Improving recognition, treatment and outcome of bacterial meningitis in infants

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Over the past two decades the introduction of routine immunisation against *Haemophilus influenzae* type b (Hib), meningococcal serogroup C, and 13 serotypes of pneumococcal bacteria has resulted in a dramatic decline in cases of meningitis caused by these bacteria across the UK.[1-4] With the very recent introduction of quadrivalent ACWY meningococcal vaccination for adolescents and the novel meningococcal B vaccine for babies a further decline is expected.

Despite these successes, enhanced surveillance undertaken by St George's, University of London, in collaboration with the British Paediatric Surveillance Unit has revealed that the incidence of bacterial meningitis in infants aged <90 days across the UK and Ireland between July 2010 and July 2011 is the same as that recorded over the past three decades and remains higher in infants born prematurely.[5-7] Data from Public Health England between 2004 and 2011 show that the rate in this age group is remarkably high, 70-fold higher than that among adults.[8]

Routine vaccines have had very little impact on disease in young infants, not only because the schedule starts from two months of age, but also because the aetiology of meningitis differs in this age group compared to adults and older children.[8] The majority of the bacteria causing meningitis in infants under three months are not vaccine preventable at present, with group B streptococcus (GBS) being responsible for around half of all cases (**FIGURE 1**). Disappointingly, although guidelines aimed at preventing cases of early onset GBS disease were published in 2003, rates of disease have not decreased in the past decade.[7,9]

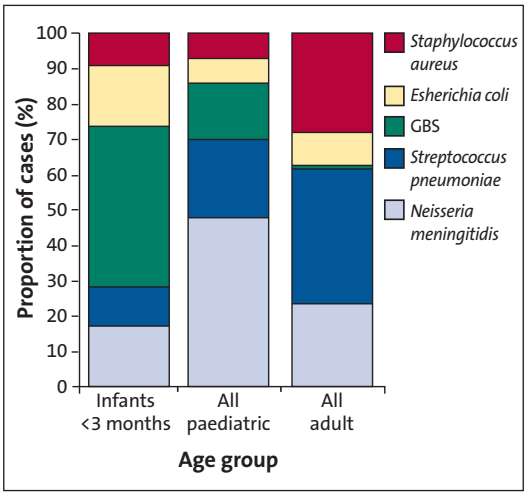

FIGURE 1 Contribution of the five main bacteria to laboratory-confirmed bacterial meningitis by age group. Key: GBS = group B streptococcus. Source: Okike et al 2014.[8]

The case fatality rate associated with neonatal meningitis has also remained unchanged since the mid-1990s and around 10% of those who become ill will die.[7] Follow up of the children who took part in the study at St George's is ongoing but previous research tells us that morbidity associated with disease is very significant and has remained unchanged from the mid-1980s to 1990s with up to 50% of survivors having long-term neurodevelopmental complications.[10,11] This illustrates the importance of long-term follow up in these children.

Based on findings regarding the variation of aetiology by month of life and a review of national and international data over two decades, the researchers suggest that a more targeted approach to empiric antibiotic use would help reduce the burden of antibiotic use while maintaining adequate cover for all infants. The National Institute for Health and Care Excellence (NICE) is encouraged to review its current recommendations.[12,13]

Following on from the surveillance study, the researchers at St George's undertook a healthcare delivery study to examine the early presenting features (particularly those present when parents noticed a problem), symptom progression, the various steps of management and whether cases were managed according to best practice (results as yet unpublished).

Importantly, fever was only present in 54% of all the cases and the classic features of meningitis were less commonly seen than in older children. Rash was extremely rare and the triad of convulsion, bulging fontanelle and neck stiffness was only seen in 1% of cases.

Although the study took place after the NICE guideline for bacterial meningitis and meningococcal septicaemia in children had been published,[14] large variability in treatment was evident. Some of the key findings were:

- delays from onset of first symptoms to getting help, in some cases due to inappropriate advice from healthcare professionals
- lack of recognition/action on clinical features in primary and secondary care

- delays in starting antibiotics
- choice of antibiotics not in conformity with published NICE guidelines
- delays in performing lumbar puncture
- lack of consensus on long-term follow up.

Meningitis Research Foundation (MRF) is dedicated to communicating new research findings to those who need it in the most appropriate and accessible way possible. As a result of findings from this study MRF has updated its symptoms information for parents to highlight the lack of fever in young infants (**FIGURE 2**). Also under development are an e-learning module and algorithm for hospital management of suspected bacterial meningitis in infants <90 days of age.

The incidence, case fatality rate and morbidity of bacterial meningitis remain high in young infants. GBS is a major contributing factor and although maternal vaccines are in development it will be years until we see these in widespread use. In the interim there is room for substantial improvements in recognition, treatment and follow-up care in this vulnerable group.

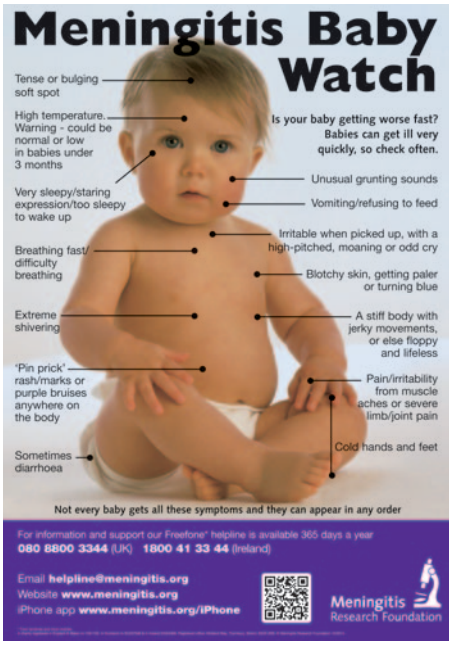

FIGURE 2 Meningitis Research Foundation's updated Baby Watch card: symptoms information for parents.

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MRF's new neonatal resources for health professionals are due to be complete by summer 2016. To keep updated on progress sign up to the MRF healthcare professionals' e-newsletter at **www.meningitis.org**. To download other MRF resources visit **www.meningitis.org/news-media/download-resources**.