MENINGOCOCCAL DISEASE – INVASIVE (IMD)

Case definition

https://novascotia.ca/dhw/populationhealth/surveillanceguidelines/mdi.pdf

Causative agent

Neisseria meningitidis, also called meningococcus, is a gram-negative aerobic diplococcus bacterium. There are several serogroups of *Neisseria meningitidis* with serogroups A, B, C, Y, W being most frequently associated with invasive disease in Canada. Invasive meningococcal disease (IMD) is a rare but endemic disease in Canada which usually occurs as a single sporadic case. Cases are reported year-round with peaks in the winter months and during periods of increased influenza activity. The incidence is highest in children under five years, particularly in infants under one, with a second peak in adolescents aged 15 to 19 years.

Source

Humans: Meningococcus commonly colonizes the nasopharynx and carriage prevalence varies by age (highest in older adolescents/young adults), serogroup and geography. Less than 1% of those colonized will progress to invasive disease.

Incubation

Usually 3 to 4 days, ranges from 2 to 10 days.

Transmission

Person-to-person through direct contact with saliva or respiratory secretions.

Communicability

Communicable from 7 days before the onset of symptoms to 24 hours after effective antibiotic treatment.

Symptoms

Symptom onset occurs 2 to 10 days (typically 3 to 4 days) after exposure. Meningitis and/or meningococcemia (also known as meningococcal sepsis) are the most common manifestations of IMD. Other forms of invasive disease include septic arthritis and pericarditis.

Meningococcal meningitis signs and symptoms are indistinguishable from those of acute bacterial meningitis caused by other bacterial pathogens (Haemophilus influenza type b or Streptococcus pneumoniae) and include:

- Sudden onset of fever
- Intense headache
- Stiff neck
- Nausea
- Vomiting
- Photophobia
- Altered mental status (e.g. drowsiness)
- In infants, clinical findings include fever, irritability, difficulty waking, difficulty feeding, vomiting, stiff neck, and bulging fontanelle.

Meningococcaemia is the most severe form of infection with sudden onset of fever, severe body aches and pains, petechial rash, hypotension, disseminated intravascular coagulation and multi-organ failure.

The case fatality ratio (CFR) is between 8% and 15%, with the CFR of meningococcemia as high as 40%.

Diagnostic testing

- Cerebral spinal fluid (CSF) for culture and gram stain. Consider testing using polymerase chain reaction (PCR) if culture negative in cases where there is high clinical suspicion and other findings consistent with bacterial meningitis, such as increased protein in CSF, increased polymorphonuclear leukocyte in CSF, or decreased glucose in CSF.
- Blood for culture.
- All positive cultures receive serogrouping at the QEII (turnaround time approximately 3 days) and are sent to the National Microbiology Lab (NML) for additional testing: repeat serogrouping, serotyping, and serosubtyping.
- If only detected by PCR for clinical diagnostic tests, molecular based serogrouping is available (if sufficient quantity).
- Further molecular characterization through NML may be warranted in some circumstance (e.g., suspected or confirmed outbreaks) and should be requested after consultation with MOH.

Treatment

- Treatment with antibiotics and follow up is under the direction of the attending health care provider.
- If the case was not treated with an antibiotic effective in nasopharyngeal eradication of *N. meningitidis* (i.e. a third generation cephalosporin or ciprofloxacin), chemoprophylaxis should be given to the case prior to discharge to ensure elimination of the organism from the nasopharynx (see ***Table 2: Chemoprophylaxis for Invasive Meningococcal Disease***)

PUBLIC HEALTH MANAGEMENT & CONTROL

Case management

Follow-up of IMD is a priority, and the following steps should be taken **immediately**:

1. Contact the most responsible physician in hospital to obtain clinical information on the case.
2. Interview the case or proxy (e.g., parent/guardian, close family member) to determine potential close contacts of the case (See ***Table 1: Close Contact Definition***), including if case:
    - attends or is employed at a childcare setting or school
    - participated in recent athletic or recreational events and/or gatherings
    - has had recent travel
3. Chemoprophylaxis should be given to case prior to discharge from hospital if neither a third- generation cephalosporin nor ciprofloxacin was given as treatment, to ensure elimination of the organism from the nasopharynx (see ***Table 2: Chemoprophylaxis for Invasive Meningococcal Disease***).
4. Determine close contacts that may require investigation (see Contact Tracing).
5. Educate the case and /or proxy about meningococcal disease, prevention measures, and provide the Meningococcal Disease ***General Information sheet*** and ***website***.
6. Encourage cases with a vaccine preventable serogroup (i.e. A, B[1], C, W, Y) who are unimmunized or incompletely immunized to complete their immunization as per the recommended ***Nova Scotia Immunization Schedules***.

Exclusion

Exclusion of cases is typically not applicable as most require hospital-level care.

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[1] Men-B vaccine costs will be covered per the *Publicly Funded Vaccine/Immunoglobulin Eligibility Policy*

Contact Tracing

The cornerstone of prevention of secondary cases of IMD is aggressive contact tracing to identify people at increased risk for disease (i.e. close contacts - see Table 1) and provide them with chemoprophylaxis. Immunoprophylaxis is also recommended if the identified strain belongs to a vaccine-preventable serogroup (A, B, C, W, Y). Close contacts should also be advised about the symptoms of IMD (i.e., fever, headache, stiff neck, petechial rash) and instructed to seek prompt medical attention if symptoms develop.

Chemoprophylaxis eliminates nasopharyngeal carriage of bacteria from the source, reducing the risk to other susceptible individuals in the social network, and prevents secondary cases if close contacts have been recently colonized.

Throat and nasopharyngeal cultures of close contacts are of **no value** in deciding who should receive prophylaxis and might unnecessarily delay institution of this preventive measure. There is no consistent relationship between nasal carriage found in the normal population and that found in an epidemic.

Close contacts of individuals with meningococcal infections have an increased risk of developing IMD; this risk is greatest for household contacts. The increased risk of disease for household contacts can persist for up to 1 year after disease in the index case and beyond any protection from chemoprophylaxis. In general, this prolonged risk is not seen among contacts that do not have ongoing exposure.

Table 1: **Close Contact Definition**

- Household contacts of a case
- Persons who share sleeping arrangements with the case
- Persons who have direct contamination of their nose or mouth with the oral/nasal secretions of a case (i.e. kissing on the mouth, shared cigarettes, shared drinking bottles or eating utensils, etc.)
- Health care workers who have had intensive unprotected contact (without droplet precautions) with infected patients (i.e. during intubation, resuscitating or closely examining the oropharynx)
- Children and staff in childcare facilities
- 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

Susceptibility

Susceptibility to IMD is low and decreases with age; however disease can present in any age. Additionally, certain medical conditions and other risk factors can increase risk of IMD such as:

- complement, properdin or factor D deficiencies
- functional or anatomic asplenia, sickle cell disease, or combined T and B cell immunodeficiencies
- certain genetic risk factors
- concurrent respiratory tract infection
- recent influenza
- active and passive smoking
- HIV infection, especially if HIV is congenitally acquired

Initiate contact tracing

Obtain names and information for all contacts who meet the definition outlined above (see ***Table 1: Close Contact Definition***).

- If the case traveled on a flight of 8 hours or more (including ground time on the tarmac) during the infectious period (7 days before onset of symptoms to 24 hours after the onset of effective treatment), then a decision must be made in consultation with the Medical Officer of Health (MOH) to obtain the passenger manifest, including names of airline crew. It is important to note that aircraft passenger manifests are rarely kept after 48 hours.
- Deceased cases have traditionally been considered a potential source of infection. If the deceased person had been treated with effective antibiotics for at least 24 hours prior to death, risk is considered low.
- Contacts do not need to be excluded from any activities.

If the case is in an health care institution/long term care facility:

- Contact tracing will be done in collaboration with Infection Prevention and Control and/or Occupational Health Safety and Wellness apart from community providers such as Emergency Health Services (EHS) which will be led by Public Health.
- For health care providers caring for a case with meningococcal disease, only persons with intensive exposure to nasopharyngeal or respiratory secretions without appropriate precautions (droplet precautions) require prophylaxis. Other individuals within the facility may meet the definition of close contacts (e.g., roommate of an institutionalized case).

If the case is in a childcare setting:

- Attendees and staff should be assessed as to whether they meet the definition of a contact, see Table 1 above.

Chemoprophylaxis

Chemoprophylaxis should be offered to all persons having close contact with an IMD case during the infectious period (the 7 days before onset of symptoms in the case to 24 hours after onset of effective treatment), regardless of their immunization status.

Chemoprophylaxis of close contacts should be administered as soon as possible and preferably within 24 hours of case identification but is still recommended for up to 10 days following last contact.

Chemoprophylaxis should be considered for close contacts of a case that is strongly suspected to be IMD, even if laboratory confirmation cannot be obtained within 24 hours.

Table 2: **Chemoprophylaxis for Invasive Meningococcal Disease IMD 2023- IDEG Endorsed**

Drug	Dosage	Comments
Ciprofloxacin [a,b] Recommended as first line for chemoprophylaxis if no contraindications exist.	**≥1mo** 20 mg/kg (maximum 500 mg), orally X 1 dose	**90-95% efficacy** Advantages include it is given as a single dose,does not interact with oral contraceptives, and is more readily available. Off label use in children.
Ceftriaxone Recommended as first line for pregnant people and alternative first line choice for chemoprophylaxis recognizing need for IM injection administration.	**<15 y** 125 mg, IM X 1 dose **≥15 y** 250 mg, IM X 1 dose	**90-95% efficacy** Ceftriaxone is the alternative for persons who cannot tolerate oral medication.
Rifampin [a] Recommended as second line for chemoprophylaxis if ciprofloxacin cannot be used.	**<1 mo** 5mg/kg, orally, every 12 hours for 2 days **≥ 1mo** 10mg/kg, (maximum 600 mg), orally, every 12 h for 2 days	**90-95% efficacy** Can interfere with efficacy of oral contraceptives and some seizure and anticoagulant medications, can stain soft contact lenses.
Azithromycin To be used only if none of the other chemoprophylaxis therapies are unable to be used.	10 mg/kg (maximum 500 mg) orally X 1 dose	**90% efficacy** Not recommended routinely; equivalent to rifampin for eradication of Neisseria meningitidis from nasopharynx in one study.

a Not recommended for use in pregnant women
b Use only if fluoroquinolone-resistant strains of N. meningitidis have not been identified in the community

Immunoprophylaxis

Determine the meningococcal immunization status of close contacts for whom immunoprophylaxis is recommended. Assess whether the individual has received meningococcal vaccine(s) and determine type of vaccine, number of doses, and age or date at time of vaccine administration.

Table 3: **Recommendations for Immunoprophylaxis of Close Contacts**

Close contacts to receive both immunoprophylaxis and chemoprophylaxis	• Household contacts of the case • Persons who share sleeping arrangements with the case • Persons who have had direct contamination of their nose or mouth contamination with oral/nasal secretions of a case (i.e., kissing on the mouth; sharing toothbrushes, eating utensils, cigarettes, mouth-guards, water bottles, or musical instrument mouthpieces) • Children and staff in childcare and preschool facilities
Re-vaccination criteria for those previously vaccinated against IMD	• Those previously vaccinated with a serogroup that differs from the index case or outbreak strain should be vaccinated immediately with the appropriate vaccine. • Those previously vaccinated with a serogroup that is the same as the index case or outbreak strain should be re-vaccinated according to ***Table 2: Recommended vaccination of close contacts for post-exposure management and for outbreak control per the Meningococcal Vaccine section of the Canadian Immunization Guide.***

NOTE: for contacts who had a one-time exposure (i.e. health care workers and air travel contacts) rather than ongoing exposure, chemoprophylaxis alone is sufficient rather than immunization and chemoprophylaxis. Chemoprophylaxis only is also sufficient for close contacts of an IMD case caused by a non-vaccine preventable serogroup or when the serogroup in the index case has not been determined. Previously vaccinated close contacts who do not meet the criteria for re-vaccination should receive chemoprophylaxis only.

Please refer to the Meningococcal Vaccine section of the ***Canadian Immunization Guide*** for in-depth vaccine recommendations and schedules of close contacts for post-exposure management and for outbreak control.

Exclusion

Exclusion of contacts is not necessary.

Education

- Review signs and symptoms of meningococcal disease and provide contacts with the ***General Information Sheet.***
- Provide contacts with information on post-exposure prophylaxis and identify potential barriers to access.
- Instruct contacts to seek medical attention immediately if they develop signs and symptoms.

Communication strategies following a sporadic case

- There is usually no need to inform the general public of a sporadic case.
- When a confirmed or probable IMD case occurs in a childcare or educational setting, including post-secondary institutions, there should be prompt communication with the heads of the institution. Timely dissemination of an information letter to students/parents/school staff to inform them of the situation should be considered in consultation with the institution, communications, and other partners where needed (e.g. privacy). Clinical judgment and risk assessment are needed to determine how broadly the information letter should be shared. In general, the higher the probability of others in the institution being infected, the broader the communication should be. Where risk is low, but community concern is high, consideration for broadening communication efforts may be needed. The case or their family should be aware of the communication in advance, if possible, but this should not delay broader communication.
- The purpose of the letter is to give information about meningococcal disease to assist with early detection of the disease, communicate actions to date, and prevent misinformation. The information should ensure awareness of the situation but preserve confidentiality of the case.
- Consideration should also be given to communicate to local health care providers to raise awareness.

Outbreak Response

In the event of an outbreak, Public Health leads the case investigation of all cases of IMD. Public health measures above and beyond those outlined above may need to be instituted, including expansion of immunoprophylaxis beyond close contacts if the outbreak is caused by a vaccine preventable serogroup. Chemoprophylaxis should only be used for close contacts of cases. There is no evidence to support the provision of widespread chemoprophylaxis for persons who are not close contacts. Specific measures will need to be determined in consultation with the MOH. A communication strategy should be developed to ensure to ensure timely, clear and consistent messages are being delivered to the public and health care providers.

Public Health Agency of Canada ***Guidelines for the Prevention and Control of Meningococcal Disease*** may provide additional information to support outbreak response and management.

Surveillance Guidelines

General Information sheet

Sample letter

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