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Predictors of frequent emergency department use among patients with psychiatric illness☆

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ABSTRACT

Objective: To identify the patient characteristics associated with frequent emergency department (ED) use and develop a tool to predict risk for returning in the next month.
Method: Prospective cohort study of 863 adults with psychiatric illness presenting to one of four general hospital EDs. ED visits and relevant clinical information in the year before and one month after the index visit were abstracted.
Results: One hundred sixty-seven of the patients (19%) were considered frequent users. Characteristics associated with frequent user status were homelessness, cocaine-positive toxicology screen, Medicare insurance, a personality disorder and hepatobiliary disease (all $P<.05$). Patients scoring in the highest risk category had nearly five times the odds of returning to the ED in the month subsequent to the index visit.
Conclusions: Psychiatric patients with frequent ED use are a heterogeneous group, but there are specific target conditions which, if confirmed, may facilitate reduced ED use and be replaced by more appropriate treatment.
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1. Introduction

Overcrowding within our Nation's emergency departments (EDs) is a major public health concern, as crowded EDs [and associated long lengths of stay (LOS)] lead to high degree of patient and provider stress, greater risk for adverse events, high costs and lower levels of patient satisfaction [1,2]. These issues appear to be even more significant for patients with mental health conditions, with LOS commonly over eight hours, and not infrequently longer than a full day [3].

All three components of ED patient flow (input, throughput and output) have been implicated in the long ED LOS experienced by psychiatric patients [4]. Greater demand for ED services (input) coupled with a reduction in the number of available inpatient psychiatric beds (output) have resulted in a high congestion queue with slow outflow (throughput) [5–8]. Patient characteristics such as homelessness, public insurance, behavioral loss of control requiring restraints or sitters, and recent substance use have been associated with prolonged ED stays [1,2].

Some patients account for a disproportionate volume of ED activity by making frequent visits and therefore may contribute to the phenomenon of ED overcrowding [9]. The definition of frequent ED usage is varied; a number of studies have used a cut-off of four or more ED visits within a 12-month period [10–13]. Several factors have been identified as being predictive of being a frequent ED user, including low socioeconomic status, public insurance and poor physical health. Mental health and substance abuse conditions have also been recognized as key risk factors for frequent use of psychiatric emergency services [14,15]. Despite a fairly robust literature, most prior work in this area has focused on a single ED, or utilization of psychiatric emergency services, or relied on large administrative databases, making specific application to broader networks of care more difficult [11,14,16–25]. In addition, relatively few studies have attempted to use the identified risk factors to prospectively predict future general hospital ED use.

The purpose of this study was to identify risk factors associated with frequent ED use in a sample of 863 patients with psychiatric conditions seen across four general hospitals in the Greater Boston area by merging administratively available data on ED utilization with detailed chart review. These data were used to create a simple predictive tool for future ED use which was then tested on a subsequent one-month sample from these hospitals.

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2. Methods

As part of a cohort study of 1000 adults with psychiatric illness who presented to the ED of one of five study hospitals, a subset of patients (N=863) presenting to four of the five hospitals was available for this analysis [26]. The fifth hospital was not included in this study because it initiated a pilot case management program to address the frequent ED visitor once data collection for the parent study was complete [27]. Among the four hospitals included in this study, two were academic medical centers with Level One Trauma Centers verified by the American College of Surgeons, and two were community hospitals. The four hospitals were part of a not for profit system in Massachusetts.

Consecutive, eligible cases presenting for care from June 2008 to May 2009 were enrolled. Cases were eligible for inclusion if the patients were adults, aged 18 years or older, and assessed to have a primary psychiatric problem or complaint after medical evaluation. Additional details are available elsewhere [26]. The percent of annual ED visits that were primarily psychiatric ranged from 1.6% of 56,593 visits at Hospital A [Academic Medical Center #1], to 3.8% of 26,576 visits at Hospital B [Community Hospital #1], to 6.7% of 78,123 visits at Hospital C [academic medical center #2], and to 5.3% of 54,927 visits at Hospital D [Community Hospital #2.]

The ED visit in which the patient was enrolled in the broader study served as an index visit for the purposes of the present analysis. Electronic (100% of cases) and hard-copy paper records (range across the four sites 90–100%) were reviewed. From these sources, demographic and clinical information about each patient was abstracted, including the patient's age, race, sex, type of insurance, chief complaint, principal discharge diagnosis, homelessness and toxicology screening results. These variables have been identified to be related to ED use. Chief complaints were assigned into one of six problem categories including somatic complaints (e.g., back pain), any aspect of suicide (e.g., ideation), mental health (e.g., auditory hallucinations); behavior change (e.g., new onset aggression); substance use (e.g., intoxication); and service request (e.g., psychiatric evaluation). A review of the electronic record was then conducted to determine the number of visits to the emergency department of the same hospital associated with the index case for both the 12 months preceding the index visit as well as the 1 month following the index visit. Each hospital had its own specific paper and electronic record which did not provide information about the other study hospitals.

Frequent users were defined using a dual definition of either four or more ED visits within the prior 12-month period (including the index visit), or three or more visits within any two month window during this prior year; this definition is generally consistent with the published literature on this topic [10–13].

This study was reviewed and approved by the institutional review board responsible for all human subject research conducted by the staffs of three of the hospitals. In addition, the institutional review board of the fourth hospital reviewed and approved the study separately.

2.1. Data analysis

Study data were entered twice by different research assistants and differences were reconciled by the first author who referred to the original source material for the purposes of adjudication. All analyses were carried out using the SAS statistical package (version 9.2). Simple descriptive statistics were calculated and are reported as counts, percentages, means, standard deviations and ranges, as appropriate. Chi-square tests were used to assess the significance of any clinical or demographic differences between frequent users and the remainder of the sample. A multivariate logistic regression analysis was then conducted to identify those factors which were specifically predictive of frequent visitor status. Variables included in this analysis were hospital, gender, age, homelessness, insurance, those general medical conditions found to be significant in univariate analyses, toxicology screen results from the index visit and the category of the chief complaint from the index visit. Missing data were infrequent and estimated to be less than 5%, due to the extensive electronic and paper record review. As needed, missing values were imputed from the group mean.

A scoring system to predict future ED usage was then developed based on those factors identified from the multivariate logistic regression analysis as being correlated with frequent user status. Scores were calculated for all 863 patients and were included in a logistic regression model to examine score correlation with the presence or absence of a visit in the month subsequent to the index visit.

3. Results

Of 863 patients, 19% or 167 unique individuals were identified as frequent users. Chi-square tests of significance were used to compare the two groups of patients. Frequent users had an average of 7 visits in the prior year, as compared to a mean of 1.5 visits in the non-frequent user group (P<.0001). Frequent users also had a greater number of visits in the month subsequent to the index visit (0.46 vs. 0.1, P<.0001). Overall, 49% of the frequent user group returned to the ED in the subsequent month, while only 12% of the non-frequent user group had a visit during this time period.

Table 1 summarizes the demographic characteristics of these patients relative to the 696 patients who were not frequent users. Chi-square tests of significance were used to compare the two groups of patients. Frequent users were more likely to be male (P=.047), to have Medicare insurance (P<.0001), to be homeless (P=.0003) and were between 40 and 60 years of age (P=.0056). Race and marital status did not differ between the two groups. Table 2 summarizes the clinical differences between the two groups. A positive toxicology screen for alcohol (P=.018) or cocaine (P=.014) was more likely in frequent users. Among health problems extrapolated from the index visit, frequent users were more likely to have cardiac (P<.0001), vascular (P<.0001), hepatobiliary (P<.0001), renal/urinary (P<.0001), alimentary tract (P=.04), bone/mineral (P=.008) and reproductive system (P=.04) problems. The overall number of health problems was not associated with repeat ED visits. Neither the chief complaint nor the psychiatric diagnosis associated with the index visit differed between the two groups.

The multivariate logistic regression analysis (summarized in Table 3) revealed that Medicare insurance (P=.0003), homelessness (P=.03), cocaine use (P=.041), a personality disorder diagnosis (P=.017) and hepatobiliary disease (P=.028) were all independently predictive of frequent ED use.

Based on those characteristics predictive of frequent use, we developed a scoring system (summarized in Table 4) as a tool to identify patients "at risk" of future ED visits. Total score was found to be highly predictive of ED usage in the month subsequent to the index visit (Table 5). Relative to patients with scores of zero, patients with a score of three or greater were significantly more likely to return to the ED (OR=4.68, P<.0001) in the month following the index visit, with 31% of this high risk cohort presenting to the ED within this time window. When compared with past frequent ED use as a predictor of future use, the total score on the tool performed similarly, with comparable c statistics (0.67 for frequent user status vs. 0.63 for total risk score) (Table 6).

4. Discussion

In this large sample of adult psychiatric patients, 19% had evidence of frequent ED utilization within the previous year. Independent factors associated with frequent use included Medicare insurance, homelessness, comorbid cocaine use, personality disorders and comorbid hepatobiliary disease. A simple predictive tool constructed from the identified risk factors showed reasonable predictive capability, with high-scoring patients showing a nearly five-fold elevation in the odds of subsequent ED use in comparison to low-scoring patients.