Passive smoking and meningococcal disease in children and young people

A systematic review and meta-analysis of comparative epidemiology studies finds that passive smoking more than doubles the risk of invasive meningococcal disease in children and young people.

**Overview:** Bacterial meningitis is the leading infectious cause of death in early childhood, making its control a priority for clinical management and public health. It usually presents as septicaemia, meningitis or both.

In the UK, 2–6 cases of bacterial meningitis occur a year per 100,000 people, with the case-fatality rate about 10%. The incidence is highest in infants around 6 months, lower in those aged 4 years, and peaks again in teenagers aged 17–18 years (Jones and Mallard 1993). The incidence is also highest in the winter months. Apart from age, risk factors include passive smoking, preceding influenza A infection and overcrowding.

See the NICE Evidence Services topic page on meningitis for a general overview of this condition.

**Current advice:** NICE has guidance on the management of bacterial meningitis and meningococcal septicaemia in children and young people under 16 years. In addition to treating the disease, clinicians have a legal requirement to notify a proper officer of the local authority urgently on suspicion of meningitis or meningococcal septicaemia. The Health Protection Agency (now part of Public Health England) has issued guidance for public health management of meningococcal disease in the UK.

The NICE pathway on bacterial meningitis and meningococcal septicaemia brings together all related NICE guidance and associated products on the condition in a set of interactive topic-based diagrams.

**New evidence:** Murray et al. (2012) did a systematic review and meta-analysis of comparative epidemiological studies to investigate the association between passive smoking and invasive meningococcal disease in children. Fifteen case-control studies (n=14,862) and 2 cohort studies (n=283,579) were included assessing passive smoking in children and young people aged under 18 years. Passive smoking was measured by self-report or biochemical markers, and the outcome of meningococcal disease was diagnosed clinically, confirmed by laboratory tests or both.

Pooled analysis of all 17 studies showed that exposure to second-hand smoke by any smoker in the household more than doubled the risk of invasive meningococcal disease (odds ratio [OR]=2.18, 95% confidence interval [CI] 1.63 to 2.92, p<0.00001). Maternal smoking during pregnancy and after birth were similarly associated with a doubling of the risk of invasive meningococcal disease, but studies of paternal smoking were too different to allow pooling, and results of individual studies were conflicting. After accounting for a small publication bias, the authors calculated that 350 cases of invasive meningococcal disease per year in the UK could arise from exposure to smoking in the home.

**Commentary:** "This study shows clear evidence that passive smoking doubles the risk of invasive meningococcal disease, with an estimated 350 cases a year in children under the age of 16 years in the UK attributable to it. This is a significant public health issue, and the information from this paper should be used to formulate public health messages."
"This study has distinct findings about the risk of meningococcal infection associated with smoking in pregnancy, which add to the already clear literature that smoking in pregnancy makes the infant more susceptible to serious respiratory infections. There is no doubt that people working to prevent meningococcal disease, together with those working with mothers and young families, should be thinking of new ways to target information to smokers to reduce the likelihood of meningococcal infection in young children.

"Smoking is linked to lower socioeconomic status, as shown in a review by Hiscock and colleagues (2012). Smoking is more common in more disadvantaged groups, and this study has conclusively shown that second hand smoke caused by anyone in the household is linked to a doubling of the risks of developing invasive meningococcal disease. Failure to reduce smoking contributes further to health inequalities and the adverse health experienced by disadvantaged groups." – Philip Monk, Consultant in Public Health, Public Health England

Study sponsorship: The University of Nottingham, Cancer Research UK and the UK Clinical Research Collaboration.