5 FOOD AND WATER BORNE

Food and water borne diseases are caused by many different pathogens (e.g. bacteria, viruses, protozoa, parasites) and/or their toxins, or by chemicals. Most cases of illness occur sporadically with no associations to other cases. However, every sporadic case of illness should be regarded as having the potential to be part of an unrecognized cluster or outbreak.

5.1 Transmission

Food and water borne infections usually cause enteric illness and are spread by the faecal-oral route. Direct transmission can occur when faecal material contacts mucous membranes (eyes, nose, and mouth) of a susceptible host. Indirect transmission can occur by contact with contaminated inanimate objects (for example environmental surfaces contaminated with faecal material) or through food or water contaminated with faecal material, and through biological products (for example Hepatitis A and blood). Cross contamination of food or water from contaminated foods can occur during food handling. Animal vectors (for example rodents and cockroaches) can also transfer pathogens by mechanical spread.

5.2 Risk Factors

The following individuals or risk factors may be associated with increased risk of spreading illness:

- Food handlers (work includes touching food during preparation, cooking food, or touching unwrapped foods to be consumed without further cooking).
- Caregivers (healthcare or childcare) who have direct contact with or contact through serving food to a susceptible population at increased risk of severe illness.
- Children less than 5 years of age, and older children and adults who are unable to implement good standards of personal hygiene.
- Circumstances where hygienic arrangements may be unreliable, for example temporary camps housing displaced persons.

The following risk factors may be associated with increased risk of acquiring illness or severe illness:

- The elderly.
- Infants and children under 5 years of age.
- Pregnant women.
- Persons who are immunocompromised.

5.3 Diagnosis and Laboratory Guidelines

Regional Laboratories:

- Process clinical samples (usually stool samples but other samples can be tested, for example blood).
- Perform pathogen isolation and basic identification techniques.
- Perform antimicrobial susceptibility testing, if applicable.

- Send enteric isolates to the Enteric Reference Laboratory for further characterization, if necessary.
- Refer isolates to external laboratories for testing not available locally.
- Report their data to Regional Public Health.

Enteric Reference Laboratory (Saint John Regional Hospital):

- The microbiology laboratory of the Saint John Regional Hospital is the New Brunswick reference center for enteric diseases. It has advanced identification and typing techniques for a variety of bacterial enteric pathogens.
- Perform advanced serotyping for *Salmonella*, *Shigella* and *Escherichia coli* O157: H7.
- Perform molecular typing using pulse field gel electrophoresis (PFGE) on *Salmonella* and *E. coli* O157:H7 isolates.
- Participates in the federal Pulse-Net Canada and National Enteric Surveillance Program (NESP). It is usually the main contact point for National Microbiology Laboratory or out of province referrals for bacterial enteric diseases. The reference laboratory also receives all enteric isolates from the regional labs and is responsible to send the laboratory data to the CDC Branch.
- Participates on Whole Genome Sequencing (WGS). This method produces detailed data in a shorter timeframe and improves detection of outbreaks and characterization of pathogens.

Laboratory Guidelines:

- Collect stool samples per current regional laboratories procedures.
- Submit samples to regional laboratories.

Please refer to disease specific guidelines for additional information on laboratory guidelines or your local laboratory.

5.4 Prevention

Education

Educate cases and contacts (for example household) about the specific disease, symptoms, diagnosis, period of communicability, and applicable preventative measures including care with food and water during travel to less developed countries. If required inform persons of any prophylaxis and/or exclusion measures (refer to specific disease guidelines).

Prevention Messages:

- Enteric Disease Precautions
- Hand washing
- Food Safety
- Environmental Management
- Safe Water Source
- Animal Handling

More information is in the prevention messages section.

For food service establishments and food handlers, consider Food Safety Training where applicable.

Immunization

Hepatitis A and Typhoid are vaccine preventable diseases. Encourage vaccination for persons travelling to endemic regions or high risk occupations.

For immunization as a public health measure see Case Management sections and individual specific disease guidelines.

5.5 Case Management

Investigation

Investigations of enteric illness should start as soon as reasonably possible after notification by laboratory or physician. In general, follow up allows for prevention of further infections from the case or from the source, identification of other cases among close contacts, identification of high risk for transmission (food handlers and caregivers), preventing the case from suffering similar illness in the future, and identifying enteric illness clusters or outbreaks.

Provide advice and education to cases about symptoms, communicability period, and applicable preventative measures. Advise cases to consult with a health care provider as needed.

A food borne illness cluster/outbreak: two or more persons experience a similar illness (usually gastrointestinal) after ingestion of a common food and epidemiological analysis and evidence implicates the common food as the source of illness (known or unknown etiology).

A water borne illness cluster/outbreak: two or more persons experience a similar illness (usually gastrointestinal) after ingestion of water or contact with water used for recreational purposes (for example swimming pools, lakes, hot tubs) and epidemiological analysis and evidence implicates the water as the source of illness (known or unknown etiology),

Most often during enteric illness investigations, two or more cases are related by time and place, but the epidemiological analysis and evidence do not implicate either food or water as the potential source. Differentiation between enteric illness caused by person-to-person transmission or from environmental exposure can be difficult.

Consider the following questions:

- Were any potentially contaminated foods consumed raw or inadequately cooked?
- Are food preparation procedures and hygienic practices adequate to prevent cross contamination?
- Did an individual in a high-risk group (for example food handler) have symptoms?
- What happened to the food after cooking and was there potential for contamination?

Exclusion/Social Distancing

All cases of gastroenteritis should be regarded as potentially infectious.

Consider risk of serious illness, risk of transmission, susceptible population; and assess occupational risk (for example food handlers and caregivers) or risk of continued presence in early learning and childcare (ELC) facilities/schools to determine if temporary exclusion is necessesary to prevent further transmission. In general, sporadic cases of undiagnosed gastroenteritis (vomiting/diarrahea) and cases of diseases that pose a low risk are excluded until asymptomatic. Cases of diseases that pose a low/medium risk are generally excluded until asymptomatic for at least 48 hours. Cases and symptomatic contacts of diseases that pose a medium/high risk are generally excluded until asymptomatic for 48 hours or until microbiological clearance is obtained. Cases, symptomatic and asymptomatic contacts of diseases that pose the highest risk are generally excluded until microbiological clearance is obtained.

If antidiarrheal medications are taken taken, exclusion criteria apply after cessation of medications.

Advice for cases who work at swimming pools or hot tubs is generally exclusion from being in the water until 48 hours after resolution of symptoms. For parasitic diseases that form cysts (giardia and cryptosporidiosis), the general recommendation is exclusion for two weeks after resolution of symptoms.

See school exclusion guidelines.

See exclusion periods for food handlers and caregivers with enteric illness. These are recommendations for exclusion periods. Individual circumstances may dictate shorter or longer exlusion periods, specific requirements for return to work (for example stool sample), or reassignment to a low risk setting as an appropriate alternative to excludion from work. These situations should be discussed with the Regional Medical Officer of Health.

Assessment - Food Handler:

- Assess if case worked while contagious.
- Ascertain if there are other workplace cases. If so, exclude any symptomatic worker.
- Assess food handling practices based on Hazard Analysis Critical Control Point (HACCP) principles. Educate food handlers in proper food handling practices.
- Assess individual's personal hygiene practices, knowledge, and awareness and consider individual's ability to maintain good hand washing and food safety practices. If inadequate personal hygiene consult with RMOH regarding exclusion period (microbiolgical clearance may be required at RMOH discretion).
- Consider exclusion from work.

Assessment - Caregivers (early learning and childcare facilities, elderly, special needs, healthcare, et cetera):

- Assess if case worked while contagious.
- Ascertain if there are other workplace cases. If so, exclude any symptomatic worker.
- Assess individual's personal hygiene practices, knowledge, and awareness and consider individual's ability to maintain good hand washing and food safety practices. If inadequate personal hygiene consult with RMOH regarding exclusion period (microbiolgical clearance may be required at RMOH discretion).
- Ascertain whether there are any ill clients or children; isolate and exclude any symptomatic persons.
- Assess infection control policy and procedures for effectiveness. Recommend review/enhancements if required. Provide information and educational resources as necessary.
- Consider exclusion from work.

Assessment- Child in early learning and childcare facility or school:

- Children below the age of five years attending early learning and childcare facilities: determine risk of illness spreading and consider exclusion recommendation to remain home until symptom free for 48 hours. Longer periods may be required for some pathogens, consult with RMOH as necessary.
- Children attending school: determine risk of illness spreading and consider exclusion recommendation per school exclusion guidelines.

Treatment

Persons with diarrhea should drink plenty of liquids to avoid dehydration, stay home when ill, and practice good personal hygiene including hand washing.

Treatment may be provided as needed and directed by a health care provider.

Immunization

Not applicable in general, refer to Hepatitis A disease specific guideline.

It may be necessary to exclude persons with enteric illness from work to prevent transmission to other individuals. Considerations include potential risk for serious illness, vulnerability of exposed population, and behaviours of infected individuals. The following are recommended exclusion periods. Consult with Regional Medical Officer of Health on individual situations as necessary.

Risk		Disease	Case	Symptomatic Contact	Asymptomatic Contact
LOW	No person to person transmission	Botulism	Until well enough to return	no	no
		Listeriosis	Until well enough to return	no	no
		Staphylococcus aureus	Until purulent skin lesions have healed.	no	no
MEDIUM	Disease generally less severe and person to person transmission low	Cholera 01/0139	Until asymptomatic and 2 consecutive negative stool cultures, collected not less than 24 hours apart		no
		Cholera non 01/0139	Until asymptomatic for at least 48 hours		no
		Campylobacteriosis	Until asymptomatic for at least 48 hours		no
		Cryptosporidiosis	Until asymptomatic for at least 48 hours		no
		Norovirus	Until asymptomatic for at least 48 hours		no
		Yersiniosis	Until asymptomatic for at least 48 hours		no
HIGH	Disease may be severe, food/water or person to person transmission, and infective dose may be very low	Giardiasis	Until asymptomatic for at least 48 hours		no
		Hepatitis A	Dependent on symptoms, usually for at least 7 days after onset of jaundice		no
		Escherishia coli (pathogenic) infection	Until asymptomatic and 2 consecutive negative stool cultures, collected not less than 24 hours apart, and at least 48 hours after antibiotic treatment		
		Salmonellosis	Until asymptomatic for at least 48 hours, and, if taking anti-diarrheal medications, at least 48 hours after treatment		
		Shigellosis	*Shigella sonnei* until asymptomatic for at least 48 hours.		
			Shigella dysenteriae, *flexneri*, *boydii* until asymptomatic and 2 consecutive negative stool cultures, collected not less than 24 hours apart, and at least 48 hours after antibiotic treatment		
		Typhoid	*Salmonella typhi* and *Salmonella paratyphi* until asymptomatic and 3 consecutive negative stool cultures, collected at least 1 week apart, and at least 2 weeks after antibiotic treatment and not earlier that one month after onset of illness		
		Paratyphoid			

5.6 Contact Management

Investigation

Collect required informaton by conducting contact interviews. Interview contacts to determine nature of contact with the case, susceptibillity to the disease, risk for severe illness; and if working in or attending a high risk setting. Household contacts are defined as persons residing in the same residence. Close contacts include sexual contacts and persons who have contact that may be fecal-oral (for example sharing meals the case cooked).

Provide advice and education to symptomatic contacts about symptoms, communicability period, and applicable preventative measures. Advise symptomatic contacts to consult with a health care provider as needed.

Where necessary, provide stool specimen kits to symptomatic contacts that are close contacts of a case and/or who are an individual in a high-risk group, for example involved in food handling, direct patient care or care for children or elderly in an institutional setting. If antibiotics were administered, stool specimens need to be taken at least 48 hours after completing antibiotics.

Exclusion/Social Distancing

Consider the risk of serious illness, risk of transmission, and susceptible population, and assess occupational risk (food handlers and caregivers) or continued presence in early childhood and learning facilities/schools and determine if temporary exclusion of symptomatic and asymptomatic conacts are necessesary to prevent further transmission. See Case Management and exclusion periods for food handlers and caregivers with enteric illness and school exclusion guidelines.

Prophylaxis

Not applicable in general, refer to Hepatitis A disease specific guideline.

Immunization

Immunization of Hepatitis A contacts could be considered, refer to disease specific guideline.

5.7 Outbreak Management

A food borne illness cluster/outbreak is when two or more persons experience a similar illness (usually gastrointestinal) after ingestion of a common food and epidemiological analysis and evidence implicates the common food as the source of illness (known or unknown etiology).

A water borne illness cluster/outbreak is when two or more persons experience a similiar illness (usually gastrointestinal) after ingestion of water or contact with water used for recreational purposes (eg. swimming pools, lakes, hot tubs) and epidemiological analysis and evidence implicates the water as the source of illness (known or unknown etiology).

Most often during enteric illness investigations, two or more cases are related by time and place, but the epidemiologic analysis and evidence do not implicate either food or water as the potential

source. Differentiation between enteric illness caused by person-to-person transmission or from environmental exposure can be difficult.

Consider the following questions:

- Were any potentially contaminated foods consumed raw or inadequately cooked?
- Are food preparation procedures and hygienic practices adequate to prevent cross contamination?
- Did an individual in a high risk group (for example food handler) have symptoms?
- What happened to the food after cooking and was there potential for contamination?

Investigation

Activate local outbreak plan when outbreak is declared.

Conduct interviews as soon as possible and obtain food and water samples early. Plan and conduct on-site inspections to identify potentially contributing factors (food, water and environmental). Characterization of organisms, for example whole genome sequencing (WGS), pulsed field electrophoresis (PFGE) or phage typing, can help identify linked patterns.

Source risk factor - water:

- Assess plausible link to water (including ice).
- Determine if water consumed came from a public water supply. If so, observe water source operations, review sampling history and disinfection processes. Conduct sampling at suspect source. Interdiction order may be necessary, as per Province of New Brunswick Interdiction Document.
- If water is from a private supply, conduct sampling at source. Remediation may be necessary.
- If water is from recreational waters, pool or beaches may need to be closed.
- Educate case and contacts on drinking water precautions.

Source risk factor - food:

- Assess if there is a plausible link to food. If so, obtain samples from either left over food or unopened product from the same batch. Ensure suspect food is held from further consumption, sale or distribution until test results are available.
- Determine if suspect food is from a food service establishment. If so, observe food service establishment operations and conduct a full inspection. Assess food handling practices based on HACCP principles. Educate and provide training to food handlers in food safety training. If indicated, include environmental surface swabs. Implement any cleanup or remediation measures as appropriate. Collect water samples if not already done.
- Determine if suspect food is from a registered plant. If so, Canadian Food Inspection Agency (CFIA) must be informed as per Foodborne Illness Outbreak Response Protocol (reference).
- Interview employees and collect clinical specimens as appropriate.

Where possible, such as in a known common exposure like a wedding reception, calculate attack rates and compare the rates of illness between people who consumed a specific food with people who did not consume a specific food.

Implement control measures as necessary, consider:

- Informing public (public advisory).
- Excluding infected persons from handling food or from attending a facility.
- Stopping distribution and recalling implicated food.
- Closing food establishment.
- Issuing boil water advisories.
- Training food handlers (food safety training and certification).

Exclusion/Social Distancing

See Case Management and exclusion periods for food handlers and caregivers with enteric illness, school exclusion guidelines, and disease specific guidelines.

Treatment/Prophylaxis

Not applicable in general, refer to the Hepatitis A disease specific guideline.

Immunization

Hepatitis A is a vaccine preventable disease; immunization may be warranted.

5.8 Other Considerations

First Nations Inuit Health

Contact the FN communities and FNIH when otbreaks/clusters occur in FN communities. First Nations Innuit Health (FNIH) employs Environmental Health Officers and public health medical specialists who deliver the health protection program and communicable disease investigations *on-reserve*. In addition FNIH is responsible to:

- Disseminate food recall information issued by the CFIA.
- Carry out food safety investigations in food establishments.
- Conduct visits at facilities with vulnerable populations (i.e., day care, treatment centers, hospitals).
- Provide public education and food handler training sessions, as needed, in affected First Nations communities.

Institutional Settings

During an outbreak within hospital and other institutionalized settings, infection control practices and enteric precautions in handling contaminated items and feces should be implemented. These

settings should practice good hand washing before and after caring for case(s) as well as ensuring that the case(s) also practice good hand washing, especially before and after toileting.

5.9 Reportable Diseases and Events

- Botulism
- Campylobacteriosis
- Cholera
- *Clostridium difficile* associated diarrhea
- Clusters of illness thought to be food, waterborne or enteric
- Cryptosporidiosis
- Cyclosporiasis
- *Escherichia coli* infection (verotoxigenic)
- Giardiasis
- Hepatitis A
- Hepatitis E
- Leptospirosis
- Listeriosis (invasive)
- Paralytic shellfish poisoning
- Poliomyelitis due to wild type poliovirus
- Salmonellosis
- Shigellosis
- *Staphylococcus aureus* foodborne intoxications
- Typhoid
- Vibrio species pathogenic to humans (other than cholera)
- Yersinosis

Additional information

The regional Enteric Database is for regional case management of enteric illness. It captures additional information on enteric reportable diseases and events (i.e. under routine surveillance (RDSS) and/or Enhanced Surveillance and/or CD Urgent Notification). It also is used for enteric diseases that are not reportable but are associated with food and water borne outbreaks.

Reportable diseases and events under routine surveillance (RDSS) included in the Enteric Database are:

- Botulism
- Cholera
- Clusters of illness thought to be food, water borne or enteric
- Campylobacteriosis
- Cryptosporidiosis
- *Escherichia coli* infection (vertoxigenic)
- Giardiasis
- Hepatitis A
- Listeriosis (Invasisve)

- Salmonellosis
- Shigellosis
- *Staphylococcus aureus* foodborne intoxications
- Typhoid
- Vibrio species pathogenic to humans (other than cholera)
- Yersiniosis

Reportable diseases and events under routine surveillance (RDSS) not specifically inlcuded in the Enteric Database but can be entered are:

- Poliomyelitis due to wild type poliovirus
- Cyclosporiasis
- Hepatitis E
- Paralytic shellfish poisoning

Food and Water Borne Education

Disease specific information				
☐ Pathogen	☐ Mode of transmission	☐ Period of communicability	☐ Risk factors for transmission	☐ Risk factors for susceptibility

Education and control measures		
Hand washing	☐ After using the washroom	☐ After diapering
	☐ After handling raw meat or poultry	☐ After contact with ill persons
	☐ After contact with animals, animal feces or farm environment	☐ After contact with domestic pets and pet treats
	☐ Before contact with children and the elderly	☐ Before preparing meals and before eating
	☐ Before giving and taking medication	
Food Safety	☐ Do not prepare food while symptomatic	☐ Importance of using a meat thermometer: Use a meat thermometer for large cuts of meat and poultry, and at all other necessary times
	☐ Store food safely to prevent contamination	
	☐ Your refrigerator temperature should not exceed 4°C	☐ Sanitize after you clean, i.e., raw juices from poultry and meat
	☐ Wash and/or peel fruits or vegetables before eating	☐ Use an appropriate sanitizer solution
	☐ Cool foods rapidly	☐ Cook or reheat thoroughly
Safe Water Source	☐ Drink from a known potable water source	☐ Springs, streams and dug wells are not safe
	☐ If water source is questionable, boil for minimum of 1 minute	☐ Regularly test well water
Social Distancing	☐ Exclusion daycare facility or school	☐ Exclusion food handlers and caregivers
Additional	☐ Disease factsheet	☐ Information provided verbally
	☐ Information provided electronically	

Date _____ Regional Public Health _____