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Asthma controller delay and recurrence risk after an emergency department visit or hospitalization

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Summary
Background: Patients who have asthma-related emergency department (ED) visits or hospitalizations are at risk for recurrent exacerbation events. Our objectives were to assess whether receiving a controller medication at discharge affects risk of recurrence and whether delaying controller initiation alters this risk.
Methods: Asthma patients with an ED visit or inpatient (IP) stay who received a controller dispensing within 6 months were identified from healthcare claims. Cox proportional hazards of the time to first recurrence of an asthma-related ED or IP visit in the 6-month period following the initial event were constructed, with time following discharge without controller medication as the primary predictor.
Results: A total of 6139 patients met inclusion criteria, 78% with an ED visit and 22% with an IP visit; 15% had a recurrence within 6 months. The adjusted hazard ratio (HR) associated with not having controller medication at discharge was 1.79 (95% confidence interval [CI], 1.42–2.25). The controller-by-time interaction was significant ($P < 0.001$), with hazard rising as time-to-controller initiation increased. Delaying initiation by 1 day approximately tripled the risk (HR 2.95; 95%CI 1.48–5.88). Sensitivity analyses, including accounting for controller fills prior to the index event, did not substantially alter these results.
Conclusions: This observational study shows that the risk of a recurrent asthma-related ED visit or IP stay increased as the time to initiate a controller increased. Our findings support the

Abbreviations: CI, Confidence interval; COPD, Chronic obstructive pulmonary disease; ED, Emergency department; HR, Hazard ratio; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICS, Inhaled corticosteroid; IP, Inpatient; LABA, Long-acting beta-agonist; OCS, Oral corticosteroid; SABA, Short-acting beta-agonist; SD, Standard deviation.

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importance of early controller initiation following an asthma-related ED or IP visit in reducing risk of recurrence.

Introduction

Asthma exacerbations are acute episodes of symptom worsening. Mild exacerbations are typically managed with quick-relief medications at home,[1] but more severe exacerbations may necessitate a physician office visit, emergency department (ED) visit, or hospitalization.[1,2] United States national survey data indicate that patients had approximately 1.75 million asthma-related ED visits and 456,000 hospitalizations in 2007.[3]

Asthma patients who have ED visits or hospitalizations due to exacerbations are at risk for recurrent events.[4–6] Therefore, practice guidelines recommend that physicians provide a discharge plan including measures to prevent future exacerbations as well as to address the current exacerbation.[1,2] ED and hospital physicians should consider prescribing a long-term controller medication at discharge, such as an inhaled corticosteroid (ICS), for patients who do not currently use a controller, in addition to continued short-term treatment with a short-acting beta-agonist (SABA) and systemic corticosteroids.[1,2,7]

Controller use after an acute event has been shown to help prevent repeat asthma-related ED visits and hospitalizations.[8–12] Sin et al.[10] showed that patients who used an ICS after discharge from asthma-related ED visits had 45% fewer subsequent ED visits over follow-up of at least 2 years. Rowe et al.[12] reported that the proportion of patients that had healthcare visits in the 3 weeks following ED treatment for an acute asthma event was lower for those who were randomly assigned to receive budesonide versus placebo upon discharge. In other analyses, children who used inhaled budesonide within 30 days of discharge[9] and patients who used inhaled anti-inflammatory medication within 100 days of discharge[11] had reduced risk of recurrent ED visits or hospitalizations over the following year. These previous controlled trials and observational studies examined the effect of starting controller medication at discharge or within a specific timeframe, but did not assess the effect of delay.

To further investigate the impact of initiating a controller after an acute asthma event, we assessed the association between receiving controller medication at discharge and risk of recurrent events; and the change in risk if controller initiation is delayed.

Methods

Data sources and patient sample

Two healthcare claims databases with de-identified medical and pharmacy data were used in this retrospective analysis: the Life Sciences Research Database and the IMPACT databases affiliated with OptumInsight; only OptumInsight data were used for patients appearing in both data sources. Administrative claims data in the Life Sciences Research Database includes medical claims, pharmacy claims, and eligibility information from a large national US health plan. The individuals covered by this health plan are geographically diverse across the US, with greatest representation in the South and Midwest US census regions. The plan provides fully insured coverage for professional (e.g., physician), facility (e.g., hospital), and outpatient prescription medication services. The IMPACT database contains similar data elements and geographic coverage, but includes data from over 46 health plans.

In order to focus on patients with persistent asthma (i.e., patients who would be candidates for a controller at ED/hospital discharge), commercial and Medicaid health plan members with evidence of an asthma-related ED visit or hospitalization followed by a controller fill were identified (Fig. 1). Specifically, patients with ED or inpatient claims with asthma diagnosis (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] 493.xx) in a primary diagnosis field or asthma diagnosis in a secondary field and respiratory diagnosis (466.xx, 48x.xx, or 49x.xx [except asthma]) in a primary field during the identification period 01 Jan 2004–31 Oct 2008 (Life Sciences), or 01 Jan 2005–31 Oct 2008 (IMPACT) were identified. The discharge date of the earliest occurring ED visit or hospitalization was defined as the index date.

A controller fill in the 6 months following the index date was required. Analysis was focused on patients whose first controller was an ICS, leukotriene modifier, or ICS/long-acting beta-agonist (LABA) combination[13] because only approximately 2% of patients with a qualifying index event filled a different type of controller first in the follow-up period. "On discharge" fills occurred 0 days post-index (discharge date) or they could be 1 day prior to discharge for patients with hospitalization index events.

In addition to the index event and follow-up controller requirements, patients were required to be at least 4 years of age and to be continuously enrolled in the health plan for the 12 months prior to the index date (baseline period) and 6 months following the index date. They were also required to have an asthma diagnosis in a primary or secondary diagnosis field and evidence of asthma treatment in the baseline period. Asthma treatment could have been quick-relief (SABAs, oral corticosteroids [OCS]) or controller medications (ICS, LABA, ICS/LABA combination, mast cell stabilizers, leukotriene modifiers, methylxanthines, immunomodulator). However, patients with claims history indicating controller pharmacy dispensing or administration within 6 months prior to the index event were excluded. This criterion was intended to reduce the possible influence of patients who might have been able to use controller