

# Infectious Disease Spotlight: Meningitis

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**To:** Chair and Members of the Board of Health

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## Recommendations

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It is recommended that the Board of Health receive this report for information.

## Key Points

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- Meningitis is a significant illness that causes severe illness and death.
- Neisseria meningitidis is a public health concern due to its rapid action and severity.
- Public health is a key partner in meningitis case and contact management, and surveillance of infectious diseases in our community.
- Public health has 24/7 reporting mechanisms to identify significant diseases of public health interest (DoPHS) and clusters of illnesses that pose a risk to our community.

## Background

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Under the Health Protection and Promotion Act (HPPA), infectious diseases are to be reported to the health unit for investigation on a 24/7 basis. The Infectious Diseases program is the team that investigates all DoPHS. Meningitis is one of the infectious diseases reportable to public health under O. Reg. 135/18: Designation of Diseases. Public health collects information in

meningitis case investigations, such as symptoms, onset, potential acquisition and transmission, health status, and risk factors. Identification of any close contacts and analysis of all these factors inform public health interventions and actions.

## Meningitis

This report highlights meningitis as a serious public health concern and elicits urgent public health actions. Meningitis refers to the inflammation of the tissues surrounding the brain and spinal cord (meninges). Bacteria, viruses, fungi, and parasites are all organisms that can become invasive and cause meningitis. Viruses are the most common sources of infection, however, bacterial meningitis is often more severe and can lead to serious complications, such as neurological deficits, hearing loss, and amputations.<sup>1,2</sup> Bacterial meningococcal meningitis caused by *Neisseria meningitidis* can be fatal within 24 hours and requires immediate medical assistance.<sup>1</sup>

### Signs and Symptoms

Meningitis usually has a sudden onset, with symptoms that include high fever, severe headache, vomiting, stiff neck, sensitivity to light, lethargy, and confusion.<sup>3,4,5</sup> Depending on the organism, a rash may also be present. In the case of meningococcal infection, infected individuals may present with red-purple blotches on the skin and/or a pinpoint rash. Infants may not have all the classic symptoms of meningitis but may be irritable, with constant or increased crying, loss of appetite, abnormal body temperature, or a bulging area at the “soft spot” on top of their head.<sup>5</sup>

### Causes and Transmission

Meningitis can be caused by many different organisms (Table 1). Bacteria, viruses, fungi, and parasites can all cause meningitis. Viruses are responsible for the largest number of meningitis cases worldwide; however, bacteria can cause more significant illness.<sup>5</sup> Regardless of the causative organism, meningitis is a serious life-threatening illness that requires immediate medical attention.

The way meningitis is spread is related to the specific organism that infects an individual. In general, organisms causing bacterial meningitis typically spread person-to-person, through close, direct contact of respiratory droplets or throat secretions (saliva or spit). It can be spread by kissing and sharing items like food, drinks, utensils, toothbrushes, water bottles, cigarettes, or vapes. Viruses that cause viral meningitis can be spread through saliva, stool, or bites from mosquitoes and ticks. Parasitic and fungal meningitis are rare in Ontario. Parasitic infections occur when individuals ingest parasitic organisms from contaminated food or water sources.<sup>6</sup> Fungal infections can occur through the inhalation of spores or invasive disease from normal body flora.<sup>7</sup>

**Table 1. Examples of organisms that cause meningitis.**

Bacteria	Viruses	Fungi	Parasites
<i>Neisseria meningitidis</i>	Enteroviruses	<i>Cryptococcus neoformans</i>	<i>Angiostrongylus cantonensis</i>
<i>Streptococcus pneumoniae</i>	Herpes e.g., HSV and varicella-zoster	<i>Aspergillus</i>	<i>Baylisascaris procyonis</i>
<i>Streptococcus agalactiae</i> (Group B Streptococcus)	Mumps	<i>Candida albicans</i>	<i>Gnathostoma spinigerum</i>
<i>Haemophilus influenzae</i>	Measles	<i>Histoplasma</i>	
<i>Listeria monocytogenes</i>	Flaviviruses e.g., West Nile Virus		
<i>Escherichia coli</i>			
<i>Mycobacterium tuberculosis</i>			

### Who is at Risk?

Meningitis can affect anybody at any age; however, infants and children are especially vulnerable. Newborns are most at risk for Group B streptococcus infection, and young children are at risk of H. influenzae, pneumococcus, and meningococcus. <sup>1</sup> Adolescents and young adults are at risk of meningococcal disease and the elderly are at risk of pneumococcal diseases. <sup>1,5</sup> Individuals with conditions that negatively impact the immune system are at higher risk of invasive diseases and meningitis.

Environmental and social factors can impact risk. When individuals live close to one another or in large groups, such as in refugee camps, mass gatherings, overcrowded households, student residences, and military settings, these can increase their likelihood of infection. <sup>1</sup> Smoking and vaping also increase the risk of illness transmission. <sup>5</sup>

### Current Status in Wellington-Dufferin-Guelph

From 2019 through 2023, the majority of cases of meningitis were caused by viruses.<sup>8</sup> In 2023, there was an increase in the number of cases of viral meningitis.<sup>8</sup> The largest age group affected was children under five years of age and enteroviruses were the main organisms identified.<sup>8</sup> Enteroviruses can cause a variety of illnesses ranging from the common cold to meningitis and typically circulate from late summer to early fall. In Canada, enteroviruses (non-polio) cause most viral meningitis cases. <sup>9</sup> Varicella zoster and herpes simplex virus type-2 were additional viral organisms identified.<sup>8</sup>

Bacterial meningitis cases decreased from last year and remained low during the pandemic.<sup>8</sup> Over 2019-2023, streptococcus was the most common bacteria identified.<sup>8</sup> No confirmed cases of *Neisseria meningitidis* were identified in our area over this timeframe,<sup>8</sup> however, in 2022/2023, there were nine contacts of confirmed cases of *Neisseria meningitidis* serotype B that required public health management. WDGPH conducted assessments and made recommendations for medication (chemoprophylaxis) and/or vaccination (immunoprophylaxis), as appropriate. WDGPH worked with provincial partners to quickly identify the contacts and provide appropriate follow-up.

## **Neisseria meningitidis – An important public health concern**

Identification of *Neisseria meningitidis* requires an urgent public health response. It can spread from person to person and individuals can get very sick quickly. Individuals that are exposed and infected can have symptoms 3-4 days after exposure.<sup>4</sup> Even with appropriate treatment, there is a 5-15% chance of death.<sup>4</sup> In addition, 10-20% of survivors will experience long-term health effects, such as neurological deficits, hearing loss, loss of limb, and amputation.<sup>4, 5</sup>

Public health nurses conduct case investigations to identify potential sources of acquisition and exposures for the case. It is important to quickly identify any close contacts as antibiotics and/or vaccines that may be required must be given within a short exposure window. Contacts will be asked to monitor themselves for signs and symptoms of illness and if symptoms occur, they must seek medical attention. Public health surveillance of cases of infectious diseases is important to identify potential outbreaks of meningitis and determine if there are any linkages between reported cases. If so, an outbreak may be declared. Approximately, 1 in 10 people carry the bacteria in their nose and throat at any given time which provides an ongoing source of potential infection.<sup>5</sup>

## **Prevention Strategies**

Immunization provides a strong level of protection for certain organisms that can cause meningitis (Table 2). Vaccines can prevent, control, and/or eliminate diseases by protecting the individual vaccinated or those around them who cannot be vaccinated.<sup>10</sup> Diseases and illnesses that historically have provided the heaviest health burden have been targeted for vaccine development. Since vaccines have been developed the number of people acquiring these vaccine-preventable illnesses has decreased. Immunization has been recognized as one of the greatest public health achievements of the 20<sup>th</sup> century. Fewer people getting ill and therefore far fewer long-term effects and deaths.<sup>10</sup>

Some examples of vaccine effectiveness on meningitis rates include *Haemophilus influenzae* B, Mumps, and *Meningococcus*. *Haemophilus influenzae* B (Hib) was the most common cause of bacterial meningitis and the leading cause of invasive disease in children under 5 years of age but has almost been eliminated with the introduction of the Hib vaccine in 1988.<sup>11</sup> Similarly,

before the measles, mumps, and rubella (MMR) vaccine, mumps was a primary cause of viral meningitis,<sup>12</sup> and after the introduction of meningococcal immunization programs in the early 2000s changed the occurrence of invasive meningococcal disease (IMD) in Canada, reducing it by 55% from the pre-vaccine era.<sup>13</sup>

**Table 2. Publicly funded vaccines that protect against meningitis.**

Type	Vaccine/Organism	Routine Vaccine Schedule*
Bacteria	<b>Pneumococcal vaccine</b> <i>Streptococcus pneumoniae</i>	Offered routinely at 2, 4, and 12 months of age. One dose is recommended at age 65 years.
	<b>Haemophilus influenzae-type b (Hib)</b>	Incorporated in routine infant vaccines at ages 2, 4, 6, and 18 months.
	<b>Meningococcal vaccine</b> ( <i>Neisseria meningitidis</i> ) Serotype C Serotype ACYW-135	The meningococcal vaccine is offered at one year of age (serotype C) and as part of the grade 7 school-based immunization program (serotypes ACYW-135).
Viruses	<b>Chickenpox (Varicella)</b> <b>Shingles (Herpes Zoster)</b>	Two doses provided at 15 months and between 4-6 years. Additional, adult doses are recommended at ≥65 years. A second dose, provided 2-6 months after the first dose.
	<b>Measles, Mumps, and Rubella Vaccine</b> Mumps	Two doses are recommended at age 1 year and between 4-6 years of age.

\*High-risk vaccine program information is available from Table 2. Eligibility Criteria for All Publicly Funded Vaccines in the [Publicly Funded Immunization Schedules for Ontario](#)

## Personal Hygiene Practices

Maintaining good hand hygiene is an effective way for individuals to protect themselves against meningitis. Hand washing is essential to prevent transmission before and after preparing food, after using the washroom, changing diapers, or helping others with the toilet. Avoid sharing personal items and food and drinks and using anything that has been in someone else's mouth. Meningococcus, Pneumococcus, and Haemophilus influenzae are bacteria that can be carried in the nose and throat making up-to-date immunizations and staying home when ill important.

## Health Equity Implications

Health inequities and social determinants of health create conditions for the transmission of infectious diseases that can contribute to the unequal burden of illness disease in communities.<sup>14</sup> Living in crowded conditions, institutions, refugee camps or shelters creates an environment where infectious diseases such as meningitis can spread. Poverty, isolation, limited education, and language barriers may create significant barriers to quickly accessing healthcare.<sup>14</sup> Stigma and discrimination can further alienate groups from seeking out health care

for diagnosis and treatment and disrupt public health efforts in the management of infectious diseases. leading to poorer health outcomes for individuals and communities.

To address disparities, WDGPH provides information about infectious diseases in clear, simple language. Written materials can be translated into other languages to aid in understanding. Professional interpretation services are used when appropriate, to reduce communication barriers. Transportation can be provided as needed, for those without means to access services to ensure that access to care is not impeded.

## Conclusion

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Meningitis is a serious public health concern and requires a comprehensive approach. Public health surveillance of infectious diseases provides public health professionals with information to respond quickly to emergent situations. Developing strong community partnerships with healthcare professionals, institutions, and organizations, especially those with ties to hard-to-reach populations can enhance public health efforts to protect our community from infectious diseases and illnesses.

## Ontario Public Health Standards

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### Foundational Standards

- Population Health Assessment
- Health Equity
- Effective Public Health Practice
- Emergency Management

### Program Standards

- Chronic Disease Prevention and Well-Being
- Food Safety
- Healthy Environments
- Healthy Growth and Development
- Immunization
- Infectious and Communicable Diseases Prevention and Control
- Safe Water
- School Health
- Substance Use and Injury Prevention

## 2024-2028 WDGPH Strategic Goals

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More details about these strategic goals can be found in [WDGPH's 2024-2028 Strategic Plan](#).

- Improve health outcomes
- Focus on children's health
- Build strong partnerships
- Innovate our programs and services
- Lead the way toward a sustainable Public Health system

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