Original Article

Level of Asthma Controller Therapy Before Admission to the Hospital

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What is already known about this topic? Choice of controller therapy and adherence to treatment affect the risk of future asthma severe exacerbations leading to hospitalization.

What does this article add to our knowledge? Before an asthma-related hospitalization, more than 60% of patients received little controller therapy and 4% were exposed to unbalanced use of long-acting beta agonists relative to inhaled corticosteroids.

How does this study impact current management guidelines? A significant part of asthma-related hospitalizations could be prevented with improved management.

BACKGROUND: In asthma, choice of controller therapy and adherence to treatment can affect the risk of future severe exacerbations leading to hospitalization.
OBJECTIVE: Our objective was to characterize treatment dispensation profiles before hospital admission for asthma.
METHODS: Using a 1/97th random sample of the national French claims data, patients with asthma aged 6 to 40 years were identified between 2006 and 2014. Patients with subsequent asthma-related hospitalization were selected. On the basis of controller therapy dispensed in the 12 months before admission, treatment profiles were categorized into clusters, using Ward's minimum-variance hierarchical clustering method.
RESULTS: Of 17,846 patients with asthma, we identified 275 patients (1.5%) with an asthma-related hospitalization. Three distinct clusters were identified. The first cluster (63.6%) included patients with few dispensations of any controller medication (<1 unit). The second cluster (32.4%) consisted of patients with frequent dispensations of long-acting beta agonists (LABAs)/inhaled corticosteroids (ICS) in fixed-dose combinations. The third cluster (4%) comprised patients receiving free combinations of ICS and LABAs, with more dispensations of LABAs than of ICS.
CONCLUSIONS: In France, before an asthma-related hospitalization, more than 60% of patients received little controller therapy and 4% were exposed to higher dispensation of LABAs than of ICS. These results indicate that a large fraction of asthma-related hospitalizations can potentially be prevented with better pharmacotherapy. **(J Allergy Clin Immunol Pract 2016;■:■-■)**

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This observational study was conducted on anonymized claims data (General Sample of Beneficiaries), and the National Informatics and Liberty Committee has delivered an overall authorization to use General Sample of Beneficiaries data for research purposes. This study was performed after approval by the Institute of Health Data (Institut des Données de Santé, approval 94, September 9, 2014). Participants' consent was not obtained, but the presented data are anonymized and risk of identification is low.
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Abbreviations used
COPD- chronic obstructive pulmonary disease
EGB- General Sample of Beneficiaries
FDC- fixed-dose combination
GPs- general practitioners
ICD-10- International Classification of Diseases, 10th Revision
ICS- inhaled corticosteroids
LABAs- long-acting beta agonists
LTD- long-term disease
LTRAs- leukotriene receptor antagonists
OCs- oral corticosteroids
SABAs- short-acting beta agonists
SNIIR-AM- Système National d'Information Inter-Régimes de l'Assurance Maladie

Asthma remains a pivotal public health issue mainly due to inappropriate use of controllers,[1] leading to poor asthma control,[2,3] deteriorated quality of life,[4] and high costs for individuals and society due to medical resource utilization[5] and loss of productivity.[6]

Preventable factors have been identified in most asthma exacerbations and deaths.[7] In addition, despite disseminated guidelines for asthma management[8,9] and intensive research on asthma management in primary care,[10] the age-standardized prevalence rate of uncontrolled asthma, as well as asthma-related morbidity and mortality, remains high throughout Europe in all age categories.[11] One reason might be the inappropriate prescribing and use of asthma medication. Asthma-related hospitalizations reflect severe exacerbation,[12] due in part to inappropriate use of asthma controllers,[13,14] and they account for a noticeable part of medical resource utilization.[5,15]

The link between the use of inhaled corticosteroids (ICS) and the occurrence of asthma-related hospitalization has been clearly established.[16-18] *A contrario*, the part of hospital admissions for asthma that is due to inappropriate or nonuse of ICS, is little documented. Investigating health care utilization patterns before asthma-related hospitalizations is essential for improving the quality of asthma care services and preventing new occurrences of severe exacerbation. To provide effective care, services may need tailoring to different controller use profiles.

The General Sample of Beneficiaries (EGB; 1/97th random sample of national primary and secondary care claims data) offers a snapshot of disease management in real-life conditions, for example, from recorded drug dispensations and outcomes such as hospital admissions due to severe exacerbations.[19-21] The aim of the present study was to use these data to investigate the patterns of use of asthma medication, so as to distinguish one or more therapeutic profiles of patients who end up being admitted to hospitals.

METHODS

This was a population-based study of a cohort of patients identified from the EGB database, a 1/97th representative random sample of the Système national d'information inter-régimes de l'Assurance maladie (SNIIR-AM),[19-21] a French nationwide population-based record of individual and anonymized data on all reimbursements for health care utilization, including therapy and outpatient medical and nursing care. No direct information on the medical indication is linked with each reimbursement, but the SNIIR-AM includes information on long-term disease (LTD) status coded in International Classification of Diseases, 10th Revision (ICD-10) codes. LTD status allows patients to receive treatment for severe and costly conditions without out-of-pocket payment. SNIIR-AM also contains information on free-access-to-care status, which enables patients of lower socioeconomic status to receive free medical care. Information from the SNIIR-AM database and medical information from the French hospital discharge database (Programme de Médicalisation des Systèmes d'Information) about all patients admitted to hospital in France, including discharge diagnoses coded in ICD-10 codes, medical procedures, and French diagnosis-related groups, are cross-referenced.

This observational study was conducted on anonymized data, and the National Informatics and Liberty Committee has delivered an overall authorization to use EGB data for research purposes. This study was performed after approval by the French Institute for Health Data (Institut des Données de Santé, approval no. 94, September 9, 2014).

Study population

Subjects were eligible for inclusion in the cohort if, between 2006 and 2014, they filled at least 3 dispensations for asthma-related medications (all R03 Anatomical Therapeutic Chemical codes except R03DX05, R03AC18, R03BB04, R03BB01, R03AK03, and R03AK04) and if the patients were aged between 6 and 40 years at the third dispensation. These drugs were excluded because they were used for more severe asthma (omalizumab) managed by secondary care physicians, or not used for asthma in France at the time of the study (indacaterol, tiotropium, ipratropium), or not available in France (reproterol or salbutamol and cromoglicate) within any period of 12 successive months. Patients who suffered from chronic obstructive pulmonary disease were excluded on the basis of LTD status and/or hospitalizations (ICD-10 codes J41, J42, J44, and J961), or on the dispensation of tiotropium bromide (R03BB04 Anatomical Therapeutic Chemical code). Likewise, patients with cystic fibrosis were excluded (E84 ICD-10 code). So were patients receiving omalizumab (R03DX05 Anatomical Therapeutic Chemical code) because their asthma is mostly managed in secondary care by respiratory physicians. For each patient, we defined the entry date as the date of the third dispensation of respiratory medications that resulted in case identification. Within the cohort, we selected patients who experienced asthma-related hospitalization, defined as a hospital discharge with asthma (J45 and J46 ICD-10 codes) as primary or related reason for hospitalization. The date of the first asthma-related hospitalization was defined as the index date. In line with similar studies,[16,22] we requested at least a 12-month baseline period between the entry date and the index date, during which patients with asthma-related hospitalization were excluded to ensure that there were sufficient longitudinal data to assess drugs received before the index date. If a patient had more than 1 asthma-related hospitalization, only the first one since the entry date was used for the analyses.

ANALYSIS

All analyses were performed in SAS V.9.3 (SAS Institute, Carry, NC). Subjects were categorized by an unsupervised classification algorithm that classified patients on the basis of controller therapy recorded, that is, ICS in a single canister, long-acting beta agonists (LABAs) in a single canister, or fixed-dose combinations (FDCs) of LABAs and ICS. Drug use was assessed in the 12 months before the index date, even if patients had more than 12 months between entry and index dates.