
EVIDENCE-BASED PRACTICE

Does Secondary Smoke Exposure Increase the Incidence and/or Severity of Asthma in Children?

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Summary of Issues:

Pediatric asthma is a significant health problem in the United States.¹ Up to 26,000 new asthma cases are identified every year. Seventeen percent of all pediatric emergency department visits are attributable to asthma. There are no universally agreed upon diagnostic criteria for asthma. Because no single agent has been identified as causing asthma and because no pathologic feature is entirely unique to asthma, the disease can more easily be described than defined. Asthma is diagnosed clinically based upon recurrent episodes of wheezing, breathlessness, chest tightness and coughing, particularly at night in the absence of other causes.

Asthma is considered a chronic inflammatory disorder associated with airflow obstruction, which is often reversible either spontaneously or with treatment. This inflammation exacerbates bronchial hyper-responsiveness to a variety of environmental stimuli including allergens and irritants. Due to inconsistency of diagnostic criteria for asthma, it is easier to measure asthma severity or to study events such as hospitalizations or deaths, rather than to measure incidence. Since a randomized controlled trial of the effect of cigarette exposure on asthma would be unethical, we must rely on either randomized trials of reduction of cigarette exposure or epidemiological studies to determine associations between secondary exposure to cigarette smoke and asthma.

Summary of the evidence:

Clinical Trials

Only one of the ten available clinical trials of measures to reduce smoking in adults living with children with asthma measured the effect of the intervention on the child's asthma.²⁻¹¹ That study, which measured the effect of a nursing intervention to decrease parental smoking on healthcare utilization for the child's asthma, found that the intervention reduced both acute asthma-related medical care visits

(odds ratio, OR 0.32; $p = 0.03$) and hospitalizations (OR 0.34; $p = 0.14$).²

Epidemiological Studies

A large number of epidemiological studies were found.¹²⁻³⁸ Four published in 2002 or 2003 are summarized below. Of the 24 additional studies identified, 19 found that environmental tobacco smoke increased the incidence, prevalence, or severity of children's asthma symptoms to a statistically significant degree, and five did not find a statistically significant relationship.

Prevalence Studies

A cross-sectional study involved two random samples of Italian subjects aged 6-7 and aged 13-14. Parents filled out questionnaires about their smoking habits and the respiratory health of their children. It was found that exposure to smoke of at least one parent increased the relative risk of current asthma among children (OR 1.34, 95% CI: 1.11-1.62) and of current wheezing among adolescents (OR: 1.24; 95% CI: 1.07-1.44). They estimated that 15% (95% CI: 12-19) of the current asthma cases among children and 11% (95% CI: 8.3-14) of the current wheezing cases among adolescents are attributable to parental smoking in Italy.³⁵

The Student Lung Health Survey (SLHS) was a stratified and multi-staged cluster survey conducted across Canada in 1996. The target study population was school children aged 5 to 19 years. The study showed that prevalence of asthma for children exposed to passive smoke in home was significantly higher than those without exposure to passive smoking (OR: 7.29).³⁶

Severity Studies

In a cross-sectional study involving participants in the third National Health and Nutrition Examination Survey (NHANES), 523 asthmatic children were stratified into tertiles based upon serum cotinine levels (a metabolite of nicotine that indicates tobacco exposure). Asthma severity was determined using reported symptoms and respiratory illness frequency. Asthmatic children in the highest coti-

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nine tertile were more likely to have moderate or severe asthma (odds ratio 2.7, 95% CI: 1.1-6.8).³⁷

A second cross-sectional study examined the relationship between tobacco smoke exposure and asthma symptoms in inner city children. Data from interviews with primary caregivers of elementary school children with asthma were analyzed (n = 590). The study showed that, after controlling for child age, anti-inflammatory medication use, and caregiver's education, exposure to higher levels of tobacco smoke was associated with nearly a three-fold increase in nocturnal symptoms in children (odds ratio 2.83; 95% CI: 1.22-6.55).³⁸

Comment:

The vast majority of cross-sectional studies clearly show increased asthma severity among children exposed to tobacco smoke, and there is evidence that exposure plays a role in asthma incidence and/or prevalence as well.

Search terms:

Passive smoking, environmental exposure to tobacco smoke, asthma in children, pediatric asthma.

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