frequent respiratory symptoms with no asthma diagnosis, and normal. Multivariate regression was used to determine if demographic or potential risk factors varied between phenotypes and whether measures of severity varied by phenotype.

RESULTS. A total of 4.8% of children had atopic asthma, 1.9% had nonatopic asthma, 3.4% had resolved asthma, and 4.3% had frequent respiratory symptoms. Mean BMI was higher among children with nonatopic asthma, whereas prenatal maternal smoking was a risk factor for resolved asthma. Atopic and nonatopic asthma were similar for most measures of asthma severity (eg, medication use and lung function), and relatively few children in either group were receiving inhaled corticosteroids (5%–10%). Patients with resolved asthma had fewer symptoms but lung-function impairment similar to that seen with current asthma, whereas children with frequent respiratory symptoms but no asthma diagnosis had normal lung function.

CONCLUSIONS. The authors conclude that asthma risk factors and measures of severity vary between children with different asthma phenotypes.

REVIEWER COMMENTS. Studies of children and adults have identified several unique phenotypes of asthma that share the feature of chronic and/or recurrent airflow obstruction. Accurate categorization is crucial in efforts to define genetic and environmental risk factors for asthma, and this work uses a very large national database to help establish environmental correlates to asthma subgroups in children. Notably, resolved asthma was linked to prenatal exposure to tobacco smoke and also to persistent impairment in lung function. Because environmental and lifestyle factors are almost certainly behind the rise in asthma prevalence, this line of research is clearly valuable from a public health perspective.

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DIAGNOSIS AND MANAGEMENT

Bacterial Contamination of Spacer Devices Used by Asthmatic Children

PURPOSE OF THE STUDY. To investigate bacterial contamination in spacer devices used by asthmatic children and the device-maintenance procedures practiced by parents.

STUDY POPULATION. The study group consisted of 62 consecutive children (aged 2–5 years) attending a clinic. All were enrolled in the study during an acute asthma attack.

METHODS. Spacer devices used by 62 asthmatic children were examined. Swabs taken from the inner surface of the reservoirs and face masks were cultured. Parents were interviewed regarding their spacer-cleaning and -disinfection routines.

RESULTS. Bacterial contamination was noted in 22 reservoirs (35.5%) and 16 masks (25.8%). Pseudomonas aeruginosa was isolated from 21.0% of the reservoirs and 14.5% of the face masks, Klebsiella pneumoniae from 6.5% and 4.8%, and Staphylococcus aureus from 9.7% and 8.1%, respectively. Only 34 parents (54.8%) reported that they received cleaning and maintenance instructions from the medical staff at initiation of spacer use by their child, and only 38 (61.8%) cleaned the device after each use.

CONCLUSIONS. Bacterial contamination is common in spacer devices. This study demonstrates that contamination rates are significantly lower when parents clean and actually dry (preferably with an air blower) spacer devices after each use. Spacer device maintenance should be emphasized in education programs for managing asthma.

REVIEWER COMMENTS. This study underscores the need for pediatricians and families to be educated about the proper care of spacer devices and the potential risks associated with improper cleaning. In particular, simple cleansing techniques can lessen or eliminate the number of nosocomial infections introduced by poor care of these devices. The benefit of metered-dose inhalers used with spacers and a face mask is high, and it is worthwhile to ensure that patients and health care workers use these devices properly and to their best advantage.

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Clinical Use of Noninvasive Measurements of Airway Inflammation in Steroid Reduction in Children

PURPOSE OF THE STUDY. To examine the clinical utility of noninvasive measures of airway inflammation as predictors for successful inhaled corticosteroid (ICS) dose reduction in children with asthma.

STUDY POPULATION. Forty children (aged 6–17 years) with stable asthma on a constant ICS dose and eligible for steroid dose reduction.
METHODS. Children were followed prospectively every 8 weeks with noninvasive measures of airway inflammation including exhaled nitric oxide (eNO), sputum induction with bronchial hyperreactivity testing, and exhaled breath condensate. Physicians who were unaware of the results of inflammatory measures made reductions in the steroid dose on the basis of clinical assessment and spirometry. Multiple logistic-regression models were used to determine the usefulness of noninvasive inflammatory markers in predicting successful steroid reduction.

RESULTS. Seventy-five percent of patients tolerated a reduction in steroid dose for at least 2 months; however, 15 (38%) of the 40 patients’ conditions subsequently failed ICS dose reduction and experienced an asthma exacerbation. All children with absence of sputum eosinophils successfully tolerated dose reduction. Increased eNO ≥22 ppb (odds ratio: 6.3; 95% confidence interval: 3.75–10.58) and increased sputum eosinophils ≥3% (odds ratio: 1.38; 95% confidence interval: 1.06–1.81) were significant predictors of failed ICS dose reduction.

CONCLUSIONS. Noninvasive measures of airway inflammation may be useful tools in optimizing treatment of children with asthma.

REVIEWER COMMENTS. These findings suggest that noninvasive measures of airway inflammation are potential adjunctive tools that can be used in pediatric patients who appear clinically stable. However, their clinical usefulness may be limited by several factors. Sputum induction was not successfully performed in 25% of the children, and some measures including bronchial hyperreactivity and breath condensate did not prove to be useful predictors in this study. In addition, criteria for predicting failure were met in 6 (21%) of 28 and 19 (39%) of 49 occasions for sputum eosinophil and eNO cutoffs, respectively, when the child was successfully weaned on the basis of clinical judgment. Conversely, use of noninvasive markers would have prevented an attempt to wean steroids on >70% of occasions when patients subsequently experienced an exacerbation. Inflammatory markers as sole predictors of success or failure will likely result in both significant undertreatment and overtreatment with ICSs. Treatment algorithms that include noninvasive airway inflammatory markers in conjunction with clinical markers are likely the best approach to optimize therapy in children who appear clinically stable.

The Influence of Pulmonary Function Testing on the Management of Asthma in Children


PURPOSE OF THE STUDY. Seventy-five percent of the asthma care in the United States is provided by primary care generalists. The National Asthma Education and Prevention Program guidelines recommend spirometry to assess management once the peak flow has stabilized. The purpose of this study was to assess how pulmonary-function tests (PFTs) performed during a patient encounter influence management decisions beyond the history and physical examination alone.

STUDY POPULATION. A total of 367 asthmatic patients were enrolled during their visit to a pediatric pulmonary clinic. The patients were 4 to 18 years old (mean: 10.4 years), and 60% were male. Patients were excluded if PFTs could not be performed on them, if they had a pulmonary diagnosis other than asthma, or if they had used albuterol within 4 hours.

METHODS. History of asthma symptoms was obtained, and a physical examination was performed. Spirometry was performed before the provider assessment. Peak expiratory flow rate (PEF) was also obtained. The results of the PFTs were not known to the provider at the time of the assessment and initial decision-making. The provider then reviewed the spirometry results and revised the initial recommendations if necessary. Changes in management were analyzed with respect to demographic data and spirometry. The diagnostic accuracy of PEF to detect abnormal lung function was determined.

RESULTS. Eight percent of the patients had mild intermittent asthma, 21% mild persistent asthma, 57% moderate persistent asthma, and 14% severe persistent asthma. Spirometry results were normal in 55% of the visits. Abnormal spirometry occurred equally in boys and girls. Sixty percent of the abnormal results were new compared with previous baseline measurements. The likelihood of an abnormal PFT increased with increasing severity classification. Ten percent of those in the group with mild intermittent asthma had abnormal PFTs, compared with 74% of those with severe persistent asthma. PFT results changed management in 15% of the visits. When spirometry did not change the treatment, the providers were more likely to have already decided to maintain therapy (58%). When spirometry did change treatment, providers were more likely to increase medications (75%). PEF was moderately inaccurate in detecting abnormal spirometry.

CONCLUSIONS. In a clinical setting, even asthma care experts tended to overestimate the degree of asthma control as

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Clinical Use of Noninvasive Measurements of Airway Inflammation in Steroid Reduction in Children

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