



Smoke-free legislation and respiratory tract infections in children

A cohort study reported that the introduction of smoke-free legislation in England resulted in a 3.5% decrease in hospital admissions for acute respiratory tract infections in children.

Overview:

- An analysis of Hospital Episodes Statistics data for 2001 to 2012 suggested that introduction of smoke-free legislation in England was associated with an immediate 3.5% reduction in admissions for respiratory tract infections (RTIs) among children.
- The initial drop in admissions was followed by smaller gradual reductions of 0.5% a year up to 2012.
- NICE guidance recommends raising public awareness of the harm caused by smoking and secondhand smoke.



Background: RTIs comprise any infection of the sinuses, throat, airways or lungs ([NHS Choices 2015](#)). Common upper RTIs include the common cold, tonsillitis and flu. Pneumonia, bronchiolitis (an infection of the small airways that affects babies and children aged under 2) and tuberculosis are common lower RTIs.

Exposure to secondhand smoke increases the risk of severe RTIs in children ([Jones et al. 2011](#)). An estimated 165,000 deaths of children worldwide caused by secondhand smoke were the result of RTIs ([Öberg et al. 2011](#)).

In July 2007 smoking in enclosed public spaces – such as pubs, restaurants, and workplaces – was banned throughout the UK. The introduction of smoke-free legislation was associated with a drop in hospital admissions for asthma in adults in England ([Sims et al. 2013](#)).

Current advice: The NICE guideline on [smoking: harm reduction](#) recommends raising public awareness of the harm caused by smoking and secondhand smoke.

The NICE guideline on [bronchiolitis in children](#) recommends that parents and carers of children with bronchiolitis who will be looked after at home should be advised that people should not smoke in the child's home.

New evidence: [Been et al. \(2015\)](#) conducted a cohort study to investigate how the introduction of a ban on smoking in enclosed public spaces affected RTIs in children in England.

Data on unplanned hospital admissions for acute RTIs in children aged 0–14 years were collected from the Hospital Episodes Statistics database. The study analysed data from 1,651,675 admissions for an upper or lower RTI in children between 2001 and 2012. The majority of these admissions (85%) were in children aged 0–4 years. Data were adjusted for month of admission to account for the seasonal peak of RTIs in winter.

The 2007 introduction of smoke-free legislation in England was associated with an immediate 3.5% reduction in admissions for RTIs among children (95% confidence interval [CI] 2.3 to 4.7%, $p < 0.001$). The drop in admissions for RTIs was driven by a 13.8% fall in admissions for lower RTIs (95% CI 12.0 to 15.6%, $p < 0.001$), with no decrease seen in admissions for upper RTIs.

The initial drop in RTI admissions was followed by smaller gradual reductions of 0.5% a year (95% CI 0.1 to 0.9%, $p = 0.017$). This gradual decrease in admissions varied according to socioeconomic status. The annual decrease in admissions for RTIs was greatest in children from the most deprived areas at 1.5% a year (95% CI 1.0 to 2.1%, $p < 0.001$ compared with children from the least deprived areas).

The authors estimated that the introduction of smoke-free legislation prevented 54,489 hospital admissions for acute RTIs among children in England between 2007 and 2012.

Strengths of this study include that it used a large national dataset and adjusted for seasonal variation in RTIs. The study is limited by the fact that the data did not distinguish between first and subsequent admissions for individual children. In addition, the observational design means that the study could not determine whether introduction of smoke-free legislation caused the observed drop in admissions for RTIs.

Commentary by Dr Michael Eisenhut, Consultant Paediatrician, Luton & Dunstable University Hospital NHS Foundation Trust:

“Been et al. (2015) established an association between introduction of national smoke-free legislation in England and a reduction of hospital admissions per year for lower RTIs in children.

“The authors noted no reduction of upper RTIs after introduction of the national smoke-free legislation. This finding is consistent with a simultaneously published study that showed no effect of the legislation on the number of RTI events in the form of milder infections represented by GP attendance ([Been et al. 2015](#)).

“Importantly, there was a dominance of the effect in young children less than 4 years old (85% of RTI admissions were in children aged 0–4 years). Most RTIs leading to hospitalisation in children are episodes of bronchiolitis caused by respiratory syncytial virus in infancy. An independent risk factor for severe bronchiolitis is maternal smoking in pregnancy ([Lanari et al. 2015](#)). Smoke exposure in pregnancy leads to reduced lung function manifesting itself particularly with the small calibre airways in infancy ([Maritz and Harding 2011](#)). This reduced lung function can persist for years and is associated with increased probability of airway narrowing leading to lower respiratory tract malfunction and hospitalisation.

“One possible confounding factor that was not taken into account by the authors was vitamin D levels. NICE public health guidance on [maternal and child nutrition](#) was introduced in 2008, which recommends giving pregnant women and children vitamin D. Vitamin D deficiency has been associated with increased severity of RTIs ([Esposito and Lelii 2015](#)). Therefore, introduction of the NICE guidance could have been a confounding factor that also reduced admissions for RTIs in the study period. On the other hand, surveys have not shown increased vitamin D levels after promotion of vitamin D supplementation ([Spiro and Buttriss 2014](#)).

“The smoke-free legislation is very likely to have significantly reduced smoke exposure in

pregnancy. This effect may account for most of the reduction in hospitalisations for lower RTIs after introduction of the legislation. The results of Been et al. (2015) therefore support the recommendations of NICE public health guidance on stopping smoking in pregnancy and after childbirth.”

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