Published in final edited form as:
Ethn Dis. 2008 ; 18(2): 225–227.

Racial Influences Associated with Asthma Management among Children in the United States

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Abstract

Objective: To examine the influence of race and having an asthma management plan on the impact of experiencing asthmatic episodes.

Methods: This study utilized the 2002 and 2003 National Health Interview Survey to conduct a retrospective study and secondary data analysis. Univariate, bivariate, and multivariate analysis was performed to examine physician asthma management plan recommendations among minority and non-minority children in the United States.

Results: Most of the study participants (59%) reported not having an asthma management plan. Children who experienced an asthma episode in the past 12 months were less likely to have an asthma management plan (OR .51, $P<.0001$). In the multivariate analysis, Whites were significantly more likely than were Blacks and Hispanics to have an asthma management plan (OR 1.66, $P=.0031$).

Conclusions: Findings from this study indicate that Black and Hispanic children with asthma are less likely to have an asthma management plan, and children with an asthma management plan are less likely to have had asthma episodes in the past 12 months. Requiring all insurers to provide an asthma management plan to children with asthma may reduce these race-based inequities.

Keywords

Public Health; Asthma; Racial Disparities; Adolescent Health Services; Health Services; Quality of Health Care

Introduction

Asthma is one of the leading chronic illnesses among children in the United States. Since the 1970s, the prevalence and severity of asthma have increased; >5 million children in the United States have asthma, and in 2002 childhood asthma was associated with 5.8 million visits to a doctor's office, 867,000 emergency department visits, and 89,000 hospitalizations each year.[1]

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Design concept of study: Piper, Elder, Glover
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Administrative, technical, or material assistance: Piper, Glover, Baek
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Asthma is more prevalent and severe among Black children than among White children in the United States.[1] Several national studies have documented disparities in childhood asthma among Black and White children, and these disparities have increased since the 1980s.[2] African American children have an annual asthma hospitalization rate of 74 per 10,000, compared to 21 per 10,000 in White children, and an asthma death rate of 11.5 per million, compared to 2.6 per million in White children.[1]

Illnesses and death associated with asthma are largely preventable, especially when patients have access to quality healthcare services and are well educated about the disease.[3] In 1991 national standards were developed (revised in 1998) by the National Heart, Lung, and Blood Institute that recommended physicians provide asthma patients with guidelines to improve the home management of asthma exacerbations; these guidelines included having a written asthma action plan with information on what to do at home, when to call the clinician, and when to seek emergency care.[4] Asthma management plans are an essential component for long-term treatment of asthma and self-management, and written asthma management plans are associated with reduced morbidity, fewer hospitalizations, and increased quality of life.[5-6]

The aim of this study was to examine the effect of having an asthma management plan on asthmatic episodes. This study will also assess the influence of race and other demographic characteristics on asthmatic episodes and having an asthma management plan.

Methods

This study used 2002 and 2003 National Health Interview Survey data to conduct a retrospective study and secondary data analysis.[7] The independent variables were age, race, sex, parental income, region, parental education, health status, health care utilization, source of health care, and health insurance coverage, and the outcome variables were asthma management plan status and asthmatic episodes. The other outcome variable, asthmatic episodes, is defined as number of episodes in last 12 months. Additional variables of interest included whether the patient was advised to change environment for asthma, whether the patient had ever taken preventive asthma medications, and number of emergency department visits due to asthma.

SAS version 8.2 was used to process the data initially.[8] To account for the complex multistage sampling design of the National Health Interview Survey, data were further analyzed with SAS callable SUDAAN.[9] To create a final combined dataset, each individual year of data was merged by using only the variables of interest. Categorical variables were used in this study, and if the response to a question included, “don't know or refused,” responses were set to missing. Institutional review board exemption from the University of South Carolina was granted.

Univariate, bivariate, and multivariate analysis was performed to examine physician asthma management plan recommendations among children in the United States. The unit of analysis was having an asthma management plan and experiencing an asthma episode. In preliminary analysis, frequency distributions and univariate statistics were measured to describe the sample. Bivariate analyses were used to compare having an asthma management plan and asthmatic episodes with the independent variables by using χ^2 statistics. The bivariate statistics provided the first indication of the differences and associations between the variables. Multivariate analysis for each outcome variable was used to adjust for other demographic factors and dichotomous variables. The fitting of the multivariate models was based on empirical and conceptual considerations. The interaction term race and asthma management was considered with the episode model to test the racial differences between having an asthma management plan and experiencing an asthma episode. The estimates produced in this study were weighted

to the current US population and to adjust for potential survey response bias. For all analyses, statistical significance was set at $P<.05$.

Results

The 2002 and 2003 National Health Interview Survey included 13,000 children, 2110 of whom were identified as having asthma. The study sample included Hispanic (22.92%), non-Hispanic White (50.96%), and non-Hispanic Black (26.12%) children. The sample was predominantly male (57.11%), and children age 5–17 years (71.10%) made up the largest age group. The largest income and education group respectively were ≥$65,000 (29.58%) and a high school education or general equivalency diploma (29.01% of mothers and 30.28% of fathers). The percentage of children with asthma who had private insurance was 55.59%, 25.69% had Medicaid, 5.90% had the Children's Health Insurance Program, 4.96% had Tricare, and 7.86% were uninsured.

Among all racial groups, 87.93% of the children had visited a doctor in the past twelve months (Table 1). Most participants (59.00%) reported not having an asthma management plan. The percentage of children with asthma in this study that had an asthma episode in the past 12 months was 62.42%.

In the bivariate analysis, Whites were significantly more likely to have an asthma management plan than were Blacks and Hispanics (OR 1.66, $P=.0031$). Children who had an asthma episode in the past 12 months were less likely to have an asthma management plan (OR .51, $P<.0001$). Children who had seen a general doctor in the past 12 months were more likely to report having an asthma management plan, although this difference did not reach statistical significance (OR 1.41, $P=.0831$).

In the multivariate analysis, statistical significance was not found within the interaction term, in which Black and Hispanic children with an asthma management plan were more likely to experience an asthma episode than were White children with an asthma management plan (Table 2). Children with an asthma management plan were less likely to experience an asthma episode in the past 12 months, and children who had seen a general doctor in the past 12 months were less likely to have an asthma episode.

Discussion

To our knowledge, this is the first study to examine the racial differences between having an asthma management plan and experiencing an asthma episode. Findings from this study indicate that Black and Hispanic children with asthma are less likely to have an asthma management plan. Minority children without an asthma management plan are more likely to experience an asthma episode; however, our study found no statistical significance among minority children with an asthma management plan to be less likely to have an asthma episode. Children with an asthma management plan were less likely to have one or more asthma episodes in the past 12 months. These results agree with those of previous studies of selected populations, in that early intervention practices are key to decreasing the negative outcomes associated with asthma.[10]

Particular strengths of this study may also be considered as some of the limitations. The use of National Health Interview Survey provided a large, nationally representative sample, and the survey results are considered accurate and reliable. This study considers the diverse sociodemographic populations of asthmatic children, along with a variety of other asthma related questions. This is one of few studies that have considered having an asthma management plan across racial groups and its effect on asthmatic episodes.

Potential limitations of the study are that it is limited by its reliance solely on parental reporting of the child's asthma without analyzing medical records, which could lead to overestimation or underestimation. The tendency for respondents to give socially desirable answers is a limitation of all survey-based research.

The cross-sectional nature of this study did not provide definitive conclusions about asthma management plan recommendations; only associations can be inferred. This was a secondary data analysis of the National Health Interview Survey and could not control for factors that were not captured by the survey. Future studies should consider these limitations in order to better assess asthma management plan recommendations for children with asthma.

Mandating all insurers to provide an asthma management plan to children with asthma may reduce the race-based inequities in having an asthma management plan. Further studies are needed to explore the findings presented in this study and to identify what factors contribute to physician recommendations of an asthma management plan.

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Table 1

Weighted percentage of asthma-related characteristics among children with asthma

Asthma Episode in the Past 12 Months	Frequency (*n*)	(%)
Yes	1314	62.42
No	791	37.58
Total	2105	100
General Doctor Visits in the Past 12 Months		
Yes	1850	87.93
No	254	12.07
Total	2104	100
Provided an Asthma Management Plan		
Yes	850	41.00
No	1223	59.00
Total	2073	100

Source: National Health Interview, 2002–2003; *N*=2110.

Table 2

Weighted odds ratio and 95% confidence intervals (CI) of children that experience an asthma episode

Characteristic	Odds Ratio	95% CI	*P* Value
Race/Asthma Management Plan			
Black and Hispanic with plan	1.08	(.72–1.61)	.7105
White with plan	Reference		
Advised to Change Environment Because of Asthma			
Yes	.69	(.56–.86)	.0007
No	Reference		
Use of Preventive Asthma Medications			
Yes	.66	(.52–.82)	.0003
No	Reference		
Asthma Management Plan			
Yes	.65	(.52–.96)	<.0001
No	Reference		
General Doctor Visits in the Past 12 Months			
Yes	.64	(.48–.86)	.0029
No	Reference		