Original Article

# A Multicenter Observational Study of US Adults with Acute Asthma: Who Are the Frequent Users of the Emergency Department?

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***What is already known about this topic?*** Prior studies demonstrated that many patients frequently visited the emergency department (ED) for acute asthma. Despite the substantial burden of these asthma-related ED visits, there have been no recent multicenter efforts to characterize this high-risk population.

***What does this article add to our knowledge?*** This multicenter study found that half of the patients had ≥1 ED visits for acute asthma in the past year and that only a small subset of these frequent users received currently recommended long-term control therapy.

***How does this study impact current management guidelines?*** Knowledge translation initiatives and quality improvement efforts in chronic asthma management are needed to decrease the observed care gap (and individual and/or societal burden) of those who frequently use the ED for their acute asthma care.

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Conflicts of interest: A. F. Sullivan has received research support from Novartis. C. Fee has received research support from the General Hospital Corporation (Massachusetts General Hospital)/Novartis; and has provided legal support on 4 medical legal cases over the past 2 years. S. J. Turner is employed by Novartis. S. Massaro is employed by, has received travel support from, and has stock/stock options in Novartis. C. A. Camargo has received research support from Novartis and Teva; has received consultancy fees from GlaxoSmithKline, Merck, Novartis Pharmaceuticals USA, and Teva. The rest of the authors declare that they have no relevant conflicts of interest.

Study Collaborators

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*Abbreviations used*
*ED- Emergency department*
*ICU- Intensive care unit*
*IQR- interquartile range*
*OR- odds ratio*
*PEF- peak expiratory flow*

**BACKGROUND: Despite the substantial burden of asthma-related emergency department (ED) visits, there have been no recent multicenter efforts to characterize this high-risk population.**
**OBJECTIVE: We aimed to characterize patients with asthma according to their frequency of ED visits and to identify factors associated with frequent ED visits.**
**METHODS: A multicenter chart review study of 48 EDs across 23 US states. We identified ED patients ages 18 to 54 years with acute asthma during 2011 and 2012. Primary outcome was frequency of ED visits for acute asthma in the past year, excluding the index ED visit.**
**RESULTS: Of the 1890 enrolled patients, 863 patients (46%) had 1 or more (frequent) ED visits in the past year. Specifically, 28% had 1 to 2 visits, 11% had 3 to 5 visits, and 7% had 6 or more visits. Among frequent ED users, guideline-recommended management was suboptimal. For example, of patients with 6 or more ED visits, 85% lacked evidence of prior evaluation by an asthma specialist, and 43% were not treated with inhaled corticosteroids. In a multivariable model, significant predictors of frequent ED visits were public insurance, no insurance, and markers for chronic asthma severity (all $P < .05$). Stronger associations were found among those with a higher frequency of asthma-related ED visits (eg, 6 or more ED visits).**
**CONCLUSION: This multicenter study of US adults with acute asthma demonstrated many frequent ED users and suboptimal preventive management in this high-risk population. Future reductions in asthma morbidity and associated health care utilization will require continued efforts to bridge these major gaps in asthma care.** **© 2014 American Academy of Allergy, Asthma & Immunology** **(J Allergy Clin Immunol Pract 2014;2:733-40)**

***Key words:*** *Acute asthma; Emergency department; Epidemiology exacerbation; Health care utilization; Racial disparity; Socioeconomic status*

Asthma prevalence remains at historically high levels, which affected 26 million Americans in 2011.[1] Asthma continues to cause a substantial health burden, with an estimated economic cost of $56 billion annually.[2] Acute asthma contributes to a significant proportion of this burden and accounts for 440,000 hospitalizations and 1.8 million emergency department (ED) visits annually.[3] Asthma-related ED visits offer an important measure of the morbidity associated with asthma.[4] Because 80% to 90% of ED patients with acute asthma are discharged home,[5] these patients provide a unique perspective of acute morbidity, a perspective that complements hospitalization and mortality statistics.[4] In addition, because most ED visits for acute asthma are theoretically preventable through high-quality longitudinal management,[6] multiple ED visits reflect failure of less costly and more prevention-oriented outpatient care.[7] Our previous multicenter study through the late 1990s found that 73% of ED patients with acute asthma reported at least 1 prior ED visit for acute asthma in the previous year (ie, they had "frequent" ED visits).[7] By contrast, between 2009 and 2010, analysis of claims data from California and Florida found that 26% of patients were frequent ED users.[5] Although the decreasing incidence of frequent ED visits is encouraging, inferences from the claims data are somewhat limited due to potential error in data collection and coding, and inevitable questions about generalizability (ie, 2 states). Despite the substantial burden of asthma-related ED visits, there have been no recent multicenter efforts to characterize this high-risk population. To address this knowledge gap, we conducted a multicenter study in 48 US EDs to characterize the patients with acute asthma who frequently visit the ED and to identify factors associated with frequent ED visits in this high-risk population.

## METHODS

### Study design and setting

We performed a multicenter chart review study to characterize adult ED patients with acute asthma as part of the Multicenter Airway Research Collaboration. This study was coordinated by the Emergency Medicine Network, a collaboration with >225 participating EDs.[8] We recruited EDs by inviting Emergency Medicine Network sites that had participated in the earlier Multicenter Airway Research Collaboration studies that evaluated patients with frequent ED visits for asthma during 1996 to 2001.[7] A total of 48 academic and community EDs across 23 US states completed the study (see Table E1 and Figure E1 in this article's Online Repository at www.jaci-inpractice.org). All the patients were managed at the discretion of the treating physician. The institutional review board of each participating center approved the study.

### Selection of participants

By using the International Classification of Diseases, Ninth Revision, Clinical Modification code 493.xx,[9] each site identified all visits with a primary ED or hospital discharge diagnosis of asthma during a 12-month period, between January 1, 2011, to December 31, 2012 (ie, they used a 24-month window from which to select the 12-month study period). Inclusion criteria were ED visits made by adult patients ages 18 to 54 years and a history of physician-diagnosed asthma before the index ED visit. We excluded the following: (1) ED visits made by patients with a history of physician-diagnosed chronic obstructive pulmonary disease, chronic bronchitis, or emphysema; (2) transfer visits; (3) repeated visits during the 12-month study period by the same individual; or (4) visits not prompted largely by acute asthma in the judgment of the site investigators. In the case of repeated visits, we only included the first randomly sampled ED visit and defined it as the index ED visit. These criteria were the same as in our earlier research on this topic.[7]

### Methods of measurement

Onsite chart abstractors reviewed 40 ED charts randomly selected by the Emergency Medicine Network Coordinating Center at Massachusetts General Hospital. Two hospitals each examined an additional 40 randomly selected charts to obtain a total of 2000 charts. All the reviewers were trained with a 1-hour lecture and then the abstractors completed 2 practice charts,

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