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MINI SYMPOSIUM: THE BURDEN OF PNEUMONIA

The burden of pneumonia in children in the developed world

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KEYWORDS

pneumonia;
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Summary There are few comprehensive epidemiological studies of pneumonia in the developed world. Ascertainment and definition are important variables in the estimation of pneumonia incidence both in primary care and from hospital data. The available figures suggest a burden of disease in the order of 10–15 cases/1000 children per year and a hospital admission rate of 1–4/1000 per year. Both incidence and hospital admission are greatest in the youngest children and rapidly fall after the age of 5 years. In a majority of cases of community acquired pneumonia an organism is not identified. Viral infections are common and influenza A, B, respiratory syncytial virus (RSV) and parainfluenza 1, 2 and 3 are the most common viruses identified. *Streptococcus pneumoniae* is the most common bacterial cause. Broad brush calculations suggest that the NHS cost of childhood pneumonia in England is £6–8 million per annum. This does not include family and social costs. There is potential for new vaccine strategies to decrease childhood pneumonia.

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INTRODUCTION

Children in the developed world are mostly well nourished and the vast majority has been immunised against pertussis, diphtheria, tetanus, measles, polio and HiB. Pneumonia has a far less dramatic impact on children's health than in the developing world but remains a serious illness and a cause of substantial childhood morbidity even if mortality is low. Data are patchy particularly on community-based incidence, morbidity and health care costs and some extrapolations have been made.

INCIDENCE IN PRIMARY CARE

In the UK, about 20% of all primary care consultations in children are for respiratory disease; the majority related to the upper respiratory tract. Pneumonia is a relatively

uncommon diagnosis in primary care (Fig. 1), most studies being hospital-based.

The best community-based study took place in Finland over 20 years ago (1981–1982) when all pneumonia patients (radiologically confirmed) in a defined paediatric population from four municipalities of a province were prospectively reported in a pneumonia register.¹ The incidence of pneumonia for children aged less than 5 years was 36/1000 per year (95% confidence interval (CI) = 29.2–42.8). For children aged 5–14 years the incidence was 16.2/1000 per year (95% CI = 13–19.4). The overall incidence was 11.6/1000 per year. There was strong male predominance in those aged less than 5 years.

In a self-reported retrospective survey of 1988–1994 from the USA, pneumonia was reported in 2.6% of children aged <17 years in the previous year.² An earlier USA study,³ performed between 1964–1975, estimated the incidence of pneumonia to be 40/1000 per year in children aged 6 months to 5 years, 22/1000 per year in those aged 5–9 years, 11/1000 per year in those aged 9–12 years and 7/1000 per year in 12–15 year old children. In another small patient-

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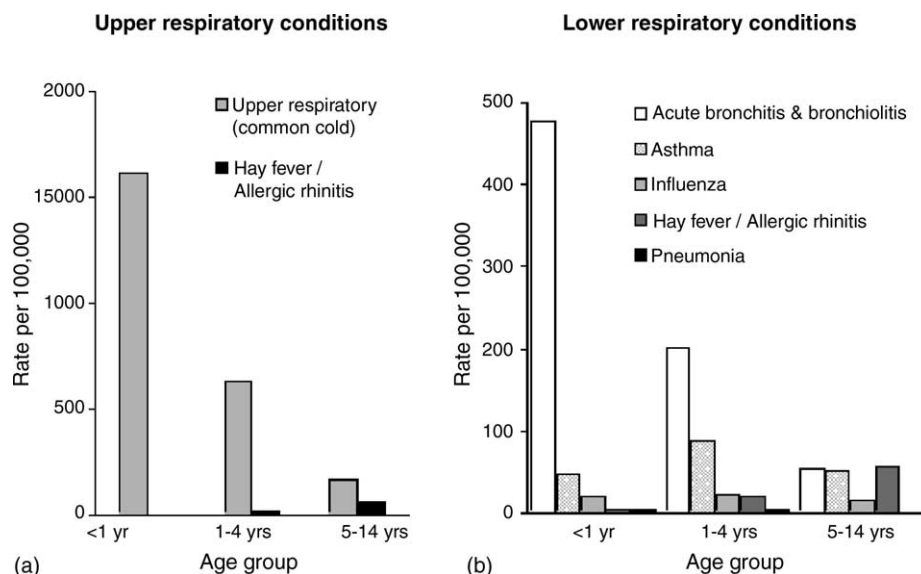


Figure 1 Mean weekly incidence rate of GP episodes for respiratory diseases in children, 1999–2001. Reproduced by kind permission of the Lung & Asthma Information Agency, Fact sheet 2003/4, Community Health Sciences, Dept., St. George Hospital Medical School 31.

reported survey from Australia, the lifetime diagnosis of pneumonia was 6.8% for children from birth to the age of 14, giving an estimated incidence of 7.6/1000 per year for children aged 0–14 years. More than one episode of pneumonia was reported in 20% of the children⁴ and 41% were diagnosed when aged between 0–4 years. In a Swiss study the incidence of pneumonia was estimated from paediatrician's and general practitioner's (GP's) reports to the Federal Swiss Health Office in the Senitel System (voluntary reporting).⁵ This gave an incidence rate of 6.6 patients/1000 children aged 0–23 months and 6 cases/1000 aged 24–59 months. Similarly data from the integrated primary care project database, which contains the computer-based patient records of 150 GPs in the Netherlands in 1997–2000, gave an incidence of 15/1000 children aged 0–10 years.⁶

In a German federal state, parents of 5–7 year olds were asked to recall episodes of pneumonia diagnosed by a physician.⁷ Analysis of these data suggested a population-based incidence of 16.6–19.3/1000 in those aged 0–1 year and 13.6–16.9/1000 in those aged 0–5 years.

INCIDENCE IN SECONDARY CARE

Pneumonia is an important cause of hospital admission in children in the developed world and it is estimated to be responsible for 3–18% of all paediatric admissions.⁸ In the Australian parent-reported study, 41% of children with pneumonia required hospitalisation, giving an estimated incidence of pneumonia requiring hospitalisation of 3.1/1000 persons per year.⁴

In the two studies from Finland, performed between 1981 and 1982, the incidence of pneumonia in children admitted to hospital from a defined geographical area was 20/1000 per year in those aged less than 2 years and 4/1000 per year in children aged 1 month to 15 years.^{1,9}

In a retrospective study from Wisconsin, USA, all children admitted to hospital between 1996 and 1998 with pneumonia were identified and regional and national census data were used to calculate disease rates.¹⁰ There were 1285 admissions (802 were <5 years old) giving estimated US incidence rates of 6.55/1000 for those aged under 5 years and 1.66/1000 aged 5–18 years.

In a further study, Bjor and Braback examined hospital discharge registers in Sweden for 1987–2000.¹¹ This register covered 98% of all hospital admissions. Over this time period there was an apparent decrease in admission for pneumonia in children aged <1 year from 14/1000 to 8/1000 for boys and 12/1000 to 7/1000 for girls (this decrease may be accounted for by a coding change between the International Classification of Diseases, 9th edition (ICD-9) and the ICD-10).

In a three year study from Hong Kong of 1740 previously healthy children, the incidence of pneumonia requiring admission to the hospital was 6.4 episodes/1000 children per year for those <5 years of age.¹² Overall 23% of their patients were <1 year old and 69% were <5 years old.

It is clear that ascertainment and definition are important variables in the estimation of pneumonia incidence both in primary care and in hospitalised patients. Nevertheless the figures suggest a burden of disease in the order of 10–15 cases/1000 children per year and a hospital admission rate of 1–4/1000 per year. Both incidence and hospital admission are greatest in the youngest children and rapidly fall after the age of 5 years.

MORBIDITY

Measurement of morbidity in pneumonia may include length of symptoms, time off school and, for those admitted to hospital, time in hospital, duration of oxygen require-

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