

Practice Variation in Management of Childhood Asthma Is Associated with Outcome Differences



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What is already known about this topic? Evidence to support guideline recommendations for regular asthma maintenance visits comes from studies showing improved patient outcomes with specialist care. The impact of asthma care provided by primary care providers is not known.

What does this article add to our knowledge? This study revealed large variation in asthma care across pediatric practices that serve patients from diverse sociodemographic groups. Children attending practices providing more asthma care, both preventive and acute, had better impairment and risk outcomes.

How does this study impact current management guidelines? Study findings support guideline recommendations for regular preventive care visits with primary care providers. They also highlight the need for effective strategies to increase the implementation of these recommendations.

BACKGROUND: Although specialist asthma care improves children's asthma outcomes, the impact of primary care management is unknown.

OBJECTIVE: To determine whether variation in preventive and acute care for asthma in pediatric practices affects patients' outcomes.

METHODS: For 22 practices, we aggregated 12-month patient data obtained by chart review and parent telephone interviews for 948 children, 3 to 12 years old, diagnosed with asthma to obtain practice-level measures of preventive (≥ 1 asthma maintenance visit/year) and acute (≥ 1 acute asthma visit/year) asthma care. Relationships between practice-level measures and individual asthma outcomes (symptom-free days, parental quality of life, emergency department [ED] visits, and hospitalizations) were explored using generalized estimating equations, adjusting for seasonality, specialist care, Medicaid insurance, single-family status, and race.

RESULTS: For every 10% increase in the proportion of children in the practice receiving preventive care, symptom-free days per child increased by 7.6 days ($P = .02$) and ED visits per child decreased by 16.5% ($P = .002$), with no difference in parental quality of life or hospitalizations. Only the association between more preventive care and fewer ED visits persisted in adjusted analysis (12.2% reduction; $P = .03$). For every 10% increase in acute care provision, ED visits per child and hospitalizations per child decreased by 18.1% ($P = .02$) and 16.5% ($P < .001$), respectively, persisting in adjusted analyses (ED visits 8.6% reduction, $P = .02$; hospitalizations 13.9%, $P = .03$).

CONCLUSIONS: Children cared for in practices providing more preventive and acute asthma care had improved outcomes, both impairment and risk. Persistence of improved risk outcomes in the adjusted analyses suggests that practice-level interventions to increase asthma care may reduce childhood asthma disparities. © 2016 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2016;4:474-80)

Key words: Asthma; Pediatrics; Primary care

Asthma is a common childhood disease that is most often managed by the child's primary care pediatrician.¹ National asthma guidelines recommend a collaborative partnership between the family and their physician, with regular asthma maintenance care visits to monitor and adjust the treatment plan as needed and to provide education and support for asthma management by parents at home.² A minimum of 2 visits/year is recommended, with more frequent visits if needed to ensure asthma control. Morbidity is reduced and use of effective preventive medications is higher in patients who report regularly scheduled visits with asthma specialists.³⁻⁵ However, few visits to optimize preventive management occur in primary care, and the impact of these visits on the child's asthma outcomes is uncertain.⁶⁻¹⁰

Initiatives such as the patient-centered medical home encourage primary care practices to adopt office systems to

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Abbreviations used

ED- emergency department
pQOL- parental quality of life
SFD- symptom-free day

coordinate and manage care of patients with chronic diseases including asthma, as well as encourage and support self-management.¹¹⁻¹⁴ However, little is known about how variation in primary care asthma management at the practice level affects asthma outcomes of individual patients. The objectives of this study were 3-fold: (1) to describe variation in asthma care provided by primary care pediatric practices; (2) to determine how variation in preventive care among practices affects patient outcomes of asthma impairment (symptom-free days [SFDs] and parental quality of life [pQOL]) and risk (urgent care in offices or in an emergency department [ED] and hospitalization); and (3) determine how variation in delivery of acute care for worsening asthma symptoms among practices affects patient outcomes of risk (ED visits and hospitalization). Our hypothesis was that patients attending practices providing more care would have improved asthma outcomes.

METHODS

We analyzed data pertaining to the year before participation in a large cluster randomized controlled trial to evaluate a telephonic peer-training intervention for parents.¹⁵ For this trial, clusters were 22 community-based primary care practices. Demographic information, asthma care, and asthma outcomes for individual practice patients were assessed by telephone interviews and chart review.

Recruitment of study participants

Eligible practices were community-based primary care practices providing asthma care to at least 40 children. Eligible families within study practices had a child between 3 and 12 years old with a physician diagnosis of asthma, and evidence of bothersome asthma within the past year by self-report assessed using 3 criteria. The first criteria was a prescription for a daily controller medication; the second was 1 or more acute exacerbations that required an unscheduled office visit, a course of oral steroids, an ED visit, or hospitalization; and the third criteria was persistent asthma symptoms.² If the first criteria was not met, the research assistant proceeded to ask about the second and, if necessary, the third criteria. Each practice used billing data to provide a list of potentially eligible families to the study team. The study team contacted these families by mail and phone to invite participation, assess eligibility, and complete the consent process. Parents who provided written consent and completed the consent and the baseline interview were enrolled. Each family was paid \$20 for completion of the baseline interview. The institutional review board at Washington University approved the study protocol: written informed consent was obtained from 1 parent in each family.

Measurement

Measurement occurred during a baseline telephone interview conducted by trained research assistants blinded to study group assignment. SFDs over the previous 12 months were estimated from the frequency of asthma symptoms in the 2 weeks before the interview,^{16,17} and pQOL was measured using the Pediatric Asthma Caregiver's Quality of Life Questionnaire (PACQLQ).¹⁸ The parent reported the number of ED visits and hospitalizations in the

previous 12 months, whether or not the child had seen a specialist for asthma care at least once in the past 12 months, and provided demographic information. Season of enrollment was categorized as follows: spring—March, April, and May; summer—June, July, and August; fall—September, October, and November; and winter—December, January, and February.

Audits of office charts were conducted by an asthma specialist (R.C.S.). All office visits for care during the 12 months before enrollment were assessed and categorized as maintenance care (annual or asthma check-up) or acute care (asthma or other). Visits were defined as *preventive care* when no acute symptoms were present and were considered to be for *asthma care* if asthma or asthma medications were mentioned. Assessed asthma care activities included assessment of asthma control and peak expiratory flow rate, report of controller medications, an asthma action plan, asthma education (any asthma education noted in the chart), and a follow-up plan. Prescription of albuterol, prednisone, and antibiotics was recorded for acute asthma visits.

Statistical analysis

Patient-level data were aggregated for practice-level measures of asthma care. For each practice, all patients in the measurement cohort were used as the denominator to estimate practice measures for asthma care including office visits (total and for asthma care), characteristics of asthma care, and specialist care (the proportion of children for categorical variables and the mean for continuous variables). Practice-level measures were summarized and reported as the median and range.

We studied the effect of asthma care assessed at the practice level on asthma outcomes assessed at the individual patient level. These included 2 impairment outcomes (SFDs and pQOL) and 2 risk outcomes (ED visits and hospitalizations). For each outcome, we first fit a mixed effect model with the measure of care as the only covariate with a random effect for practices. Then, we fit another mixed model with the measure of care and other covariates including the child's age, race, Medicaid insurance, single parent, specialist care, and season as covariates, and with a random effect for practices. These covariates were selected because they are identified as potential confounders in the literature.^{4,19-23} All statistical analyses were done using SAS (SAS Institute, The SAS System version 9.12, Cary, NC). For continuous outcomes (SFD and pQOL), we used the mixed model procedure, and for the count variables (number of ED visits and hospitalizations), we used the GLIMMIX procedure with negative binomial distribution for overdispersion of data. For all analyses, a probability of $P \leq .05$ was used to establish statistical significance (2-sided tests). Continuous variables are summarized as the mean \pm standard deviation or median and range or interquartile range.

RESULTS

Participants

Most of the 22 participating practices were pediatric group practices (63.6%) (solo or 2-physician, 27.3%; multispecialty group, 9.1%) and suburban (81.8%) (Table I). Ten (45.5%) practices had an electronic medical record. Between March 11, 2009, and May 19, 2011, 948 families were recruited from these practices (median subjects/practice, 35; interquartile range, 25-69). Of those eligible, the overall participation rate was 75.8%; the median participation rate across the 22 practices was 74.7% (interquartile range, 71.7%-82.6%). Most of the subjects (80.4%) were assessed as eligible by parental report of a

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