sending children to daycare when they are experiencing diarrheal illness.
- Counselling of susceptible individuals traveling to intermediate or high endemic areas regarding safeguarding themselves from infection.

Immunization

- Travellers should see travel advice and vaccines from an appropriate travel health consultant.
- Typhoid immunization is recommended for laboratory personnel regularly working with *S. typhi* in clinical or research laboratories. Technicians working in routine microbiology laboratories do not need to be vaccinated.

Management

1. Case

History

Efforts should be made to identify the source by taking into consideration the reservoir, mode of transmission, incubation period, and the onset of illness. Assessment should include:

- history of travel to endemic countries[3] or history of contact with individuals who have travelled to endemic countries or are infected with *S. typhi*;
- recent immigration from an endemic country;
- food history including consumption of shellfish;
- history of high risk sexual practices especially those involving contact with feces;
- history of residing in areas with poor sanitation including improper water treatment and sewage disposal;
- determine immunization history;

[3] There is a higher risk of typhoid fever in countries or areas with low standards of hygiene and water supply facilities.

- identify underlying medical conditions (i.e., decreased gastric acidity, HIV infection, organ transplantation, and lymphoproliferative disease).

Determine risk of transmission and exposure to others:
- determine if attendance at daycare/dayhome or other type of institutional contact;
- determine if case falls into category of individuals and occupations with high risk of transmission.

Identify household and other close contacts (e.g., travel companions). See Contact Definition.

Immunization
- Routine typhoid immunization is not recommended in Canada.
- Refer to the Canadian Immunization Guide for additional information about typhoid vaccines.[4]

Education
Cases should be informed about the modes of disease transmission and information must be shared as follows:
- the importance of hand washing should be stressed;
- the case must not prepare food for others during their period of communicability;
- the case may be excluded from work – see Exclusion;
- safer sex practices.

Treatment/Supportive Therapy
- Treatment choices are governed by the most recent guidelines.
- Antibiotic resistance is increasing. Antibiotic treatment should be based on antimicrobial susceptibility testing.
- Management of chronic carriers should be discussed with an infectious disease specialist as required.
- The public health practitioner should direct any questions regarding the current treatment protocols to the physician/nurse practitioner or Medical Health Officer. See Appendix H - Sources for Clinical Treatment Guidelines.
- Patients with concurrent schistosomiasis must also be treated with praziquantel to eliminate possible carriage of *S. typhi* bacilli by the schistosomes.

[4] http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-typh-eng.php.

Exclusion[5]

Cases should be excluded until three consecutive negative stool specimens (obtained 24-48 hours apart) have been provided. The stool specimens should not be collected until:

- 24 hours after appropriate antibiotic therapy has been completed
  AND
- stools have returned to normal for the individual.

If one of the stool specimens is positive for *S. typhi*, the individual should be excluded from high risk occupations and be treated as a convalescent carrier (the same treatment as a case).

Following treatment of the convalescent carrier, monthly samples should be obtained. If any one of the monthly specimens are negative, two more negative specimens are required (obtained 24-48 hours apart) before the exclusion criteria is lifted.

The case will be considered a chronic carrier if samples continue to be positive for 12 months. Exclusion from high risk occupations is warranted. Redeployment from high risk activities/occupations should be considered.

Referrals

Refer to public health inspection if source cannot be identified and transmission continues.

Referral to an infectious disease specialist may be considered.

II. Contacts/Contact Investigation

Contact Definition

Contacts include:

- persons living in the household;
- individuals exposed to the same source (i.e., travel companions to the endemic area);
- sexual contacts;
- children and childcare workers in a daycare/dayhome;

[5] The exclusion criteria for cases infected with typhoid and their contacts is inconsistent in the literature and in published guidelines. The approach incorporated in this manual takes into consideration practical aspects as well as the public health implications. References include Heymann (2015), British Columbia Center for Disease Control, Alberta Health, and Health Protection Agency.

- healthcare workers who have provided personal care for a case.

Education

- Advise contacts of the importance of seeking medical care should symptoms develop.
- Advise contacts of prevention and control measures and the requirement to follow exclusion criteria as applicable.

Prophylaxis/Immunization

Selective immunization should be considered for people with ongoing household or intimate exposure to an *S. typhi* carrier (Canadian Immunization Guide, 2012).

Exclusion

- Symptomatic contacts should be managed and excluded as a case.
- Asymptomatic contacts involved in high-risk occupations and settings should submit a stool specimen and be excluded from these settings until results of stool specimen are available.
  - Those with positive stool specimens should be managed and excluded as a case.
  - Those with negative stool specimens require no further exclusion.

III. Environment

Child Care Centre Control Measures

- Strict enforcement of infection control measures. Refer to Saskatchewan Ministry of Health Infection Control Manual for Day Care Facilities.[6]
- Interview the operator of the daycare and check attendance records to identify suspect cases that may have occurred during the previous month.
- If other confirmed or suspected cases have occurred, collect stool specimens from all staff members and children who are symptomatic or who have had diarrhea during the previous 2 weeks.
- If other possible cases are identified, facility to be inspected by public health inspector.
- Instruct the operator to notify public health immediately if new cases of diarrhea occur.

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

- Call or visit once each week for 2 weeks after onset of the last case to verify that surveillance and appropriate hygienic measures are being carried out.

Institutional Control Measures

- Consult with the infection control practitioner for the facility. Determine if there have been any unusual incidents of typhoid-compatible illness within the past month. If so, investigation for possible common-source outbreaks or any continuing sources of exposure.
- In addition to standard precautions, contact precautions are used with a case of *S. typhi*.

Epidemic Measures

- Promptly report any groups of cases of acute diarrheal disease to the local medical health officer, even in the absence of specific identification of the causal agent. Immediate reporting to the Ministry is required if a cluster or outbreak is suspected.
- Investigate water, food, and milk supplies.
- Use general sanitation measures.
- Prophylactic administration of antibiotics is not recommended.
- Typhoid vaccine is not recommended for the control or containment of outbreaks in Canada.
- Publicize the importance of handwashing after defecation.

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Enteric Illness

Yersiniosis

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 (American Academy of Pediatrics, 2009)

Confirmed Case of ***Yersinia enterocolitica***	Clinical findings consistent with enterocolitis and isolation of *Yersinia enterocolitica*, usually from a stool culture but may be from throat swab, blood, peritoneal fluid, synovial fluid, bile, urine, cerebrospinal fluid, sputum, wounds, and/or mesenteric lymph nodes.

Note: Only *Y. enterocolitica* is a notifiable disease in Saskatchewan. Yersiniosis is not a nationally notifiable disease.

Confirmed Case of ***Yersinia psuedotuberculosis*** (not reportable in Saskatchewan)	Clinical findings consistent with pseudotuberculosis and isolation of *Yersinia pseudotuberculosis* from stool cultures and also from throat swabs, mesenteric lymph nodes, blood, and/or peritoneal fluid. *Y. pseudotuberculosis* causes an acute mesenteric lymphadenitis, clinically characterized by an appendicitis-like syndrome, sometimes with diarrhea.

Causative Agent

- *Yersinia enterocolitica* (*Y. enterocolitica*) or *Yersinia pseudotuberculosis* (*Y. pseudotuberculosis*); both are gram negative bacilli.
- *Y. enterocolitica* is not part of the normal human flora.
- *Y. enterocolitica* can multiply under refrigeration and micro-aerophilic conditions (requires oxygen but at a lower concentration than is present in the atmosphere).

Symptoms

- *Y. enterocolitica* is most often linked with gasteroenterocolitis and can cause acute watery diarrhea, with leucocytes, blood and mucus in the stool, fever, headache, anorexia, and vomiting.
- *Y. pseudotuberculosis* presents with abdominal pain, adenitis, appendicitis, or terminal ileitis.

Incubation Period

Usually 3-7 days; generally under 10 days.

Reservoir/Source

- Animals. The pig is the main reservoir for *Y. enterocolitica*. *Y. pseudotuberculosis* is found in rodents and other small mammals.
- Outbreaks of *Y. enterocolitica* have been attributed to soybean cake (tofu), pork chitterlings (large intestines), contaminated milk, and bean sprouts.
- Strains of *Y. enterocolitica* can be found in meats (pork, beef, lamb, etc.), oysters, fish, and raw milk. The exact cause of the food contamination is unknown. However, the prevalence of this organism in the soil and water and in animals such as pigs, beavers, and squirrels, offers ample opportunities for it to enter our food supply.
- *Y. enterocolitica* is able to multiply under refrigeration and microaerophilic conditions.

Mode of Transmission

- Fecal-oral transmission through the consumption of contaminated food and water, or contact with infected persons or animals (Heymann, 2008).
- *Y. enterocolitica* infection is most often associated with ingestion of contaminated food (raw or inadequately cooked pork products, tofu, and unpasteurized milk) (American Academy of Pediatrics, 2009).
- Transmission by transfusion of stored blood from donors who were asymptomatic or had mild gastrointestinal illness (American Academy of Pediatrics, 2009).
- Person-to-person transmission is rare (American Academy of Pediatrics, 2009).
- Poor sanitation and improper food handling techniques by food handlers, including improper storage, cannot be overlooked as contributing to contamination and possible transmission.

Risk Factors/Risk Groups

- Those most at risk for disease and possible complications are the very young, the debilitated, the elderly and immunocompromised individuals.
- People with excessive iron storage syndromes have a higher susceptibility to *Yersinia* bacteremia because the iron binding agents enhance the growth of the organism.

Period of Communicability

- There is fecal shedding at least as long as symptoms exist, usually for 2-3 weeks; if untreated shedding may persist for 2-3 months.
- Prolonged asymptomatic carriage has been reported in both children and adults.

Specimen Collection and Transport

Submit stools in Cary-Blair transport media. Submit three or four spoonfuls (using built-in spoon) of liquid stool and mix thoroughly with the semi-solid Cary-Blair transport media. The final mixture should not fill the Cary-Blair container any more than three-quarters full. Blood cultures should be submitted if patient is septic. Refer to the Saskatchewan Disease Control Laboratory Compendium of Tests for further details at http://sdcl-testviewer.ehealthsask.ca.

Methods of Control/Role of Investigator

Prevention and Education

Refer to the Enteric 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.

- Provide public education about personal hygiene, especially the sanitary disposal of feces and careful hand washing after defecation, and before and after food handling, especially after handling pork or before eating food.
- Educate food handlers about proper food and equipment handling and hygiene, especially in avoiding cross-contamination from raw meat products and thorough hand washing.
- Educate about the risk of sexual practices that permit fecal-oral contact.
- Test private water supplies for presence of bacterial contamination, if suspected.

- Educate the public on the dangers of consuming raw or undercooked meats, unpasteurized milk and contaminated water.

Management

I. Case

History

- Determine possible source of infection taking into consideration the incubation period, reservoir, and mode of transmission. Assessment may include:
  - determining ingestion of potentially contaminated food (especially pork) or water and the time of consumption;
  - determining contact with animals;
  - assessing for history of high risk sexual practices, especially contact with feces;
  - obtaining a food history;
  - identifying history of recent travel.
- Assess for history of residing in areas with poor sanitation including improper water treatment and sewage disposal and include recent immigration.
- Assess for history of similar symptoms in other members of the household.
- Obtain implicated food samples, if possible.
- Suspected contaminated food may be held to prevent consumption.
- Suspected contaminated food may be destroyed.

Immunization

Not applicable.

Treatment/Supportive Therapy

- Yersiniosis is often self-limited.
- Antibiotics may shorten the duration of symptoms and are especially important for septicaemia or other invasive disease. 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 (MHO). See Appendix H - Sources for Clinical Treatment Guidelines.
- Antibiotic resistance has been demonstrated.

Exclusion

Exclusion should be considered for symptomatic persons who are:

- Food handlers, health care, childcare or other staff involved with personal care, children below the age of five years in childcare: Exclude until diarrhea has resolved.
- Older children and adults unable to maintain adequate standards of personal hygiene (i.e., mentally or physically handicapped): Exclude until diarrhea has resolved. If the individual is living in an institution, follow contact precautions until diarrhea has resolved.
- Diarrhea is considered to be resolved when stools have been normal for that individual for 48 hours.

Referrals

Refer to public health inspection if source cannot be identified and transmission continues, or if food source suspected.

II. Contacts/Contact Investigation

Contact Definition

Contacts include:

- persons living in the household;
- children and childcare workers in a day care/day home;
- individuals exposed to the same source (if it is identified).

Testing

Symptomatic contacts should be assessed by a physician.

Prophylaxis/Immunization

Not applicable.

Exclusion

- Symptomatic contacts, in high-risk environments, may be excluded until diarrhea has resolved.
- Asymptomatic contacts are not excluded from work or day care.

III. Environment

Child Care Centre/Schools Control Measures

Refer to Saskatchewan Ministry of Health Infection Control Manual for Child Care Facilities.[1]

Health Facilities Control Measures

Refer to your Health Authority Infection Control Manual. Contact precautions should be used in healthcare setting where children or adults have poor hygiene or incontinence which cannot be contained.

Epidemic Measures

- Any group of cases of acute gastroenteritis or cases suggestive of appendicitis must be reported at once to the MHO, even in the absence of specific causal identification.
- Investigate general sanitation and search for common-source vehicle; pay attention to consumption of (or possible cross-contamination with) raw or undercooked pork; look for evidence of close contacts with pet dogs, cats and other domestic animals.

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

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