

Appendix A: Disease-Specific Chapters

Chapter: Meningococcal disease, invasive

Effective: February 2019

Meningococcal disease, invasive

Communicable

Virulent

**Health Protection and Promotion Act:
O. Reg. 135/18 (Designation of Diseases)**

1.0 Aetiologic Agent

Meningococcal disease is caused by *Neisseria meningitidis*, a gram-negative, diplococcus.¹ Meningococcal serogroups are classified according to the immunological reactivity of the capsular polysaccharide.² Serogroup A, B, C, Y and W-135 are most commonly associated with invasive meningococcal disease (IMD).³

2.0 Case Definition

2.1 Surveillance Case Definition

Refer to [Appendix B](#) for Case Definitions.

2.2 Outbreak Case Definition

The outbreak case definition varies with the outbreak under investigation. Please refer to the *Infectious Diseases Protocol, 2018* (or as current) for guidance in developing an outbreak case definition as needed.

The outbreak case definitions are established to reflect the disease and circumstances of the outbreak under investigation. The outbreak case definitions should be developed for each individual outbreak based on its characteristics, reviewed during the course of the outbreak, and modified if necessary, to ensure that the majority of cases are captured by the definition. The case definitions should be created in consideration of the outbreak definitions.

Outbreak cases may be classified by levels of probability (*i.e.* confirmed and/or probable).

3.0 Identification

3.1 Clinical Presentation

Clinical illness associated with IMD usually manifests as meningitis, meningococemia or both.³ Less common presentations are pneumonia with bacteremia, septic arthritis and pericarditis.^{1,3}

Meningococcal meningitis presents as sudden onset of fever, headache, stiff neck, nausea and often vomiting, photophobia, and an altered mental state.⁴ In infants, clinical findings include fever, irritability, difficulty waking, difficulty feeding, vomiting, stiff neck, and bulging fontanelle.⁵

Meningococemia (meningococcal sepsis or bloodstream infection) is the most severe form of infection characterized by sudden onset of fever, chills, malaise, myalgia, limb pain, prostration, and a macular, maculopapular, petechial, or purpuric rash.^{3,4}

The case fatality ratio (CFR) is between 8% and 15%, with the CFR of meningococemia as high as 40%.^{1,4} Of survivors, 10%-20% may experience long-term sequelae such as neurologic deficits, hearing loss, loss of limb use, amputation of digit or limb, and skin scarring.^{1,3}

3.2 Diagnosis

See [Appendix B](#) for diagnostic criteria relevant to the Case Definitions.

For further information about human diagnostic testing, contact the Public Health Ontario Laboratories or refer to the Public Health Ontario Laboratory Services webpage: <http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx>

4.0 Epidemiology

4.1 Occurrence

Meningococcal disease is rare in Ontario. Between 2013 and 2017, an average of 28 cases occurred per year in Ontario.*

The incidence of serogroup C disease has decreased since the early 2000s. Following the introduction of the quadrivalent meningococcal vaccine in 2009, the incidence of serogroups Y and W-135 has also decreased. The incidence of both serogroup B and Y are higher in Ontario compared to the other serogroups.

Serogroup A is extremely rare in Ontario and Canada and is usually associated with travel. Serogroup A disease predominates in Africa and Asia.

Incidence rates are generally highest in infants, adolescence and young adults.¹

Please refer to Public Health Ontario's (PHO) Reportable Disease Trends in Ontario reporting tool and other reports for the most up-to-date information on infectious disease trends in Ontario.

<http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx>

For additional national and international epidemiological information, please refer to the Public Health Agency of Canada and the World Health Organization.

* Data included in the epidemiological summary are from January 1, 2013 to December 31, 2017. Data were extracted from Query on February 7, 2018 and therefore are considered preliminary.

4.2 Reservoir

Humans.

At any given time about 10% of the population carries meningococci in their nasopharynx.⁶

4.3 Modes of Transmission

Person-to-person by respiratory droplets or direct contact with secretions of the nose and throat, and often with an asymptomatic carrier.¹ Direct contact includes activities such as kissing or sharing drinking bottles.⁶

4.4 Incubation Period

Two to ten days, commonly three to four days.¹

4.5 Period of Communicability

Infectious period is considered to be the seven days prior to onset of symptoms to 24 hours after the initiation of appropriate antibiotic therapy.² A person who is untreated or a carrier can spread the bacteria until meningococci are no longer present in discharge from the nose and mouth.¹

4.6 Host Susceptibility and Resistance

Susceptibility to clinical disease appears to be low as evidenced by the high ratio of carriers to cases. Susceptibility decreases with age; incidence rates are highest in infants, adolescence and young adults.¹ There is an increased risk of secondary infections in close contacts of cases, particularly in household contacts.⁶

5.0 Reporting Requirements

As per Requirement #3 of the “Reporting of Infectious Diseases” section of the *Infectious Diseases Protocol, 2018* (or as current), the minimum data elements to be reported for each case are specified in the following:

- *Ontario Regulation 569 (Reports)* under the *Health Protection and Promotion Act (HPPA)*;⁷
- The iPHIS User Guides published by PHO; and
- Bulletins and directives issued by PHO.

6.0 Prevention and Control Measures

In the event that publicly funded vaccines are needed for case and contact management, the board of health should contact the ministry’s immunization program at vaccine.program@ontario.ca as soon as possible.

6.1 Personal Prevention Measures

Immunize as per the current Publicly Funded Immunization Schedules for Ontario.⁸

In Ontario, the *Immunization of School Pupils Act* (ISPA) is the legislation that governs the immunization of school pupils for the designated diseases that are included in the Act. All students without a valid exemption must have documented receipt of meningococcal vaccine according to the specified schedule.⁸

In Ontario, the *Child Care and Early Years Act, 2014* (CCEYA) is the legislation that governs licensed child care settings. Pursuant to *Ontario Regulation 137/15* under the CCEYA, children who are not in school and who are attending licensed child care settings must be immunized as recommended by the local medical officer of health prior to being admitted. Under the CCEYA parents can provide a medical reason as to why the child should not be immunized or object to immunization on religious/conscience grounds.⁹

Travelers to parts of the world where meningococcal infection is endemic or epidemic should be advised with regards to meningococcal immunization. Some immunocompromised persons and individuals with ongoing risk of exposure to *N. meningitidis* (e.g. laboratory personnel) may require re-vaccination as often as every three to five years.²

Health care workers (HCWs) should avoid direct contact with respiratory secretions of infected cases by maintaining droplet precautions during intensive contact with the case.⁶ In general, risk of nosocomial transmission of IMD is low and there is no recommendation for routine meningococcal immunization of HCWs.²

6.2 Infection Prevention and Control Strategies

Hospitalized persons should be placed under droplet precautions until 24 hours after initiation of appropriate antibiotic therapy in addition to routine practices.³

Refer to PHO's website at www.publichealthontario.ca to search for the most up-to-date information on Infection Prevention and Control.

6.3 Management of Cases

In addition to the requirements set out in the Requirement #2 of the "Management of Infectious Diseases – Sporadic Cases" and "Investigation and Management of Infectious Diseases Outbreaks" sections of the *Infectious Diseases Protocol, 2018* (or as current), the board of health shall investigate cases to determine the source of infection. Refer to Section 5: Reporting Requirements above for relevant data to be collected during case investigation.

Treatment with antibiotics and follow up is under the direction of the attending health care provider. To ensure eradication of *N. meningitidis* nasopharyngeal carriage, cases who did not receive treatment using ceftriaxone or other third-generation cephalosporins should also receive chemoprophylactic antibiotics prior to discharge from hospital. Chemoprophylaxis using rifampin, ciprofloxacin, or ceftriaxone is between 90%-95% effective in decreasing nasopharyngeal carriage.¹⁰

6.4 Management of Contacts

Close contacts of an IMD case should be identified and followed up to determine eligibility for chemoprophylaxis as they are at increased risk of IMD.³ Household contacts are at particularly high risk with a secondary transmission rate about 500-800 times greater than that of the general population.^{3,10} All identified contacts should be alerted to signs and symptoms of IMD and advised to seek medical attention immediately should they develop febrile illness or any other clinical manifestations of IMD. Additionally, provide contacts with counseling and education on the risk of disease, how to prevent secondary transmission and availability of chemoprophylactic antibiotics.

Under the following circumstances, chemoprophylaxis should be offered to all persons having close contact with an IMD case during the infectious period (seven days before onset of symptoms in the case to 24 hours after initiation of effective treatment) regardless of their immunization status:⁶

- Household contact of a case;
- Children and staff in contact with the case in child care settings;
- Persons who have direct nose or mouth contamination with the case's oral/nasal secretions such as through kissing on the mouth, shared cigarettes, toothbrushes, eating utensils, drinking bottles;^{3,6}
- HCWs who have had intensive unprotected contact (without wearing a mask) with an infected person such as in intubation, mouth-to-mouth resuscitation, or closely examining the oropharynx;
- Persons who share sleeping arrangements with the case; and
- Airline passengers sitting immediately on either side of the case, but not across the aisle, when the total time spent aboard the aircraft was at least 8 hours.

Antimicrobial chemoprophylaxis should be given to close contacts as soon as possible, preferably within 24 hours of the case being identified. Prophylaxis given greater than 14 days after exposure may be of little to no value.⁴ Chemoprophylaxis using rifampin, ciprofloxacin, or ceftriaxone is between 90%-95% effective in decreasing nasopharyngeal carriage.¹⁰

Table 1: Recommended chemoprophylaxis for Invasive Meningococcal Disease¹⁰

Drug	Age of Infants, Children, and Adults	Dosage (Dose, route, frequency)	Considerations
Rifampin	< 1 month ≥ 1 month Adults	5mg/kg, oral, q12h x 2 days 10mg/kg (maximum 600mg), oral, q12h x 2 days 600mg, oral, q12h x 2 days	<ul style="list-style-type: none"> • Can interfere with efficacy of medications including oral contraceptives, anticonvulsants and anticoagulants • Can stain contact lenses • Not recommended for pregnant women
Ceftriaxone	< 15 years ≥ 15 years	125mg, IM, single dose 250mg, IM, single dose	<ul style="list-style-type: none"> • Safe for pregnancy
Ciprofloxacin	Adults	500mg, oral, single dose	<ul style="list-style-type: none"> • Not used in communities where fluoroquinolone-resistant strains of <i>N. meningitidis</i> have been detected • Not recommended for pregnant women

In addition to the chemoprophylaxis, close contacts having ongoing exposure to a case should also receive immunization with a serogroup-specific meningococcal vaccine where indicated (i.e. if the case is caused by a vaccine-preventable serogroup). Health care workers and airline contacts do not require immunoprophylaxis. In addition, previously vaccinated close contacts who do not meet the criteria for re-vaccination do not need immunoprophylaxis. Refer to the current Canadian Immunization Guide for recommendations on meningococcal vaccine.²

Chemoprophylaxis is not recommended for casual contacts such as school, work or transportation contacts (except as noted above), social contacts, persons without direct contact with the case, and HCWs without direct exposure to a case's nasal/oral secretions.⁶

6.5 Management of Outbreaks

Please see the *Infectious Diseases Protocol, 2018* (or as current) for the public health management of outbreaks or clusters in order to identify the source of illness, manage the outbreak and limit secondary spread.

Refer to the National Guidelines for the Prevention and Control of Meningococcal Disease for further information.⁶

7.0 References

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3. Committee on Infectious Diseases, American Academy of Pediatrics. Section 3: Summaries of Infectious Diseases: Meningococcal Infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. *Red Book: 2018 Report of the Committee on Infectious Diseases*. 31 ed. Itasca, IL: American Academy of Pediatrics; 2018.
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5. Moore D, editor. *Your child's best shot: a parent's guide to vaccination*. 4 ed. Ottawa, ON: Canadian Paediatric Society; 2015.
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8. Ontario, Ministry of Health and Long-Term Care. *Publicly Funded Immunization Schedules for Ontario: December 2016*. Toronto, ON: Queen's Printer for Ontario; 2016.
9. Child Care and Early Years Act, 2014, S.O. 2014, c. 11, Sched. 1, (2018).
10. Cohn AC, MacNeil JR, Clark TA, Ortega-Sanchez IR, Briere EZ, Meissner HC, et al. Prevention and Control of Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *Morbidity and Mortality Weekly Report: Recommendations and Reports*. 2013;62(RR-2):1-28.

8.0 Document History

Table 2: History of Revisions

Revision Date	Document Section	Description of Revisions
January 2014	General	<p>New template.</p> <p>Title of Section 4.6 changed from “Susceptibility and Resistance” to “Host Susceptibility and Resistance”</p> <p>Title of Section 5.2 changed from “To Public Health Division (PHD)” to “To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry”</p> <p>Section 9.0 Document History added.</p>
January 2014	1.0 Aetiologic Agent	<p>Addition of the second sentence (“Meningococcal serogroups are classified according to the immunological reactivity of the capsular polysaccharide”).</p>
January 2014	2.2 Outbreak Case Definition	<p>Addition of the first paragraph (“Public health units should notify Public Health Ontario... the changing dynamics of the outbreak.”).</p> <p>Addition of the fifth bullet point in the second paragraph (“Further strain typing ...to support linkage”).</p>
January 2014	3.1 Clinical Presentation	<p>Entire section revised.</p>
January 2014	3.2 Diagnosis	<p>Addition of direction to contact Public Health Ontario Laboratories or PHO website for additional information on human diagnostic testing.</p>
January 2014	4.1 Occurrence	<p>Entire section revised.</p>
January 2014	4.2 Reservoir	<p>Second sentence changed from “ N. meningitides can live in the nose and throat of healthy persons, known as asymptomatic carriers” to “Nasopharyngeal carriage of meningocci is common; at any given time about 10% of the population carries meningococci”.</p>
January 2014	4.5 Period of Communicability	<p>Addition of second sentenc (“A person who is untreated or a carrier can spread the bacteria until meningococci are no longer present in discharge from the nose and mouth”).</p>

Revision Date	Document Section	Description of Revisions
January 2014	5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry	The following was deleted: “and create the case as a person under investigation (PUI) until diagnostic information is received. These would include the following cases of IMD: i) Any case that is suspected to be part of a potential cluster/outbreak ii) An anticipated media release or a case that has evoked media attention iii) Any sporadic or outbreak-related case for which the testing laboratory is unable to culture the organism after 48 hours incubation iv) Any sporadic or outbreak-related case where assistance is required for appropriate testing and v) There is evidence of a cluster of cases and when the serogroup is identified indicating the need for immunization”.
January 2014	6.1 Personal Prevention Measures	Entire section revised.
January 2014	6.2 Infection Prevention and Control Strategies	Addition of reference to PIDAC IPAC best practices documents.
January 2014	6.3 Management of Cases	Entire section revised.
January 2014	6.4 Management of Contacts	Entire section revised.
January 2014	6.5 Management of Outbreaks	Deletion of the following four paragraphs: “An outbreak is defined as increased transmission of N .meningitidis in a population, manifested by an increase in cases of the same serogroup.” “A cluster is defined as 2 or more cases of the same serogroup that are closer in time and space than expected for the population or group under surveillance (3).” “Provide public health management of infectious diseases outbreaks or clusters in order to identify the source of illness, stop the outbreak and limit secondary spread.” “Decision to immunize contacts of a vaccine preventable case will be made in consultation with the Public Health Division.” Addition of the following paragraph: “Provide public health management of outbreaks or clusters in order to identify the source of illness and stop the outbreak. Refer to the National Guidelines for the Prevention and control of Meningococcal Disease for further information”

Revision Date	Document Section	Description of Revisions
January 2014	7.0 References	Updated.
January 2014	8.0 Additional Resources	Updated.
February 2019	General	Minor revisions were made to support the regulation change to Diseases of Public Health Significance. Common text included in all Disease Specific chapters: Surveillance Case Definition, Outbreak Case Definition, Diagnosis, Reporting Requirements, Management of Cases, and Management of Outbreaks. The epidemiology section and references were updated and Section 8.0 Additional Resources was deleted.
February 2019	6.0 Prevention and Control Measures	Updates regarding the ordering of publicly funded vaccines for case and contact management.
February 2019	6.1 Personal Prevention Measures	Updates to information on Immunization of School Pupils Act and Child Care and Early Years Act.

