



Health, Healthy Living and Seniors

Public Health and Primary Health Care
Communicable Disease Control
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Re: Yersiniosis

Please note that effective January 1, 2015 individual cases of yersiniosis (*Yersinia enterocolitica*, *Yersinia pseudotuberculosis*) are no longer reportable to Manitoba Health, Healthy Living and Seniors by laboratory or health care professional.

Health Care Professional:

- The Enteric Outbreak Summary Report form should be completed for all outbreaks and returned to the Public Health Surveillance Unit. CNPHI (Canadian Network for Public Health Intelligence) users should login to CNPHI and enter data into the Enteric Outbreak Summary. Non-CNPHI users may request the form by email: outbreak@gov.mb.ca .
- Cooperation in Public Health investigation (if required) is appreciated.

Regional Public Health or First Nations Inuit Health Branch:

- Outbreak investigation as per this protocol.

Sincerely,

“Original Signed By”

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Yersiniosis



Public Health Branch

1. Case Definition

1.1 Confirmed Case

Isolation of *Yersinia enterocolitica* or *Yersinia pseudotuberculosis* from an appropriate clinical specimen (e.g., stool, blood) with or without clinical illness^a (1).

1.2 Probable Case

Clinical illness^a in a person who is epidemiologically linked to a confirmed case (1).

2. Reporting Requirements

Laboratory:

- All positive results from laboratory tests are reportable to the Public Health Surveillance Unit (204-948-3044 secure fax).
- Clinical laboratories are required to submit isolate sub-cultures from individuals who tested positive for *Y. enterocolitica* and *Y. pseudotuberculosis* to Cadham Provincial Laboratory (CPL) within seven days of report.

Health Care Professional:

- Probable cases are reportable to the Public Health Surveillance Unit (form available at: www.gov.mb.ca/health/publichealth/cdc/protocol/form2.pdf) ONLY if a positive lab result is not anticipated (e.g., poor or no specimen taken, person has recovered). Confirmed cases do not require reporting by health care professional as they will be reported to Manitoba Health by the laboratory.

3. Clinical Presentation/Natural History

Common symptoms of infection with *Y. enterocolitica*, especially in young children include fever, diarrhea (which may be bloody) and

abdominal pain (2-5). Nausea and vomiting may also occur (4). In older children and adults, abdominal pain may mimic appendicitis (2-5). Symptoms may persist for one to three weeks (4). *Y. enterocolitica* septicemia is uncommon but is severe and often fatal when it occurs (4). It is most often reported in patients with underlying immunocompromising conditions, the elderly and patients with iron overload (4). Focal manifestations of *Y. enterocolitica* are uncommon and include pharyngitis, meningitis, osteomyelitis, pyomyositis, conjunctivitis, pneumonia, empyema, endocarditis, active peritonitis, abscesses of the liver and spleen, and primary cutaneous infection (3). The major manifestations of *Y. pseudotuberculosis* are fever, scarlet fever-like rash and abdominal symptoms (3). Infection with *Y. pseudotuberculosis* is less common and tends to be more severe than infection with *Y. enterocolitica* (5).

The most common post-infectious complications of yersiniosis are erythema nodosum and reactive arthritis (4-6). These complications occur more often in older children and adults, particularly those with HLA (human lymphocyte antigen)-B27 (3, 4).

4. Etiology

Yersinia species are pleomorphic gram-negative bacilli (4). More than 60 serotypes and six biotypes of *Y. enterocolitica* have been described (4), many of them non-pathogenic (2). Serotypes O:3, O:5.27, O:8 and O:9 and biotypes 2, 3 and 4 have most often been isolated from patients (4). *Y. pseudotuberculosis* is less common than *Y. enterocolitica* (6). *Y. pseudotuberculosis* is grouped into six serotypes with each serotype containing pathogenic isolates (6).

^a Characterized by diarrhea and/or abdominal pain and fever.

5. Epidemiology

5.1 Reservoir

A wide range of wild and domestic animals (2, 3, 7). The pig is the main reservoir for *Y. enterocolitica* (2, 3). *Y. pseudotuberculosis* has been isolated from deer, elk, goats, sheep, cattle and rodents (rats, squirrels, beaver), rabbits and many species of birds (3).

5.2 Transmission

Fecal-oral. Transmission occurs by consumption of contaminated food (raw or undercooked pork products including cold cuts, unpasteurized or incompletely pasteurized milk) or water (2, 3). Because of its ability to multiply under refrigeration (6, 9) and in micro-aerophilic conditions, there is an increased risk of infection by *Y. enterocolitica* if uncured meat, stored in evacuated plastic bags, is undercooked (2). Outbreaks have been associated with the preparation of chitterlings (pork intestines) (10-11) and consumption of ready-to-eat processed pork (12). Transmission by direct or indirect contact with animals (including pets) has occurred (2, 3). Indirect transmission has been documented from transfusion of stored blood from donors who were asymptomatic or who had mild illness, and occurs rarely by direct person-to-person transmission (2, 3). Nosocomial transmission has been documented (2, 3).

5.3 Occurrence

General: Worldwide (2). *Y. enterocolitica* is the species most commonly associated with human infection and the majority of cases occur in infants and children (2). In temperate climates, rates of infection are higher during the cold season (2).

Canada: Yersiniosis is not a nationally notifiable disease and the laboratory-confirmed cases reported to the National Enteric Surveillance Program (NESP) are voluntary and thus an under-representation of actual infections. In 2009, 382 cases of *Yersinia* species (non-*Yersinia pestis*) were reported to NESP for an estimated incidence rate of 1.13 per 100,000 population (13).

Manitoba: Seven cases of yersiniosis were reported in 2010 for an incidence rate of 0.6 per 100,000 population. The average incidence rate for 2000-2010 was 0.8 per 100,000 population; however, the incidence rate fluctuated between 0.3 and 1.3 (per 100,000 population) for this period. A laboratory-confirmed outbreak (6 cases) of *Y. enterocolitica* linked to ingestion of raw milk was reported in 2008.

5.4 Incubation Period

Usually four to six days with a range of one to 14 days (3).

5.5 Host Susceptibility

Enterocolitis is usually more severe in children (2). Individuals with impaired immune defences are at higher risk of septicemia and localized metastatic infections (4). Post-infectious sequelae occur more often in older children and adults, particularly those with HLA-B27 (3).

5.6 Period of Communicability

Secondary transmission appears rare (2). Fecal shedding occurs for as long as symptoms persist, usually two to three weeks (2, 3). Prolonged asymptomatic carriage has been reported in children and adults (2).

6. Laboratory Diagnosis

Yersinia species may be isolated from stool or from blood. When foodborne illness is suspected, “suspected foodborne illness” should be indicated on the requisition and if yersiniosis is suspected, “possible yersiniosis” should be included on the requisition. The sample should be submitted directly to the Cadham Provincial Laboratory (CPL) for processing in the event of suspected outbreak activity or limited local laboratory capacity for *Yersinia* testing. Isolation and identification of *Yersinia* usually takes 48-96 hours.

Contact your direct-service laboratory if multiple tests for other organisms are required. Serotyping is performed on all *Y. enterocolitica* samples and isolates submitted to CPL. Antimicrobial susceptibilities may be requested from CPL.

7. Key Investigations for Public Health Response

- Investigation of food (especially pork), water and milk supplies for source of infection or cross-contamination. Collection of implicated food/water samples for testing (usually performed by Public Health Inspectors). Refer to the *Enteric Illness Protocol* available at: www.gov.mb.ca/health/publichealth/cdc/protocol/enteric.pdf
- Occupational exposure investigation (e.g., animal carcass handling/processing).
- History of contact with animals including pets.

8. Control

8.1 Management of Cases

- Exclusion from food handling and from direct care of infants and young children, the elderly and immunocompromised and institutionalized patients should be considered until 48 hours after the last symptoms.
- Education on personal and food hygiene should be provided (e.g., proper hand washing).

Infection Control Measures:

Contact Precautions are indicated in children who are incontinent or unable to comply with hygiene and should be considered for incontinent adults if stool cannot be contained or for adults who contaminate their environment. Otherwise, Routine Practices are adequate.

Treatment:

It is generally unnecessary to treat otherwise healthy individuals with acute, non-complicated enteritis (6). Antibiotic treatment is indicated for:

- patients with septicemia or sites of infection other than the gastrointestinal tract (2, 3, 6).

- immunocompromised individuals with enteritis (3).

Both *Y. enterocolitica* and *Y. pseudotuberculosis* are usually sensitive to tetracyclines, fluoroquinolones and trimethoprim/sulfamethoxazole (2, 3). Many isolates are resistant to first-generation cephalosporins and most penicillins (3, 4). If necessary, treatment can be modified once antibiotic sensitivity testing results are known.

8.2 Management of Contacts

- Education on personal and food hygiene should be provided (e.g., proper hand washing).
- Symptomatic contacts should have stools cultured and be encouraged to seek medical attention.
- Symptomatic contacts should be managed as cases until culture results are known. Management can be modified as necessary.

8.3 Management of Outbreaks

An outbreak is defined as the occurrence of case(s) in a particular area and period of time, which is in excess of the expected number of cases.

- Outbreaks should be investigated to identify a common source of infection and prevent further exposure to that source. The extent of outbreak investigations will depend upon the number of cases, the likely source of contamination and other factors.
- Refer to the *Enteric Illness Protocol* available at: www.gov.mb.ca/health/publichealth/cdc/protocol/enteric.pdf and *Outbreak Report* form at: <http://www.gov.mb.ca/health/publichealth/cdc/protocol/form10.pdf>.
- Public notification should occur. The level of notification will usually be at the discretion of regional Public Health and/or the provincial Public Health Division for local outbreaks but may be at the discretion of the Federal Government

for nationally linked foodborne outbreaks as per *Canada's Foodborne Illness Outbreak Response Protocol (FIORP) 2010: To guide a multijurisdictional response* available at:

www.phac-aspc.gc.ca/zoono/fiorp-pritioa/index-eng.php

- Public education messaging on preventive measures should occur (refer to Section 8.4 below).

8.4 Preventive Measures

- Eating raw or undercooked pork should be avoided (e.g., chitterlings-food prepared from small intestines of pigs) (2, 14). If chitterlings are prepared, hands and fingernails should be thoroughly cleaned with soap and water before touching infants or their toys, bottles, pacifiers etc. (14).
- Do not consume unpasteurized milk and milk products (2, 14).
- Hand washing prior to food handling and eating, after handling raw meat and after contact with animals (2, 14).
- Prevention of cross-contamination in the kitchen: separate cutting boards for meat and other foods and careful cleaning of cutting boards, countertops and utensils with soap and hot water after preparing raw meat (14).
- Thorough cooking of eggs and other foods of animal origin before consumption. The following internal cooking temperatures are recommended:
 - 63°C (145°F) for all fish and whole cuts of meat, especially pork (allow 3 minutes resting time before carving/consuming meat);
 - 71°C (160°F) for all ground meats and egg dishes;
 - 74°C (165°F) for all whole and ground poultry (chicken and turkey) including stuffing and casseroles (8).

More information is available at:

http://www.fsis.usda.gov/is_it_done_yet/thermometer_placement_and_temps/index.asp .

- Leftover food should be refrigerated and consumed within three days of preparation or frozen until use as *Yersinia* can grow at refrigerated temperatures.
- Protection of water supplies from human and animal feces and appropriate water purification (2).
- Sanitary disposal of human and animal feces (2, 14).

References

1. Ontario Ministry of Health. Infectious Diseases Protocol, 2009 Appendix B: Provincial Case Definitions for Reportable Diseases. Available at:
http://www.health.gov.on.ca/english/providers/program/pubhealth/oph_standards/oph/protgds/protocol/appendixb/appendix_b.pdf .
2. Heymann, David L. Yersiniosis. In: *Control of Communicable Diseases Manual 19th ed*, American Public Health Association, Washington, 2008; 690-693.
3. American Academy of Pediatrics. *Yersinia enterocolitica* and *Yersinia pseudotuberculosis* Infections. In: Pickering LK ed. *Redbook 2009 Report of the Committee on Infectious Diseases 28th ed*. Elk Grove Village, IL: American Academy of Pediatrics, 2009; 733-735.
4. Dennis, David T and Mead, Paul S. *Yersinia* Species, Including Plague. In: Mandell GL, Bennett JE, Dolin R eds. *Principles and Practice of Infectious Diseases 7th ed*. Elsevier, Philadelphia, 2009; 2943-2953.
5. Centers for Disease Control and Prevention. Chapter 3 – Infectious Diseases Related to Travel: Yersiniosis. *The Yellow Book*, 2012 available at:

<http://wwwnc.cdc.gov/travel/yellowbook/2012/chapter-3-infectious-diseases-related-to-travel/yersiniosis.htm> .

6. Norwegian Scientific Committee for Food Safety. A preliminary risk assessment of *Yersinia enterocolitica* in the food chain: some aspects related to human health in Norway, 2004. Available at: <http://www.vkm.no/dav/d165b9d426.pdf>.
7. Bottone, Edward J. *Yersinia enterocolitica*: The Charisma Continues. *Clinical Microbiology Reviews* 1997; 10 (2): 257-276.
8. United States Department of Agriculture Food Safety and Inspection Service. Is it Done Yet? Available at: http://www.fsis.usda.gov/is_it_done_yet/thermometer_placement_and_temps/index.asp.
9. Bari Md., Hossain M. Anwar, Isshiki K and Ukuku D. Behavior of *Yersinia enterocolitica* in Foods. *Journal of Pathogens* 2011; Article ID 420732, 13 pages.
10. Jones TF, Buckingham SC, Bopp CA *et al.* From Pig to Pacifier: Chitterling-Associated Yersiniosis Outbreak among Black Infants. *Emerging Infectious Diseases*, 2003; 9(8): 1007-1009.
11. Abdel-Haq NM, Asmar BI, Abuhammour WM and Brown WJ. *Yersinia enterocolitica* infection in children. *Pediatr Infect Dis J* 2000; 19 (10): 954-958.
12. Grahek-Ogden D, Schimmer B, Cudjoe KS *et al.* Outbreak of *Yersinia enterocolitica* Serogroup O:9 Infection and Processed Pork, Norway. *Emerging Infectious Diseases*, 2007; 13(5): 754-756.
13. Public Health Agency of Canada. National Enteric Surveillance Program (NESP) Annual Summary 2009. Available at: http://www.nml-lnm.gc.ca/NESP-PNSME/assets/pdf/NESP_2009_Annual_Report_ENG.pdf.
14. Centers for Disease Control and Prevention. *Yersinia enterocolitica* and Pigs. Available at: <http://www.cdc.gov/healthypets/diseases/yersinia.htm>.