Original Article

Physician Specialty Influences Important Aspects of Pediatric Asthma Management

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What is already known about this topic? Physician training influences asthma management with differences noted between generalists (family physicians and pediatricians) and subspecialists (pediatric allergy and respirology) for inhaled corticosteroids prescriptions, asthma action plans, and pulmonary function testing.

What does this article add to our knowledge? Patient management domains with the greatest physician discretion (investigations, comorbid diagnoses, and asthma treatment) are different by physician specialty. More importantly, asthma control, as measured by improvement in FEV_1, also is different by physician specialty.

How does this study impact current management guidelines? Updated asthma guidelines should emphasize (1) a multidisciplinary, multispecialty approach to asthma care; (2) consideration of comorbid conditions, especially among pediatric patients; and (3) inclusion of validated asthma control questionnaires as part of the asthma record.

BACKGROUND: Physician training influences patient care.
OBJECTIVE: To compare asthma management and change in the percentage predicted FEV_1 among pediatric physician specialties.
METHODS: A retrospective cohort of children 6 years of age or older, seen in a multidisciplinary asthma clinic between 2009 and 2010, and followed to 2012, was completed to examine differences in asthma outcomes by specialty (2 pediatricians, 3 pediatric allergists, 5 pediatric respirologists). Univariate analyses compared investigation, including allergy testing (skin prick or RAST), comorbid conditions, and prescription by specialty. Multivariate regression, which controlled for random effect of the individual physician, examined specialty differences for prescribed inhaled corticosteroids (ICS) and changes in percentage predicted FEV_1.
RESULTS: More than 56% of the patients (309/548) were seen by pediatric respirologists, 26% by pediatric allergists, and 18% by pediatricians. Physician specialty influences investigation requested, comorbid diagnoses, treatment, and improvement in FEV_1. Pediatric allergists' patients had more allergy tests, were more likely to be diagnosed with allergic rhinitis and, consequently, were more likely to be prescribed nasal steroids than pediatricians and pediatric respirologists. Pediatricians were less likely to prescribe ICS (odds ratio 0.39 [95% CI, 0.15-0.96]; $P < .05$) than pediatric allergists, with the greatest difference in ICS prescription among children with a percentage predicted $FEV_1 \geq 80\%$. Improvement in FEV_1 among children who received care with pediatric allergists was higher than those seen by pediatricians (13%; $P < .001$) and pediatric respirologists (8%; $P = .005$).
CONCLUSIONS: Patient management domains with the greatest room for discretion (investigations, comorbid diagnoses, and treatment with ICS among children with normal lung function) are most heavily influenced by physician specialty. These results have implications for asthma management at the patient level and in future practice guidelines. © 2014 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2014;2:306-12)

Key words: *Pediatrics; Asthma; Physician training; Inhaled corticosteroids; Spirometry*

Differences in asthma management demonstrated in earlier studies, despite the publication of asthma guidelines since 1990,[1,2] were due to differences in patient demography and physician training. Adult patients seen by the allergists had a higher socioeconomic status than those patients seen by respirologists.[3] Patients treated by the respirologists had more severe asthma and required more medication than those treated by allergists.[3] A cross-sectional parent-report survey[4] demonstrated differences between generalists (pediatricians, family or general practitioner) and subspecialists (pediatric respirologists, pediatric allergists) for inhaled corticosteroids (ICS) prescriptions, asthma action plans, and pulmonary function testing. The study design by Diette et al[4] precluded an examination of patient outcomes and differences between subspecialties.

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Abbreviations used
%FEV_1- Percentage predicted FEV_1
BMI- Body mass index
CT- Computed tomography
CXR- Chest radiography
ED- Emergency department
FVC- Forced vital capacity
GERD- Gastroesophageal reflux disease
ICS- Inhaled corticosteroid
LABA- Long-acting β-agonist
LTRA- Leukotriene receptor antagonist
NICU- Neonatal intensive care unit
NSAID- Nonsteroidal anti-inflammatory drug
OR- Odds ratio
OSA- Obstructive sleep apnea
SABA- Short-acting β-agonist
SDB- Sleep disordered breathing
SPT- Skin prick test

Percentage predicted FEV_1 (%FEV_1) is used to assess asthma control and direct asthma management. The %FEV_1 has been associated with hospitalizations, emergency department (ED) visits, and oral corticosteroid use.[5] FEV_1 is a component of the Asthma Control Questionnaire.[6] A change in FEV_1 is an outcome of asthma randomized control trials,[7] cohort studies, and systematic reviews.[8,9] The objective of this study was to compare differences in patient demographics, asthma management (diagnostic testing and therapeutic management), and change in %FEV_1 among physician specialties (pediatric respirologists, pediatric allergists, and pediatricians) in a tertiary-care asthma clinic.

METHODS

A retrospective cohort study of children seen in a tertiary care asthma clinic was conducted to examine differences in asthma management based on physicians' specialty training. Approval from the university research ethics board and consent of the participating physicians was obtained.

Multidisciplinary asthma clinic

Any physician could make a referral to the asthma clinic. Five pediatric respirologists, 3 pediatric allergists, and 2 community-based pediatricians staffed the clinic. The pediatricians had completed at least 1 year of a pediatric respirologist fellowship. Each physician provided clinical service on a different half day with minimal interaction. All clinic physicians had access to a certified nurse asthma educator who provided in-clinic skin prick testing and spirometry (before and after bronchodilator). Referring physician's training and patient's complexity determined to which physician specialty a patient was triaged. Uncomplicated referrals from family physicians were triaged to any physician. Children with multiple comorbidities or referrals from pediatricians were triaged to either pediatric respirologists or pediatric allergists. There was no consistent in triaging of patients between pediatric allergists and pediatric respirologists.

Study population

Study participants needed to be at least 6 years of age by their final clinic visit (censored at October 31, 2012). Patients, seen at least once between January 1, 2009, and December 31, 2010, were identified through the asthma clinic booking and physician billing records. Children with cystic fibrosis or immune deficiency were excluded.

Chart extraction

Each unique physician-patient pair had a separate chart. A complete list of all variables extracted from the chart, including markers of asthma severity, comorbid conditions and investigations, are provided in Table E1 (in this article's Online Repository at www.jaci-inpractice.org). Investigations refer to all medical tests completed on the patient such as skin prick testing, chest radiography, computed tomography, overnight oximetry, and blood work. The name and dose of any medications prescribed and the spirometry results were obtained from the patient's initial consultation and from the patient's most recent clinic visit censored on October 31, 2012. A single person with a single data entry completed the chart extraction. Data entry error was checked by using tables and graphs, and the charts were pulled, and the information was verified for variables that had abnormal values. The inclusion of patient charts in which the diagnosis of asthma was uncertain (eg, change in billing codes) were reviewed by one of us (P.J.M.). Two of us pediatric respirologists (P.J.M., C.M.) independently reviewed the available charts of patients not on asthma medication at their final clinic visit to confirm an asthma diagnosis. Disagreements were jointly reviewed, and consensus was reached.

Statistical analysis

Results from the most recently seen physician were used in all analyses. Univariate analyses (ANOVA and χ^2 test) compared demographics, asthma severity, comorbid conditions, and investigations by physician specialty. The *a priori* primary outcome was ICS prescription at the patient's most recent visit because some physicians may not alter management at the initial consultation. ICS included ICS alone or ICS in combination (eg, ICS plus long-acting β-agonist [LABA], ICS plus leukotriene receptor antagonist [LTRA]). Multivariate logistic regression, when controlling for the random effect of an individual physician, was used to test the association between ICS prescription and physician specialty after adjusting for differences in individual physician prescribing patterns and other potential explanatory factors.

Multivariate linear regression analysis was used to examine differences in the dose of inhaled steroid among different specialty training, among those participants prescribed ICS. The Canadian Thoracic Society equivalency table was used to convert prescribed ICS into a budesonide dipropionate per day equivalent dose.[10] Similarly, multivariate linear regression was used to examine changes in %FEV_1 from the first visit to the last visit by adjusting for nonsteroid asthma medicine and differences among physicians within a specialty. Multinomial regression examined differences in the choice of ICS add-on therapy at the patient's final visit among physician specialties (online supplement additional results section and Table e5 found in this article's Online Repository at www.jaci-inpractice.org). The reference group was of patients on ICS alone or ICS plus short-acting β-agonists.

RESULTS

During the 24-month study period, there were 566 eligible charts of 533 individual patients, in which 32 patients were seen by more than one or more specialists within the same clinic (1 patient saw 3 different physicians). Of the 533 patients, 47