

BI0053 / **BIOLOGICAL / Infectious Diseases (Human and Animal)**

Meningococcal Meningitis (Human)

Definition

Meningococcal meningitis is a bacterial form of meningitis, a serious infection of the thin lining that surrounds the brain and spinal cord, that is caused by the bacterium *Neisseria meningitidis*. Meningococcal meningitis has the potential to cause large-scale epidemics and is observed worldwide (WHO, 2018).

Reference

WHO, 2018. Meningococcal meningitis. World Health Organization (WHO). www.who.int/news-room/fact-sheets/detail/meningococcal-meningitis Accessed 3 November 2020.

Annotations

Synonyms

Not identified.

Additional scientific description

Meningococcal meningitis is a bacterial form of meningitis. Of the twelve types of *Neisseria meningitidis*, called serogroups, six (A, B, C, W, X, Y) can cause epidemics. The bacteria can be carried in the nasopharyngeal tract without causing symptoms and are transmitted through droplets of respiratory or throat secretions upon close and prolonged contact. It is believed that 1% to 10% of the population are asymptomatic carriers (WHO, 2018a).

The average incubation period is four days but can range from two to ten days. The most common symptoms are a stiff neck, high fever, sensitivity to light, confusion, headaches and vomiting. Some cases may develop haemorrhagic rash. Meningococcal meningitis can kill in hours and if untreated, is fatal in 50% of cases. It may result in brain damage, hearing loss or disability in 10% to 20% of survivors (WHO, 2018a).

Diagnosis of meningococcal meningitis relies on lumbar puncture showing a purulent spinal fluid. The bacteria can sometimes be seen in microscopic examinations of the spinal fluid. Diagnosis is confirmed by growing the bacteria from specimens of spinal fluid or blood or by polymerase chain reaction (PCR). Identification of the serogroups and susceptibility testing to antibiotics are important to define control measures (WHO, 2018a).

Meningococcal meningitis is observed in a range of situations, from sporadic cases, to small clusters, to huge epidemics throughout the world, with seasonal variations (WHO, 2018a). International outbreaks have been associated with various mass gatherings.

Meningococcal meningitis is observed worldwide but the highest burden of the disease is in the so-called 'meningitis belt' of sub-Saharan Africa, stretching from Senegal in the west to Ethiopia in the east. The geographical distribution and epidemic potential differ according to the serogroup. Estimates of global meningococcal disease burden vary widely from 116,000 to 429,000 cases worldwide (2015). This range reflects uncertainty due to inadequate surveillance in several parts of the world (WHO, 2018a).

Metrics and numeric limits

Surveillance, from case detection to investigation and laboratory confirmation is essential to the control of meningococcal meningitis. The World Health Organization (WHO) has published recommendations on types of surveillance and case definitions for vaccine preventable diseases (WHO, 2018b).

Key relevant UN convention / multilateral treaty

International Health Regulations (2005), 3rd ed. (WHO, 2016).

Examples of drivers, outcomes and risk management

The geographic distribution and epidemic potential differ according to the serogroup of *Neisseria meningitidis*. There are no reliable estimates of global meningococcal disease burden due to inadequate surveillance in several parts of the world. During the dry season between December to June, dust winds, cold nights and upper respiratory tract infections combine to damage the nasopharyngeal mucosa, increasing the risk of meningococcal disease. At the same time, transmission of *N. meningitidis* may be facilitated by overcrowded housing. This combination of factors explains the large epidemics which occur during the dry season in the meningitis belt (WHO, 2018a).

Infants are at highest risk, but rates decrease after infancy and then increase in adolescence and young adulthood. Surveillance during mass gatherings should be intensified. Risk factors for meningococcal carriage include concomitant upper respiratory tract infections, overcrowded living conditions, smoking and passive smoking, and terminal complement pathway deficiency (WHO, 2018b).

Licensed vaccines against meningococcal disease have been available for more than 40 years, but to date no universal vaccine against meningococcal disease exists (WHO, 2018a). Vaccines are serogroup specific and confer varying degrees of duration and protection. They are used for prevention (routine immunisation) and in response to outbreaks (prompt reactive vaccination) (WHO, 2018a).

Antibiotic prophylaxis for close contacts, when given promptly, decrease the risk of transmission. This is recommended in the meningitis belt in non-epidemic situations (WHO, 2018a).

The WHO promotes a strategy comprising epidemic preparedness, prevention, and outbreak control (WHO, 2018a):

- Preparedness focuses on surveillance, from case detection to investigation and laboratory confirmation.
- Prevention consists of vaccinating individuals from age groups at major risk using a conjugate vaccine targeting appropriate serogroups.
- Epidemic response consists of prompt and appropriate case management and reactive mass vaccination of populations not already protected through vaccination.

Meningitis epidemics in the African meningitis belt constitute an enormous public health burden. In December 2010, a new meningococcal A conjugate vaccine was introduced in Africa through mass campaigns targeting persons 1 to 29 years of age. As of November 2017, more than 280 million persons have been vaccinated in 21 African belt countries (WHO, 2018a).

The vaccine is remarkably safe and cheap; around USD 0.60 per dose while other meningococcal vaccine prices range from USD 2.50 to USD 117.00 per dose. In addition, its thermostability allows its use under Controlled Temperature Chain (CTC) conditions. Its impact on carriage and the reduction in disease and epidemics is significant: a 58% decline in meningitis incidence and 60% decline in the risk of epidemics. It is now introduced into routine infant immunisation programmes. Maintaining high coverage is expected to eliminate meningococcal A epidemics from this region of Africa. However, other meningococcal serogroups such as W, X and C still cause epidemics and around 30,000 cases are reported each year in the meningitis belt (WHO, 2018a).

The WHO is committed to eliminating meningococcal disease as a public health problem and in 2020 published a draft of the proposal for defeating meningitis by 2030 (WHO, 2020).

References

WHO, 2016. International Health Regulations (2005), 3rd ed. World Health Organization (WHO). www.who.int/ihr/publications/9789241580496/en Accessed 3 October 2020.

WHO, 2018a. Meningococcal meningitis. World Health Organization (WHO). www.who.int/news-room/fact-sheets/detail/meningococcal-meningitis Accessed 3 November 2020.

WHO, 2018b. Meningococcus WHO Surveillance of Vaccine-Preventable Diseases. Last updated: 5 September 2018. World Health Organization (WHO). www.who.int/immunization/monitoring_surveillance/burden/vpd/WHO_SurveillanceVaccinePreventable_12_Meningococcus_R2.pdf?ua=1 Accessed 3 November 2020.

WHO, 2020. Defeating Meningitis by 2030: a global roadmap (Draft 8 April 2020). World Health Organization (WHO). www.who.int/immunization/research/development/DefeatingMeningitisRoadmap.pdf?ua=1 Accessed 3 November 2020.

Coordinating agency or organisation

World Health Organization.