Asthma perception can be one of the most significant barriers to compliance with controller medication and response to acute episodes. In particular, adolescents have multiple barriers to adequate treatment of chronic diseases such as asthma. Physicians need to be sensitive to this issue in this group. Understanding and building interventions to improve symptom perception in this population are key to improving control and avoiding adverse events.

**Results.** Of 409 households, 349 (85%) remained in the study and were randomly assigned, with 175 assigned to the intervention group and 174 to the control group. After the intervention, lung function tests showed nonsignificant improvement in daily FEV₁ (difference in mean FEV₁: 130.7 mL [95% confidence interval [CI]: −20.3 to 281.7 mL]; P = .09) and peak expiratory flow rate (difference in mean peak expiratory flow rate: 12.29 l/min [95% CI: −4.57 to 29.15 mL]; P = .15). However, on the basis of parental reports and diaries, children in the intervention group had significant reductions in asthma symptoms and improved well-being, compared with the control group. They had fewer reports of poor health (adjusted odds ratio [OR]: 0.48 [95% CI: 0.31–0.74]; P < .001), less sleep disturbed by wheezing (OR: 0.55 [95% CI: 0.35–0.85]; P < .001), less dry cough at night (OR: 0.52 [95% CI: 0.32–0.83]; P = .01), and reduced scores for lower respiratory tract symptoms (OR: 0.77 [95% CI: 0.73–0.81]; P = .013). The intervention group also had 1.8 fewer days (95% CI: 0.11–3.13 days; P < .04) off school, 0.4 fewer visits (95% CI: 0.11–0.62 visits; P = .01) to a doctor for asthma, and 0.25 fewer visits (95% CI: 0.09–0.32 visits; P = .01) to a pharmacist for asthma than did the control group. Exposure to low temperatures was 50% less in the intervention group (95% CI: 0.49–1.93; P = .001). The mean temperature of the control households was lower than that of the intervention households by 1.10°C (95% CI: 0.54–1.67°C; P < .001) in the living room and 0.57°C (95% CI: 0.05–1.08°C; P = .001) in the child’s bedroom. Indoor nitrogen dioxide levels were significantly reduced in the intervention group, compared with the control group, in the living room (geometric mean: 8.5 vs 15.7 μg/m³; P < .001) and the child’s bedroom (7.3 vs 10.9 μg/m³; P < .001).

**Conclusions.** Instilling nonpolluting, more-effective heating in the households of children with asthma did not significantly improve lung function but did significantly reduce symptoms of asthma, days off school, health care utilization, and exposure to nitrogen dioxide.

**Reviewers’ Comments.** Asthma is aggravated by the outdoor and indoor environments. Indoor temperatures, damp, mold, and pollutants have been implicated as important factors. This study shows the impact of nonpolluting, home-heating systems on symptoms in children with asthma. In this randomized, controlled trial, significant improvements in frequency and severity of symptoms were noted and there were trends toward improved lung function. These trends toward improved health effects should increase public awareness of this intervention while additional studies are undertaken.


**Purpose of the Study.** To calculate the age-specific incidence of wheeze and to determine whether wheezing at par-
ticular ages in early life is predictive of abnormal pulmonary function (airway hyperreactivity [AHR] and percentage of predicted forced expiratory volume in 1 second [FEV1]) and current asthma at age 6 to 7 years.

STUDY POPULATION. The Childhood Allergy Study is an ongoing study evaluating environmental determinants of childhood allergies and asthma. An unselected birth cohort consisting of 835 term infants born to women >18 years of age belonging to a health maintenance organization in the suburban Detroit, Michigan, area between 1987 and 1989 was followed prospectively with annual interviews through age 6 to 7 years. The children were then seen in the clinic for further evaluation at age 6 to 7 years. Ninety-three percent of the children were born to mothers who identified themselves as white.

METHODS. Current asthma was defined as ever having a physician diagnosis of asthma and symptoms of asthma or use of asthma medication in the previous year. Spirometry and methacholine challenge were performed during the clinic visit at 6 to 7 years of age. The provocative concentration of methacholine causing a 20% decrease in FEV1 was considered abnormal at <16 mg/mL. Methacholine challenge and spirometry results for children with current asthma were excluded from analysis.

RESULTS. Age-specific wheeze incidence according to parental report was highest at age 1 year (27.2%). The second highest incidence was at age 6 years (13.4%). Wheeze incidence was higher for boys than for girls at all ages (1–6 years), and the 6-year cumulative incidence of wheezing was higher for boys than for girls (66.2% vs 47.6%). At age 6 to 7 years, 7.3% of the children had current asthma (boys: 10.3%; girls: 4.5%). Abnormal AHR was seen in 35.7% of patients without current asthma at age 6 to 7 years, compared with 75% of those with current asthma. The percentage of predicted FEV1 was normal in all children but was higher in those without current asthma (94.5%) than in those with current asthma (87.9%). Wheezing at ≤3 years (early wheeze) was not associated with current asthma at age 6 to 7 years in either boys or girls. Wheezing at >4 years (late wheeze) was associated with current asthma at age 6 to 7 years. Neither early nor late wheezing was associated with abnormal AHR or percentage of predicted FEV1 at age 6 to 7 years. History of childhood eczema or parental asthma and cord blood immunoglobulin E levels did not affect any of the associations.

CONCLUSIONS. Wheezing in the first 3 years was not associated with current asthma at age 6 to 7 years and was not associated with AHR or FEV1 at age 6 to 7 years.

REVIEWER COMMENTS. The data from this unselected cohort are similar to those seen in the United States (Tucson Children’s Respiratory Study) and Europe, with the lack of association of wheeze in early childhood with subsequent asthma. The Tucson study determined that certain characteristics of atopy in the child and atopy and asthma in the parents were predictive of subsequent asthma, which led to the development of the Asthma Predictive Index. In the current study, cord blood immunoglobulin E levels, childhood eczema, and parental asthma history did not affect the negative associations of wheezing in the first few years with subsequent development of asthma. Wheezing at ≥4 years was associated with current asthma at age 6 to 7 years.

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Seasonal Patterns in Health Care Use and Pharmaceutical Claims for Asthma Prescriptions for Preschool- and School-Aged Children
Van Dole KB, Swern AS, Newcomb K, Nelsen L.

PURPOSE OF THE STUDY. The goal of the study was to determine how seasonal patterns of asthma medication prescription claims relate to seasonal patterns of asthma-related health care use (outpatient visits, emergency department visits, and hospitalizations) for children.

STUDY POPULATION. Data were collected for preschool-aged children (2–5 years of age) and school-aged children (6–12 years of age).

METHODS. An ecological analysis of data from insurance claims records from 2002 through 2004 was conducted with a large US health care plan (United Healthcare) database. Patterns of health care use and estimates of prescription asthma controller and reliever use were determined. Controller medications were defined as inhaled corticosteroids, leukotriene receptor antagonists, and long-acting β2-adrenergic receptor agonists. Reliever medications were defined as short-acting β2-adrenergic receptor agonists only. Rates were constructed by week; deviations from annual mean rates were used to determine peaks in use.

RESULTS. Rates of emergency department visits, outpatient visits, and hospitalizations were lowest during summer months; rates increased beginning in September, peaking in October or November. Asthma controller and reliever medication claims increased beginning in September, peaking in December.

CONCLUSIONS. The data suggest that children who reduce their asthma medications during the summer do not resume taking asthma medications until symptoms of asthma worsen. The summer hiatus and other factors may contribute to seasonal increases in health care use.
# Association of Early Life Wheeze and Lung Function

Alan B. Goldsobel  
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