



RESEARCH SUMMARY

Respiratory Health in Pre-School Children

Incidence of Acute Otitis Media and Sinusitis Complicating Upper Respiratory Tract Infection: The Effect of Age

K. Revai et al.

Pediatrics (2007) 119, 1408-1412

Population-Based Study of the Impact of Childcare Attendance on Hospitalizations for Acute Respiratory Infections

M. Kamper-Jorgensen et al.

Pediatrics (2006) 118, 1439-1446

Day Care Centers and Respiratory Health

P. Nafstad et al.

Pediatrics (1999) 103, 753-758

Infants and young children are particularly prone to developing acute infections of the upper respiratory tract. Most pre-school children suffer from several colds a year, regardless of how and where they are cared for. Many of these infectious episodes are complicated by more serious infection, such as acute otitis media (inflammation of the middle ear) or sinusitis, or else by the development of asthma. These three studies, published during the last decade in the same journal, *Pediatrics*, and concerning populations in different Western countries, all conclude that incidence of both simple respiratory infection and complications is increased in infants and children attending childcare facilities. The effect is larger, and in some cases only statistically significant, in children who started attending childcare very early in life. Interestingly, none of the studies found consistent evidence for the often repeated theory that repeated early exposure to such infections is protective in later childhood. All three studies reach remarkably similar conclusions, including a recommendation that it is optimal to postpone enrolling children in group care until after the first, or even the second, year of life.

The earliest of the three studies, by Per Nafstad and colleagues from the National Institute of Public Health in Oslo, Norway, and John Hopkins University, Maryland, USA, assessed all children living in the city of Oslo and born in 1992 for respiratory problems. These children were between three and five years old during the study period. Eighty percent of these pre-schoolers were attending day care centres, with most of the others being cared for in the family home. Parents and care-givers were asked about the frequency of "common cold" type symptoms such as a runny nose and a cough, whether the children had suffered from recurrent otitis media or sinusitis, and whether they had been diagnosed with an allergy with respiratory symptoms (asthma or hay fever). The frequency of these ailments was correlated against family characteristics known or thought to influence viral infection, including exposure to pets, number of siblings, dampness in the home and whether their parents smoked.

The study authors found that the risk of many of the respiratory ailments studied increased for children in day-care centres, when compared with those in home care. By far the most statistically significant effects, however, were seen in children who first attended day-care very

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early in life. It was particularly significant that, after all other variables had been controlled for, children starting day-care before their second birthdays were over two-and-a-half times as likely to develop recurrent otitis media, and over one-and-a-half times as likely to develop recurrent croup or be diagnosed with asthma, as those still cared for at home as 3-5 year olds. There was less increase in the risk of otitis media, and no increase at all in the risk of doctor-diagnosed asthma, in children starting day-care or nursery school between the age of two and the time of the study.

In statistical studies such as these it is always important to examine whether there could have been any factors that might have caused a bias in the sample that affected the results – for example, in this one, factors affecting differences in health between children in day-care and those cared for at home. It is, for instance, likely that any children who develop serious medical problems will be taken out of day-care as a preventative measure. This, however, is likely to under-estimate, rather than over-estimate, any difference in reported illness patterns in favour of children cared for at home. Asthma is difficult to diagnose in very young children, and it is possible that children in day-care – who will need alternative arrangements if they are ill – are taken to the doctor more often, and examined more thoroughly, than those cared for at home. It would seem surprising, however, if this could even part explain the significant increase observed in the prevalence of asthma in those children who entered day-care at the youngest ages. Furthermore, even in 1999, Norway had one of the most generous maternity leave policies in the Western world, and very few of the children in the sample entered childcare under the age of one. It is interesting to speculate whether a more dramatic increase in the prevalence of asthma – which can be a dangerous childhood disease – would be observed in a population with a higher percentage of babies in their first year cared for in nurseries.

These conclusions have been echoed in the two more recent studies, one in Europe and the other in the USA. Mads Kamper-Jorgensen and her colleagues in Copenhagen studied the impact of childcare arrangements on childhood hospitalizations for acute respiratory infection (ARI) using all complete records of Danish children born between 1989 and 2004, recording over 138,000 hospital stays by children under five during the study period. This study design is unusual, as most such studies – and, indeed, both the others described here – record infections as reported by parents, caregivers or community doctors, and therefore include trivial as well as serious illnesses. The reported pattern of serious respiratory illness, however, was comparable with these others in that younger children, boys, and children in day care rather than home care were all observed to be at higher risk of hospitalization for respiratory disease.

In this study, however, the increase in risk in children cared for outside the home was only statistically significant in the younger children (under two years) and in children recently enrolled in a new childcare facility. Furthermore, the effect of childcare was much larger in children from families with no siblings under five years old. Both these differences can easily be explained by considering exposure to infectious agents: the increase in exposure is larger for the more protected children with no young siblings, and, in healthy children at least, continued exposure to the same environment will tend to build up immunity. Although boys were at higher risk than girls, the effect of childcare on both genders was similar.

In 2007, Krystal Revai and her colleagues at the University of Texas analysed the age distribution of upper respiratory infection complicated by either acute otitis media or sinusitis in Texan children under three years old. Over six hundred respiratory infections were studied in 112 children as part of an ongoing, long-term analysis of otitis media pathogenesis in early childhood. The researchers found that 30% of the upper respiratory infections were

complicated by otitis media and 8% by sinusitis. The age distribution of the two diseases differed, however: acute otitis media was most commonly diagnosed in babies under one, and decreased steadily in older children, while the frequency of diagnosed sinusitis did not vary significantly with age. There was a slight, but hardly significant, increase in sinusitis in children in the second year of life.

In the US, as in all Western countries, toddlers in the second and third years of life are more likely than young infants to attend group child care. Revai and her colleagues found that although the older children studied were also less likely to suffer from otitis media, within each age group this infection was found to occur more often in children cared for outside the home. This difference was most marked in babies under one year. This study reaches the same overall conclusion as the others: that although young children will always suffer from coughs and colds, the risk of complications arising from these infections can be minimised if the youngest and most vulnerable – infants in the first year of life – are cared for in the family home.

Summary by Dr Clare Sansom