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ABSTRACT

Asthma is a widely prevalent chronic disease affecting children in the United States. Prior studies show that blacks are more likely to die from asthma than other racial groups. Despite this fact, blacks are less likely to receive the recommended medication to appropriately treat their asthma. Because of the disparity in treatment, this study was conducted to determine if minorities were receiving information recommended by the NAEPP Guidelines. Logistic regression was used to determine the receipt of instructional information. Results show that males are less likely; and those below the age of 17 are more likely to receive the information.

Key words:
Asthma
Blacks
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Running head: Professional Concordance with the NAEPP Guidelines

Measurement of Health Care Professional Concordance with the National Asthma Education and Prevention Program Guidelines for the Management of Asthma

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INTRODUCTION

Over the past 20 years, asthma has emerged as a major public health problem in the United States (49). It is a chronic respiratory illness often associated with familial, allergenic, socioeconomic, psychological, and environmental factors. It is the most common chronic illness among children in the United States and accounts for a substantial number of hospital admissions, physician visits, and school absences (17, 34). Unfortunately, the level of treatment received by patients has not kept pace with the rising number of patients. The treatment being delivered is fragmented and disjointed leading to unnecessary emergency care which substantially increases the costs of treating asthma and also causes preventable deaths (2, 43).

In order to bring about uniformity and ascertain that every patient seeking services receives the appropriate preventive therapies, the National Heart, Lung, and Blood Institute's (NHLBI) National Asthma Education and Prevention Program (NAEPP) sponsored by the National Institutes of Health convened an expert panel to develop guidelines for the diagnosis and management of asthma in 1991. The guidelines were released in 1991 and revised in 1997. The guidelines indicated that appropriate therapy must include four components: the use of objective measures of lung function to assess the severity of asthma and to monitor the course of therapy, comprehensive pharmacologic therapy that includes medications to reverse and prevent the underlying airway inflammation and to relieve the bronchoconstriction, environmental control measures to avoid or control factors that precipitate asthma exacerbations, and patient education to foster a partnership among the patient, the patient's family, and the clinician (55) . In 2002, the NHLBI updated their recommendations in the Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma (EPR-2). The updated report emphasizes patient education in asthma management (52). The report is now considered the "gold standard" for asthma diagnosis and management (19).

The recommendations in the EPR2 have been included in Healthy People 2010. Healthy People 2010 is the Department of Health and Human Services' plan for achieving a healthier nation in the next decade. The Healthy People 2010 agenda has two overarching goals which

are to increase the quality of years of healthy life and eliminate health disparities. Asthma is included in the Respiratory Diseases chapter of Healthy People 2010, with information on asthma issues and trends, disparities, and opportunities related to achieve the objectives for asthma. These objectives include:

- Reduce asthma deaths
- Reduce hospitalizations for asthma
- Reduce hospital emergency department visits for asthma
- Reduce activity limitations among persons with asthma
- Reduce the number of school or work days missed by persons with asthma due to asthma
- Increase the proportion of persons with asthma who receive formal patient education, including information about community and self-help resources, as an essential part of the management of their condition.
- Increase the proportion of persons with asthma who receive appropriate asthma care according to the NAEPP Guidelines.
- Establish in at least 15 states a surveillance system for tracking asthma death, illness, disability, impact of occupational and environmental factors on asthma, access to medical care, and asthma management.

Specific steps for achieving these objectives include providing written care plans to all people with asthma, instructing patients on the proper use of inhalers, educating patients about early signs and symptoms of asthma episodes and how to respond, prescribing and monitoring the use of appropriate medications, and helping persons with asthma assess and reduce their exposure to environmental risk factors at home, schools, and work (10). As indicated earlier, asthma education, if delivered in close association with medical care has been shown to have benefits, but this is dependent on the type of education delivered.

The EPR-2 emphasizes education because it has been shown to increase compliance with dosing regimens (1, 16, 17). In addition, asthma education, if delivered in close association with medical care, has been shown to reduce morbidity and improve quality of life (22, 32, 42, 45, 51, 50, 63). However, benefits vary by the type of asthma education delivered.

Currently, there are two types of asthma educational techniques that are being utilized in the health care setting. They are traditional asthma education and self-regulation or self-

management education. Traditional education is the simplest level where education is limited to the transfer of information about asthma, its causes, and its treatment (24, 25); and thus, teaches patients about the pathophysiology of asthma, identification and modification of triggers, and the mechanism of action drugs. Traditional asthma education programs have been shown to improve patient knowledge, but its impact on health outcomes is less well established (10, 24, 25, 65). The main problem with traditional asthma education is that it provides the facts about the disease, but fails to generate a sense of self-efficacy in the patient. Without a sense of control of their disease or self-efficacy patients fail to take ownership of their disease and perceive that they are incapable of effectively managing the disease which can, in turn, become a self-fulfilling prophecy.

Mixed results have been uncovered with the use of traditional asthma education especially when examining the cultural background of the group receiving the training. Moudgil et al. (2000) have found that despite delivering traditional asthma education directly to both minority and non-minority patients, the two groups did not experience the same level of clinical outcomes. Beyond culture and race/ethnicity, Abdulwadud et al. (1999) have found that a limited asthma education program in a hospital outpatient setting had a positive impact on patients' knowledge of asthma, but not on their quality of life, self-management skills, or attitudes and beliefs about asthma. And, Gibson et al. (2000) have found that limited asthma education did not reduce hospitalization for asthma and no significant change on doctor visits, lung function, and medication use.

The most significant effect of traditional asthma education is the increase in patient knowledge about asthma. But, as stated by Kolbe (1999), knowledge alone does not guarantee appropriate behavior due to a variety of adverse socioeconomic and psychological factors that need to be considered for each patient. Knowledge is power, but only if translated into action. While this form of asthma education can improve knowledge, its inability to improve outcomes has led those trying to reduce the number of emergencies due to asthma to seek something else; their answer—self-management education.

Self-management asthma education allows the patient to become empowered and increase their level of self-efficacy to the point that they believe that they can effectively manage their asthma with limited guidance from their attending physician and thus they can maintain appropriate control of their symptoms. Self-management of asthma involves the patient making therapeutic, behavioral, and environmental adjustments in accordance with advice from healthcare professionals. Guided self-management of asthma is a treatment strategy in which patients are taught to act appropriately when the first signs of asthma exacerbation appear (37). This technique has been deemed to be more effective than traditional asthma education because it allows health-care professionals to serve as coaches to patients, aiding them in understanding how to manage and prevent episodes of symptoms. This outcome has been shown to have a more positive effect than the outcome realized with the use of traditional asthma education. Clark et al. (2000) demonstrated that patients who were trained using self-management asthma education experienced fewer symptoms and less health-care use than patients who had been trained using traditional asthma education alone. This type of education complements traditional patient education in supporting patients so they can live the best possible quality of life with their chronic condition. Whereas traditional patient education offers information and technical skills, self-management education teaches problem-solving skills and as a result self-efficacy (8).

A positive outcome of self-management is compliance with the medical regimen. Non-compliance has been shown to increase mortality and morbidity (59). Berg et al. (1997) indicate that compliance is complicated by the fact that patients overestimate their own compliance with the recommended regimen. Thus, through self-management programs patients are encouraged to participate in the daily management of their particular chronic disease. The success of participation in this type of asthma education has been shown through several studies. Berg et al. (1997) note that the addition of a self-efficacy enhancing component to self-management programs have been shown to be a significant benefit. They indicate that self-efficacy is a significant factor for many health care behaviors and is linked to general health functioning. They note that it may be postulated that perceived self-efficacy expectancies have a strong influence on chronically ill patients' ability to manage their own care. Cote et al. (2001) add to this

discussion by indicating that the single prescription of a self-action plan does not diminish asthma morbidity. They indicate that when patients with asthma are not given sufficient information and reinforcement, they do not seem to have enough self-confidence to increase the dosage of inhaled corticosteroids according to asthma symptom severity or peak expiratory flow meter recommendations despite having the written instructions. Thus, it is through both the receipt of an asthma action plan and separate provider instructional education that success is reached.

The NAEPP Guidelines offer specific techniques that allow physicians to provide both information and reinforcement. These strategies include the provision of understanding causes and triggers, proper metered dose inhaler and peak flow meter use, following written guidelines, keeping written diaries, skills on how to use an inhaler, spacer, holding chamber, and evaluating results of treatment. The guidelines specify that there should be a strong emphasis on education in patients at the time of diagnosis and as part of continuing care (47, 53,). This training should be tailored to the needs of the patient while maintaining sensitivity to cultural beliefs and practices.

Most studies that have been completed to date have tried to determine the concordance between physician practice and the National Asthma Guidelines on the basis of pharmacological management (13, 36, 38, 39, 49). Fewer studies have looked at whether physicians' provision of asthma education is in concordance with the NAEPP Guidelines. Those that have addressed concordance find that adherence is lower than the expert panel that developed the guidelines would have expected. Finkelstein et al. (2000) found that only half of the pediatric and family physicians they surveyed reported providing written asthma plans. Legorreta et al. (1998), after analysis of 1996 survey data, found that of those asthma patients enrolled in a California health maintenance organization only twenty-six percent of respondents reported having a peak flow meter. Krishnan et al. (2001) analyzed responses to questionnaires administered to asthmatic adults enrolled in sixteen managed care organizations. They found that fewer African Americans than whites reported care consistent with recommendations for self-management education and instruction on how to avoid triggers.

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The current study expands on these studies. The study uses the National Asthma Survey, which is sponsored by the Centers for Disease Control and Prevention and the National Center for Environmental Health and examines the health, socioeconomic, behavioral, and environmental predictors that relate to better asthma control. The study attempts to determine the level of adherence by health care practitioners in the state of Texas with the asthma guidelines in the area of patient education. Preliminary expectations are that patients of minority status will be the least likely to receive the recommended information outlined in the guidelines.

METHODS

Data Sources

The data analyzed come from the National Asthma Survey. The survey is sponsored by the National Center for Environmental Health and Center for Disease Control and Prevention. It uses the same sampling frame used by the National Immunization Survey. The National Asthma Survey (NAS) uses standardized questions to produce comparative data across states and the nation. It also incorporates state specific data needs with customized questions and specific domains of interest. The survey was developed to examine the health, socioeconomic, behavioral, and environmental predictors that relate to better control of asthma, as well as to determine detailed prevalence rates by various demographic characteristics on a national level. The survey explores the content of care and health care experiences of persons with asthma. It targets population subgroups such as persons with specific health conditions or from low-income households. It also provides estimates adjusted for non-coverage of households without telephones. Data for the national survey were collected from February 2003 to February 2004 and data for the state samples were collected from March 2003 to March 2004. The four state samples are for Alabama, California, Illinois, and Texas.

Study Sample

The sample used includes men, women, and children residing in the state of Texas between March 2003 and March 2004 who had a diagnosis of asthma. All persons from three

ethnic and racial groups (non-Latino black, non-Latino white, and Latino) were included. The sample originally included 1,507 individuals, however 243 had to be eliminated because they did not provide income information when asked. The resulting sample includes 1,264 subjects diagnosed with asthma from March 2003 to March 2004.

Dependent Variables

Six dichotomous outcome variables are examined in the study based on six questions included in the NAS; these questions correspond with the recommendations presented by the National Asthma Education and Prevention Guidelines indicating when provider to patient instruction should occur in order to effectively manage the patient's asthma.

The first question asked was, "Did a health professional show you how to use the inhaler?" The responses to this question were included because asthmatics are required to be prescribed two types of medication—a corticosteroid, which is taken every day to control the inflammation in the lungs and a β_2-agonist, which is a rescue medication and is typically used when a patient has an episode or an attack. These drugs are used to relax the muscles around the airway and open the airway. Because both of these drugs are often taken via an inhaler (they may also be taken via nebulizer or orally), instruction on how to properly use an asthma inhaler is essential to every asthmatic especially in the event of an emergency. In addition, the NAEPP Guidelines suggest that every patient should be instructed on how to use the device appropriately.

The second question asked was, "Has a health professional ever advised you to change things in your home, school, or work to improve your asthma?" The responses to this question were important to include in the study because there are numerous 'triggers' in a patients environment that can exacerbate their asthma. By taking the appropriate steps, the patient's asthma can be effectively managed.

The third question asked was, "Has a doctor or other health professional ever given you an asthma management plan?" An asthma management plan is a printed form that tells when to change the amount or type of medication, when to call the doctor for advice, and when to go to

the emergency room. The responses to this question were included because the NAEPP Guidelines indicate that self-management interventions with written action plans have the greatest benefits, including reducing emergency department visits, hospitalizations, and improving lung function.

The fourth question asked was, "Has a doctor or other health professional ever taught you how to use a peak flow meter to adjust daily medications?" A peak flow meter is a portable, inexpensive, hand-held device used to measure how air flows from a patient's lungs. The responses to this question were included because the NAEPP Guidelines suggest that peak flow monitoring for patients should be considered because it may enhance clinician-patient communication and increase patient and caregiver awareness of disease status and control.

The fifth question asked was, "Has a doctor or other health professional ever taught you how to recognize early signs or symptoms of an asthma episode?" The responses to this question were included because the ability to witness the early signs of a possible asthma attack are crucial to preventing an attack either by allowing the patient to change environment, access their medication, or seek professional help. In addition, the NAEPP Guidelines recommend that all patients should be instructed on what to look for as signs of their worsening asthma. These signs could include drops in the peak flow meter reading, coughing, shortness of breath, and/or a increased breathing rate.

The sixth, and final question used for this study, asked, "Has a doctor or other health professional ever taught you what to do during an asthma episode or attack." As with any illness, knowing what to do in the event of a medical emergency can save a patients life. According to the NAEPP Guidelines receiving instruction from a health care professional can prevent an asthma episode or attack from becoming so serve it could be life threatening. It can also instruct a patient and care giver when to call the physician or go to the emergency department. However, this information needs to be provided prior to an asthma attack rather than during. Thus, the responses to this question were also included in the study.

Answers to all of these questions were provided by either the referenced person diagnosed with asthma or their guardian.

Independent Variables

The models include nine explanatory predictor variables; they include gender, age, income, possession of health insurance, ethnicity, race, emergency room visit as a result of asthma, asthma attack, and inpatient stay as a result of asthma.

Gender, possession of health insurance, ethnicity, emergency room visit, asthma attack, and inpatient stay are all dichotomous. Health insurance is also included as a dichotomized variable. Studies have shown that possession of health insurance can have a positive effect on health outcomes, thus in this study it is hypothesized that possession of health insurance should have a positive effect on the type and quality of information and the amount of instruction provided to patients. This variable is dichotomized into having health insurance or not having health insurance.

The intention had been to include highest level of education completed as a predictor however, analysis of the data determined that this was not possible because the majority of individuals included in the sample refused to respond to the question. To ensure that leaving this variable out of the study would not produce biased results an exploratory univariate analysis was conducted to determine the effect of the variable on the six outcome variables. In every case, the education variable showed no effect.

In this study, ethnicity is classified as either Hispanic or non-Hispanic. This variable was changed to Latino in order to capture the African contribution to this ethnicity. All individuals who identified as Latino were stripped of the race so that all individuals were only included in either the ethnic group or in one of the racial groups.

Income is broken into three variables. Lower income (0-19,999), middle income (20-64,999), and upper income (65-75,000+). Age is also split into three variables, patients below age 5 years old, patients between 5 and 17 years of age, and patients 18 years old and above.

Race is also not dichotomized because survey respondents were permitted to identify their racial background and a national origin or ancestry that identified the subject's race. If a race other than one of the seven existing categories was indicated, then a verbatim response was captured. Verbatim responses were reviewed and matched against a database of alternative race

terminology maintained by the U.S. Census Bureau. However, for purposes of this analysis race was limited to three categories, non-Latino black, non-Latino white, and other, which also had to be non-Latino. Other was classified as those individuals who did not self-identify as non-Latino black, non-Latino white, or Latino. An example would be an individual who self-identified as Asian.

Emergency room visit is defined as the patient visiting the emergency department at least once for an asthma exacerbation within the data collection period. This variable is dichotomized into having an emergency room visit or not having an emergency room visit. Asthma attack is defined as having at least one asthma attack and being treated by a physician during the data collection period. Like the previous variables this variable is dichotomized into having an asthma attack or not having an asthma attack. Inpatient visit is defined as a patient who was admitted to the hospital, at least once, because of his or her asthma. Inpatient visit is dichotomized into having an inpatient stay for asthma and not having an inpatient stay for asthma.

Analysis

Multivariate logistic analysis is used to test the hypothesis that differences in receipt of information to manage asthma effectively exist along racial and ethnic lines. Due to the complex survey design of the National Asthma Survey (NAS), STATA is used to accurately estimate variance. The study includes six model models: (1) the likelihood of the receipt of instruction on changing the patient's environment (avoiding triggers), (2) likelihood of receiving an asthma plan, (3) likelihood of the receipt of instruction to appropriately use a peak flow meter, (4) likelihood of the receipt of instruction on how to identify the early signs of an asthma attack, (5) likelihood of the receipt of instruction on how to appropriately use an asthma inhaler, and (6) the likelihood of the receipt of instruction to know what to do in the event of an asthma attack. All six models were analyzed using SVYLOGIT. SVYLOGIT was used in order to account for the sampling design. The NAS uses a stratified sampling technique, thus using SVYLOGIT accounts for different variances across strata preventing biased variance estimates.

The study analyzes six logistic models, the dependent variables for each are:

1. Change—the likelihood of receiving instruction on changing the patient's environment (avoiding triggers).
2. Plan—the likelihood of receiving an asthma plan.
3. Peak—the likelihood of instruction on the appropriate use of a peak flow meter.
4. Early Signs—the likelihood of receiving instruction on how to recognize the early signs of an asthma attack.
5. Attack—the likelihood of receiving instruction on what to do in the event of an asthma attack.
6. Inhaler—the likelihood of receiving instruction on how to use an asthma inhaler appropriately.

The models are defined as:

$$Y = \beta_1 Gender + \beta_2 Age + \beta_3 Income + \beta_4 Health\ Insurance + \beta_5 Race_1 + \beta_6 Race_2 + \beta_7 Ethnicity + \beta_8 Emergency\ Room\ Visit + \beta_9 Asthma\ Attack + \beta_{10} Inpatient\ Stay$$

Sample Characteristics

Characteristics of the sample are shown in Table 1 on page 23. Twelve hundred and sixty-four individuals are identified as eligible for enrollment in the study. Forty percent of the sample is below the age of 17 years old. Slightly more than half are female, had health insurance, are middle income, and have not visited the emergency room or had an inpatient stay because of their asthma. Those included in the study are individuals who were identified as asthmatics living in Texas between March 2003 and March 2004 and who met all the established criteria. The weighted sample correctly represents 2,192,166 asthmatics living in the state of Texas between March 2003 and March 2004.

RESULTS

Please refer to Tables 2, 3, and 4 on pages 24, 25, and 26 for all results.

Gender

It is commonly known that males are more likely to suffer from asthma than females. According to National Center of Health Statistics, females are about seven percent more likely

than males to ever have been diagnosed with asthma, but among children 0-17 years of age, males are more likely than females to have an asthma diagnosis; 139 per 1,000 versus 104 per 1,000 for females. The reason for the increased prevalence in boys is unclear, but some researchers have suggested that the higher rates are due to boys having narrower and less flexible airways than girls. This difference in physical features, rather than gender alone, may make boys susceptible to airflow problems before age 10. After age 10, the airway diameter and length ratios for both sexes tend to be equal (49). Because of the increased prevalence among males, it is expected that males will receive equal if not more educational instruction from their providers than their female counterparts.

Contrary to initial expectations, results indicate that males are more likely to receive less rather than more instruction than their female counterparts. In all models, males are less likely to receive the necessary instruction as recommended by the NAEPP Guidelines. Consider the receipt of information to change the environment in order to improve the patients asthma, male patients are less likely to receive the necessary information than females even after controlling for all emergency services (OR: 0.63; 95% CI: 0.47-0.83, p = 0.002). The results are similar for the receipt of an asthma plan, receipt of instruction on how to effectively use a peak flow meter, how to recognize the early signs of an asthma attack, what to do during an asthma attack, and how to use an asthma inhaler.

Age

Asthma is more prevalent in persons below the age of 17 years than it is in older adults. In 2002, rates decreased with age; 83 per 1,000 children 0-17 years had asthma compared to 68 per 1,000 adults 18 years and over. In this particular study children are divided into those below the age of 5 years old and those 5 to 17 years of age. The results of the logistic models show that children under the age of 5 years old are more likely to receive change information (OR: 1.80; 95% CI: 1.05-3.08, p = 0.032), receive an asthma plan (OR: 4.00; 95% CI: 2.24-7.12, p = 0.000), and receive instruction on what to do in the event of an asthma attack (OR: 2.32; 95% CI: 1.00-5.39, p = 0.049). Those below the age of five years old are perfectly correlated with the

peak flow meter and therefore could not be predicted. However, children below the age of five years old are less likely to receive instruction on the appropriate use of an inhaler (OR: 0.08; 95% CI: 0.04-0.15, p = 0.000). This is more likely the result of the fact that younger children are less likely to be prescribed an inhaler because inhalers are difficult to use my children in this age group. Rather these patients are prescribed oral or nebulized medications which provide the same results as the inhaler does for older patients.

The results for children between the ages of 5 and 17 years old show that they are more likely to receive an asthma plan (OR: 1.94; CI: 1.41-2.67, p = 0.000), receive instruction on how to effectively use a peak flow meter (OR: 1.43; 95% CI: 1.08-1.89, p = 0.012), receive instruction on how to recognize the early signs of an asthma attack (OR: 2.48; 95% CI: 1.78-3.45, p = 0.000), and be instructed in what to do during an asthma attack (OR: 2.01; 95% CI: 1.41-2.87 p = 0.000). There is no difference between patients 5 to 17 years old and older patients in terms of receiving instructional information on how to appropriately use an asthma inhaler. Nor, is there any difference between younger patients and older patients in terms of receiving instructional information on changing their environmental surroundings.

Income Level

The government's report, *Opportunity for All: Tackling Poverty and Social Exclusion* (33), identified poor health as one of the major problems associated with low income (4). Thus, it's expected that the higher the level of income the more likely the probability that a patient will receive the recommended instruction as outlined by the NAEPP Guidelines. However, the results show that there is no difference in the receipt of instructional information based on the level of income.

Health Insurance Coverage

Theoretically, having insurance improves the quality of health care an individual receives. Thus, those who have health insurance, in this study, should receive all the instructional information recommended by the NAEPP Guidelines. The results of the study show that having

health insurance does not increase or decrease the likelihood that a patient will receive the information recommended by the NAEPP Guidelines.

Race

Historically, race has been a predictor of the level and quality of health care that an individual would receive. This has been particularly true when considering minority patients. Even though it has been documented throughout history, it continues today. Past studies suggest that financial access alone does not eliminate racial/ethnic disparities in health care (28) Under use of preventive asthma medications has been described in various settings, especially inner-city and emergency department populations. A study at one children's hospital found that black and Latino children were less likely to be using appropriate medications before hospital admission and also were less likely to have preventive medication prescribed on discharge (42). The authors indicate that these differences may be attributable to racial and ethnic differences in health beliefs and concepts of disease, differences in beliefs about the value of prevention, fears about steroids, and/or lack of regularity in the life of the family. The authors fail to indicate that there maybe a possible genetic linkage. Numerous studies have assessed the linkage between asthmatic patients in geographic regions around the world, such as Korea, Italy, Russia, Costa Rica, Japan and other countries. Some of these studies have found linkage between particular genes and asthma while others have found that there is no linkage (12, 23, 31, 44, 54, 62). However, most of these studies do not address race. One study that did address race focused on Caucasian children (7). The authors found that the gene they were researching does not play a major role in the development of bronchial asthma in this population. Referring back to the original study conducted at the children's hospital, Lieu et al. (2002) also fail to mention that it could also be due to a lack of cultural competency on the part of the physician (49).

Thus, in this study it was expected that those of minority decent would not receive the same level of treatment or, in this case, instruction as their white counterparts. The two minority racial groups being studied in this study are non-Latino blacks or African Americans and "others", which includes any person who did not self-identify as non-Latino black, non-Latino white, or

Latino. It is expected that denial of instruction services will occur even though the 'treatment' being evaluated has no associated financial cost. Typically, failure to deliver certain services to minority groups is often attributed to the lack of economic means including health insurance. However, in this study, the outcome variables being measured involves only instruction, the lack of economic means is irrelevant. As a result, every patient who presents to a health professional for treatment should receive the information recommended by the NAEPP Guidelines.

Contrary to previous research, results of the six models show that there is no difference between non-Latino blacks and non-Latino whites in relation to the receipt of change information, instruction on how to identify early signs of an asthma attack, receipt of an asthma plan, and instruction on how to appropriately use an inhaler. However, non-Latino blacks are less likely to receive instruction on what to do in the event of an asthma attack (OR: 0.75; 95% CI: 0.59-0.95, p = 0.019).

Those individuals who are classified as 'others' show no difference from non-Latino whites in relation to the receipt of asthma plans, instruction on the use of peak flow meter or inhaler, instruction on what to do in the event of an asthma attack, instruction on how to recognize the early signs of an asthma attack, and the receipt of instruction on how to control their asthma. However, this group is less likely to receive change instruction (OR: 0.83; 95% CI: 0.71-0.97, p = 0.021).

Ethnicity

The only ethnicity examined in this study is the Latino group. According to the United States census, the estimated Latino population of the United States as of July 1, 2005 had reached 42.7 million, making people of Latino origin the nation's largest ethnic or racial minority group. Currently, Latinos constitute fourteen percent of the nation's total population; this estimate excludes the 3.9 million residents in Puerto Rico. In addition, one-in-five children under the age of five years old in the United States are now Latino (57).

This population also has a significant presence in the state of Texas. Currently Latinos account for 7.8 million resident in Texas and the number continues increase through births and

immigration. Because Latinos are considered a minority group in the United States despite their growing numbers, it is expected that they will also receive less instruction from their health care professionals than their non-minority counterparts. This outcome could be exacerbated by language barriers.

Despite the expectations listed above, results of the six response variables show that there is no difference in the receipt of instruction between Latinos and their non-Latino counterparts.

Emergency Services

It is expected that all patients who receive emergency care will receive the instruction recommended in the NAEPP Guidelines (1) because of the situation they are in and (2) in order to avoid future emergencies. However, results from the six models show that patients who have asthma attacks are less likely to receive the recommended instruction in all cases with the exception of the receipt of an asthma plan and receipt of change information. In both cases, those who experience an asthma attack receive instructional information at the same rates as those who have not experienced an asthma attack.

Further analysis of the asthma attack variable shows that those who have an asthma attack are less likely to receive instructional information on changing their environment (OR: 0.53; 95% CI: 0.40-0.69, p = 0.000) and instruction on what to do in the event of an asthma attack (OR: 0.36; 95% CI: 0.26-0.50, p = 0.000). They are also less likely to receive instruction on how to appropriately use a peak flow meter (OR: 0.51; 95% CI: 0.39-0.68, p = 0.000) and an inhaler (OR: 0.46; 95% CI: 0.32-0.67, p = 0.000). They are also less likely to receive instruction on how to recognize the early signs of an asthma attack (OR: 0.47; 95%CI: 0.35-0.62, p = 0.000) and receive an asthma plan (OR: 0.64; 95% CI: 0.47-0.87, p = 0.005).

Analysis of the emergency room visit variable shows that if a patient has had an emergency room visit they are more likely to receive an asthma plan (OR: 2.17; 95% CI: 1.29-3.63, p = 0.003), instruction on what to do during an asthma attack (OR: 2.57; 95% CI: 1.36-4.79, p = 0.003), and how to use a peak flow meter (OR: 1.83; 95% CI: 1.07-3.13, p = 0.026). There is

no difference between those who experience an emergency room visit and those who do not in regards to the receipt of change information, receipt of instruction on how to recognize the early signs of an asthma attack, and the receipt of instruction on the appropriate use of an asthma inhaler.

Analysis of the inpatient stay variable shows that there is no difference in the receipt of change information, an asthma plan, instruction on how to appropriately use a peak flow meter, or instruction on how to recognize the early signs of an asthma attack based on whether a patient had an inpatient stay or not. However, results show that those who experience an inpatient stay are more likely than those who have not to receive instruction on what to do in the event of an asthma attack (OR: 3.38; 95% CI: 1.08-10.5, p = 0.036). They are also more likely to receive instruction on the appropriate use of an asthma inhaler (OR: 3.77; 95% CI: 1.26-11.2, p = 0.017).

DISCUSSION

In practice, patient-physician time is scare. Both the patient and the physician have to prioritize services received or services delivered. Because both the physician and patient have limited time and the patient has limited cognition, regardless of whether the disease is life threatening, selection of the amount of information to relay is important. When reviewing the six NAEPP recommended teachable areas, it is easy to see how a prioritization of the six areas could be created, possibly unknowingly, by the physician based on their belief of what the patient needs to know. In a busy physician's practice or the emergency room the physician or health care provider has a fixed amount of time to provide information to the patient. The vast majority of that time is used on managing critical patient medical needs; patient assessment, diagnosis, and creation of a treatment plan specific to the patient's presenting or reoccurring symptoms. The pressures a physician may feel might include providing the medical care for patients who are in situations that are clinically significant, such as the end of life. As a result of these pressures, physicians may establish a short list of critical information to give to patients to manage their asthma. Physicians may unknowingly create specific short lists for specific groups of people. As

a result, a particular type of patient, possibly based on race, ethnicity, gender, or age, may receive certain information while others may not because of the physician's belief that one patient is more likely to be noncompliant than another and possibly the delivery of *all* the information or instruction could be a waste of the physician's valuable time.

The six areas recommended by NAEPP Guidelines that the physicians may be prioritizing are:

1. Receiving change information
2. Receiving an asthma plan
3. Receiving instruction on the appropriate use of a peak flow meter
4. Recognition of the early signs of an asthma attack
5. Receiving instruction on what to do in the event of an asthma attack
6. Receiving instruction on the appropriate use of an asthma inhaler

Based on how a clinician might think, sorting these areas into those skills that are critical to the survival of an asthmatic, the list order changes to:

1. Receiving instruction on what to do in the event of an asthma attack
2. Recognition of the early signs of an asthma attack
3. Receiving instruction on the appropriate use of an asthma inhaler
4. Receiving instruction on the appropriate use of a peak flow meter
5. Receiving an asthma plan
6. Receiving change information

Those items at the top of the list are those that are critical to life or death, which I will call critical survival skills, they are followed by skills that are interventional, which a patient should do to stop or slow the progression of an asthma attack; these I will refer to as building blocks. Those items at the bottom of the list are those skills that are based on the patients ability to more effectively mange their disease, these I shall refer to as cognitive skills. It may not negatively affect a patient if they have not been taught some of the items that are on the lower part of the list. Thus, the most critical or vital skills are: (1) knowing what to do in the event of an asthma attack and (2) knowing how to recognize the early signs of an asthma episode or an asthma

attack. The skills that can be viewed as fundamental building blocks to prevent the declining control of asthma are: (1) using an asthma inhaler and (2) using a peak flow meter. The skills that are based on the fundamental building blocks and may be viewed as cognitive skills include: (1) receipt of an asthma plan and (2) receipt of change information.

Organizing the teachable skills into these three areas: (1) critical survival skills, (2) building blocks, (3) cognitive skills, the results provide the following interpretations:

Critical Survival Skills

The two models which address critical survival skills are Model 4 and Model 5. Considering Model 4 first, the results suggest that children between the ages of 5 and 17 years old are more likely to receive training in this critical survival skill of recognizing the early signs of an asthma attack. However, males and those who have experienced an asthma attack are less likely to receive training in this critical survival skill.

Looking at the second model which also addresses critical survival skills, Model 5—Likelihood of receiving instruction on what to do in the event of an asthma attack. Patients are more likely to receive critical survival skills training if they are under the age of 17, have experienced an emergency room visit or an inpatient stay. Males, non-Latino blacks, Latinos, and those who experience an asthma attack are less likely to receive the critical survival skill of receiving instruction on what to do during an asthma attack.

Building Blocks

Models 6 and 3 address the building block skills. Let us look at only Model 6—Likelihood of being trained on how to appropriately use an asthma inhaler. The results suggest that males and those below the age of 5 years old are less likely to receive this building block training. As explained earlier, the latter are less likely to receive instruction on the use of an inhaler because those below the age of 5 years old are more likely to be prescribed oral steroids due to the difficulty they face using an asthma inhaler. Those who experience an asthma attack are also less likely to receive the building block skill on how to appropriately use an asthma

inhaler. However, those who have health insurance and those who experience an inpatient stay are more likely to receive the building block skill.

Next, let us look at the second model which also addresses building block skills, Model 3— Likelihood of receiving instruction on the appropriate use of a peak flow meter. Patients are more likely to receive this building block skill if they are between the ages of 5 and 17 years old and have experienced an emergency room visit. Males and those who have experienced an asthma attack are least likely to receive the building block skill to know how to appropriately use a peak flow meter.

Cognitive Skills

The models which address cognitive skills training, in order of priority, are Model 2 and Model1. Results from Model 2—Likelihood of receiving an asthma plan, suggests that patients below the age of 17 and those who experience an emergency room visit are more likely to receive this cognitive skill. Males and those who experience an asthma attack are less likely to receive the cognitive skill of an asthma plan.

Results from Model 1—Likelihood of receiving change information suggests that those below the age of 5 are more likely to receive this cognitive skill. The results also suggest that those who have experienced an asthma attack, are male, and are classified as other, are less likely to receive this cognitive skill of instruction in changing their environment.

LIMITATIONS

As with any study, this study has its limitations and they should be noted. First, because the National Asthma Survey is based on patient self report, which may not attain the same level of accuracy as a chart review, the responses may not be as accurate, because it depends solely on the respondent's memory, as those that would have been received from a chart review. However, the survey design used may eliminate much of the deficit. Second, because only data from Texas was used, the results are not generalizable to other states or the nation as a whole.

Finally, an education variable was not included in the analysis because most respondents did not respond to this question. However, univariate analysis was conducted to determine what impact this variable may have had on the multivariate results. However, results from the preliminary analysis indicate that the education variable would not have any impact on the results of the analyses.

CONCLUSION

The intention of this study was to determine whether racial minority groups would receive less instructional information recommended by the NAEPP Guidelines than their non-minority counterparts. Race appears to have mixed results, more positive than negative. However, the problem appears not to be with race or ethnicity as originally hypothesized, but rather gender. Therefore, physicians need to be made aware that there is internal bias that is negative towards male asthmatics. They should also be encouraged and commended for the positive impact they are having on children 17 years of age; both 0-5 and 5-17 years old.

TABLES

Table 1—Sample Characteristics

	Distribution of Sample N (%)	Latino N (%)	White N (%)	Black N (%)	Other N (%)
Sample	1,264 (100.0%)	116 (9.2%)	855 (67.6%)	156 (12.3%)	137 (10.8%)
Age					
Under 5	87 (6.9%)	11 (9.5%)	48 (5.6%)	17 (10.9%)	11 (8.0%)
Between 5 and17	423 (33.5%)	48 (41.4%)	260 (30.4%)	66 (42.3%)	49 (35.8%)
Over 18	754 (59.6%)	57 (49.1%)	547 (64.0%)	73 (46.8%)	77 (56.2%)
Gender					
Male	567 (44.9%)	50 (43.1%)	379 (44.3%)	79 (50.6%)	59 (43.1%)
Female	697 (55.1%)	66 (56.9%)	476 (55.7%)	77 (49.3%)	78 (56.9%)
Health Insurance					
Yes	1,076 (85.1%)	88 (75.9%)	737 (86.2%)	140 (89.7%)	111 (81.0%)
No	188 (14.9%)	28 (24.1%)	118 (13.8%)	16 (10.3%)	26 (19.0%)
Income					
Low Income	270 (21.4%)	41 (35.3%)	137 (16.0%)	52 (33.4%)	40 (29.2%)
Middle Income	572 (45.3%)	62 (53.4%)	361 (42.2%)	84 (53.8%)	65 (47.4%)
High Income	422 (33.4%)	13 (11.3%)	357 (41.8%)	20 (12.8%)	32 (23.4%)
Emergency Visit					
Yes	165 (13.1%)	19 (16.4%)	87 (10.2%)	36 (23.0%)	23 (16.8%)
No	1,099 (86.9%)	97 (83.6%)	768 (89.8%)	120 (77.0%)	114 (83.2%)
Asthma Attack					
Yes	629 (49.8%)	46 (39.7%)	301 (35.2%)	61 (39.1%)	53 (38.7%)
No	635 (50.2%)	70 (60.3%)	554 (64.8%)	95 (60.9%)	84 (61.3%)
Inpatient Stay					
Yes	57 (4.5%)	6 (5.2%)	28 (3.3%)	17 (10.9%)	6 (4.4%)
No	1,207 (95.5%)	110 (94.8%)	827 (96.7%)	139 (89.1%)	131 (95.6%)

Table 2: Models 1 and 2

	Model 1			Model 2		
	Change			Plan		
Variables	OR	CI	Sig.	OR	CI	Sig.
Male	0.63	0.47-0.83	**	0.59	0.43-0.83	**
Under 5 years of age	1.80	1.05-3.08	*	4.00	2.24-7.12	***
Between 5 and 17 years of age	1.31	0.98-1.75		1.94	1.41-2.67	***
Low Income	0.81	0.53-1.24		0.70	0.41-1.18	
Middle Income	0.78	0.56-1.07		0.77	0.54-1.10	
Health Insurance	1.29	0.85-1.95		1.17	0.75-1.83	
Race						
Black	1.11	0.88-1.39		0.91	0.69-1.19	
Other	0.83	0.71-0.97	*	0.95	0.81-1.13	
Ethnicity						
Latino	1.10	0.65-1.87		0.87	0.50-1.49	
Health Services due to asthma						
Emergency Room Visit	0.78	0.48-1.27		2.17	1.29-3.63	**
Asthma Attack	0.53	0.40-0.69	***	0.64	0.47-0.87	**
Inpatient Stay	1.35	0.67-2.72		1.68	0.81-3.46	

P < 0.05 *
P < 0.01 **
P < 0.001 ***
NA <5 years of age predicts failure perfectly.

Table 3: Models 3 and 4

	Model 3			Model 4		
	Change			Plan		
Variables	OR	CI	Sig.	OR	CI	Sig.
Male	0.67	0.50-0.89	**	0.65	0.49-0.88	**
Under 5 years of age	NA	NA		1.58	0.79-3.18	
Between 5 and 17 years of age	1.43	1.08-1.89	*	2.48	1.78-3.45	***
Low Income	0.94	0.64-1.47		0.78	0.51-1.20	
Middle Income	1.04	0.75-1.44		0.99	0.69-1.41	
Health Insurance	1.27	0.85-1.90		1.41	0.95-2.09	
Race						
Black	0.81	0.63-1.04		0.91	0.72-1.14	
Other	0.92	0.79-1.07		0.99	0.85-1.15	
Ethnicity						
Latino	0.81	0.47-1.39		0.96	0.53-1.72	
Health Services due to asthma						
Emergency Room Visit	1.83	1.07-3.13	*	1.24	0.74-2.09	
Asthma Attack	0.51	0.39-0.68	***	0.47	0.35-0.62	***
Inpatient Stay	2.11	0.74-5.99		1.38	0.52-3.64	

P < 0.05 *
P < 0.01 **
P < 0.001 ***
NA <5 years of age predicts failure perfectly.

Table 4: Models 5 and 6

	Model 5			Model 6		
	Attack			Inhaler		
Variables	OR	CI	Sig.	OR	CI	Sig.
Male	0.67	0.49-0.91	*	0.68	0.47-0.99	*
Under 5 years of age	2.32	1.00-5.39	*	0.08	0.04-0.15	***
Between 5 and 17 years of age	2.01	1.41-2.87	***	1.03	0.68-1.55	
Low Income	0.74	0.47-1.18		0.75	0.42-1.35	
Middle Income	0.96	0.66-1.40		0.96	0.59-1.56	
Health Insurance	1.37	0.90-2.08		1.66	0.97-2.86	
Race						
Black	0.75	0.59-0.95	**	0.89	0.68-1.17	
Other	0.98	0.83-1.15		0.96	0.78-1.18	
Ethnicity						
Latino	0.64	0.37-1.12		0.64	0.33-1.24	
Health Services due to asthma						
Emergency Room Visit	2.57	1.38-4.79	**	1.30	0.66-2.57	
Asthma Attack	0.36	0.26-0.50	***	0.46	0.32-0.67	***
Inpatient Stay	3.38	1.08-10.5	*	3.77	1.26-11.2	*

P < 0.05 *
P < 0.01 **
P < 0.001 ***
NA <5 years of age predicts failure perfectly.

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