# Invasive Meningococcal Disease (*Neisseria meningitidis*)

Manitoba
Public Health Branch

## Summary of Updates

**January 2025**

Minor updates to the protocol include:

- Table 1 in Section 8.2 includes addition of ciprofloxacin use for children ≥1 month of age.
- Incorporated previous guidance into the body of the protocol:
  - Reporting requirements
  - Additional guidance for immunoprophylaxis of group 1 close contacts in Section 8.2.1.

## 1. Case Definition

### 1.1 Confirmed case

Clinical illness[1] with laboratory confirmation of at least one of:

- Isolation of *Neisseria meningitidis* from a normally sterile site (e.g., blood, cerebrospinal fluid (CSF), joint, pleural or pericardial fluid)

OR

- Demonstration of *N. meningitidis* DNA by nucleic acid test (NAT) from a normally sterile site (e.g., blood, CSF, joint, pleural or pericardial fluid). (1)

### 1.2 Probable case

Clinical illness[1] with purpura fulminans or petechiae in the absence of laboratory confirmation and no other apparent cause OR compatible clinical illness[1] with non-confirmatory laboratory evidence:

- Gram-negative diplococci in CSF

OR

- Detection of *N. meningitidis* antigen in CSF. Positive antigen test results from urine and serum samples are unreliable for diagnosing meningococcal disease. (1)

## 2. Reporting Requirements

**Laboratory**

All positive laboratory results as noted in the case definition are reportable by laboratory to the Manitoba Health Surveillance Unit (MHSU) via fax or established electronic interface.

A phone report must also be made to the Medical Officer of Health (MOH) at 204-788-8666 on the same day the result is obtained.

Clinical laboratories are required to submit isolate sub-cultures from individuals who tested positive for invasive *N. meningitidis* to Cadham Provincial Laboratory (CPL) within seven days of report.

[1] Usually meningitis and/or septicemia, although other manifestations may be observed (e.g., orbital cellulitis, septic arthritis). Invasive disease may progress rapidly to petechiae or purpura fulminans, shock and death.

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**Health Care Professional**

Probable cases of invasive meningococcal disease (IMD) are reportable to the MHSU on the same day they are identified. Reporting to be completed by phone (204-788-6736) during regular hours (8:30 a.m. to 4:30 p.m.) AND by faxing the completed *Clinical Notification of Reportable Diseases or Conditions Form* (MHSU-0013) (found in MHSU's Surveillance Forms webpage at www.gov.mb.ca/health/publichealth/surveillance/forms.html) by secure fax to 204-948-3044. After-hours, contact the Medical Officer of Health on-call at 204-788-8666.

Adverse events following immunizations (AEFI) should be reported by health care professionals by completing and returning the *Report of Adverse Events Following Immunization Form* (MHSU-2334) (found in MHSU's Surveillance Forms webpage at www.gov.mb.ca/health/publichealth/surveillance/forms.html).

**Regional Public Health/First Nations Inuit Health Branch (FNIHB)**

All case investigations are to be completed in the Public Health Information Management System (PHIMS). For public health providers without access to PHIMS, the *Vaccine Preventable Disease Investigation Form* (MHSU-8733) (found in the MHSU's Surveillance Forms webpage at www.gov.mb.ca/health/publichealth/surveillance/forms.html) should be completed and submitted to Manitoba Health, Seniors and Long-Term Care (MHSLTC) by secure fax (204-948-3044). The critical data elements, which are required documentation for all case and contact investigation, are listed with an asterisk (*) on the investigation forms.

## 3. Clinical Presentation/Natural History

Invasive disease syndromes include bacteremia, sepsis and meningitis, with the latter being the most common. (2) Meningococcal sepsis (meningococcemia) is the most severe form of infection characterized by abrupt onset of fever, and petechial or purpuric rash, often associated with hypotension, shock, acute adrenal hemorrhage and multi-organ failure. (3) Meningococcemia may occur without meningitis and should be suspected in cases of otherwise unexplained acute febrile illness associated with petechial rash and leukocytosis.

Signs and symptoms of meningococcal meningitis are indistinguishable from signs and symptoms of acute meningitis caused by *Streptococcus pneumoniae* or other bacterial pathogens. (4) Meningeal infection is characterized by sudden onset of fever, headache and stiff neck, often accompanied by nausea, vomiting, photophobia and altered mental status. (3) In infants, symptoms of meningitis may have a slower onset, signs may be non-specific and neck stiffness may be absent. (5) Other forms of meningococcal disease such as pneumonia, purulent arthritis and pericarditis are much less common. (2)

The case fatality rate (CFR) of IMD varies depending on the prevalence of disease, the site of infection and the socioeconomic conditions of the population in which it occurs, (6) but averages 9 to 12 percent, even with appropriate antibiotic therapy. Up to 20 percent of survivors

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of invasive disease will have permanent sequelae including hearing loss, neurologic damage or digit or extremity amputation. (3)

## 4. Etiology

*N. meningitidis* (meningococcus) is a gram-negative diplococcus. The polysaccharide capsule is the basis for the serogroup typing system; at least 13 serogroups cause disease in humans. (6) Invasive disease is invariably caused by one of five serogroups: A, B, C, Y and W-135. (3) Groups A, B and C account for at least 90 percent of cases; however, groups Y and W-135 are increasing in some areas. (2)

## 5. Epidemiology

### 5.1 Reservoir and Source

Humans. (2) Approximately 10 percent of adolescents and adults are asymptomatic transient carriers of *N. meningitidis*. (3)

### 5.2 Transmission

*N. meningitidis* is transmitted by respiratory droplets or by direct contact with secretions from the nasopharynx (e.g., kissing on the mouth) of infected or colonized individuals. (3, 7) Fomite transmission is not important as the organism does not survive in the environment. (2) Nosocomial transmission is uncommon. (8)

### 5.3 Occurrence

**General:** Occurs sporadically and in outbreaks worldwide. In Europe and North America, the incidence of meningococcal disease is higher during winter and spring; in sub-Saharan Africa, the disease usually peaks during the dry season (i.e., from December to June). (2, 3) Incidence is highest in infants. (2) The highest burden of disease is concentrated in sub-Saharan Africa, in a region designated the "meningitis belt". (9) In this area, the annual incidence can be as high as 1,000 cases per 100,000 population. (10) Epidemics occur in populations where there is crowding and lack of sanitation. (6)

**Canada:** Rates of IMD have decreased over the past decade (11); however, IMD is still endemic in Canada. Periods of increased activity occur approximately every 10 to 15 years. (8) From 1995–2006, the incidence of IMD averaged 0.77 cases per 100,000 population per year in Canada. On average, 235 cases were reported annually. Using the 12-year average, the highest incidence was observed in infants less than one year of age (8.7 cases per 100,000), followed by children one to four years of age (2.3 per 100,000). The rates declined until adolescence and peaked again at 15–19 years (1.9 per 100,000) and 20–24 years (1.0 per 100,000). (12) Serogroups B and C have been responsible for most reported cases of endemic disease in Canada; meningococcal outbreaks are almost exclusively due to serogroup C. (8) Serogroups A and W-135 are rare in Canada. Rates and numbers of serogroup Y invasive disease have remained stable. (12)

**Manitoba:** From 2000–2009 inclusive, IMD incidence averaged 0.63 cases per 100,000 population per year in Manitoba. The highest incidence was observed in infants less than one year of age (4.84 per 100,000) followed by children one to four years of age (2.05 per 100,000). Meningitis was the most common presentation. Five serogroup C cases in teens in spring 2001 prompted a mass immunization program for teens aged 13–19 years, living in or attending school in Winnipeg.

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### 5.4 Incubation Period

Usually three to four days, but ranges from 2–10 days. (2)

### 5.5 Host Susceptibility

Individuals with functional or anatomic asplenia and those with complement, properdin or factor D deficiency are at increased risk of IMD. (8) Other factors such as crowding, low socioeconomic status, active or passive exposure to tobacco smoke and concurrent upper respiratory tract infections also increase the risk of meningococcal disease. (2, 3) The duration of serogroup-specific immunity following infection is unknown. (2)

### 5.6 Period of Communicability

From seven days before onset of clinical symptoms until 24 hours after onset of effective antimicrobial therapy. (13) Penicillin will temporarily suppress meningococci, but it does not usually eradicate the organism from the oronasopharynx.

## 6. Laboratory Diagnosis

Culture is the preferred diagnostic test as antimicrobial susceptibility testing and serotyping can be performed on the isolate. Nucleic acid testing (NAT) is useful to confirm the presence of *N. meningitidis* when the sensitivity of culture may be low, usually because of prior antibiotic administration. Consult with CPL (204-945-7184) before submitting a specimen for NAT.

Serogroup determination is routinely performed, and serotyping is available. Antibiotic susceptibility testing may not be routinely performed but is available with special request.

## 7. Key Information for Public Health Response

- Case and contact history
- Travel history
- Antibiotic treatment/prophylaxis
- Immunization history (including type of meningococcal vaccine, the number of doses and age at vaccine administration)

## 8. Control

Healthy individuals (i.e., no symptoms of invasive disease, pneumonia or conjunctivitis) found to have positive *N. meningitidis* nasopharyngeal cultures do not require antibiotic prophylaxis for *N. meningitidis* or follow-up unless they themselves are contacts and meet the definition for Group 1 or Group 2 Close Contacts (refer to Sections 8.2.1 and 8.2.2 below).

Non-IMD presentations (e.g., conjunctivitis, pneumonia) should be treated with appropriate systemic antibiotics (13) that will eliminate the organism from the nasopharynx. Such non-invasive meningococcal cases should not be reported to MHSU. However, they may require prophylaxis of contacts (refer to Section 8.2) but the evidence for chemoprophylaxis of contacts of non-invasive meningococcal cases is very scant. (14, 15) Such decisions are left to the discretion of the attending clinician, who may consult an MOH on a case-by-case basis.

### 8.1 Management of IMD Cases

**Treatment**

Treatment should begin immediately after the clinical diagnosis, even before meningococci have been identified.

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- Empiric therapy with a third-generation cephalosporin (e.g., cefotaxime, ceftriaxone) (3, 4) and vancomycin (3) is recommended until the specific etiologic agent has been identified to fully cover disease caused by other potential bacterial pathogens.
- **Laboratory-confirmed meningococcal disease:** Penicillin is recommended. (4, 6) Cefotaxime, ceftriaxone and ampicillin are alternatives. (4) Chloramphenicol should be considered in penicillin-allergic patients where an immediate-type reaction to penicillin is described. (2, 4, 6)

Patients with IMD should also receive antimicrobial chemoprophylaxis prior to hospital discharge with rifampin, ciprofloxacin or ceftriaxone (refer to Table 1) if a third-generation cephalosporin was not given as treatment, to ensure elimination of the organism from the nasopharynx. (2, 4, 5, 8, 13)

**Infection Control Measures**

In addition to Routine Practices, hospitalized patients should be placed on Droplet Precautions until 24 hours after institution of appropriate antimicrobial therapy.

## 8.2 Management of Contacts

A contact is defined as someone who was exposed to the case during the case's period of communicability (seven days before symptom onset until 24 hours after onset of effective antimicrobial therapy).

- The Regional Health Authority (RHA) of case residence or First Nations Inuit Health (if applicable) will contact reported cases to establish a list of close contacts (defined below). Public health nurses with the assistance of the local MOH will determine who should receive chemoprophylaxis and immunoprophylaxis.
- Close contacts should be alerted to the signs and symptoms of meningococcal disease and be advised to seek medical attention immediately should they develop febrile illness or any other clinical presentation consistent with IMD. (13)
- Contacts have been divided into two groups: Group 1 Close Contacts refer to contacts who will have ongoing exposure to the case and Group 2 Close Contacts refer to contacts who had transient exposure to the case.

### 8.2.1 Management of Group 1 Close Contacts

- Defined as:
  - Household contacts of a case (the attack rate for household contacts is 500 to 800 times the rate for the general population) (4)
  - Persons who share sleeping arrangements with a case

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- Persons who have direct contamination of their nose or mouth with the oral/nasal secretions of a case (e.g., kissing on the mouth, shared cigarettes, shared drinking bottles).
- Children and staff in childcare and nursery school facilities. (8)

- Chemoprophylaxis (refer to Table 1 below) is recommended regardless of immunization status. (8, 13) Chemoprophylaxis should be administered as soon as possible and preferably within 24 hours of case identification but is still recommended for up to 10 days after the last contact with an infectious case. (13)

**Table 1 – Recommended Chemoprophylaxis Regimens for Close Contacts of IMD Cases**

| Drug | Dosage | Comments |
|---|---|---|
| Ciprofloxacin | **Adults ≥ 18 years of age:** 500 mg x single dose PO<br>**Children ≥ 1 month of age:** 20mg/kg (maximum 500 mg) x single dose PO | Preferred regimen for adults because of demonstrated safety in this age group, lower cost, single dose and absence of red discoloration of body fluids.<br>Contraindicated during pregnancy.<br>Use only if fluoroquinolone-resistant strains of *N. meningitidis* have not been identified in the community. Note: at this time, fluoroquinolone resistance is uncommon in Manitoba. Guidance will be updated should this change. |
| Rifampin | **Adults:** 600 mg PO q 12h x 4 doses<br>**Children ≥ 1 month of age:** 10mg/kg (maximum 600 mg) per dose PO q 12h x 4 doses<br>**Infant < 1 month of age:** 5mg/kg per dose PO q 12h x 4 doses | Contraindicated in pregnancy.<br>Urine and tears may be stained red. Advise against wearing soft contact lenses as these can also be stained.<br>Can reduce effectiveness of oral contraceptives. Advise use of alternative/additional contraceptive measures. |
| Ceftriaxone | **Adults and adolescents ≥ 12 years:** 250 mg IM x 1 dose<br>**Children < 12 years:** 125 mg IM x 1 dose | Recommended drug for pregnant women.<br>Dilute in 1% lidocaine to reduce pain at injection site.<br>Alternative option for persons who cannot tolerate oral medication. |

**Note: MHSLTC provides chemoprophylaxis at no charge to Public Health confirmed close contacts only.** Release of medication requires approval/authorization by a Medical Officer of Health.

**Sources:**

PHAC's *Guidelines for the Prevention and Control of Meningococcal Disease: Recommendations for Chemoprophylaxis* (www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2005-31/guidelines-prevention-control-meningococcal-disease/recommendations-chemoprophylaxis.html)

CDC's *Manual for the Surveillance of Vaccine-Preventable Diseases: Meningococcal Disease* (www.cdc.gov/surv-manual/php/table-of-contents/chapter-8-meningococcal-disease.html, see Table 1: Recommended chemoprophylaxis regimens for close contacts of persons with invasive meningococcal disease)

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- Immunoprophylaxis should be considered when the case's serotype is known and vaccine preventable.
  - Close contacts who were not previously immunized against the case's serogroup, or did not complete their primary series, should complete a primary series of the appropriate vaccine as soon as possible.
  - Close contacts to a case of IMD caused by serogroup A, C, Y or W who were previously immunized with a full primary series of meningococcal vaccine that protects against the case's serogroup should be re-vaccinated with the following intervals:
    - If they were less than one year of age at last meningococcal vaccination, administer a dose of Men-C-ACYW vaccine at least four weeks from their last meningococcal vaccine.
    - If they have an underlying medical condition that puts them at risk for IMD, administer a dose of Men-C-ACYW vaccine at least four weeks from their last meningococcal vaccine.
    - If they were more than one year of age at last meningococcal vaccination and are not at high risk for meningococcal disease, administer a dose of the Men-C-ACYW vaccine at least a year since their last meningococcal vaccine.
  - Close contacts to a case of IMD caused by serogroup B should receive a dose of meningococcal B vaccine at least four weeks after their last dose. If they did not previously complete a primary series, the series should be completed.
  - For further information on immunoprophylaxis, refer to the *Canadian Immunization Guide, Meningococcal Vaccines* chapter (www.canada.ca/en/public-health/services/publications/healthy-living/canadian- immunization-guide-part-4-active-vaccines/page-13-meningococcal-vaccine.html#t2, see Table 2: Recommended vaccination of close contacts for post-exposure management and for outbreak control).

### 8.2.2 Management of Group 2 Close Contacts

- Defined as:
  - Health care workers (HCWs) who have had intensive unprotected contact (without wearing a mask) with infected patients (e.g., intubating, resuscitating or closely examining the oropharynx) (13);
  - Fellow passengers (e.g., airline) if transport occurred within the last 10 days (i.e., still eligible for chemoprophylaxis) and a passenger manifest is available. These individuals may be at increased risk, as bacteria transmitted through respiratory droplets can be propelled short distances (< 1 metre) during coughing and sneezing (13):
    - Those sitting immediately on either side of the case (but not across the aisle or in front of or behind the case) when the total time spent aboard the transport

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vessel was at least eight hours from when the passengers are seated until they disembark (7, 8);
  - Other passengers/staff who have had direct contact with respiratory secretions from the index case. (7)
- Chemoprophylaxis only (as described above for Group 1 close contacts) is recommended.
- Immunoprophylaxis is not recommended as there will not be ongoing exposure to the case. (8)

### 8.3 Management of Outbreaks

- Management of outbreaks may require immunization campaigns. At-risk individuals will be determined by Public Health and Primary Health Care and/or Regional Health Authority, in consultation with an Outbreak Response Team and reference to published guidelines (e.g., current *Canadian Immunization Guide*).
- Measures to reduce crowding should be implemented, when possible for outbreaks caused by non-vaccine preventable serogroups/strains.
- Refer also to *Epidemiological Investigation of Outbreaks* (www.gov.mb.ca/health/publichealth/cdc/protocol/investigation.pdf).

### 8.4 Preventive Measures

- Routine childhood immunization and immunization of high-risk individuals with meningococcal vaccine(s) following the current Manitoba Immunization Schedule (www.manitoba.ca/health/publichealth/cdc/div/schedules.html) and eligibility criteria (www.manitoba.ca/health/publichealth/cdc/vaccineeligibility.html).
- Reduction of crowding in households, workplaces, barracks, schools, camps etc. (2)
- Canadian travelers should consult travel health clinics for appropriate vaccination recommendations before travelling to affected countries.

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