25 Pneumococcal

25.1 Introduction

25.1.1 Invasive pneumococcal disease (pneumonia, bacteraemia and meningitis) is a major cause of morbidity and mortality, especially among the very young, the elderly, those with an absent or non-functioning spleen and those with other causes of impaired immunity. The pneumococcus is the commonest cause of community acquired pneumonia. Pneumococcal pneumonia is estimated to affect 1/1000 adults each year and has a mortality of 10-20%. The pneumococcus is also one of the most frequently reported causes of bacteraemia and meningitis. During 1995, 3,897 laboratory isolates from blood or CSF were reported to the Public Health Laboratory Service. Recurrent infections may occur associated with abnormalities such as fractures of the skull.

25.1.2 *Streptococcus pneumoniae* (the pneumococcus) is an encapsulated Gram positive coccus. 84 capsular types have been characterised, of which 8-10 cause two thirds of the serious infections in adults and about 85% of infections in children. Immunity to infection is complicated, but depends greatly on type specific anti-capsular antibodies. However the level of antibody required for protection is not currently known.

25.1.3 Antimicrobial resistance among *S. pneumoniae* is increasing in the UK and worldwide and susceptibility to penicillin, cephalosporin and macrolide antimicrobials can no longer be assumed. In 1994, 2.5% of bacteraemia and meningitis isolates reported to the PHLS in England and Wales showed full or intermediate resistance to penicillin and 11.2% were resistant to erythromycin.

25.2 Pneumococcal Vaccine

25.2.1 Pneumococcal vaccine is a polyvalent vaccine containing 25 microgrammes of purified capsular polysaccharide from each of 23 capsular types of pneumococcus which together account for about 90% of the pneumococcal isolates causing serious infection in Britain. It is supplied in a single dose vial.

25.2.2 Most healthy adults develop a good antibody response to a single dose of the vaccine by the third week following immunisation. Antibody response is not so reliable in young children, those with immunological impairment (including an absent or dysfunctional spleen) and those being treated with immunosuppressive therapy. Antibody response in children under two years of age is likely to be poor.

■ 25.2.3 Many studies of efficacy have found it difficult to reach firm conclusions, but overall efficacy in preventing pneumococcal pneumonia is probably 60-70%. The vaccine is less effective in children under two years of age and in those with immunosuppression. It has been relatively ineffective in patients with multiple myeloma, Hodgkins and non-Hodgkins lymphoma, especially during treatment, and in chronic alcoholism. It does not prevent otitis media or exacerbations of chronic bronchitis, and since so much pneumococcal meningitis is in young children and those with skull defects, its scope for preventing this disease is limited.

■ 25.2.4 Antibody levels usually begin to wane after about five years, but may decline more rapidly in asplenic patients and children with nephrotic syndrome.

■ 25.2.5 Vaccine should be stored unopened at 2-8°C and inspected before being given to check that it is clear, colourless and without suspended particles.

■ 25.3 Recommendations

■ 25.3.1 Pneumococcal vaccine is recommended for all those aged two years or older in whom pneumococcal infection is likely to be more common and/or dangerous, ie those with:

i. Asplenia or severe dysfunction of the spleen, including homozygous sickle cell disease and coeliac syndrome

ii. Chronic renal disease or nephrotic syndrome

iii. Immunodeficiency or immunosuppression due to disease or treatment, including HIV infection at all stages

iv. Chronic heart disease

v. Chronic lung disease

vi. Chronic liver disease including cirrhosis

vii. Diabetes mellitus

■ 25.3.2 Where possible, the vaccine should be given, together with advice about the increased risk of pneumococcal infection, four to six weeks (but at least two weeks) before splenectomy and before courses of chemotherapy. If this is not practicable, as in traumatic splenectomy, the vaccine should be given as soon as possible after recovery from the operation, and before discharge from hospital. If not given before chemotherapy and/or radiotherapy, immunisation should be delayed until at least six months after completion of therapy.

■ 25.3.3 **Additional measures for asplenic and hyposplenic patients:** Haemophilus influenzae b, influenza, and in some circumstances meningococcal vaccines are additionally recommended and antibiotic prophylaxis (usually phenoxymethyl penicillin) is advisable at least until the age of 16 years. New guidelines have recently been published and a patient card and information sheet are available from the Department of Health (details at the end of this chapter).

■ 25.3.4 It is recommended that GPs actively identify and contact unimmunised asplenic patients to offer them advice and to immunise them.

■ 25.3.5 It is also recommended that GPs identify patients on their lists in the other groups for whom vaccine is recommended (25.3.1) and that doctors take opportunities to immunise those who have not previously been immunised:

i. at routine GP or hospital consultations

ii. on discharge after hospital admission

iii. when immunising against influenza.

■ 25.3.6 Pneumococcal vaccine may be given at the same time as influenza vaccine, at a different site, but note that whereas influenza vaccine must be given annually, for most patients pneumococcal vaccine is given once only and re-immunisation may cause adverse reactions (see 25.5 and 25.6.2).

25.4 Route of administration and dosage

A single dose of 0.5ml is given subcutaneously or intramuscularly preferably into the deltoid muscle or lateral aspect of the mid thigh. Intradermal injection may cause severe local reaction. The vaccine must not be given intravenously. The vaccine is used as supplied. No dilution or reconstitution is necessary.

25.5 Re-immunisation

Re-immunisation is not normally advised (see 25.6.2) except, after 5-10 years, in individuals in whom antibody levels are likely to have declined more rapidly such as those with no spleen, with splenic dysfunction or with nephrotic syndrome. A few centres are able to measure antibody levels in cases where there is doubt about the need for re-immunisation. This should first be discussed with a local haematologist.

25.6 Adverse Reactions

25.6.1 Mild soreness and induration at the site of injection and, less commonly, a low grade fever may occur.

25.6.2 Re-immunisation with the earlier 12 and 14-valent vaccines produced more severe reactions in some recipients, especially if less than three years had elapsed since the first injection. Reactions correlated with high levels of circulating antibodies. The same considerations are likely to apply to re-immunisation with the 23-valent vaccine.

25.7 Contraindications

25.7.1 Pneumococcal vaccine should not be given during an acute infection. The vaccine is not recommended in pregnancy or in women who are breast feeding.

25.7.2 Re-immunisation within three years of a previous dose of pneumococcal vaccine is contraindicated.

25.8 Supplies

25.8.1 Pneumococcal vaccine is supplied by Pasteur Merieux MSD Ltd. (Tel: 01628 773200).

25.8.2 A patient card and information sheet for asplenic and hyposplenic patients is available from: Department of Health, PO Box 410, Wetherby, LS23 7LL Fax: 01937 845 381, or in Scotland from: Public Health Policy Unit, Scottish Office Department of Health, Room 18, St Andrew's House, Edinburgh EH1 3DE.

25.9 Bibliography

Streptococcus pneumoniae: virulence factors, pathogenesis and vaccines.
Alonsodevelasco E, Verheul AFM, Verhoef J, Snippe H.
Microbiol Rev 1995; 59: 591-603.

Community-acquired pneumonia in adults in British hospitals in 1982-83: A survey of aetiology, mortality, prognostic factors and outcome.
Br Thoracic Society Research Committee, Q J Med 1987; 62: 195-220.

Hospital study of adult community-acquired pneumonia.
MacFarlane J T, Ward M J, Finch R D, Macrae A D,
Lancet 1982; ii: 255-8.

Community acquired pneumonia
Bartlett JG, Mundy LM
N Engl J Med 1995; 333: 1618-24

Pneumococcal bacteraemia and meningitis in England and Wales 1982-92
Aszkensay OM, George RC, Begg NT
Comm Dis Rep 1995; 5: R45-50

Antibiotic resistant pneumococci in the United Kingdom.
George R C, Ball L C, Cooper P G,
CDR 1992; 2: R37-43

Prevalence of antibiotic resistance and serotypes in pneumococci in England and Wales : results of observational surveys in 1990 and 1995
Johnson A P, Speller D C E, George R C et al
BMJ, 1996; 312: 1454-6

PHLS surveillance of antibiotic resistance, England and Wales: emerging resistance in Streptococcus pneumoniae
Speller DCE, Johnson AP, Cookson BD et al
Emerging Infect Diseases 1996; 2: 57-58

Efficacy of pneumococcal vaccination in adults: a meta-analysis of randomised controlled trials
Fine MJ, Smith MA, Carson CA et al
Arch Int Med 1994; 154: 2666-77

Pneumococcal polysaccharide vaccine efficacy: An evaluation of current recommendations
Butler JC, Breiman RF, Campbell JF et al
JAMA 1993; 270: 1826-31

Immunogenicity of pneumococcal revaccination in patients with chronic disease
Davidson M, Bulkow LR, Grabman J et al
Arch Int Med 1994; 154: 2209-14

Immunogenicity and safety of a 23-valent pneumococcal polysaccharide vaccine in healthy children and in children at increased risk of pneumococcal infection
Lee H-J, Kang J-H, Henrichsen J et al
Vaccine 1995; 13: 1533-8

Guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen.
Working Party of the British Committee for Standards in Haematology Clinical Haematology Task Force
BMJ 1996; 312: 430-4