

Symptoms and treatment of the bacterial meningitis infection



Thomas Willis, an English doctor who was an integral part in the history of anatomy, neurology and psychiatry, described patients with, “inflammation of the meninges with a continual fever” as well as an early epidemic of meningitis in 1661. Robert Whytt, a Scottish physician who proved that the central nervous system was essential for neuro-muscular response, provided a typical depiction of the stages of tuberculous meningitis. Physicians Gaspard Vieusseux and Andre Matthey, were the first to truly discover meningitis during an outbreak in Switzerland (8). Heinrich Quincke, a German internist and surgeon, utilized his new found technique of lumbar puncture, which he is most famous for, to examine cerebrospinal fluid to diagnose meningitis. Organisms that cause meningitis were identified in the late 1800s. By this time more symptoms were also being recognized. Some of these symptoms were described by Russian physician Vladimir Kernig and Polish physician Jozef in 1899 and were therefore dubbed Kernig’s sign, a severe stiffness of the hamstrings and Brudzinski sign, a severe neck stiffness.

The most common causes of meningitis are viral and bacterial infections. Some other, less common, causes include cancer, chemical irritations, fungi and drug allergies (6). The infection causes inflammation of the meninges (3), the three membranes covering the brain and spinal cord, in an infected individual. Meningitis can be contagious. It can be transferred by coughing, sneezing or simply by close contact with someone infected. Though there are symptoms of contacting meningitis, there are tests that must be done to determine if someone has it as well as which type they have in order to properly treat the infection.

Viral meningitis is the most common type. The Enterovirus category causes 85 percent of these cases and they include coxsackievirus A, coxsackievirus B and echoviruses. These cases are more common during the summer and fall seasons. Viruses' that make up the other 15 percent of cases include West Nile virus, influenza, mumps, HIV, measles, herpes viruses and Coltivirus, which causes Colorado tick fever. Viral meningitis typically presents with common symptoms such as decreased appetite, fever, seizures, sensitivity to light, irritability, lethargy as well as nausea and vomiting. This form of meningitis can go away without treatment, but some cases would require treatment. There are several types of bacteria that can cause bacterial meningitis. The most common types are:

- *Streptococcus pneumoniae*, which is usually located in the respiratory tract, sinuses, and nasal cavity. This bacteria causes pneumococcal meningitis.
- *Neisseria meningitidis*, which is spread through respiratory fluids like saliva. This bacteria causes meningococcal meningitis.
- *Haemophilus influenzae*, which causes infections of the blood, inflammation of the windpipe, cellulitis, and infectious arthritis as well as bacterial meningitis.
- *Listeria monocytogenes*, which are a type of foodborne bacteria.
- *Staphylococcus aureus*, which is typically found in the respiratory tract as well as on the surface of the skin, and causes staphylococcal meningitis (6).

Symptoms & Treatment

The bacterial meningitis infection has a rapid onset of symptoms including lethargy, stiff neck, headache, nausea and high fever. This is a result of the pathogen entering the individual's bloodstream. This is known as meningococemia. Because of the common nature of its symptoms the disease can be mistaken and lead to more severe symptoms such as seizures and an altered mental status. If symptoms continue to be overlooked or misdiagnosed it can quickly lead to death (4). Significant symptoms to watch for in distinguishing meningitis over the common flu are headache, stiff neck, known as the Brudzinski sign (5), sensitivity to bright lights (6), and skin lesions that look similar to bruising known as petechiae (7). The only way to accurately diagnose bacterial meningitis is through a bacterial culture of a patient's cerebral spinal fluid. Even with proper treatment bacterial meningitis is fatal in 5 to 40 percent of children and 20 to 50 percent of adults who contract the infection.

Bacterial meningitis can be fatal if it's not treated quickly. That is why the two primary modern vaccines offered are for bacterial meningitis. In 1906 Georg Joachmann of Germany and Simon Flexner of the US found that horses could be used to create antibodies against bacterial meningitis. This allowed the first successful methods of treating meningitis with serum therapy.

Antibiotic therapy became a more common treatment in the 1900s with the use of sulfonamides and penicillin (7).

Vaccination against meningitis has progressed to the creation of vaccines which are still used today. The Haemophilus influenzae type b vaccine (Hib) is part of the recommended childhood vaccines. It is also given to adults who <https://assignbuster.com/symptoms-and-treatment-of-the-bacterial-meningitis-infection/>

do not have a spleen as well as those with sickle cell anemia or AIDS. The Pneumococcal conjugate vaccine (PCV7) is also a recommended childhood vaccination. In 1981 the Meningococcal polysaccharide vaccine (MPSV4) was established (2). It is the recommended vaccine for older children and adults at risk. In 2005 Meningococcal conjugate vaccine (MCV4) became part of the recommended vaccinations for preadolescent children. It is also recommended for those living in community style residences, such as college students or military personnel, to reduce their risk (9). The meningococcal conjugate vaccine, targets the four most common types of bacterial serotypes. It lasts longer and offers long term defense, particularly if you keep up with getting booster shots.

The Meningitis Belt

Meningococcal disease has continually had outbreaks worldwide throughout history. It has been a cause of human suffering for centuries. From 1905 to 2016 (see Table 1. pdf) most occurrences have been in Africa followed up by the Middle East, China, Europe, Russia then South America and the US.

Though the incidence rate is lower in some areas, meningitis is present on all five continents. Meningitis is a global health concern. Since its first outbreak in 1840, Africa has been the most affected by epidemics of bacterial meningitis. Unfortunately this is most likely because of the military from Europe bringing the bacteria with them that is a causative agent of bacterial meningitis (10). America, Asia, and Europe are less affected parts of the world compared to Africa in modern times. There is a portion of the continent known as the “ African meningitis belt” (Diagram 1, pg 13). This is where the majority of cases of meningitis are recorded. It spreads from Senegal to

Ethiopia to include a total of 26 countries (11). This region is known to have a major outbreak every five to twelve years. Compared to the average annual attack rate of 0.3 to 3 per 100,000 in other regions of the world, this region's attack rate reaches 1,000 cases per 100,000 people.