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Infectious Disease Trends in Ontario

Archive of 2018 Summaries

December 2020

Public Health Ontario

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How to cite this document:

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Infectious disease trends in Ontario: archive of 2018 disease summaries. Toronto, ON: Queen's Printer for Ontario; 2020.

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Introduction

This document includes the disease summaries that were previously available in the 2018 Infectious Disease Trends in Ontario tool, released in November 2019. These summaries focus on 2018 data and prior years for four diseases of public health significance: Carbapenemase-producing *Enterobacteriaceae* (CPE), Chlamydia, Cryptosporidiosis and Invasive meningococcal disease (IMD). Public Health Ontario (PHO) has not updated the 2018 summaries to reflect the data currently available in the Infectious Disease Trends in Ontario tool,[1] which is updated annually. Therefore, the information presented in these 2018 summaries may not match the data presented in the current version of the Infectious Disease Trends in Ontario tool. For information on the data sources and data extraction dates related to the 2018 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 technical notes of the Infectious Disease Trends in Ontario tool.[2]

2018 Summaries

Carbapenemase-producing *Enterobacteriaceae* (CPE)

Background

Carbapenemase-producing *Enterobacteriaceae* (CPE) are a family of bacteria that produce enzymes (i.e., carbapenemases) which inactivate carbapenems and several other classes of antibiotics.[3] The emergence of CPE is a growing global public health concern, as carbapenems are considered to be the last line of defence for treating infections caused by resistant *Enterobacteriaceae*.[3] The increase in reports of carbapenem resistance worldwide has been linked to the spread of transmissible genetic elements (for example, plasmids) and resistant organisms from person-to-person primarily in health care settings.[3] As *Enterobacteriaceacae* are normal gastrointestinal flora, once CPE are acquired, individuals may become colonized and subsequently develop infections. CPE have been associated with increased morbidity and mortality among those with severe infections.[4]

CPE were first identified in Ontario in 2008,[5] following which several outbreaks associated with hospital exposures were reported.[6,7] In December 2011, PHO, in collaboration with the Ministry of Health, established a voluntary laboratory-based surveillance system. CPE cases identified through voluntary surveillance increased steadily from 2012 to 2016, with most cases linked to travel-related exposures.[8] On May 1, 2018, the Ministry of Health designated CPE colonization or infection as a disease of public health significance,[9,10] thereby ending the voluntary surveillance program. The shift from voluntary to mandatory reporting is a critical step to understanding provincial CPE epidemiological trends, which will help inform infection prevention and control policies and practices to prevent local transmission.

Epidemiology

From May to December 2018, 195 confirmed cases of CPE (with 206 carbapenemases) were reported in Ontario. Fifty nine percent (115/195) of cases were colonizations, 35.4% (69/195) were infections and the disease status for the remaining 5.6% (11/195) was unspecified. New Delhi metallo-β-lactamase (NDM) was the most frequently reported carbapenemase (101/206; 49.0%) followed by oxacillinase-48 (OXA-48) carbapenemases (53/206; 25.7%). The majority (112/195; 57.0%) of cases were over 65 years of age, an elderly demographic that is at greater risk of health care associated infections due to the prevalence of comorbidities that require frequent health care access. Among the 175 cases that reported a known risk factor, the most commonly reported risk factor was having a chronic illness/underlying medical condition (145/175; 82.9%). Almost half (82/175; 46.9%) of cases with a known risk factor indicated they had travelled outside of Canada in the last 12 months.

Chlamydia

Background

Chlamydia is a bacterial sexually transmitted infection (STIs) caused by *Chlamydia trachomatis,* and is the most frequently reported disease of public health significance in Ontario. It is transmitted from person to person through anal, vaginal and (less often) oral sex, and from mother to child during birth.[11] While often asymptomatic, clinical sequelae of chlamydia infections include pelvic inflammatory disease, infertility, ectopic pregnancy, chronic pelvic pain and arthritis in women, epididymo-orchitis in men, and reactive arthritis in both genders.[12] Its clinical presentation also includes cervicitis in women, and urethritis in men.[12] The most effective method to prevent chlamydia transmission outside of abstinence is to use condoms during all sexual activities, as well as participating in routine screening.[12]

Epidemiology

Since 2005, the rate of chlamydia infections reported in Ontario has been steadily trending upwards. Compared to the 26,215 cases reported in 2008 (203.5 cases per 100,000 population), the number of cases has increased by 82.7% in 2018, with 47,898 cases reported (331.7 cases per 100,000 population). An unintentional decline in reported cases was observed following changes made to the provincial cervical cancer screening guidelines in 2012, which reduced the frequency of Pap tests conducted.[13] This led to a decrease in screening rates for chlamydia, most notably in women aged 15–19 years, as this age group is omitted under the new cervical cancer screening guidelines; however, cases have continued to increase since 2013, with the most dramatic increase occurring from 2016 to 2018.

The age and sex demographics of chlamydia cases in 2018 were similar to trends observed in the past five years. Of the cases reported in 2018, females made up the majority at 57.2% of cases. The highest incidence rates of chlamydia were observed among females aged 20–24 years (2,172 cases per 100,000 population); this age group has seen the most dramatic increase in cases over time. Females have consistently reported higher rates of chlamydia infection compared to males.

Toronto reported the majority of cases in Ontario in 2018 (13,911 cases), followed by health units with generally higher populations. The highest reported incidence rates were from Northwestern, with 657.0 cases per 100,000 population, followed by other health units within the Northern region.

In 2018, the five most commonly reported risk factors for chlamydia were: no condom used (67.9%), sex with the opposite sex (61.1%), a new sexual contact in the past two months (21.7%), more than one sexual contact in the last six months (18.5%), and repeat STIs (10.6%). These risk factors have been the most frequently reported risk factors for chlamydia since 2011.

Cryptosporidiosis

Background

Cryptosporidiosis is caused by *Cryptosporidium* spp., a microscopic parasite that infects the gut of both humans and animals. In humans, it can cause watery diarrhea which can be severe in those with weakened immune systems. The parasite has a hardy outer shell that resists chlorine treatment and can survive in the environment for up to six months, but survival can be longer in moist environments.[14] Although there are many species of *Cryptosporidium*, *C. parvum* and *C. hominis* are most commonly associated with human illness.[15]

Outbreaks of cryptosporidiosis have been associated with contact with infected cattle, transmission in child care settings, and ingestion of contaminated recreational water. Less frequently, outbreaks have been attributed to contaminated food or drinking water.[16]

Epidemiology

In 2018, cryptosporidiosis was the fifth most commonly reported enteric disease in Ontario.[17] Between 2012 and 2016, an annual average of 357.2 confirmed cases were reported. Although the incidence of cryptosporidiosis over this period gradually increased, the number of cases reported in 2018 more than doubled to 751 confirmed cases. During the five year period from 2012–16, there was no significant difference in the proportion of cases accounted for by males (50.1%) and females (49.8%). In contrast, females (53.7%) accounted for more cases than males (46.2%) in 2018. The mean age of cases also increased from 22.6 years in 2012–16 to 26.4 years in 2018. There was no change in the seasonal distribution of cases; the months from June through to October accounted for 69% of cases in 2018 compared to 67% from 2012–16.

The observed increase in cases in 2018 was not characterized by any clustering of cases, which is generally indicative of an outbreak. There was also no shifts in social or behavioural risk factors in 2018 compared to baseline (2012–16). Instead, the increase in 2018 was determined to be predominantly due to a change in laboratory diagnostic methodology from traditional microscopy to the more sensitive polymerase chain reaction (PCR) test. This increase in incidence is likely to continue as more laboratories switch from microscopy to PCR testing for diagnosing cryptosporidiosis. The year 2017 was not included in the baseline period, as it is considered the transition year when the switch from microscopy to PCR occurred.

Invasive meningococcal disease (IMD)

Background

Invasive meningococcal disease (IMD) is a rare, vaccine preventable disease caused by the bacteria *Neisseria meningitidis*. Most people colonized with N. meningitidis are asymptomatic carriers; however, if the bacteria invades a normally sterile site, such as the blood stream, it can cause a serious systemic infection leading to meningitis and/or sepsis. Approximately 10% of IMD cases are fatal and 10–20% of survivors have long-term sequelae, including hearing loss, neurologic disabilities and digit or limb amputations.[18] Most IMD is caused by five serogroups: A, B, C, W and Y.[18]

Ontario's routine meningococcal immunization program began in 2004 with one dose of conjugated meningococcal C (Men-C-C) vaccine at 12 months of age. In 2005, an adolescent program was introduced, initially using Men-C-C vaccine (2005-2008). Since 2009, the adolescent program has used one dose of quadrivalent conjugated vaccine (Men-C-ACYW). Serogroup B vaccine (4CMenB) and Men-C-ACYW are incorporated into Ontario's high-risk immunization schedules.[19]

Epidemiology

In 2018, there were 32 IMD cases in Ontario; 53% were male. Cases ranged in age from 8 months to 80 years, with a median age of 52 years. The most common reported serogroups in 2018 were B, W and Y with 10 cases each (31% of cases per serogroup); the remaining two cases were serogroups C and E. Since the introduction of routine immunization, the overall IMD incidence rate has decreased over time; however, trends within specific serogroups vary.

Notably, cases of serogroup C have decreased from an average of 11.2 to 2.6 cases per year from 2005–09 and 2014–18, respectively. IMD caused by serogroup W, however, increased over this same time period, from an average of 2.6 cases reported annually between 2005 and 2009 to 10 cases in 2018, with the proportion among older adults increasing from 48% to 73%. The increasing incidence of serogroup W in Ontario, particularly in older adults is consistent with trends observed across Canada and linked to the emergence of a hypervirulent strain (sequence type-11 clonal complex or ST-11 CC).[20] From 2005 to 2009, an average of 25.6 cases of serogroup B were reported per year; however, IMD cases caused by serogroup B have decreased by over half, with an average 11.2 cases per year between 2014 and 2018.

Among the 32 cases reported in 2018, 17 (53%) had a known immunization status, the majority (82%) of whom had never received meningococcal vaccine. Three cases were vaccinated with one dose of quadrivalent conjugate meningococcal vaccine. Of these cases, two had vaccine preventable illness (serogroup Y) and one was non-vaccine preventable (serogroup E).

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Appendix 1: Data Sources for 2018 Summaries

Reporting

In Ontario, over 70 diseases are specified as diseases of public health significance (formerly reportable diseases) under Regulation 135/18: Designation of Diseases pursuant to the *Health Protection and Promotion Act* (HPPA), R.S.O 1990.[10,9] Regulation 135/18 replaced Regulation 559/91: Specification of Reportable Diseases on May 1, 2018.[21]

Health care providers, laboratories and other individuals (including school principals and superintendents of institutions) with a duty to report diseases specified under Regulation 135/18 must make such reports to the Medical Officer of Health in the local public health unit (PHU) within which they operate, as outlined in Ontario Regulation 569.[22] PHUs provide case management services to individuals suspected of having a disease of public health significance in their jurisdiction in accordance with the HPPA, the Ontario Public Health Standards and the Infectious Diseases Protocol.[23,24] Required case data are subsequently reported to the province through the integrated Public Health Information System (iPHIS).

Integrated Public Health Information System (iPHIS)

The main source for disease data for the 2018 summaries from the Infectious Disease Trends in Ontario interactive tool is iPHIS, the electronic reporting system used by all local PHUs to report cases of diseases of public health significance in Ontario.[17] iPHIS replaced the Reportable Diseases Information System (RDIS) and was implemented in phases throughout 2005 starting on April 1, with full implementation by all local PHUs by the end of that year.

Data Extraction

The iPHIS data used in the 2018 summaries for Chlamydia, Cryptosporidiosis and Invasive meningococcal disease were extracted on May 22, 2019. Data on Carbapenemase-producing *Enterobacteriaceae* (CPE) infection were extracted from iPHIS on July 26, 2019.

Population data used for calculating incidence rates were extracted from IntelliHEALTH on October 19, 2017 (estimates up to 2016) and October 24, 2017 (projections for 2017 and 2018). 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.

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