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Reportable Disease Trends in Ontario

Archive of 2015 summaries

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Introduction

This document includes the complete disease summaries that were previously available in the 2015 Reportable Disease Trends in Ontario tool. These summaries focus on 2015 data and prior years for seven reportable diseases (*Clostridium difficile* infection outbreaks in hospitals, cyclosporiasis, hepatitis C, measles, salmonellosis, infectious syphilis and verotoxin producing *Escherichia coli*). Public Health Ontario (PHO) has not updated the 2015 summaries to reflect the data currently available in the Reportable Disease Trends in Ontario tool, which is updated annually. Therefore, the information presented in the 2015 summaries may not match the data presented in the current version of the Reportable Disease Trends in Ontario tool. For information on the data sources and data extraction dates related to the 2015 summaries, please refer to Appendix 1. For additional information about the data and methods, including case definitions, classifications and data management, please refer to the Reportable disease trends in Ontario, 2016: Technical notes.

2015 summaries

Clostridium difficile infection (CDI) outbreaks in hospitals

Clostridium difficile is an anaerobic spore forming bacterium that is the leading cause of healthcare associated diarrhea.[1] In September 2008, *Clostridium difficile* infection (CDI) outbreaks in Ontario hospitals became reportable in accordance with the *Health Protection and Promotion Act*.[2,3] Since 2011, the number of CDI outbreaks reported in Ontario had been steadily decreasing until recently when the number of outbreaks increased from 19 in 2014 to 26 in 2015 . Despite this increase in outbreaks, the average number of cases per outbreak continues to remain stable.

Individuals who are elderly, hospitalized, or have severe underlying illness are at greatest risk of acquiring CDI.[1,4] Reported data from CDI outbreaks in Ontario hospitals show that those 60 years and older continue to be affected disproportionately, with males experiencing higher rates than females. Other predisposing risk factors include recent history of antibiotic use, immunocompromising conditions such as diabetes, gastrointestinal surgery, use of chemotherapeutic drugs, and use of medications that suppress gastric acid secretion.[1,4] Although likely underreported, antibiotic use continues to be the most common risk factor in CDI outbreaks reported in Ontario. Public health units with academic teaching hospitals that serve a high proportion of at-risk patients are likely to have higher rates of CDI and may experience more outbreaks as a result.

Cyclosporiasis

Cyclosporiasis is caused by the parasite Cyclospora cayetanensis. The parasite is not endemic to Canada and is not transmitted from person to person. As a result, cases reported in Canada are either acquired during international travel, particularly to the Caribbean, Mexico, Latin America or Asia; or through the

consumption of imported fresh produce such as berries, leafy greens and other vegetables, fruits and herbs. For the five-year period from 2010 to 2014, approximately 50% of cyclosporiasis cases reported in Ontario were associated with international travel.

While travel-related cases continued to account for a large proportion of cyclosporiasis cases in 2015, the number of cases reported in that year represented a marked increase in incidence in comparison to the previous ten years. The increase was due in part to what appeared to be two separate outbreaks of cyclosporiasis that occurred over the summer and fall of 2015. In the first outbreak, 81 cases in Ontario were part of a nation-wide increase in the incidence of non-travel related cases. Imported fresh produce including berries and leafy greens were suspected in this outbreak. In the second outbreak, 34 cases of cyclosporiasis were linked to consumption of sugar snap peas imported from Guatemala and sold exclusively through a single grocery chain in Ontario. The implicated product was recalled by the retailer as a result of the epidemiologic evidence generated by investigation of these cases.

Identifying the source of illnesses in non-travel related cases and outbreaks of cyclosporiasis is challenging for several reasons. In Ontario, peaks in the incidence of cyclosporiasis typically coincide with the importation of fresh produce from Cyclospora-endemic countries. As a result, observed increases may be due to multiple food sources. Due to the limitations of available laboratory methods for Cyclospora, epidemiologic evidence linking cases to a specific food source through food consumption and/or purchase histories is critical. In the absence of laboratory subtyping methods for Cyclospora, cases due to different exposures cannot be differentiated or definitively attributed to a specific source. Further Cyclospora is not easily detected in food using available laboratory methods, making it difficult to definitively attribute illnesses to a specific source.

Hepatitis C

Hepatitis C is a blood-borne infection caused by the hepatitis C virus. Unlike hepatitis A and B, a vaccine does not exist to provide protection from the hepatitis C virus. Hepatitis C can be transmitted through percutaneous exposure to blood, such as when sharing injection drugs or drug equipment with a person who is infected. Less frequently infection can occur through unprotected sexual activity under certain circumstances or from a HCV RNA-positive pregnant female to their newborn.[5] It is estimated four to seven percent of pregnant females who are HCV RNA-positive will transmit hepatitis C to their newborn.[5] Between 75 and 85% of individuals infected with hepatitis C become chronic carriers and therefore remain able to transmit the virus to others.[6] Although 90% of acute hepatitis C cases are asymptomatic, long-term sequelae associated with chronic hepatitis C infections include cirrhosis, liver failure, and hepatocellular carcinoma, and become increasingly common with increasing duration of infection.[5] Due to these infection-related long-term sequelae, hepatitis C is considered the most burdensome infectious disease in Ontario.[7]

Risk factors associated with acquisition of hepatitis C infections have changed over the years. Prior to the screening of blood products for hepatitis C, receipt of contaminated blood and blood products was the most common risk factor associated with hepatitis C infections.[5] Sharing of injection drug equipment is now the most common risk factor.[5] In 2012, the Centers for Disease Control and Prevention in the

United States recommended screening for hepatitis C among individuals born between 1945 and 1965, as this group made up approximately 75% of the hepatitis C cases in the United States.[8] In Ontario, the prevalence of hepatitis C virus among those born between 1945 and 1974 is being investigated and this analysis will assist in policy decisions regarding screening of this cohort.[9]

The incidence rate of reported cases of hepatitis C in Ontario has remained relatively stable since 2011. In 2015, 4,250 cases of hepatitis C were reported in Ontario, an incidence rate of 30.8 per 100,000 population. While the cases and incidence rate represent diagnoses that occurred in 2015, acquisition of infection may have occurred many years in the past.

The highest rate of reported cases of hepatitis C in 2015 occurred in the Northwestern Health Unit with an incidence rate of 148.3 per 100,000 population, followed by an incidence rate of 106.4 per 100,000 in the Thunder Bay District Health Unit.

Hepatitis C infections are more common in males, with 61.8% (2,627/4,250) of the reported cases in 2015 being males. The male age group with the highest incidence rate was 25-29 year olds, followed by those 50-59 years of age. Among reported cases in females in 2015, the highest reported incidence rate occurred in the 25-29 age group followed by those 20–24 years old.

There have been rapid developments in treatment for hepatitis C. Recently available direct acting antiviral drugs have very high cure rates with treatment durations of only 8 to 12 weeks and far fewer side effects than previously used drugs. Improved access to these drugs will result in increased numbers of individuals successfully treated and cured of hepatitis C infection, thereby preventing long-term sequelae. In addition, treatment could potentially lead to decreased transmission of hepatitis C in Ontario by decreasing the number of infected individuals who can spread the virus to others.

The current Ontario case definition is being revised to more clearly delineate individuals who are infected and at risk of transmitting the virus to others versus those whose infections have resolved and therefore are no longer infectious.

Measles

Indigenous measles has been eliminated from Canada; the last endemic case of measles was reported in 1997.[10] In September 2016, the Pan American Health Organization (PAHO) declared that measles has been eliminated from the region of the Americas, 22 years after an initiative was launched to eliminate measles, rubella and congenital rubella syndrome.[11] But despite measles elimination, Ontario and the rest of Canada continue to experience ongoing measles activity due to importation of cases from other parts of the world where the disease remains endemic. Globally there has been substantial measles activity reported in Europe, Africa and Asia. Immunization with two doses of a measles-containing vaccine is the most effective method of preventing disease acquisition and transmission. In Canada, measles vaccine is only available in combination with mumps, rubella and varicella vaccines (as MMR and MMRV vaccines). A two-dose measles immunization program was implemented in Ontario in 1996. Presently, the first MMR dose is administered at 12 months of age, while the second dose is administered as a combined MMRV vaccine between four and six years of age.

In 2015, 20 confirmed cases of measles were reported from six public health units in Ontario (Toronto=10; Niagara=6; York=1; Halton=1; Hamilton=1; Peel=1). Cases ranged in age from 13 months to 55 years. Eight of 20 cases were children less than 18 years of age. The remaining 12 cases were adults, two of whom were born before 1970.

A cluster of 18 cases were reported in January and February of 2015 from four public health units. None of these cases reported a travel history outside of Canada; 17 of the 18 cases were genotype D4 and molecular epidemiology suggested they were closely related. The remaining case did not have laboratory testing, however was part of a smaller subset of cases with epidemiologic links to each other. Two additional sporadic cases were reported in March and May; the first case reported traveling to Pakistan and Turkey 7-21 days before rash onset while the second case did not have a travel history. Both cases were identified as genotype D8.

Six adults (including the two cases born prior to 1970) had unknown immunization status. Immunization status was known for the remaining 14 cases (70.0%). Among these, nine cases (two adults and seven children) were unimmunized, two adult cases received two doses of measles-containing vaccine, and three cases received one dose of measles-containing vaccine. Among the three cases who received one dose, one adult case received the dose at 9 months of age, one adult case received the dose at 12 months of age, and one child who also received the dose at 12 months was younger than 4-6 years old, which is the recommended age range for the second dose in Ontario. Continued efforts and vigilance are required to demonstrate and maintain the measles elimination status.

Salmonellosis

Annual incidence rates for salmonellosis averaged over 3,000 cases per year in the 1990s, but have since declined to approximately 2,700 cases per year for the period 2005 to 2015. In 2015, Public Health Ontario formally investigated six outbreaks of salmonellosis of provincial and/or national scope. Important learnings pertaining to the control and prevention of salmonellosis, and foodborne diseases in general are highlighted for four of these outbreaks: *S*. Reading, *S*. Muenchen and two of *S*. Enteritidis.

Public Health Ontario (PHO), in collaboration with federal and other provincial public health and food safety partners, began an investigation into an outbreak of *S*. Reading in January 2015. Thirty-one cases, including 23 cases from Ontario, were identified nation-wide from November 2014 to June 2015. Illnesses occurred primarily among persons with a history of consuming Eastern Mediterranean cuisine. Despite extensive epidemiological, microbiological and food trace-back investigations, a common source was not identified. The outbreak investigation highlighted the importance of incorporating an ethno-culturally sensitive approach to traditional outbreak investigation methodologies that includes collaboration with affected communities to build trust and rapport, and facilitates the successful development and implementation of tailored investigational approaches.

An outbreak of 55 cases of *S*. Muenchen was investigated in 2015. Illness onset for these cases ranged from early 2014 to mid-2015. Contact with reptiles (primarily geckos and/or their environment) was identified as the most frequently reported exposure. Among cases who were re-interviewed, most

engaged in reptile husbandry practices that could have resulted in their acquisition of salmonellosis, but were not aware of the association between exposure to reptiles and the risk of salmonellosis. These findings, coupled with the rise in ownership of exotic pets including reptiles/amphibians, present an opportunity for the prevention and control of salmonellosis through public education, collaboration with the pet industry and possibly province-wide legislation governing the sale of exotic pets.

In 2015, PHO investigated two separate outbreaks of *S*. Enteritidis in which uncooked, frozen, processed chicken products were implicated. These products may be mishandled by the public because they appear cooked but are actually raw. A total of 71 cases from Ontario were linked to these two outbreaks. Similar to other outbreak investigations in which these products were implicated, the investigations highlighted the need to revisit government and industry policies related to uncooked, frozen, processed chicken products to prevent contamination at the source and infection at the consumer level. To this end, specific measures pertaining to changes in packaging, labelling, marketing, and manufacturing of uncooked, frozen, processed chicken products are recommended to decrease the risk of enteric illnesses.

These outbreak investigations and other source attribution studies have demonstrated that salmonellosis is primarily transmitted to humans through consumption of commonly implicated food sources such as eggs, meat and poultry. More frequently in recent years, Salmonella acquisition has been attributed to consumption of fresh produce and novel food items such as chia seeds. These factors necessitate a multi-faceted approach to the control of salmonellosis that integrates data from public health, animal health and food surveillance programs in order to inform on-farm practices, industry standards and public messaging pertaining to food safety. However, significant hurdles in the prevention of salmonellosis and other foodborne diseases remain owing to the increasing globalization of our food sources, challenges relating to food traceability, and marketing and labelling practices that lead to consumer misperception of risk.

Syphilis, infectious

The epidemiology of infectious syphilis (i.e., primary, secondary, early latent, and infectious neurosyphilis) in Ontario has changed considerably over the past ten years. Following a slight rise in the provincial incidence reported between 2006 and 2008, the incidence rate of 3.5 cases per 100,000 population in 2008 increased by 71.4% to 6.0 cases per 100,000 population in 2009. This increase was primarily attributable to ongoing outbreaks among men who have sex with men (MSM). Between 2010 and 2014, this increase was sustained, with an average annual incidence rate of 6.0 cases per 100,000 population. In 2015, a total of 1,068 cases of infectious syphilis were reported in Ontario, corresponding to an incidence rate of 7.7 cases per 100,000 population and representing a 20.3% increase compared to the reported rate for 2014 (6.0 cases per 100,000 population).

With respect to syphilis staging, the 1,068 cases of infectious syphilis reported in 2015 were classified as follows: 320 (30.0%) had primary syphilis, 368 (34.5%) had secondary syphilis, 364 (34.1%) had early latent syphilis, and 16 (1.5%) had infectious neurosyphilis. All 16 cases of infectious neurosyphilis were male.

In 2015, the reported incidence of infectious syphilis was 25.2 times higher among males (15.1 cases per 100,000 population) than females (0.6 cases per 100,000 population), with males accounting for 96.0% (1,025/1,068) of all cases reported in Ontario. Those aged 25-39 years continue to experience the greatest burden of disease: among males, the incidence was highest among those 30-39 years of age (32.3 cases per 100,000 population); for females, the incidence was highest among those 25-29 years of age (1.9 cases per 100,000 population).

Geographically, the number of public health units (PHUs) in Ontario reporting cases of infectious syphilis has increased over the last ten years. In 2006, 61.1% (22/36) of PHUs reported cases; by 2015, this has risen to 86.1% (31/36) of PHUs. Toronto, Ottawa, and Thunder Bay District PHUs reported the highest incidence of infectious syphilis cases in 2015, with rates of 25.2, 10.2 and 5.8 cases per 100,000 population, respectively.

Of the 1,068 cases of infectious syphilis in 2015, 94.9% (1,013/1,068) had at least one risk factor reported. For the 95.3% (977/1,025) of males with available risk factor information, the most commonly reported risk factors included sex with same sex partner (834/977; 85.4%), no condom used (623/977; 63.8%), and more than one sex partner in the last six months (398/977; 40.7%). For females, of the 82.5% (33/40) reporting at least one risk factor, sex with opposite sex (32/33; 97.0%) and no condom used (29/33; 87.9%) were the most commonly reported risk factors. No risk factor information was available for the three cases with unspecified gender.

Human immunodeficiency virus (HIV) co-infection is common among infectious syphilis cases. Of the 1,068 cases reported in Ontario in 2015, 37.6% (402/1,068) were reported to be co-infected with HIV (i.e., diagnosed with HIV prior to or within one year of their syphilis diagnosis). Many infectious syphilis cases may not know their HIV status or may have been tested anonymously; therefore, the number of co-infected cases is likely higher than reported above.

Verotoxin producing *Escherichia coli*

Incidence rates for Verotoxin producing *Escherichia coli* (VTEC) have decreased since 2005, with the largest decline in incidence rates occurring since 2011. However, the number of cases reported in 2015 rose to 172 from 126 cases in 2014. The reasons for the increase in VTEC cases in 2015 are unknown but result from increases in sporadic cases. Given that most cases of VTEC reported in Ontario are sporadic in nature, prevention and control measures must be broad and focused on reducing contamination of raw foods during growth, harvest, processing, storage and transportation as well as enhancing behaviours related to food safety at the consumer level.

In 2015, there were four outbreaks of VTEC in Ontario. No source was identified for three of these outbreaks, which had total case counts of 4, 13 and 29 cases. For one outbreak, there were a total of six confirmed cases across four public health units, with three of the six cases reporting attendance at separate pig roast events. Pork served at these events was tracked back to a single farm where *E. coli* O157 was detected in live pigs using Polymerase Chain Reaction (PCR) testing. PCR testing was not able to determine whether the farm strains were identical to the human strains, however detecting any *E.*

coli O157 in pigs was noteworthy and thus supports the likelihood that the farm was the source of the outbreak.

The VTEC serogroup O157 has been the main focus of public health prevention and response for the last few decades because most non-O157 serogroups of VTEC are not readily detected in the laboratory using routine methods. Testing for these organisms is only undertaken by the Ontario public health laboratory at the request of the submitter. As a result, non-O157 VTEC cases are likely under-diagnosed in Ontario. Other challenges to the control and prevention of VTEC pertain to the epidemiology of the disease. Outbreaks are generally associated with small case counts which make them more difficult to detect using traditional epidemiological approaches. For this reason, detection of most outbreaks of VTEC is reliant on subtyping methodologies (pulsed-field gel electrophoresis testing) that ascertain whether reported cases are due to an increase in sporadic cases or due to cases that are linked through a common source.

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Appendix 1: Data sources for 2015 summaries

Reporting

In Ontario, over 70 diseases have been specified as reportable under Regulation 559/91 pursuant to the *Health Protection and Promotion Act* (HPPA), R.S.O 1990. Health care providers, laboratories, and other individuals (including school principals and superintendents of institutions) with a duty to report reportable diseases must make such reports to the medical officer of health in the local PHU within which they operate. PHUs provide case management services in accordance with the HPPA, Ontario Regulation 569, the Ontario Public Health Standards, and the Infectious Diseases Protocol to persons in their jurisdiction with reportable diseases. Required case data are subsequently reported to the province through iPHIS.

integrated Public Health Information System (iPHIS)

The main source for reportable disease data for the 2015 summaries from the Reportable disease trends in Ontario interactive tool is the integrated Public Health Information System (iPHIS), the electronic reporting system for reportable diseases in Ontario. iPHIS replaced the Reportable Diseases Information System (RDIS) and was implemented in phases throughout 2005 starting on April 1, with full implementation by all 36 local public health units (PHUs) by the end of that year.

Data extraction

The iPHIS data used in the 2015 summaries for cyclosporiasis, hepatitis C, measles, salmonellosis, infectious syphilis and VTEC were extracted on October 14, 2016. Data for CDI outbreaks were extracted from iPHIS on September 30, 2016.

Population data used for calculating incidence rates were extracted from IntelliHEALTH on September 2, 2016. IntelliHEALTH Ontario is a repository of health-related data that describes the population and delivery of health care services in Ontario. Population counts for Ontario are originally sourced from Statistics Canada and were obtained through IntelliHEALTH Ontario.

Public Health Ontario
480 University Avenue, Suite 300
Toronto, Ontario
M5G 1V2

647.260.7100
communications@oahpp.ca
www.publichealthontario.ca