



MENINGITIS

Meningitis is an inflammation (swelling) of the meninges, the three protective membranes that cover the brain and spinal cord.

The inflammation may be caused by infection with viruses, bacteria, fungus or parasites. Less commonly, meningitis may also occur due to by certain drugs, injuries or cancer. Meningitis can be life-threatening because of the inflammation's proximity to the brain and spinal cord; therefore, the condition is classified as a medical emergency.

From 2007 until 2019, a total of 279 cases of bacterial meningitis and septicemia were notified in Malta, with an average notification rate of 0.8 cases per 100,000 population per year (Figure 1). The most common meningococcal serotypes detected were Serogroup Type C and Serogroup Type B (Figure 2).

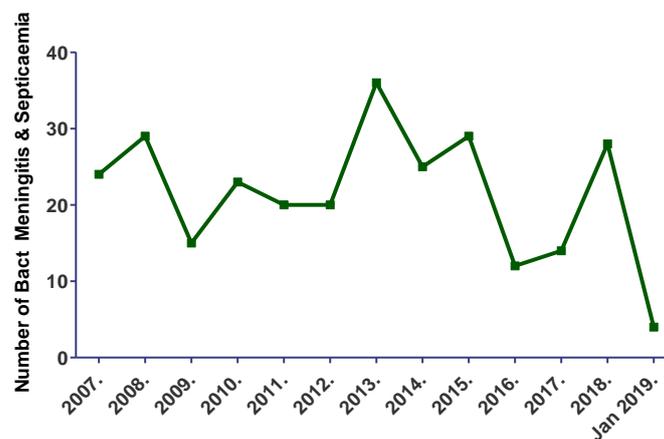


Figure 1: Number of bacterial meningitis and septicemia cases notified to the IDCU in Malta, 2010-2017. (Source: IDCU)

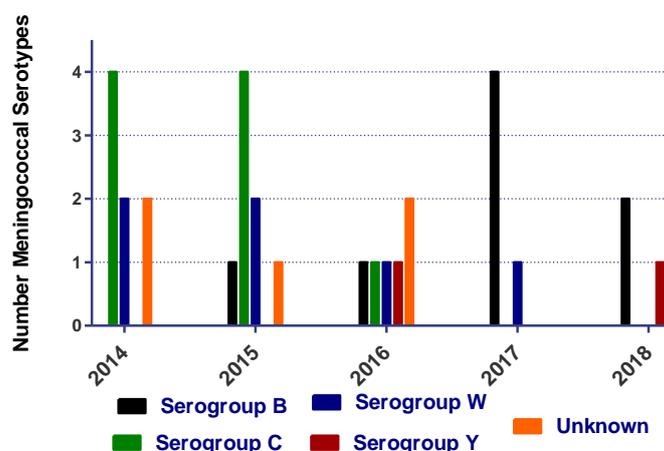


Figure 2: Meningococcal serotypes notified to the IDCU in Malta, 2014-2018. (Source: IDCU)





CLINICAL FEATURES

High index of suspicion of meningitis is required for persons with the following symptoms:

- Severe headache
- Neck stiffness
- Sudden high fever
- Altered mental status
- Photophobia (intolerance to bright light)
- Irritability (children)

DIAGNOSIS OF MENINGITIS

The following tests are generally performed when someone is suspected of having meningitis:

- Blood tests are performed for markers of inflammation (e.g. C-reactive protein, complete blood count).
- Blood cultures
- Lumbar puncture (if appropriate)
- Viral laboratory testing (e.g. PCR)

VIRAL MENINGITIS

It is the most common type of meningitis. It is often less severe than bacterial meningitis and most people get better without treatment. The main viruses causing meningitis include:

- Enteroviruses (non-polio)
- Mumps Virus
- Herpesvirus including:
 - Herpes simplex viruses type 1 (HSV-1) or type 2 (HSV-2)
 - Varicella-zoster viruses (such as chickenpox and shingles)
- Measles virus
- Influenza Virus
- Arboviruses such as West Nile virus, Chikungunya, Zika
- HIV
- Lymphocytic choriomeningitis virus (LCMV)

The groups with higher risk of acquiring viral meningitis include children younger than 5 years old and people with a weakened immune system.

In most cases, there is no specific treatment for viral meningitis. Most people with mild viral meningitis completely recover within 7 to 10 days.





BACTERIAL MENINGITIS

Risk factors for bacterial meningitis include:

- Extremes of age (children and elderly)
- Community settings
- Medical conditions and comorbidities
- Pregnancy
- Immunodeficiency syndromes
- Travelling

COMMON CAUSES OF BACTERIAL MENINGITIS VARY BY AGE GROUP:

- **Newborns <1 month:** *Group B Streptococcus*, *Streptococcus pneumoniae*, *Listeria monocytogenes*, *Escherichia coli*

These bacteria may be transmitted from mother to baby before or during birth or through contact with adults who handle the baby.

- **Babies and children:** *Streptococcus pneumoniae*, *Neisseria meningitidis* type A, B, C, W, Y, *Haemophilus influenzae* type B (Hib), group B *Streptococcus*
- **Teens and young adults:** *Neisseria meningitidis* type A, B, C, W, Y, *Streptococcus pneumoniae*
- **Older adults:** *Streptococcus pneumoniae*, *Neisseria meningitidis*, *Haemophilus influenzae* type b (Hib), group B *Streptococcus*, *Listeria monocytogenes*

OTHER TYPES OF BACTERIAL MENINGITIS WHICH MAY OCCUR IN IMMUNOSUPPRESSED PATIENTS:

- ***Staphylococcus aureus*:** In people who have undergone neurosurgery or with a history of head trauma.
- ***L. monocytogenes*:** adults over 60 years, cancer patients, or the immunosuppressed
- ***Salmonella*** – rare and affects newborn babies

PROGNOSIS OF BACTERIAL MENINGITIS

Bacterial meningitis is potentially lethal, with an estimated 2% mortality. Early diagnosis and prompt treatment of bacterial meningitis is essential in the prevention of death or permanent damage to the nervous system.





TREATMENT

In case of bacterial meningitis, prompt administration of intravenous (IV) antibiotics and sometimes corticosteroid treatment is crucial. However, the antibiotic or combination of antibiotics depends on the type of bacteria causing the infection. Laboratory testing should be performed as soon as meningitis is suspected.

Upon notification, IDCU will make necessary contact tracing as per protocol.

TRANSMISSION

Humans are the reservoir for most of these bacteria and viruses. Transmission may occur from person to person, especially if there has been contact for more than 8 hours, through contact with fluids from the mouth or nose of an infected person.

For most pathogens that can cause meningitis, the risk of transmission and development of meningitis still remains very low.

PREVENTION AND CONTROL

- **Appropriate hand washing** and routine cleaning procedures prevent many bacterial and viral infections
- **Prophylactic treatment for close contacts** may be needed to prevent and control outbreaks
- **Immunisation** is key to prevent deaths and disabilities

Table 1: Data of deaths & disabilities caused by meningitis

<u>Type of Meningitis</u>	<u>Mortality</u>	<u>Disabilities</u>
H. influenzae B	1 in 20	1 in 10
Meningococcal	1 in 10	2 in 10
Pneumococcal	1 in 5 (children) 3 in 5 (adults)	1 in 4

*Figures retrieved from “Meningitis” presentation at Infection Control Conference, 2019, presented by Dr. Pace.





VACCINATIONS AVAILABLE IN MALTA

There are a number of vaccines that can protect against bacteria that cause meningitis.

1. The vaccine against **Haemophilus Influenza B (HiB)** is usually given in the combination 5 in 1 (DTaP-IPV-Hib) or the 6 in 1 (DTaP-IPV-Hib-HepB) vaccine at 6 weeks, 2 months, 3 months, and 4 months of age with a booster dose given between 12-24 months. The 5 in 1 vaccine is part of the National Immunisation Schedule.

2. There are 2 types of **pneumococcal vaccine** that help prevent pneumococcal meningitis and septicaemia. These are the conjugate vaccines of which there are two brands available: the 10-valent (**Synflorix™**) containing polysaccharides from 10 common pneumococcus capsular types and the 13-valent (**Prevnar 13™**) containing 13 common pneumococcus capsular types. These vaccines are recommended for children <5 years and adults >65 years of age.

An older type of pneumococcal vaccine is the polysaccharide vaccine which contains antigens from 23 types of pneumococcus. This vaccine is mostly recommended for use in persons suffering from chronic respiratory conditions to prevent pneumonia. Two different brands are available: **Pneumo23™** and **Pneumovax II™**.

3. Vaccines against **meningococcus C** are of the polysaccharide conjugate type and are recommended for children under 5 years of age. There are two brands locally available: **Neisvac C™** (Pfizer) and **Menjugate™** (GSK).

4. Vaccines that protect against **meningococcal meningitis groups A, C, W and Y** are also conjugate polysaccharide types. There are two vaccines of this type on the market. One can be used from 2 months of age onwards (**Nimenrix™**) whereas the other is licensed for use from 2 years onwards (**Menveo™**).

5. Vaccines that protect against **meningococcal meningitis B** include **Bexsero™** and **Trumenba™**. Bexsero™ can be given to babies from the age of 2 months whereas Trumenba™ is licensed for use from the age of 10 years onwards.

It is important to note that dosage schedules differ for different age groups and doctors are advised to familiarise themselves with the schedules for each particular age group before vaccinating.

No vaccinations are yet available for the other types of meningitis-causing bacteria.

