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Factors associated with poor controller medication use in children with high asthma emergency department use

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ABSTRACT

Background: Understanding health and social factors associated with controller medication use in children with high-risk asthma may inform disease management in the home and community. Objective: To examine health and social factors associated with the Asthma Medication Ratio (AMR), a measure of guideline-based care and controller medication use, in children with persistent asthma and frequent emergency department (ED) use.
Methods: Study questionnaires, serum allergen sensitization, salivary cotinine, and pharmacy record data were collected for 222 children enrolled from August 2013 to February 2016 in a randomized clinical trial that tested the efficacy of an ED- and home-based intervention. Logistic regression was used to examine factors associated with an AMR greater than 0.50, reflecting appropriate controller medication use.
Results: Most children were male (64%), African American (93%), Medicaid insured (93%), and classified as having uncontrolled asthma (44%). Almost half (48%) received non–guideline-based care or low controller medication use based on an AMR less than 0.50. The final regression model predicting an AMR greater than 0.50 indicated that children receiving specialty care (odds ratio [OR], 4.87; 95% confidence interval [CI], 2.06–11.50), caregivers reporting minimal worry about medication adverse effects (OR, 0.50; 95% CI, 0.25–1.00), positive sensitization to ragweed allergen (OR, 3.82; 95% CI, 1.63–8.96), and negative specific IgE for dust mite (OR, 0.33; 95% CI, 0.15–0.76) were significantly associated with achieving an AMR greater than 0.50.
Conclusion: Clinical decision making for high-risk children with asthma may be enhanced by identification of sensitization to environmental allergens, ascertaining caregiver's concerns about controller medication adverse effects and increased referral to specialty care.
Trial Registration: clinicaltrials.gov Identifier: NCT01981564.

Introduction

Asthma is a complex inflammatory disease of the respiratory system with strong genetic and environmental components.[1] Approximately 7.1 million US children have asthma, with African American children experiencing higher asthma morbidity and mortality than non-Hispanic white children.[2,3] Poverty is considered one marker for developing asthma[4] and ongoing symptoms,[5] primarily because of increased exposure to indoor allergens and medication nonadherence. Exposure and sensitization to indoor pests (ie, cockroach and rodents) and exposure to secondhand smoke (SHS) is high in inner-city children. Positive allergen sensitization is found in most children hospitalized for asthma,[6] and atopy is a major contributor to asthma morbidity.

Anti-inflammatory or controller medications are the mainstay of preventive asthma therapy.[7] In particular, inhaled corticosteroid (ICSs) and combination ICSs and long-acting β-agonists (LABAs) improved lung function, with leukotriene modifiers (LTMs) having

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a secondary role.[7] Despite national guidelines recommending daily use of controller medication for all children with persistent asthma, ICS use ranges from 40% to 70% and tends to be lowest among poor minority children.[8–10] One reason for lack of guideline-based care in inner-city children with persistent asthma may be low rate of referral to asthma specialty care. Asthma specialists are more likely to prescribe guideline-based controller medication therapy compared with primary care physicians,[11] yet few minority children with asthma receive specialty care, potentially resulting in poor asthma control[12] and higher costs from increased reliance on hospitals and EDs for episodic care.[13,14]

One measure of guideline-based care is the Asthma Medication Ratio (AMR), which is the ratio of controller medication fills to total asthma medication fills during the past 12 months.[14] Ratios of 0.50 or higher have been associated with decreased asthma morbidity and ED use and increased adult quality of life.[14] Understanding factors associated with controller medication use in children with a high number of asthma ED visits may inform clinical interventions aimed at improving asthma control and receipt of guideline-based asthma care among high users of the ED. The objectives of this study were (1) to examine the level of controller medication fills in children with frequent asthma ED visits and (2) to identify health and social factors associated with guideline-based controller medication use.

Methods

Design and Study Setting

This was a cross-sectional study that examined baseline data obtained from 222 children with persistent asthma who enrolled in a randomized clinical trial that tested the efficacy of an ED- and home-based environmental control intervention for children with frequent ED visits for asthma.[10] All children were recruited during an asthma ED visit and received serum allergen specific IgE serologic tests measured by fluorescent enzyme immunoassay to identify allergen sensitization and salivary cotinine measurement to screen for exposure to environmental tobacco smoke during the ED visit. Survey and saliva data collection was performed by 3 trained research assistants, and blood was drawn from the child by trained ED nurses during the enrollment ED visit. Fidelity checks were performed with monthly examination of all item frequencies in REDCap. When irregularities were detected, research assistant retraining occurred. Quality control of cotinine samples included reanalyzing samples with outlier values (top 10th percentile).

Allergen sensitization and cotinine results were provided to the caregiver and or primary care physician (PCP) for all children. Caregivers assigned to the intervention arm received timely, targeted environmental control education and provision of environmental control remediation supplies for any positive indoor IgE test results (ie, cockroach bait for positive cockroach IgE allergen result). Caregivers of children with positive cotinine test results received a brief motivational interview intervention to implement a total home smoking ban. All families received $30.00 for completing the baseline interview survey, and no additional incentives were provided to intervention families. The study is registered with clinicaltrials.gov (NCT01981564). The Johns Hopkins Medical Institutional and the University of Maryland institutional review boards approved the study protocol. Baseline data are presented in this article.

Data Collection

Families of children aged 3 to 12 years were recruited and enrolled during an asthma ED visit throughout August 2013 to February 2016. Inclusion criteria were physician-diagnosed persistent and uncontrolled asthma based on current National Asthma Education Prevention Program (NAEPP) guidelines[7] and having 2 or more ED asthma visits or 1 or more hospitalization during the past 12 months and residing in the Baltimore metropolitan area. Children were excluded if they had significant other nonasthma respiratory conditions (ie, cystic fibrosis). Written informed consent was obtained from each child's primary caregiver or legal guardian, and all children older than 8 years provided verbal assent to participate. Saliva was collected from the child for cotinine measurement to determine level of SHS exposure,[15] and blood was collected to test for child sensitization to common environmental allergens. In addition, the caregiver completed a 45-minute survey interview ascertaining sociodemographic and health information. All eligible children were approached and screened for study participation. As seen in Figure 1, 554 children and caregivers were screened for study enrollment in the ED. Of the 554 children and caregivers, 215 caregivers declined to participate, and 117 children were ineligible for enrollment, resulting in 222 children enrolled in the study. No significant differences were noted in child age, race/ethnicity, or neighborhood zip codes between enrolled and nonenrolled children.

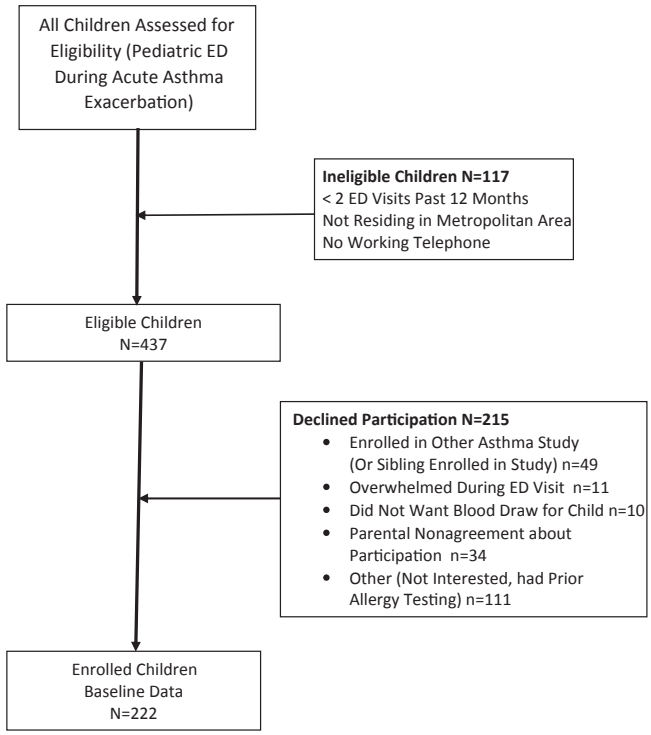

Figure 1. Recruitment and enrollment flow diagram. ED indicates emergency department.

Measures

Asthma medication fills and caregiver worry about medication adverse effects

The primary outcome was the AMR measure based on data obtained from pharmacy dispensing records. All asthma medications dispensed during the prior 12 months were obtained for each child. Pharmacy records for child asthma medications were obtained from all pharmacies used as reported by the caregiver during a 12-month period. Each pharmacy used and identified at baseline was contacted via fax with a copy of the signed consent and Health Insurance Portability and Accountability Act forms requesting a complete list of all asthma medications dispensed during the prior 12 months. Pharmacies not responding within 1 week were contacted by the study nurse (A.B.) to retrieve records over the telephone. Pharmacy records were considered complete if