Patterns of asthma control: A 3-year analysis of patient claims

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Background: The goal of asthma therapy is to maintain consistent control.

Objective: We sought to examine the patterns of asthma control recorded over 3 years using administrative claims and resource utilization definition.

Methods: We performed a retrospective observational study with a nationally representative patient-level database containing pharmacy and medical claims. Patients with asthma (International Classification of Diseases, Ninth Revision–Clinical Modification code 493.xx), patients undergoing treatment with at least 1 asthma medication, and patients with 36 months of continuous claims coverage during the calendar years 1996 through 2002 were identified. A total of 63,324 patients were included in the study. Patients were classified as having controlled asthma in year 1 if they had less than 4 claims for a short-acting β_2-agonist, no claims for an OCS, and no asthma-related emergency department visits or hospitalizations. Patients were then followed over the next 8 quarters (2 years) to observe whether control was maintained. Control during a quarter was defined with the same criteria, except the reliever threshold was adjusted to 2 or more claims per quarter.

Results: Thirty-nine thousand ninety-five (57%) patients were defined as having controlled asthma during year 1. During the 2-year follow-up period, a range of 10% to 14% of these patients with controlled asthma met the criteria of uncontrolled asthma during any given quarter. Overall, 46,227 (73%) patients identified met the criteria for uncontrolled asthma at least once during the 3-year period.

Conclusions: This study demonstrates that almost 75% of asthmatic patients experience an uncontrolled asthma episode 1 or more times over a 3-year period. Furthermore, we found that significant fluctuations in asthma control exist, even in patients with prior controlled asthma. (J Allergy Clin Immunol 2005;115:935-9.)

Key words: *Asthma, asthma control, administrative claims, asthma variability, controller medications*

Asthma is a chronic respiratory disease characterized by variable airflow obstruction.[1] The patterns of symptoms and exacerbations are a function of exposure to common triggers, including allergens, viral respiratory infections, exercise, and airway irritants; use of specific controller medications; and underlying characteristics of the patient's disease. The time of year[2] and time of day[3] might cause further changes in asthma control. Finally, individual perception of asthma control differs and might be modified by activity level or the use of reliever medication.

Asthma symptoms and exacerbations are associated with significant morbidity. More than 14.5 million workdays and 14 million schooldays are missed because of asthma.[4] There are nearly 2 million emergency department (ED) events and 500,000 hospitalizations for this disease annually. In addition, asthma adversely affects quality of life.[5] The changing pattern of asthma disease control reflects both the exposure to triggers and adherence with controller medications. The clinical expression of the disease is altered by multiple factors either to enhance or diminish control and might contribute to asthma being more commonly a persistent rather than an intermittent disease.[6] The changes noted in the lung biopsy specimens of children[7] and adults with asthma, even when the disease is in clinical remission,[8] add evidence to the chronic and persistent nature of the disease.

The purpose of this analysis was to characterize changes in asthma control over a 36-month period for managed care enrollees from a number of plans distributed across the United States. Control was assessed on a resource utilization definition of asthma exacerbations, including asthma-related ED visits, asthma-related hospitalizations, oral corticosteroid (OCS) use, or increased dispensing of short-acting β_2-agonists (SABAs). Asthma-related utilization was analyzed over 36 months to determine the pattern of asthma control over time.

METHODS

This was a retrospective observational study using administrative claims data from multiple managed care plans distributed across the

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Abbreviations used
ED: Emergency department
LABA: Long-acting β-agonist
LTRA: Leukotriene receptor antagonist
OCS: Oral corticosteroid
SABA: Short-acting β_2-agonist

United States. Patient-level administrative medical and pharmacy data were captured from the PharMetrics Anonymous Patient-Centric Database (Waterton, Mass), which contains administrative claims from more than 40 managed care plans across the United States and encompasses inpatient and outpatient medical care linked to prescription claims and ancillary charges. Medical utilization in the database is grouped into episodes of care on the basis of Symmetry Health Data Systems' Episode Treatment Group analytic methodology.[9] Claims are grouped into episodes on the basis of diagnosis, with clinically validated algorithms to ensure correct matching of drug and medical claims and to clinically define the appropriate initiation and termination dates of each type of episode. The database is Health Insurance Portability and Accountability Act of 1996 compliant and has encrypted unique patient identifiers to integrate pharmacy and medical claims.

All data are collected from claims submitted by providers (ie, physicians, pharmacies, and hospitals) to payers (ie, managed care organizations) to receive payment for services rendered. All claims undergo an initial check by the providers and payers to ensure correct coding of elements related to billing, such as diagnosis codes for medical care and national drug codes for prescription claims. In addition, before inclusion in the Patient-Centric Database, the data undergo a further level of quality-validity check, ensuring that all claims are checked for double billing–nonadjudicated claims, valid age range, and sex-specific procedures for inappropriate sex. Studies with these data have been published previously in peer-reviewed journals, and these data are currently used by the contributing plans for benchmarking and research purposes.[10-12]

Sample selection

The study population was identified from the database for the period January 1, 1996, to December 31, 2002. Subjects aged 5 to 55 years with asthma were identified by using International Classification of Diseases, Ninth Revision-Clinical Modification codes 493.0 through 493.9. To be qualified for the analysis, patients must have been continuously eligible for benefits for 36 months (inclusive of the date of the asthma diagnosis), with evidence of active asthma management in each of the 3 years determined by at least one medical claim for asthma and/or a prescription claim for SABAs, long-acting β-agonists (LABAs), inhaled corticosteroids, or leukotriene receptor antagonists (LTRAs) in each year of observation.

Collection of data

Utilization data were collected and analyzed to assess medical and pharmaceutical utilization, ED visits, and hospitalizations. All medical and pharmacy claims were captured for each subject over the 36-month study period. Patients were classified in year 1 as not in control if they had 4 or more SABA prescription claims, 1 or more OCS prescription claims, 1 or more asthma-related ED visits, or 1 or more asthma-related hospitalizations at any time during the first year. Years 2 and 3 of the follow-up were divided into 8 consecutive quarters (3-month time periods). An uncontrolled period was defined as a patient meeting any of the following: 2 or more SABA prescription claims, 1 or more OCS prescription claims, 1 or more asthma-related ED visits, or asthma-related hospitalization occurring anytime during a given quarter. Patients could have up to 8 uncontrolled episodes in this 2-year follow-up period. This article reports on a population of subjects who were followed longitudinally. Descriptive analysis is presented.

RESULTS

A total of 63,324 patients were identified who had a diagnosis of asthma and met the 36-month enrollment-utilization criteria. Table I provides an overview of the sample: 26,740 (42.2%) were 5 to 17 years of age, and 55.3% were female. Comorbid diagnoses are comparable between the controlled and uncontrolled cohorts, with the exception of a higher rate of acute bronchitis diagnoses in the patients with uncontrolled asthma. More than one third of all patients had at least one episode (medical claim) of acute respiratory infection during this 3-year study.

During year 1, 27,229 (43%) patients met the criteria for uncontrolled asthma. If the criteria for uncontrolled asthma in year 1 were adjusted to the definitions applied in years 2 and 3, this number would increase to 46.2%. Furthermore, if the criteria were based on only ED, hospitalization, or OCS use, the number would decrease to 19,891 (31%). The proportion who met the criteria for uncontrolled asthma was not significantly different across categories of age (41% to 43%) and sex; approximately 42% of each cohort met at least one of the criteria for uncontrolled disease (Fig 1). The uncontrolled cohort in year 1 was at higher risk for remaining uncontrolled in subsequent time periods; 34.0% to 41.7% met the criteria for a subsequent period of uncontrolled asthma in one or more of the subsequent 8 quarters. However, a significant proportion of the originally controlled cohort in year 1 was also at risk of becoming uncontrolled in later time periods. During years 2 and 3, 53% of the population with controlled asthma (n = 36,662) experienced uncontrolled asthma. In the 2 follow-up years, 10.6% to 13.8% of these subjects experienced an uncontrolled episode in any 3-month period. In general, the proportion of persons identified with uncontrolled asthma in both cohorts was relatively constant over the 2-year follow-up, with a small seasonal inflection noted in the fourth quarter of each year (Fig 2).

Table II provides a view of the individual claims criteria used to define uncontrolled asthma in years 2 and 3. For the patients in the uncontrolled cohort, approximately 3-fold more subjects continued to meet the criteria for uncontrolled asthma in years 2 and 3, predominantly because of persistent use of SABAs when compared with the year 1 controlled cohort. The OCS-ED-hospital criteria were met in the former group about 21% to 26% of the time. In contrast, in the controlled cohort a higher proportion, approximately 34% to 46% of subjects, had uncontrolled asthma in years 2 and 3 because of ED visit–hospitalization or OCS utilization. During the 3 observational years, 73% of the total study population met at least one criteria for uncontrolled asthma (Fig 3).