Ann Allergy Asthma Immunol 114 (2015) 485–491

Contents lists available at ScienceDirect

Tailoring interventions: identifying predictors of poor asthma control

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ARTICLE INFO

Article history:
Received for publication November 4, 2014.
Received in revised form March 16, 2015.
Accepted for publication March 17, 2015.

ABSTRACT

Background: Determining the factors that will predict long-term asthma control is essential for improving health outcomes and decreasing the burden on the health care system. Patient-reported outcomes (PROs) on health behaviors can provide valuable information about future asthma control but have rarely been considered in previous analyses.

Objective: To develop statistical models for evaluating the predictors of long-term asthma control using PROs such as scores of the Asthma Control Test and the Asthma Self-Efficacy Scale.

Methods: Of 1,437 individuals contacted, 566 (39%) at baseline and 486 (34%) at follow-up completed the questionnaires, including 4 PROs (Asthma Control Test, Asthma Self-Efficacy Scale, Mini-Asthma Quality of Life Questionnaire, and Beliefs about Medication Questionnaire). Long-term asthma control was evaluated by assessing overuse of rescue medication and emergency department visits. A multivariate logistic generalized estimating equation model was fitted to evaluate the possible effect of the studied factors on asthma control.

Results: The complete case generalized estimating equation analysis included 286 participants who had complete PROs at the 2 evaluation times. After adjusting for socioeconomic status and smoking status, the Mini-Asthma Quality of Life Questionnaire was a significant predictor of asthma exacerbation. For each 1-point increase on the Mini-Asthma Quality of Life Questionnaire, there was a 0.25 decrease in the odds of a patient's asthma getting out of control.

Conclusion: These findings suggest opportunities to decrease the burden on health care by tailoring interventions that combine PROs with other clinical and sociodemographic variables.

Introduction

Despite advances in the development of medications and guidelines for diagnosis and management, asthma remains an important health problem.[1,2] The primary goal of asthma treatment is for patients to maintain disease control, in part by the absence of asthma exacerbations.[3] The large proportion of individuals with poor control contributes to increased usage of health care resources and high health care costs.[4–8] Existing evidence suggests that considerable decreases in morbidity could be achieved by the prevention, early detection, and timely treatment of asthma exacerbations that result from poor disease control and poor lung function.[1,9]

Providing appropriate treatment and improving health outcomes for asthma require a mechanism for identifying patients at risk of developing asthma exacerbations. This means determining the factors associated with poor asthma control. Delineating such predictors can help identify patients in need of further intervention and could help the health care team tailor patient-centered interventions in a way that will maximize the derived benefits for individual patients. Therefore, for this study, the authors defined an algorithm based on the recommendation of Kawasumi et al,[10] which identifies patients who experience serious adverse asthma exacerbations and then receive medical services in an emergency department (ED) or overuse controller medications or fast-acting β-agonists (FABAs) or fill at least 1 prescription for oral steroids.

Most studies that have examined predictors of asthma exacerbations have focused on clinical and laboratory measurements. Studies also have identified patient characteristics, such as

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Disclosure: Authors have nothing to disclose.

Funding: A grant from GlaxoSmithKline supported this work. Dr Ahmed is supported through a career award from the Fonds de la Recherche en Santé du Quebec. Dr Zaihra was supported through a postdoctoral fellowship in respiratory medicine from the Richard and Edith Strauss Foundation.

http://dx.doi.org/10.1016/j.anai.2015.03.026
1081-1206/

socioeconomic status (SES), age, sex, body mass index, and smoking status, as significant predictors of poor asthma control.[11–13] Similarly, patient-reported outcomes (PROs) and previous health care usage have been shown to predict asthma exacerbations 12 months later.[10] Other key predictors of poor asthma control have included poor access to care and poor quality of care that have been related to characteristics of the primary care physician responsible for the patient's asthma management.[13,14]

Less attention has been devoted to evaluating the influence of patient health behaviors on asthma control, which are potentially modifiable patient characteristics. There is increasing recognition that greater attention to patient behaviors and their influence on future outcomes will likely play an important role in improving health outcomes for asthma.[15–18] The influence of personality traits and beliefs about medicines on adherence to asthma treatment have been recognized as an important factor in predicting asthma exacerbations.[19] The relation among self-management, self-efficacy and improved health behaviors and clinical outcomes also has been shown in other chronic conditions.[20–24] These included improved ability to manage pain, less depression, increased frequency of exercise, using medicine as prescribed, managing stress, and following a recommended diet.

Integration of the clinical markers of asthma control with PROs has been identified as crucial for evaluating the risk of asthma exacerbations in patients, which in turn helps in planning patient-specific interventions.[25,26] The purpose of this study was to evaluate and compare the independent predictive ability of PROs, including self-perceived asthma control, self-efficacy, and perception about quality of life and beliefs about medications, for the risk of asthma exacerbations. The authors hypothesized that all these would be significant predictors. A secondary objective was to evaluate the interaction between self-efficacy and self-perceived asthma control because the authors hypothesized that self-reported symptoms in those more confident in managing their asthma symptoms would have significantly fewer future asthma exacerbations.

Methods

Study Participants and Procedure

Participants for this study were identified through primary care physicians participating in the Medical Office of the 21st Century (MOXXI) study[27] who were in full-time fee-for-service practices in a large metropolitan area. Primary care physicians were identified by professional association master lists and contacted by letter and telephone to determine their interest in participating in the MOXXI project. Patients of these physicians were identified from the Quebec provincial health database, La Régie de l'assurance maladie du Québec (RAMQ), by medical service claims and physician and beneficiary files. Individuals with probable asthma were identified through the MOXXI system using information on written and dispensed prescriptions and medical services claims diagnostic codes based on algorithms validated in prior research.[28] Participants at least 18 years of age who consented to the MOXXI project and who had a confirmed diagnosis of asthma were called by a member of the research team and invited to participate in the study.

The institutional review board of McGill University (Montreal, Quebec, Canada) approved this study.

Measurements

Patient-reported outcomes

The following patient-reported questionnaires were completed over the phone at 2 time points a year apart, namely at baseline and at follow-up.

Asthma Self Efficacy Scale. The Asthma Self Efficacy Scale measures confidence in managing situations that precipitate asthma. The ASES asks patients to rate their confidence in avoiding an asthma attack in different situations encompassing activities, interactions with others, and feelings or emotions. The ASES is based on basic self-efficacy theories that state that patients' perceptions of their own capabilities will affect their motivations, coping behaviors, and ability to maintain certain behaviors.[29] Previous studies have supported the validity and reliability of the ASES.[30,31]

Asthma Control Test. The Asthma Control Test (ACT), a 5-point patient-administered survey for assessing asthma control, has emerged as a simple and quick tool for evaluating patient-reported asthma control.[32,33] In addition to asking about asthma symptoms during the past 4 weeks, the ACT asks patients to rate their overall level of asthma control. The reliability, validity, and responsiveness of the ACT have been tested in a sample of patients new to the care of an asthma specialist. The ACT has been found to be internally consistent (Cronbach $\alpha = 0.85$)[33] and to have moderate test and retest reliability (intra-cluster correlation = 0.77).

Beliefs about Medicines Questionnaire. Patient's beliefs about their medicines were evaluated using the Beliefs about Medicines Questionnaire (BMQ).[34,35] The BMQ is comprised of 2 5-item Likert scales assessing patients' beliefs about the "necessity" of prescribed medication for controlling their illness and their "concerns" about the potential adverse consequences of taking it. The necessity concern differential score was calculated by subtracting the specific concerns scale from the specific necessity scale (range −20 to 20).[19] A positive differential score indicates that the patient has stronger beliefs in the necessity of medications compared with concerns and vice versa in the case of a negative score. Emilsson et al[19] found the 2 subscales of the BMQ to be internally consistent with the Cronbach α for the specific necessity and concern scales (0.87 and 0.78, respectively).

Mini-Asthma Quality of Life Questionnaire. The Mini-Asthma Quality of Life Questionnaire (MAQLQ) is a shorter but more efficient version of the original Asthma Quality of Life Questionnaire (AQLQ). It was developed and fully validated by Juniper et al.[35] The MAQLQ has 15 questions in the same domains as the original AQLQ (symptoms, activities, emotions, and environment). A score can be derived for each domain and for an overall composite score. Items are scored on a scale from 1 to 7, with a higher score reflecting better status.

Patient's sociodemographic characteristics

Sex, age, and indicators of SES (eg, household income) were obtained from the RAMQ. Age was categorized into 3 groups (18–39, 40–59, and ≥60 years old). Average household income obtained by each subject's residential postal code was used as an indicator of income data and the corresponding SES of the study participant. Furthermore, it was divided into 3 income groups: low (income ≤$31,753), middle (income $31,753–$80,000) and high (>$80,000). Thus, subjects were allocated to 1 of 3 categories of SES based on the average household income of residents in their postal code area.[36]

Comorbidity conditions

Patients' smoking status during the past year also was evaluated by telephone interview. Subjects were considered smokers if they smoked at least 1 cigarette per day over a 1-year period before recruitment. In accord with the study by Kawasumi et al,[10] 2 categories of medical conditions, as factors that can influence asthma presentation and management, namely "somatic complaints and neurotic disorder" and "cardiac-related conditions," were created.

Asthma control

The number of doses of FABAs dispensed was based on records of dispensed prescriptions in the prescription claims file of the