

# Appendix A: Disease-Specific Chapters

Chapter: Meningococcal disease, invasive

Revised January 2014

# Meningococcal disease, invasive

Communicable

Virulent

**Health Protection and Promotion Act:**

**Ontario Regulation 558/91 – Specification of Communicable Diseases**

**Health Protection and Promotion Act:**

**Ontario Regulation 559/91 – Specification of Reportable Diseases**

## 1.0 Aetiologic Agent

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

## 2.0 Case Definition

### 2.1 Surveillance Case Definition

[See Appendix B.](#)

### 2.2 Outbreak Case Definition

Public health units should notify Public Health Ontario (PHO), as specified by the Ministry of Health and Long-Term Care (the Ministry), when a case is identified. If secondary transmission occurs, an outbreak case definition may be developed in consultation with PHO based on a review of the epidemiology of identified cases. The outbreak case definition may evolve over time to reflect the changing dynamics of the outbreak.

The outbreak case definition varies with the outbreak under investigation. Consideration should be given to the provincial surveillance case definition and the following criteria when establishing an outbreak case definition:

1. Clinical, laboratory and/or epidemiological criteria;
2. Time frame of occurrence;
3. Geographic location(s) or place(s) where cases live or became ill/exposed;
4. Special attributes of cases (e.g. age, underlying conditions); and
5. Further strain typing as appropriate, which may be used to support linkage.

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

## 3.0 Identification

### 3.1 Clinical Presentation

Clinical illness associated with IMD usually manifests as meningitis, meningococemia or both.<sup>3</sup> Less common presentations are pneumonia with bacteremia, septic arthritis and pericarditis.<sup>1,3</sup>

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

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.<sup>3,4</sup>

Case fatality ratio (CFR) is between 8% and 15%, with CFR of meningococemia as high as 40%.<sup>1,4</sup> Of survivors, 10%-20% may experience long-term sequelae such as mental retardation, hearing loss, loss of limb use, amputation of digit or limb, and skin scarring.<sup>1,3</sup>

### 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 2007 and 2011, an average of 51 cases occurred per year in the province. Since 2007, serogroup B has been responsible for most cases of IMD, followed by serogroup Y; serogroup C and W135 are relatively uncommon.<sup>6</sup> Serogroup A is extremely rare in Ontario and usually associated with travel (serogroup A disease predominates in Africa and Asia. Incidence rates are highest in infants, adolescence and young adults).<sup>1</sup>

For more information on meningococcal diseases activity in Ontario, refer to the current versions of the Ontario Annual Infectious Diseases Epidemiology Reports and the Monthly Infectious Diseases Surveillance Report.<sup>6,7</sup>

### 4.2 Reservoir

Humans.<sup>1</sup> Nasopharyngeal carriage of meningococci is common; at any given time about 10% of the population carries meningococci.<sup>8</sup>

### 4.3 Modes of Transmission

Person-to-person through direct contact with the nose and throat secretions of an infected person, and often with an asymptomatic carrier or by respiratory droplets.<sup>1</sup> IMD is also spread by oral secretion during close and direct contact through activities such as kissing or sharing drinking bottles.<sup>8</sup>

### 4.4 Incubation Period

Two to ten days, commonly three to four days.<sup>1</sup>

### 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.<sup>2</sup> 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.<sup>1</sup>

### 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.<sup>1</sup> There is an increased risk of secondary infections in close contacts of cases, particularly in household contacts.<sup>8</sup>

## 5.0 Reporting Requirements

### 5.1 To local Board of Health

Individuals who have or may have IMD shall be reported to the Medical Officer of Health (MOH) by persons required to do so under the *Health Protection and Promotion Act, R.S.O. 1990* (HPPA).<sup>9</sup>

**Note:** Laboratory confirmed cases are to be reported by phone to the local MOH as soon as identified.

### 5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry

Report confirmed and probable cases.

Cases shall be reported using the integrated Public Health Information System (iPHIS), or any other method specified by the ministry **within one business day of receipt of initial notification** as per iPHIS Bulletin #17: Timely Entry of Cases and Outbreaks.<sup>10</sup>

The minimum data elements to be reported for each case are specified in the following:

- *Ontario Regulation 569* (Reports) under the HPPA;<sup>11</sup>
- The iPHIS User Guides published by PHO; and
- Bulletins and directives issued by PHO.

## 6.0 Prevention and Control Measures

### 6.1 Personal Prevention Measures

Immunize as per the current *Publicly Funded Immunization Schedules for Ontario*.<sup>12</sup> 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 five years.<sup>2</sup>

Health care workers (HCWs) should avoid direct contact with respiratory secretions of infected cases by maintaining droplet precautions during intensive contact with the case.<sup>8</sup> In general, risk of nosocomial transmission of IMD is low and there is no recommendation for routine meningococcal immunization of HCWs.<sup>2</sup>

### 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.<sup>3</sup>

Refer to Public Health Ontario's website at [www.publichealthontario.ca](http://www.publichealthontario.ca) to search for the most up-to-date Provincial Infectious Diseases Advisory Committee (PIDAC) best practices on Infection Prevention and Control (IPAC). PIDAC best practice documents can be found at:

[http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC\\_Documents.aspx](http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC_Documents.aspx).

### 6.3 Management of Cases

Cases should be investigated to determine the source of infection, including inquiring about travel history or exposure to persons who have recently travelled and documenting location of travel. Investigation should commence as soon as possible after receiving the initial report. Refer to Section 5: Reporting Requirements above for relevant data to be collected during case investigation. The following disease specific information should also be obtained during case management:

- Clinical: symptoms and date of symptom onset, complications, outcome;
- Laboratory: specimen type, specimen source, positive culture with sensitivities if possible, specific serogroup;
- Immunization: status, specifically dates of vaccination with meningococcal vaccine(s) and type of meningococcal vaccines
- Epidemiologic: exposures or risk factors (i.e. contact history, travel history including location and dates), attendance at daycare or other public facility. Identify close contacts (see below).

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.<sup>13</sup>

## 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 contracting IMD.<sup>3</sup> Household contacts are at particularly high risk with a secondary transmission rate about 500-800 times greater than that of the general population.<sup>3, 13</sup> 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 prophylactic antibiotic.

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:<sup>8</sup>

- Household contact of a case;
- Children and staff in contact with the case at child care and nursery school facilities;
- 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;<sup>3, 8</sup>
- 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.<sup>4</sup> Chemoprophylaxis using rifampin, ciprofloxacin, or ceftriaxone is between 90%-95% effective in decreasing nasopharyngeal carriage.<sup>13</sup>

**Table 1: Recommended chemoprophylaxis for Invasive Meningococcal Disease<sup>13</sup>**

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"> <li>• Can interfere with efficacy of medications including oral contraceptives, anticonvulsants and anticoagulants</li> <li>• Can stain contact lenses</li> <li>❖ Not recommended for pregnant women</li> </ul>
Ceftriaxone	< 15 years  ≥ 15 years	125mg, IM, single dose  250mg, IM, single dose	<ul style="list-style-type: none"> <li>• Safe for pregnancy</li> </ul>
Ciprofloxacin	Adults	500mg, oral, single dose	<ul style="list-style-type: none"> <li>• Not used in communities where fluoroquinolone-resistant strains of <i>N. meningitidis</i> have been detected</li> <li>❖ Not recommended for pregnant women</li> </ul>

In addition to the chemoprophylaxis, close contacts having ongoing exposure to a case should also receive immunization with the 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.<sup>2</sup>

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.<sup>8</sup>

## 6.5 Management of Outbreaks

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.<sup>8</sup>

As per the *Infectious Diseases Protocol, 2008* (or as current), outbreak management shall be comprised of, but not be limited to, the following general steps:

- Confirm diagnosis and verify the outbreak;
- Establish an outbreak team;
- Develop an outbreak case definition;
- Implement prevention and control measures;
- Implement and tailor communication and notification plans depending on the scope of the outbreak;
- Conduct epidemiological analysis on data collected;
- Conduct environmental inspections of implicated premise where applicable;
- Coordinate and collect appropriate clinical specimens where applicable;
- Prepare a written report; and
- Declare the outbreak over in collaboration with the outbreak team.

## 7.0 References

- 1 Heymann D, editor. Control of communicable diseases manual. 19th ed. Washington, DC: American Public Health Association; 2008.
- 2 National Advisory Committee on Immunization; Public Health Agency of Canada.. Canadian immunization guide. Evergreen ed. Part 4 active vaccines:Meningococcal vaccine. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2012 [cited 2013 Aug 27]. Available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-meni-eng.php>.
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- 5 Gold R. Your child's best shot: a parent's guide to vaccination. 3rd ed. Ottawa, ON: Canadian Paediatric Society; 2006. p. 135-53.
- 6 Ontario. Ministry of Health and Long-Term Care. Ontario annual infectious diseases epidemiology report, 2009. Toronto, ON: Queen's Printer for Ontario; 2009 (or as current) [cited 2013 Aug 27]. Available from: [http://www.health.gov.on.ca/en/common/ministry/publications/reports/epi\\_reports/epi\\_report\\_2009.aspx](http://www.health.gov.on.ca/en/common/ministry/publications/reports/epi_reports/epi_report_2009.aspx).
- 7 Ontario Agency for Health Protection and Promotion (Public Health Ontario). Monthly infectious diseases surveillance report. 1(12). Toronto, ON: Queen's Printer for Ontario; 2012 [cited 2013 Aug 27]. Available from: <http://www.publichealthontario.ca/en/ServicesAndTools/SurveillanceServices/Pages/Monthly-Infectious-Diseases-Surveillance-Report.aspx>.
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- 9 *Health Protection and Promotion Act*, R.S.O. 1990, c. H.7. Available from:  
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- 10 Ontario. Ministry of Health and Long-Term Care. Timely entry of cases and outbreaks. iPHIS bulletin. Toronto, ON: Queen's Printer for Ontario; 2012:17 (or as current).
- 11 Reports, R.R.O. 1990, Reg. 569. Available from:  
[http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_900569\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900569_e.htm)
- 12 Ontario. Ministry of Health and Long-Term Care. Publicly funded immunization schedules for Ontario: August 2011. Toronto, ON: Queen's Printer for Ontario; 2011 [cited 2013 Aug 27]. Available from:  
<http://www.health.gov.on.ca/en/public/programs/immunization/docs/schedule.pdf>
- 13 Centers for Disease Control and Prevention. Prevention and control of meningococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep. 2013 [cited 2013 Aug 27];62(RR-2). Appendix A, Antimicrobial Chemoprophylaxis; p. 23-24. Available from:  
[http://www.cdc.gov/MMWR/preview/mmwrhtml/rr6202a2.htm?s\\_cid=rr6202a2\\_w](http://www.cdc.gov/MMWR/preview/mmwrhtml/rr6202a2.htm?s_cid=rr6202a2_w)

## 8.0 Additional Resources

Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Routine practices and additional precautions in all health care settings. 3rd ed. Toronto, ON: Queen's Printer for Ontario; 2012. Available from:  
[http://www.publichealthontario.ca/en/eRepository/RPAP\\_All\\_HealthCare\\_Settings\\_Eng2012.pdf](http://www.publichealthontario.ca/en/eRepository/RPAP_All_HealthCare_Settings_Eng2012.pdf)

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Public Health Agency of Canada. Supplement: advice for consideration of quadrivalent (A, C, Y, W135) meningococcal conjugate vaccine, for use by provinces and territories. Can Commun Dis Rep.; 2010 [cited 2013 Aug 27];36S2:1-35. Available from:  
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World Health Organization. Meningococcal meningitis, Factsheet N141. Geneva, Switzerland: WHO; 2012 [cited 2013 Aug 27]. Available from: <http://www.who.int/mediacentre/factsheets/fs141/en/>

## 9.0 Document History

**Table 2: History of Revisions**

Revision Date	Document Section	Description of Revisions
January 2014	General	New template. Title of Section 4.6 changed from “Susceptibility and Resistance” to “Host Susceptibility and Resistance” 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” Section 9.0 Document History added.
	1.0 Aetiologic Agent	Addition of the second sentence (“Meningococcal serogroups are classified according to the immunological reactivity of the capsular polysaccharide”).
	2.2 Outbreak Case Definition	Addition of the first paragraph (“Public health units should notify Public Health Ontario... the changing dynamics of the outbreak.”). Addition of the fifth bullet point in the second paragraph (“Further strain typing ...to support linkage”).
	3.1 Clinical Presentation	Entire section revised.
	3.2 Diagnosis	Addition of direction to contact Public Health Ontario Laboratories or PHO website for additional information on human diagnostic testing.
	4.1 Occurrence	Entire section revised.
	4.2 Reservoir	Second sentence changed from “ N. meningitides can live in the nose and throat of healthy persons, known as asymptomatic carriers” to “Nasopharyngeal carriage of meningococci is common; at any given time about 10% of the population carries meningococci”.

<b>Revision Date</b>	<b>Document Section</b>	<b>Description of Revisions</b>
	4.5 Period of Communicability	Addition of second sentence (“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”).
	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”.
	6.1 Personal Prevention Measures	Entire section revised.
	6.2 Infection Prevention and Control Strategies	Addition of reference to PIDAC IPAC best practices documents.
	6.3 Management of Cases	Entire section revised.
	6.4 Management of Contacts	Entire section revised.
	6.5 Management of Outbreaks	Deletion of the following four paragraphs: “An outbreak is defined as increased transmission of <i>N. meningitidis</i> 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

Revision Date	Document Section	Description of Revisions
		<p>secondary spread.”</p> <p>“Decision to immunize contacts of a vaccine preventable case will be made in consultation with the Public Health Division.”</p> <p>Addition of the following paragraph:</p> <p>“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”</p>
	7.0 References	Updated.
	8.0 Additional Resources	Updated.

