MENINGOCOCCAL (INVASIVE) DISEASE

Disease Overview

Meningococcal disease is an acute, potentially severe illness caused by aerobic gram-negative diplococcus bacteria known as *Neisseria* meningitides. Invasive infection of this type usually results in meningococcemia, meningitis, or both. There are 13 serogroups (also referred to as strains) of the *Neisseria* meningitis. In Canada, five of its serogroups (A, B, C, W-135, and Y) are responsible for the majority of disease. Invasive meningococcal disease (IMD) is a medical emergency, requiring early diagnosis, hospitalization, and effective antimicrobial treatment. Invasive disease is a severe form of infection that occurs when the bacterium gets into parts of the body where bacteria are not usually found, such as the bloodstream and the meninges. IMD is a vaccine preventable disease.

Symptoms

Symptoms occur 2 to 10 days (usually 3 to 4 days) after exposure and include the sudden development of fever, drowsiness, irritability or agitation, intense headache, vomiting, stiff neck and a characteristic rash. Severe cases can result in delirium and coma and, if untreated, toxic shock and death.

Mode of Transmission

Meningococcal bacteria are spread through direct contact with respiratory droplets from the nose and throat of an infected person. *N. meningitidis* can live in the nose and throat of an otherwise healthy person (asymptomatic carrier). Up to 5-10% of people may be asymptomatic carriers but less than 1% of those colonized will progress to invasive disease.

Reservoir

Humans.

Incubation Period

The incubation period of meningococcal disease is 3 to 4 days, with a range of 2 to 10 days.

Period of Communicability

A person is capable of passing the infection to others as long as the bacteria are present in discharge from the nose and mouth. The bacteria usually disappear from the nose and throat within 24 hours after appropriate antimicrobial treatment has begun.

Risk Factors

Increased risk of acquiring illness:

- Persons who have had direct contact with respiratory droplets from the nose and throat of an infected person such as kissing, coughing, sneezing, and sharing eating utensils, drinking glasses, water bottles, cigarettes, or lipstick.
- Unimmunized or incompletely immunized individuals.
- Travel to areas where IMD is endemic or where there is high risk for disease transmission.
- Laboratory personnel who are potentially routinely exposed to *N. meningitides*.

- Military personnel during training and deployments.

Surveillance Case Definition

Confirmed case

Clinical evidence of invasive disease[1] with laboratory confirmation of infection:

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

OR

- demonstration of *N. meningitidis* DNA by an appropriately validated nucleic acid test (NAT) from a normally sterile site.

Probable case

Clinical evidence of invasive disease with purpura fulminans or petechiae, with no other apparent cause and with non-confirmatory laboratory evidence:

- detection of *N. meningitidis* antigen in the CSF.

Diagnosis and Laboratory Guidelines

Laboratory confirmation of N. meningitidis is done through either culture or PCR. Culture can be done on blood or CSF sample; however, CSF sample are often tested with rapid PCR kits. Rapid PCR kits provide quick results and can test for multiple pathogens at a time. Positive rapid PCR results are usually followed by culture, since an isolate is required for AMR testing and any further molecular tests.

Laboratory confirmation of a clinical diagnosis of Invasive Meningococcal Disease in a timely fashion is important for the identification and management of cases, close contacts and outbreaks, as well as for regional and national surveillance and detection of epidemiologic trends over time. Regional Public Health should contact the laboratory to confirm serogrouping will be done; this test is necessary to establish if the strain is vaccine preventable and which vaccine needs to be offered to contacts of a case.

Contact your regional laboratory for more information on specimen collection and testing timelines.

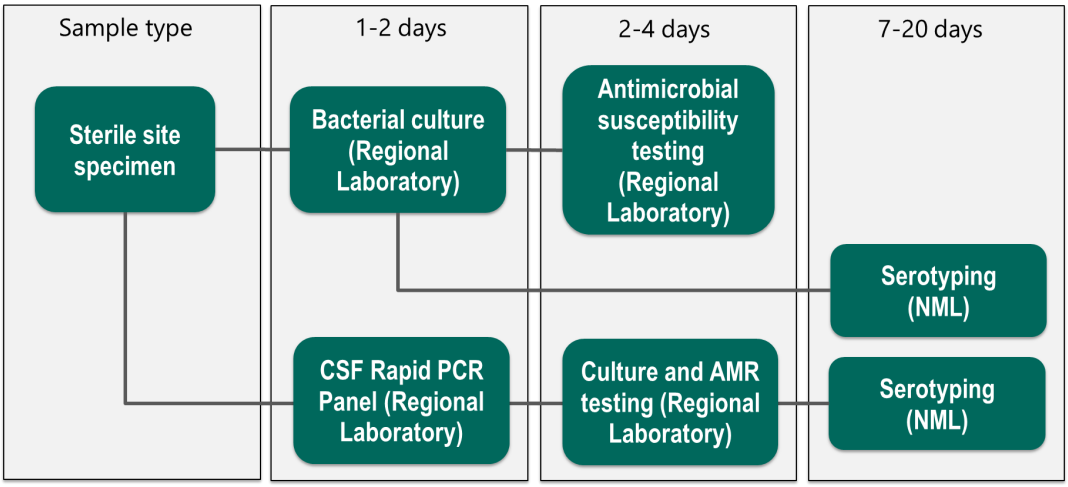
[1] Clinical illness associated with invasive meningococcal disease usually manifests itself as meningitis and/or septicemia, although other manifestations may be observed (e.g. orbital cellulitis, septic arthritis). Invasive disease may progress rapidly to petechiae or purpura fulminans, shock and death.

In New Brunswick meningococcal isolates from all Invasive Meningococcal Disease cases should be sent to the regional laboratories to ensure appropriate and timely monitoring of serogroups, and for antibiotic susceptibility testing.

Isolates are forwarded to Public Health Agency of Canada's National Microbiology Laboratory (NML) for serogrouping, phenotypic typing and genetic analysis.

Laboratory Testing

An overview of testing timelines for samples after the sample has been received by the laboratory. Turnaround times are averages and may change depending on the urgency of the situation.



Reporting

Per Policy 2.2 Disease and Event Notification to OCMOH and Disease and Event Reporting section.

- Enhanced Surveillance. For all confirmed and probable cases an enhanced surveillance form should be completed and information sent to OCMOH within 24 hours of completing interview.
- Routine surveillance (RDSS) for all confirmed cases.
- CD Urgent Notification form for all confirmed cases

Case Management

Education

The case or relevant caregiver should be informed about:

- The nature of the infection, the length of the communicable period and the mode of transmission
- Hand washing
- Respiratory disease precautions
- Cough/sneeze etiquette

Investigation

Upon receipt of information from a clinician or laboratory of a person suspected to have IMD, immediately begin investigation and treat a patient as a "case under investigation" for public health management purposes. Initiation of control measures must not wait laboratory confirmation of the case.

Exclusion/ Social Distancing

Where there is a strong clinical suspicion of Invasive Meningococcal Disease and laboratory confirmation of the diagnosis may be delayed, hospitalized patients should be placed on Droplet precautions. Droplet precautions for *Neisseria meningitidis* are required until 24 hours after appropriate antibiotic therapy has been initiated or another etiology has been determined. Public Health may need to liaise with hospital Infection Prevention & Control Professionals.

Treatment

Treatment may be provided as needed and directed by a health care provider.

To ensure eradication of N. meningitidis nasopharyngeal carriage, in addition to therapeutic antibiotics, the case should receive chemoprophylaxis before hospital discharge unless the infection was treated with an antibiotic that is effective in nasopharyngeal eradication of *N. meningitides*, see table Chemoprophylaxis Agents for Close Contacts of Meningococcal Infection for more information and consult with an Infectious Disease physician.

Immunization

Different serogroups can cause disease and protection conferred by vaccination is specific to the vaccine strains. Therefore, vaccination is usually recommended to protect against other serogroups for individuals who did not receive vaccines if eligible according to the New Brunswick immunization program.

Contact Management

Education

Most cases of meningococcal infection are unexpected and cannot be prevented; however, it is important to inform the clients that risk can be reduced by not sharing drinks, eating utensils, lipsticks, cigarettes, etc. with anyone.

Contacts should be educated on symptoms of IMD and advised to seek medical attention immediately should they develop febrile illness or any other clinical manifestations of IMD.

Investigation

Meningitis is transmitted person-to-person by droplet route. For the purpose of public health management, only contacts with significant exposure should be identified.

The cornerstone of prevention of secondary cases of Invasive Meningococcal Disease is aggressive contact tracing to identify people at increased risk of disease (i.e., close contacts).

Close contacts are individuals who have had significant exposure to a case of invasive meningococcal disease during the period of time in which the case was infectious (seven days before the onset of symptoms to 24 hours after the initiation of appropriate antibiotic therapy).

Close contacts include:

- Household contacts of the case.
- Persons who share sleeping arrangements with the case.
- Persons who have had direct contamination of their nose or mouth with oral/nasal secretions of a case (i.e., kissing on the mouth, sharing toothbrushes, joints, cigarettes, eating utensils, mouthguards, water bottles, musical instrument mouthpieces).
- Children and staff in childcare and preschool facilities.
- Health care workers who have intensive unprotected contact (without wearing a mask) with infected patients (e.g., during intubation, resuscitation, or closely examining the oropharynx of patients).
- 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 eight hours.

Exclusion/ Social Distancing

Exclusion of close contacts is not recommended.

Post Exposure Prophylaxis (PEP)

Chemoprophylaxis:

Regardless of their vaccination status, chemoprophylaxis should be provided to close contacts in order to eliminate meningococci from any carrier within the network of close contacts, thereby reducing the risk to other susceptible individuals in the social network. Advise close contacts to complete the full course of antibiotic agents provided to ensure optimal effectiveness.

Administer chemoprophylaxis as soon as possible and preferably within 24 hours of diagnosis of the case. However, chemoprophylaxis is still recommended for up to 10 days (the incubation period) after the last contact with the case. Contact that occurs after the case has received 24 hours of appropriate antibiotic therapy is not a concern as the case is no longer infectious after this time.

Chemoprophylaxis is indicated for close contacts when there is strong clinical suspicion of Invasive Meningococcal Disease in the index case, and laboratory confirmation is not possible within 24 hours (i.e., gram-negative diplococci present and clinically compatible signs and symptoms of meningococcal disease).

Chemoprophylaxis for Close Contacts of IMD Cases (PHAC)		
Drug	**Dose**	**Comments**
Ciprofloxacin	**Adults >= 18 years of age**: 500 mg x 1 dose PO	Contraindicated during pregnancy and lactation. Only approved for persons > 18 years of age. Not recommended for prepubertal children.

Rifampin	**Adults**: 600 mg PO q12h x 4 doses **Children >= 1 month of age**: 10mg/kg (maximum 600 mg) per dose PO q12h x 4 doses **Infants < 1 month of age**: 5mg/kg per dose PO q12h x 4 doses	Contraindicated in pregnancy. Urine and tears may be stained red. Advise against wear of soft contact lenses as they can also be stained. Can reduce effectiveness of oral contraceptives. Advise use of alternative contraceptive measures. Can interfere with the efficacy of anticonvulsants and anticoagulants
Ceftriaxone	**Adults**: 250 mg IM x 1 dose **Children <12 years**: 125 mg IM x 1 dose	Recommended drug for pregnant women. Alternative for persons who cannot tolerate oral medication. Dilute in 1% lidocaine to reduce pain at injection site.

Chemoprophylaxis is not effective in preventing disease once invasion of tissue has taken place.

Chemoprophylaxis in NOT recommended for casual contacts (i.e., school or classroom contacts, transportation and workplace contacts, or social contacts that are not close contacts).

Chemoprophylaxis is NOT recommended for emergency workers or health care contacts of cases, EXCEPT for those workers who have had intensive unprotected contact (without wearing a mask) with infected patients (e.g., during intubation, resuscitation, or close examination of the oropharynx) before antimicrobial therapy was initiated. In those situations, there is possibility that the health care worker's nose or mouth has been directly contaminated with oral or nasal secretions from the case of Invasive Meningococcal Disease or with the purulent discharge from the eyes of a case of primary meningococcal conjunctivitis.

Immunoprophylaxis (Vaccination):

Vaccination or re-vaccination of certain susceptible close contacts, in addition to chemoprophylaxis, should be considered when the serogroup is vaccine preventable, as it may further reduce the risk of subsequent meningococcal disease.

Close Contacts considered for immunoprophylaxis if the meningococcal serogroup identified is vaccine preventable are:

- Household contacts of the case.
- Persons who share sleeping arrangements with the case.
- Persons who have had direct contamination of their nose or mouth with oral/nasal secretions of a case (i.e., kissing on the mouth, sharing toothbrushes, joints, cigarettes, eating utensils, mouthguards, water bottles, musical instrument mouthpieces).
- Children and staff in childcare and preschool facilities.

The vaccination status of close contacts, including the type of meningococcal vaccine, the number of doses and age at vaccine administration, should be determined.

Re-vaccination criteria for those previously vaccinated against IMD

The following provides criteria for re-vaccination of previously vaccinated close contacts when the index case has a vaccine preventable IMD serogroup or there is a vaccine preventable outbreak of IMD:

- Those previously vaccinated with a serogroup that differs from the index case or outbreak strain.
- Those previously vaccinated with the same serogroup:
    - If they were < 1 year of age at last meningococcal vaccination and more than 4 weeks has passed since their last meningococcal vaccine;
    - If they have an underlying medical condition that puts them at risk and more than 4 weeks has passed since their last meningococcal vaccine;
    - If they were > 1 year of age at last meningococcal vaccination and more than 1 year has passed since their last meningococcal vaccine and they have no medical condition that puts them at risk for meningococcal disease.

If the serogroup result is not available at the time of chemoprophylaxis, inform close contacts that vaccine may be recommended when laboratory results are available.

Close contacts who are health care workers or 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.
Please refer to the Canadian Immunization Guide for recommended vaccination of close contacts for post-exposure management and outbreak control.

Management of Special Situations

Travelers in areas with high meningococcal activity

- When an Invasive Meningococcal Disease has been identified in a traveler who was within the infectious period during the journey, a decision on the need for contact tracing and chemoprophylaxis should be based on the mode of transportation, the length of time fellow travelers could have been exposed to the case and the type of exposure. Any decision should be made in collaboration with the provincial epidemiologist AND Medical Officer of Health.

Outbreak Management

Activate the local outbreak plan when an outbreak is declared.