

Smoking and Meningococcal Disease

Introduction

This fact sheet provides information about meningococcal disease (MD) and the relationship between MD and smoking. Meningococcal disease is a life-threatening infection caused by meningococcal bacteria. It is a term used to describe two major illnesses: meningitis and septicaemia. These can occur on their own or both together. Meningitis refers to inflammation of the membranes lining the brain and spinal cord. The membranes, called meninges, help protect the brain from injury and infection. Septicaemia is a severe infection of the blood.¹ Bacteria multiply in the blood, releasing endotoxins that cause widespread damage to the body. Septicaemia is generally more life-threatening than meningitis.

MD is spread via direct contact with respiratory droplets from an infected person. Close contact – such as kissing, sneezing or coughing on someone, or living in close proximity to an infected person - facilitates the spread of the disease. The average incubation period is four days, but can range between two and 10 days. After the incubation period, the onset of symptoms is sudden and death can follow within hours.²

- In recent years there has been a steady decline in the incidence of meningococcal disease from over 2,000 reported cases in the late 1990s in England and Wales to fewer than 700 in 2014.³
- Around 7% of cases of MD will result in death.
- In as many as 10-15% of cases, there are persistent neurological defects, including loss of hearing and sight, brain damage or damage to major organs, loss of digits or limbs and paralysis.¹

Who is at risk of MD and why?

Meningococcal disease can affect any age group but young children, particularly babies under the age of one, are most at risk. The risk is further increased if infants are exposed to tobacco smoke – see section on secondhand smoke below. Teenagers and young adults are the second most at risk group. Both adults and children can carry meningococcal bacteria harmlessly in the back of the throat. Around 10% of the general population will be carriers at any given time. Once someone has carried these bacteria, they are more likely to develop immunity as a result.¹

Babies and young children are more at risk because their immunological defences are not fully developed. A risk factor for teenagers and young adults is increased social interaction; this increases the number of carriers to around 30%.^{1,4} Likewise, people who live in overcrowded premises are also at increased risk of MD.^{5,6}

Tobacco Smoke and MD

Exposure to tobacco smoke, via both active and passive smoking, has been shown to independently increase the risk of developing MD.^{7,8,9,10}

Research carried out in Norway, Sweden, Denmark and the Netherlands provides further evidence for the link between smoking and MD. In Norway a positive association was observed between reduced incidence of MD and reduction in population smoking prevalence between 1975 and 2009 although evidence from the other countries was inconclusive due to limited data.¹¹

According to the US Centres for Disease Control “antecedent viral infection, household crowding, chronic underlying illness and both passive and active smoking are associated with increased risk for meningococcal disease.”¹² **It has been estimated that smoking is responsible for a third to a half of all cases of MD.**^{10,13,14}

Exposure to secondhand smoke does not only increase the risk of developing MD; one study has indicated that exposure to secondhand smoke may also be linked to increased mortality among MD patients, with mortality among those patients exposed to secondhand smoke being over twice that of those who were not exposed.¹⁵

The link between smoking and exposure to secondhand smoke and MD appears to be a dose response relationship; the risk of carrying the meningococcal bacteria increases significantly with heavier smoking,^{16,17} and risk of developing MD also increases with heavier active smoking or exposure to secondhand smoke.^{5,18}

One explanation for the increased rates of meningococcal in smokers and passive smokers may lie in the increased ability of bacteria to adhere to mucosa.¹⁹ Furthermore, smoking is also a known risk factor for infection in general so it is likely that this is a contributing factor in the link between tobacco use and MD.²⁰

Secondhand Smoke, MD and Children

There is strong evidence of an association between cigarette smoking in the home and increased rates of MD in children.^{5,21,22,23}

A meta analysis published in 2010 found a significant association between exposure to secondhand smoke and MD in children. The researchers analysed 42 studies and found that children exposed to secondhand smoke were twice as likely to get invasive meningococcal disease.²⁴

A more recent meta-analysis of 18 studies found both secondhand smoke exposure, and exposure to maternal smoking during pregnancy, increased the risk of childhood invasive MD. Secondhand smoke exposure in the home doubled the risk of MD, with some evidence that this increased in line with increased exposure. The greatest risks were observed in children under five. Maternal smoking during pregnancy increased the risk of MD by three times. The authors concluded that exposure to secondhand smoke caused an additional 630 cases of invasive MD in children under 16 in the UK alone.²⁵

A review of the evidence by the Royal College of Physicians concluded that 22% of cases of meningitis in children can be attributed to secondhand smoke exposure in the home.²⁶

Further information

For further information on the signs and symptoms of meningitis and septicaemia contact the Meningitis Now helpline on 0808 80 10 388 or visit the website: www.meningitisnow.org.

References

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