6.22 Pneumonia

See Background Paper 6.22 (BP6_22Pneumo.pdf)

**Background**

Pneumonia is an acute infection of the lungs. When an individual has pneumonia, the alveoli in the lungs are filled with pus and fluid, which makes breathing painful and limits oxygen intake. Pneumonia has many possible causes, but the most common are bacteria and viruses. The most common pathogens are *Streptococcus pneumoniae*, *Haemophilus influenzae* type b (Hib), and respiratory syncytial virus (RSV). *S. pneumoniae* is the most common cause of bacterial pneumonia in children under five years in the developing world.\(^1\) The second most common cause of bacterial pneumonia in children is Hib, followed by RSV - the most common cause of viral pneumonia in children under two years. The populations most at risk for pneumonia are children under five years, people aged 65 or over, and people with pre-existing health problems.

Pneumonia remains the leading cause of death in children under five worldwide. It accounts for about 1.6 million deaths a year in this age group - 18% of all deaths among children under five.\(^1,2\) More than 99% of all pneumonia deaths occur in low- and middle-income countries.\(^3\) South Asia and sub-Saharan Africa bear the burden of more than half of the total number of cases of suspected pneumonia among children under five worldwide. Children in low-income countries are nearly 18 times more likely to die before the age of five than children in high-income countries, due mainly to pneumonia and other acute infections.\(^2\) For both European regions and the world, the disease burden for pneumonia (caused by pneumococcus, Hib, and RSV) is highest in children aged under one year. About 434,779 pneumonia deaths occur in this age group - over 74% of all pneumonia deaths in children aged under five.\(^4\)

In Europe, mortality rates for pneumonia are substantially higher in children up to the age of four and in adults aged 75 and over than in most other age groups. In Western Europe the highest mortality rates for pneumonia are in elderly people aged 80 and over (279 deaths per 100,000 people), while in Eastern Europe similar mortality rates for pneumonia exist in infants aged 0 to 6 days (278 deaths per 100,000). See Figure 6.22.1.
Many effective treatments are available for bacterial pneumonia in children and adults. Analysis of recent studies on effective antibiotic treatments showed comparable efficacy between the various antibiotics currently used in clinical practice. However, antibiotics are only effective in treating bacterial pneumonia and cannot treat viral pneumonias such as RSV that mainly occurs in infants. Malaria is an infectious disease that manifests similar symptoms to that of pneumonia, and these symptoms often overlap, making it difficult to identify the cause. However, a rapid diagnostic test (RDT) is available for malaria to help ensure that a definitive diagnosis can be made and correct treatment given, even in resource-poor health settings. There are currently no available rapid point-of-care diagnostics to differentiate between bacterial and viral pneumonia. This is a key gap in monitoring the spread of both bacterial and viral pneumonia and in providing appropriate treatment.

Pneumococcal vaccines, such as Hib, conjugate vaccines and polysaccharide vaccines are highly effective in preventing most bacterial pneumonias. Pneumococcal conjugate vaccines (PCV) are available for use in children and adults, and pneumococcal polysaccharide vaccines (PPV) for adults. Three conjugate vaccines – PCV7, PCV10 and PCV13 – are widely recommended for use in children. Each vaccine protects against different serotypes of the pneumococcus. Children in the developing
world are exposed to different serotypes from those that affect children in industrialized countries and this is reflected in the appropriate choice of vaccine.\textsuperscript{6}

**Remaining challenges**

Pneumococcal conjugate vaccines have been shown to have greater immunogenicity against the most prevalent paediatric serotypes and PCV is the current vaccine of choice to protect against \textit{S. pneumonia}, the leading cause of bacterial pneumonia.\textsuperscript{7} The ideal vaccine would be a pneumococcal vaccine that can generate an immune response against all pneumococcal pathogens, regardless of their serotype. Development of PCV with additional serotypes or vaccines containing protein antigens is underway. For adults, PPV is used in high- and low-income countries throughout the world. This vaccine prevents invasive pneumococcal disease, most notably in younger, healthier adults, although it was shown to prevent bacterial pneumonia, in a study of nursing home residents.\textsuperscript{8}

**Research needs**

In order to reduce the high global burden of pneumonia, research is needed into the development of point-of-care rapid diagnostic tests for pneumonia and vaccines that can protect against viral pneumonia. The availability of improved rapid diagnostic tests at point-of-care, together with the appropriate use of effective antibiotic treatments would help prevent deaths, while widespread use of pneumococcal vaccines, especially among the elderly, would help lower the incidence of pneumonia worldwide. Research is needed to understand the low uptake of PPV in the elderly so that vaccination rates can be increased. In addition, there is a need to reformulate currently recommended antibiotics into small dosage and injectable forms, in order to ensure better uptake in children and newborns.

**References**

\textsuperscript{1} Pneumonia and diarrhoea: Tackling the deadliest diseases for the world’s poorest children. New York, UNICEF, 2012.


