Global burden of disease

Streptococcus pneumoniae in children under 5 years old

It is estimated that *Streptococcus pneumoniae* infection causes between 700 000 and 1 million child deaths around the world each year. The burden of pneumococcal disease among children <5 years old at global, regional, sub-regional, and national levels has been estimated for the year 2000.

Data were obtained from vaccine trials, national records when available, and systematic literature review. It is estimated that in 2000 there were 14.5 million cases of severe pneumococcal disease in children <5 year old and 826 000 deaths (91 000 in HIV-positive children). Sub-Saharan Africa and Asia had the greatest numbers. Most pneumococcal deaths were from pneumonia (90%), with 7% from meningitis and 3% from non-pneumonia, non-meningitis syndromes. Two-thirds (66%) of all severe pneumococcal disease was in Asia and Africa. Deaths from pneumococcal disease in childhood were increased by a factor of 40 in countries not using routine vaccination with pneumococcal conjugate vaccine. The Global Alliance for Vaccines and Immunisation (GAVI) provides financial support for pneumococcal vaccination. The first country to take up this offer was Rwanda, where vaccination began in April 2009.

Haemophilus influenzae type b in children under 5 years old

Conjugate vaccines against disease caused by *Haemophilus influenzae* type b (Hib) have been available for nearly 20 years and have proved highly effective. Despite this, WHO has estimated that Hib causes about 3 million serious cases and 386 000 child deaths each year. Now fresh estimates have been reported.

The study included data from vaccine trials, national estimates, and surveillance studies. For the year 2000 it was estimated Hib caused 8.13 million serious illnesses worldwide, with 371 000 deaths of children aged 1–59 months (8100 in HIV-positive children). Hib was responsible for 5.6% of all postneonatal child deaths. Of the 371 000 deaths, 79% were from pneumonia and 21% from meningitis. Very few (0.11%) were from non-pneumonia, non-meningitis syndromes. There were 278 200 deaths from Hib infection in Africa and south-east Asia (75% of the total). Without vaccination Hib causes about 1304 cases of pneumonia and 31 cases of meningitis per 100 000 children under the age of 5 years each year.

Almost all deaths from Hib could be prevented by vaccination. The cost of vaccines has fallen and financial assistance for low-income countries is available via GAVI.

Preventing the spread of respiratory viruses

Public health management of, and advice about, recent respiratory virus epidemics and pandemics has tended to concentrate on vaccination and antiviral drugs rather than simple physical barriers to the spread of infection. A systematic review published in the *BMJ* has re-emphasised the importance of physical interventions

The review covered 59 studies including four randomised trials. Their quality was generally poor or mixed. The following measures were highly effective in reducing the spread of respiratory virus infections: handwashing >10 times a day (55% risk reduction), face masks (68% reduction), N95 masks (81%), gloves (57%), gowns (77%), and combined handwashing, masks, gloves, and gowns (91% risk reduction). There was limited evidence for the effectiveness of social distancing. Hygienic measures can prevent spread among younger children and within households.

Tiotropium in moderate COPD

Long acting β2 agonists, inhaled steroids, and anticholinergic drugs are all used in the treatment of chronic obstructive pulmonary disease (COPD). The studies supporting their use have all, however, been in patients with severe COPD. Now a multinational trial has shown benefit from a long-acting anticholinergic drug (tiotropium) in patients with moderate COPD.

A total of 5993 patients aged at least 40 with moderate COPD were randomised at 487 centres in 37 countries to inhaled tiotropium 18 µg once daily or placebo, for 4 years. Moderate COPD was present in 2739 patients and 2375 were included in the final analysis. The rate of decline of mean postbronchodilator forced expiratory volume in 1 second (FEV1) was 43 ml per year (tiotropium) vs 49 ml per year (placebo). The rate of decline of prebronchodilator FEV1was similar in the two groups. Health status was better in the tiotropium group at all time points. Tiotropium reduced the time to first exacerbation by 18% and the time to exacerbation causing hospital admission by 26% (both significant).

Non-invasive ventilation after extubation

The use of non-invasive (face-mask) ventilation after extubation in respiratory crises for patients with chronic respiratory disorders may prevent re-intubation and improve rates of survival. A multicentre trial in Spain has confirmed the benefit.

The trial included 106 intubated and mechanically ventilated patients with chronic respiratory disorders who were hypercapnic after a successful trial of spontaneous breathing. Randomisation was to noninvasive ventilation or conventional oxygen treatment after extubation. Respiratory failure ensued within 72 hours in 15% (non-invasive ventilation) vs 48% (controls), a highly significant difference.

Among 27 patients with respiratory failure not needing immediate reintubation, 17 were successfully treated with non-invasive ventilation. Mortality at 90 days was 11% (non-invasive ventilation) vs 31% (controls).

The researchers suggest that non-invasive ventilation after extubation should be routine in these circumstances.