associations between these measures and risk factors for respiratory morbidity in infants with recurrent lower respiratory tract symptoms.

STUDY POPULATION. Studied subjects were 444 children aged <3 years with recurrent lower respiratory tract symptoms including wheeze, dry or productive cough, and/or shortness of breath.

METHODS. Subjects were assessed for FeNO, lung function tests, and the dosimetric methacholine challenge test. Blood was collected for the analysis of peripheral blood eosinophil count. Clinical data were collected by interviewing the parents and by reviewing the medical records of the children.

RESULTS. A total of 136 full-term, steroid-free, infection-free infants, median ages of 16.4 months (range 4.0–26.7 months) were enrolled. The median level of FeNO was 19.3 ppb. Elevated FeNO (≥27 ppb) was associated with maternal history of asthma (adjusted odds ratio, 3.2; P = .012) and increased airway responsiveness (adjusted odds ratio, 4.1; P = .012). However, atopy, blood eosinophilia, lung function, age, height, gender, paternal history of asthma or allergy, parentally reported respiratory symptoms, physician-confirmed wheeze, and environmental exposures were not associated with elevated FeNO.

CONCLUSIONS. Among infants with recurrent lower respiratory tract symptoms, elevated FeNO was significantly associated with a maternal history of asthma, and with increased airway responsiveness to methacholine.

REVIEWER COMMENTS. The results of the present cross-sectional study provides further evidence that increased airway responsiveness and maternal, not paternal, history of asthma are significant factors determining FeNO levels in infants with recurrent respiratory symptoms. However, there was no mention of severity level classification of respiratory symptoms. Therefore, it was not possible to explore the influence of disease severity. That no relationship between FeNO levels and peripheral blood eosinophilia was found suggests that elevated FeNO levels may reflect inflammatory factors other than eosinophilic inflammation identified in blood; sputum eosinophils, although much less practical to obtain, particularly in infants, may be worth investigating. This study possibly has an influence in clinical practice for infants with recurrent lower respiratory tract symptoms. Future studies are needed in larger cohorts to determine whether FeNO can be a noninvasive predictor or biomarker for monitoring respiratory disease, such as asthma or wheezing, in infants.

The Association Between BMI, Vigorous Physical Activity and Television Viewing and the Risk of Symptoms of Asthma, Rhinoconjunctivitis and Eczema in Children and Adolescents: ISAAC Phase Three


PURPOSE OF THE STUDY. To determine if a relationship exists between body mass index (BMI), vigorous physical activity, and television viewing, with symptoms of eczema, rhinoconjunctivitis, and asthma.

STUDY POPULATION. Data from 76 164 children aged 6 to 7 years (29 centers; 17 countries) and 201 370 adolescents aged 13 to 14 years (73 centers; 35 countries) was analyzed as part of the International Study of Asthma and Allergies in Childhood (ISAAC) Phase III study, a multicenter, multicountry, cross-sectional population chosen from a random sample of schools in a defined geographical area.

METHODS. Parents or guardians (for children aged 6–7 years, focusing on height and weight, symptoms of asthma, rhinoconjunctivitis, eczema symptoms, vigorous physical activity, and television viewing) completed questionnaires characterizing asthma, rhinitis, and eczema. Adolescents self-completed the questionnaires. Vigorous physical activity was determined by how many times per week the patient breathes hard with exercise. Television viewing was assessed by how many hours were watched per week. In most centers, the individual completing the questionnaire reported height and weight.

RESULTS. There was a dose–effect relationship seen with the risk of asthma symptoms and eczema in patients who were obese or overweight compared with those children who were underweight. This finding was not seen for rhinoconjunctivitis. Vigorous physical activity correlated with symptoms of asthma, rhinoconjunctivitis, and eczema in adolescents but not in young children. Viewing ≥5 hours of television a day was associated with an increased risk of symptoms of asthma, rhinoconjunctivitis, and eczema in adolescents compared with watching <1 hour. In the 6- to 7-year-old group, television watching for ≥5 hours daily was associated with increased asthma symptoms.

CONCLUSIONS. There is a link between overweight/obesity and symptoms of asthma. Significant associations are also seen for symptoms of eczema but not rhinoconjunctivitis. These complex relationships are affected by lifestyle activity levels, with sedentary behavior having more of a negative impact.

REVIEWER COMMENTS. Although there are several limitations to this study based on the reliance of parental and self-
The Joint Commission Children’s Asthma Care Quality Measures and Asthma Readmissions


**PURPOSE OF THE STUDY.** To examine provider compliance with 3 Joint Commission Children’s Asthma Care (CAC) measures, β-agonist use (CAC 1), systemic steroid use (CAC 2), and patient discharge with a home management plan of care (CAC 3). The study also examined whether use of these measures had an impact on the rate of patient readmission to the hospital for asthma care. Additional measures examined included length of stay, costs, and relative resource units.

**STUDY POPULATION.** A total of 1865 patients, ages 2 to 17 years, discharged between January 1, 2005, and December 31, 2010, from the Primary Children’s Medical Center in Salt Lake City, Utah, with the primary diagnosis code for asthma (493.xx).

**METHODS.** An asthma care process model was designed, based on national guidelines and asthma quality measures. Initial implementation was facilitated by paper-based decision support tools such as admission and discharge order sets. Due to difficulties with consistency in documentation, an electronic discharge order set was implemented. All information was determined from retrospective chart review. Provider adherence with all 3 measures was documented. Rate of readmission to any of 22 surrounding hospitals or emergency departments for each patient was noted.

**RESULTS.** Preimplementation with CAC 1 and CAC 2 were high at 99% and 100%, respectively. Preimplementation compliance with CAC 3 was 0% but improved to 87% during postimplementation period. After 9 months, readmission rates decreased from 17% to 12%. No statistically significant differences were observed for any of the secondary hospitalization outcomes.

**CONCLUSIONS.** Implementation of an asthma care process model compliant with CAC measures is associated with a sustained, though delayed, reduction in asthma readmissions with no changes in secondary hospitalization outcomes, such as length of stay or cost of hospitalization. High baseline compliance with CAC 1 and CAC 2 suggests that they may not be ideal measures in evaluating effective care for childhood asthma.

**REVIEWER COMMENTS.** An inpatient asthma care model, including an asthma action plan at discharge, reduces hospital readmissions. Though the specific care models may differ between hospitals and providers, the importance of time spent educating patients and their families about appropriate pharmacotherapy and environmental control of asthma cannot be understated. Although this facility demonstrated high baseline compliance with β-agonist and oral steroid use, this should not undermine the importance of these measures in asthma care. This study serves as a reminder to health care providers of the significant role that patient education plays in the long-term care of children with asthma.

**Association Between Evidence-Based Standardized Protocols in Emergency Departments With Childhood Asthma Outcomes: A Canadian Population-Based Study**


**PURPOSE OF THE STUDY.** To assess the utility of evidence-based standardized protocols (EBSPs) for children treated in emergency departments (EDs) for asthma compared with EDs with no standardized protocols (SPs) in Ontario, Canada.

**STUDY POPULATION.** Children with previously diagnosed asthma ages 2 to 17 years (N = 31,128) seen in 146 EDs in Ontario from April 2006 to March 2009.

**METHODS.** The primary outcome measure for this retrospective population-based cohort study was hospital admission at the time of the index ED visit. Secondary outcomes included 7-day return visit to ED and 7-day outpatient follow-up visit.

**RESULTS.** Of 146 EDs, 70.5% did not use SPs for treating pediatric asthma. The cohort made a total of 46,510 ED visits. From the index ED visit, 4211 (9.1%) were admitted to the hospital. Of those discharged, 1778 (4.2%) and 7350 (17.4%) had ED return visits and outpatient follow-up visits, respectively. The EBSPs were not associated with hospitalizations, return visits, or follow-up (adjusted odds ratio, 1.17 [95% confidence interval (CI), 0.91–1.49]; adjusted odds ratio, 1.10 [95% CI,
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*Pediatrics* 2013;132:s39
DOI: 10.1542/peds.2013-2294

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DOI: 10.1542/peds.2013-2294MMM

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