Effectiveness of an asthma management program in reducing disparities in care in urban children

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Objective: To examine differences in the effectiveness of a program to reduce use of health care services in urban-dwelling black and Hispanic children as a way to understand the origins of disparities.

Methods: We examined hospitalization rates, emergency department (ED) visits, outpatient visits (OPVs), and bronchodilator and inhaled corticosteroid (ICS) prescriptions in 2,362 children receiving Medicaid who were enrolled in an asthma management program (Easy Breathing) from June 1, 1998, through May 31, 2001. We used generalized estimating equations to fit multivariate marginal Poisson regression models, controlling for sex, ethnicity, asthma severity, and secular trends.

Results: Hospitalization rates were high and decreased 53% for black children and 33% for Hispanic children after the intervention. The ED visits decreased for Hispanic children, and OPVs decreased for both black and Hispanic children after Easy Breathing. The ICS prescription rates increased, with a decrease in the bronchodilator to ICS ratio from 5.81 to 2.16 in black children and from 4.74 to 2.17 in Hispanic children. Hispanic children filled more prescriptions for bronchodilators and ICSs (odds ratio, 1.29; 95% confidence interval, 1.05–1.59; $P = .01$; and odds ratio, 1.55; 95% confidence interval, 1.14–2.11; $P = .005$; respectively) 3 and 12 months after Easy Breathing. Black children were more likely than Hispanic children not to fill any asthma prescription. A total of 12% of children filled no asthma prescriptions.

Conclusions: Hispanic children seek more medical services than black children, whereas black children fill fewer prescriptions for bronchodilators and ICSs than Hispanic children. Easy Breathing reduces overall hospitalizations and OPVs in black and Hispanic children and asthma-specific ED visits in Hispanic children; the benefits of Easy Breathing are different in Hispanic and black children.

Ann Allergy Asthma Immunol. 2008;100:545–550.

INTRODUCTION

Childhood asthma disproportionately affects underrepresented minority populations,[1–4] with racial and ethnic differences in asthma prevalence and severity, emergency department (ED) visits and outpatient visits (OPVs), and hospitalizations. Even within minority populations, Puerto Rican children have more asthma, have more severe asthma, and use more health care services than black children.[5–10] Inequities involving socioeconomic status, housing quality, population density, stresses related to living in an urban area, lack of family and community support, environmental tobacco smoke exposure, and rodent- and cockroach-infested living areas are contributing factors.[11–19] Disparities also exist in access to medical care, use of health care services, asthma knowledge, asthma diagnosis and treatment, inadequate medication prescription by clinicians, and parental adherence.[18,20–25]

Disparities are created when the capacity to control disease arises and the benefits of this capacity are distributed unequally. For asthma, inhaled corticosteroids (ICSs) are effective but underprescribed. Guidelines for asthma management from the National Asthma Education and Prevention Program (NAEPP) are available[26,27] but have not been integrated into primary care, although they can be used effectively.[28,29]

Easy Breathing is a disease management program for primary care clinicians that began in 1998 in Hartford, Connecticut.[6] Program implementation by primary care clinicians in this poor, urban community has reduced health care use in large numbers of children receiving Medicaid.[28] Hartford's children (46% Hispanic and 38% black according to the US Government Census 2000) receive care in 6 primary care clinics and 2 EDs in the city, all of which use Easy Breathing. We compared use of and adherence to the program by primary care clinicians and the patterns of health care use and prescription drug use before and after program implementation in Hartford's Hispanic and black children as one way to better understand the origins of disparities within an urban community.

METHODS

Study Population

The study population consisted of children (6 months to 18 years old) who (1) resided in Hartford and received care at any of Hartford's primary care clinics from June 1, 1998, through May 31, 2001; (2) received Medicaid or State of

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Disclosures: Authors have nothing to disclose.

Funding Sources: The Patrick and Catherine Weldon Donaghue Medical Research Foundation.

Received for publication November 6, 2007; Received in revised form December 5, 2007; Accepted for publication December 5, 2007.

Connecticut Health Insurance Plan (SCHIP) and were matched to their claims data; (3) were enrolled in Easy Breathing; (4) had physician-diagnosed asthma; and (5) identified their ethnicity as black or Hispanic.

Easy Breathing

Easy Breathing is an NAEPP guideline–based asthma management program, which has been previously described.[6,26–28] Program entry begins with the Easy Breathing Survey, which is completed by the parent at a clinic visit regardless of the reason for the visit and includes 4 validated questions to assist in diagnosing asthma.[30] These 4 questions ask about asthma symptoms in the previous 12 months, nocturnal cough, exercise-related symptoms, and the duration of a cough with colds. For children with asthma, the clinician completes the Provider Evaluation, a set of questions to determine disease severity and control, and creates a severity-specific asthma treatment plan.[31] The Provider Evaluation asks about the frequency of daytime and nocturnal symptoms, restrictions to exercise, and use of oral steroids. Copies of all materials are given to the Easy Breathing program. The program is used by all of the primary care clinics in Hartford, including hospital-based clinics, university-based clinics, and federally qualified health care centers.

Sources of Data

Medicaid claims and eligibility files from July 1997 through May 2001 were obtained from Connecticut's Peer Review Organization, Qualidigm Inc, for enrollees in Hartford. The data consisted of all paid claims for inpatient and ED care, OPVs, and all filled prescriptions using codes from the *International Classification of Diseases, Ninth Revision* (*ICD-9*) and *Current Procedural Terminology 4*. Four groups of asthma drugs (bronchodilators, ICSs, oral steroids, and nonsteroidal anti-inflammatory medications, including leukotriene modifiers) were identified using National Drug Codes. Demographic information was obtained from the Easy Breathing Survey. Asthma diagnosis and severity were obtained from the Provider Evaluation. Prescribing information was obtained from the asthma treatment plan. Information regarding medical services use and drug prescriptions for children with asthma who were never enrolled in Easy Breathing was provided by the State of Connecticut's Department of Public Health.

Statistical Analyses

Health care use was examined using paid claims for 1 year (July 1997 through June 1998) before Easy Breathing and for 3 years after program initiation. We compared the relative rates of health care services use after enrollment in Easy Breathing to the rates for the same children before enrollment. Each child contributed to the analysis for every Medicaid-eligible month during the 4-year period. Thus, at any point in time after the start of Easy Breathing, there were children enrolled in Easy Breathing, children not yet enrolled, and children never enrolled. For all analyses, data on health care use were pooled for the period *after* enrollment and compared with the health care use rates calculated in the same way *before* enrollment. Therefore, the primary efficacy comparisons are historical (using each child's health care use data before and after enrollment) and contemporaneous (using the health care use of all children enrolled at a given time along with all children yet to be enrolled in Easy Breathing).[28] The latter comparison provides a quasi-control design with a group of children in whom asthma severity can be controlled.

Because each child has multiple data points, generalized estimating equations were used to fit multivariate marginal Poisson regression models. All analyses controlled for sex, ethnicity, asthma severity, and the effect of longer-term secular trends (eg, changes in ICS use in the community) and the aging of the cohort.

Pearson χ^2 tests, Fisher exact tests, and Cochran-Mantel-Haenszel tests were used to compare demographics, and odds ratios (ORs) and 95% confidence intervals (CIs) were calculated. Data were analyzed using SAS statistical software, version 9.1 (SAS Institute Inc, Cary, North Carolina).

RESULTS

Study Population

From June 1, 1998, through May 31, 2001, 8,568 Hartford children (6 months to 18 years old) completed an Easy Breathing Survey. Of these, 7,395 (86%) were Medicaid eligible and matched to their claims. Results from these children were used in all subsequent analyses. The ethnic and age distributions of these children are similar to Hartford's residents; 4,437 children (65%) self-identified as Hispanic and 1,960 children (29%) self-identified as black with a mean (SD) age of 9.2 (4.9) years (as of May 31, 2001). Compared with children without matched claims, children with matched claims were younger ($P = .001$), were more likely female ($P = .01$) and Hispanic ($P < .001$), and had asthma ($P < .001$).

Asthma and Asthma Severity

Of the 2,362 children with physician-confirmed asthma (Table 1), 87% of Hispanic children were Puerto Rican and 93% of black children were African American. Approximately half (52%) of the children had intermittent asthma and 48% had persistent asthma. Hispanic children were more likely to have newly diagnosed asthma than black children ($P = .05$). A new asthma diagnosis was made if the parents denied ever being told that their child had asthma and the child had never received any treatment (inhalers, pills) (by self-report) for asthma. Hispanic children had more severe asthma than black children ($P < .001$), but no difference was found in sex ($P = .35$) or age ($P = .66$) between black and Hispanic children with asthma.

Health Care Service Use Before and After Enrollment in Easy Breathing

Before Easy Breathing, Hispanic children had more overall ED visits and OPVs and more asthma-specific OPVs than black children (Table 2). Overall and asthma-specific hospitalization rates were high compared with national rates[5] for