Meningococcal Disease

- Meningococcal disease causes bacterial meningitis and sepsis, both serious and life-threatening conditions\(^1,2\).
- Meningococcal disease caused by serogroup B (MenB) accounts for the majority of cases in some industrialized countries\(^3\).
- Infants and adolescents are at the highest risk of being infected\(^4\).

Meningococcal disease is a sudden, life-threatening illness that manifests as bacterial meningitis – an infection of the membrane around the brain and spine – and sepsis – a bloodstream infection\(^1,2,4\). Caused by the bacterium, *Neisseria meningitidis*, meningococcal disease progresses rapidly and can lead to death within 24 hours of the first symptoms\(^5\).

According to the World Health Organization (WHO), approximately 5-10 percent of people who contract meningococcal disease will die even if they are diagnosed and receive early and appropriate treatment\(^5\).

Of those who survive, as many as one in five will suffer life-long devastating complications, called sequelae, such as brain damage, learning disabilities, hearing loss and limb loss\(^2\).

**Signs and Symptoms**

The initial symptoms of meningococcal disease are often unspecific and flu-like, and it can be difficult for even a health care professional to diagnose early\(^8\). Classic symptoms, such as neck stiffness and petechial (small purplish) rash, do not appear until relatively late in the illness, which can delay lifesaving treatment\(^9\).

<table>
<thead>
<tr>
<th>Meningitis Symptoms(^8)</th>
<th>Sepsis Symptoms(^10)</th>
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<tbody>
<tr>
<td>– Fever</td>
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<tr>
<td>– Vomiting</td>
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<tr>
<td>– Severe headache</td>
<td>– Limb, joint, or muscle pain</td>
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<tr>
<td>– Painfully stiff neck</td>
<td>– Cold hands and feet</td>
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<tr>
<td>– Sensitivity to light</td>
<td>– Shivering</td>
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<tr>
<td>– Very sleepy</td>
<td>– Pale or mottled skin</td>
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<tr>
<td>– Confusion</td>
<td>– Breathing fast or breathless</td>
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<tr>
<td>– Rash (not present in all cases)</td>
<td>– Small flat or raised fine rash of red or purple spots that progresses to larger red patches or purple lesions</td>
</tr>
<tr>
<td>– Seizures</td>
<td>– Very Sleepy</td>
</tr>
<tr>
<td></td>
<td>– Confusion</td>
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</table>

Without treatment, the mortality rate from meningococcal disease is 70-90\(^\circ\)\(^7\).

Distinct symptoms of meningococcal disease typically do not manifest until 13-22 hours after the first symptoms appear\(^9\).
Transmission

Most cases of meningococcal disease occur in previously healthy people without any warning. Meningococcal bacteria can be passed easily between people, for example through coughing, sneezing and direct contact, such as kissing.

Common adolescent and young adult lifestyles – such as going out to crowded night clubs, living in a dormitory or military barracks, or traveling to areas where meningococcal disease is common, can increase the likelihood of a person contracting meningococcal disease or becoming a carrier of meningococcal bacteria. Smoking and kissing can also increase the likelihood of contracting the disease in these age groups.

Infants may be more likely to become infected through close contact with their family members who may carry the bacteria in their noses and throats without symptoms themselves.

While the bacteria can cause deadly disease, some people can harbor and spread the bacteria to others, without necessarily becoming ill themselves. Once acquired, a person can carry the bacteria for up to 6 months. In fact, close contact with a carrier can increase the risk of acquiring the bacteria by 800 fold.

Risk Groups

Infants and adolescents are particularly susceptible to meningococcal disease.

Infants may be particularly susceptible to meningococcal disease in part because their immune systems have not fully developed. However, the majority of infants impacted by the disease were previously healthy.

Adolescents and young adults also are at increased risk of contracting meningococcal disease, often because they start to encounter new situations and undergo changes in their lifestyles. These age groups also have an unusually high case fatality rate from meningococcal disease.

Further, adolescents and young adults are more likely to carry the bacteria than other age groups and can transmit the bacteria to family and friends.

At any given time, it is believed that up to 10-20% of people worldwide can carry N. meningitidis, the bacteria that causes meningococcal disease, in their nose and throat without showing any symptoms.
Other groups at increased risk of contracting meningococcal disease include travelers, military personnel and Muslim pilgrims traveling to the Hajj or Umrah\textsuperscript{5,18,19}. In our modern globalized world, travelers have the potential to acquire and to contribute to the spread of meningococcal disease, as well as introduce new groups of bacteria to countries in which they were not previously present.

**Epidemiology**

*N. meningitidis*, the bacteria that cause meningococcal disease, can be divided into groups, called serogroups\textsuperscript{15}. Five main groups cause the majority of all meningococcal disease around the world – A, B, C, W-135 and Y\textsuperscript{2,5}.

It should be noted that the dominant groups of meningococcal disease vary by country and region, and can change over time, making it an even more unpredictable disease, and a significant public health threat for many countries\textsuperscript{6}. Meningococcal disease can be endemic, causing sporadic cases or small outbreaks within communities and institutions, or epidemic, spreading quickly throughout large populations\textsuperscript{6}.

**Treatment**

According to the WHO, hospitalization and antimicrobial therapy are necessary for the treatment of meningococcal disease as it can be a potentially fatal disease\textsuperscript{5}. A range of antibiotics have been used, including penicillin, ampicillin, chloramphenicol and ceftriaxone\textsuperscript{5}. Given its rapid progression, meningococcal disease\textsuperscript{5} can be challenging despite appropriate treatment and prompt medical intervention.

**Meningococcal Disease Prevention**

Meningococcal disease is a major cause of preventable death and disability in both industrialized and developing countries\textsuperscript{6}. The most effective way to prevent and control meningococcal disease is through the use of a vaccine that offers protection against as many bacteria groups as possible\textsuperscript{6}.

Vaccination campaigns against the two other leading causes of bacterial meningitis – Haemophilus influenzae type b (Hib) and Streptococcus pneumoniae (pneumococcus) – have already proven to be highly successful\textsuperscript{12}. Meningococcal disease, however, remains
without complete vaccine coverage\textsuperscript{6,12}.

Recently, vaccines have been developed that offer protection against all of the major disease-causing serogroups of \textit{Neisseria meningitidis} (A, B, C, W-135, and Y), the third form of bacterial meningitis\textsuperscript{21}. Meningococcal serogroup B (MenB) remains an unmet public health need as the most common cause of bacterial meningitis for which there is no readily available licensed global vaccine\textsuperscript{6,20}.

\textbf{Bexsero\textsuperscript{®}} (Multicomponent Meningococcal Group B Vaccine [rDNA, adsorbed]) is the result of more than 20 years of pioneering research in vaccine development. MenB has been a particularly elusive target because the outer coating of the bacteria is not well recognized by the immune system as an antigen, making it especially challenging to develop a broadly effective vaccine until recent scientific developments\textsuperscript{16}. Bexsero is a broad coverage MenB vaccine and was developed by an award-winning scientific approach that involved decoding the genetic makeup (genome sequence) of MenB\textsuperscript{21}. This innovative approach provides the foundation for a new generation of vaccines that could help prevent other diseases with a significant diversity of disease-causing strains\textsuperscript{21}.

After the approval of Menveo\textsuperscript{®} (Meningococcal Group A, C, W-135 and Y- Conjugate Vaccine) in 2010, the anticipated approval of groundbreaking Bexsero underscores Novartis unique leadership position in the fight against devastating meningococcal disease. Novartis may soon be in the unique position of being able to offer vaccines to help to protect against all five main serogroups of meningococcal bacteria (A, B, C, W-135 and Y) that cause the majority of all cases around the world.

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\textbf{References}


10. Mayo Foundation for Medical Education and Research. Sepsis.


