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The prevalence of psychiatric diagnoses and associated mortality in hospitalized US trauma patients

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ABSTRACT

Background: We hypothesized that psychiatric diagnoses would be common in hospitalized trauma patients in the United States and when present, would be associated with worse outcomes.

Materials and methods: The Nationwide Inpatient Sample (NIS, 2012) was used to determine national estimates for the number of patients admitted with an injury. Psychiatric diagnoses were identified using diagnosis codes according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition.

Results: A total of 36.5 million patients were admitted to hospitals in the United States in 2012. Of these, 1.3 million (4%) were due to trauma. Psychiatric conditions were more common in patients admitted for trauma *versus* those admitted for other reasons (44% *versus* 34%, $P < 0.001$). Trauma patients who had a psychiatric diagnosis compared to trauma patients without a psychiatric diagnosis were older (mean age: 61 *versus* 56 y, $P < 0.001$), more often female (52% *versus* 50%, $P < 0.001$), and more often white (73% *versus* 68%, $P < 0.001$). For ages 18-64, drug and alcohol abuse predominated (41%), whereas dementia and related disorders (48%) were the most common in adults ≥65 y. Mortality was lower for trauma patients with a psychiatric diagnosis compared to those who did not in both unadjusted and adjusted analysis (1.9% *versus* 2.8%; odds ratio: 0.56, $P < 0.001$).

Conclusions: Psychiatric conditions are present in almost half of all hospitalized trauma patients in the United States; however, the types of conditions varied with age. The frequency of psychiatric conditions in the trauma population suggests efforts should be made to address this component of patient health.

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Introduction

Mental illness is common in the United States. Conservative estimates suggest that 18% of the US population has a mental disorder at any point during a 12-mo period, whereas some estimates are as high as 26%.[1,2] Psychiatric diseases place a significant burden on patients who are hospitalized when compared with patients who are admitted without a psychiatric condition. A review of 12 studies of hospitalized patients with psychiatric comorbidities found that length of stay, costs of care, and resource utilization were higher compared with hospitalized patients without such a comorbidity.[3]

It is thought that mental illness may be even more common in hospitalized trauma patients than that in the general population. Single-center studies have evaluated the rates of psychiatric conditions in their inpatient trauma populations. The prevalence of psychiatric illnesses in this population ranges from 20%-63%.[4-8] However, different studies use varying definitions for psychiatric conditions. Given the substantial variability between trauma center populations and in how diagnoses were defined, it is difficult to know the true burden of psychiatric disease in the hospitalized trauma population. It is also not known if these conditions are associated with worse clinical outcomes. Given the known magnitude of the problem of mental illness in our society and the evidence that psychiatric conditions may be more common in trauma patients, we sought to determine the burden of psychiatric illness in hospitalized trauma patients in the United States. We hypothesized that psychiatric diagnoses would be common in trauma patients and that having a psychiatric diagnosis would be associated with higher mortality after trauma.

Materials and methods

Patients and data

Data from the Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project, and Agency for Healthcare Research and Quality were used for this study. The NIS is nationally representative sample of hospitalized patients in the United States and can be weighted to produce national estimates. All numbers presented in the results represented weighted national estimates.

We included all patients admitted to US hospitals in 2012. Trauma patients were identified using *International Classification of Diseases, Clinical Modification* (*ICD-9-CM*), version 9, diagnosis codes.

A patient was determined to be a trauma patient if the patient had a primary diagnosis consistent with trauma (*ICD9-CM* 800.00 to 959.0, excluding 905 to 909, 910 to 924, and 930 to 939). Patients with a psychiatric condition were identified if they had any listed *ICD-9-CM* codes indicating a psychiatric condition, as defined in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (*ICD-9-CM* 290-319.99). Injury severity measures including injury severity scores were derived using a publicly available Stata program for Injury Classification, which uses *ICD-9-CM* diagnosis codes to determine scores.

Statistical analysis

Statistical analysis was performed using STATA version 14.1. Survey weights were used to conduct the analysis, and all reported frequencies are weighted numbers. Categorical data were compared using Pearson chi-squared analysis. Continuous data were compared using Student *t*-test for data satisfying normality assumptions, and Wilcoxon rank sum was used for nonparametric data.

Regression was used to determine factors associated with death and length of stay. Hierarchical modeling was used to control for center effects. Independent variables included in the regression models were demographics (age, sex, race, payer status, and median household income), number of comorbidities, injury severity, and hospital region. Variables were included in the analysis based on a priori decision as to relevant confounders. Iterative model development to produce the most accurate and parsimonious model resulted in the final selected variables. Trauma center status was not included as this information is not included in NIS data.

This study was waived by the Stanford Human Subjects Institutional Review Board as only de-identified data were used.

Results

A total of 36.5 million patients were admitted to hospitals in the United States in 2012. Of these, 1.4 million (4%) were admitted with a primary diagnosis of trauma. The rate of psychiatric conditions in trauma patients was higher than that in the nontrauma inpatient population (44% *versus* 33%, $P < 0.01$).

Trauma patients with a psychiatric diagnosis were different from those without across all measures (Table 1). On average, trauma patients with a psychiatric diagnosis were older (61 *versus* 56 y, $P < 0.001$), more often female (52% *versus* 50%, $P < 0.001$), more often white (73% *versus* 68%, $P < 0.001$), had higher number of comorbidities (mean number 2.7 *versus* 1.6, $P < 0.001$), and were less likely to have private insurance (20% *versus* 30%, $P < 0.001$). Severe injuries, as defined by an injury severity score of >15, were more common in those without psychiatric diagnoses compared with those with psychiatric diagnoses, but the magnitude of this difference was small (16% *versus* 15%, $P = 0.002$.)

The specific psychiatric diagnosis varied in frequency according to age (Fig. 1). The most prevalent diagnoses were neurodevelopmental disorders in patients <18 years ($n = 5445$; 47%), substance abuse in patients 18-64 years ($n = 140,730$; 43%), and dementia and persistent mental disorders in adults ≥ 65 years ($n = 147,600$; 49%; Table 2).

Outcomes were different between trauma patients who had a psychiatric diagnosis and those who did not. In-hospital mortality was slightly lower for trauma patient with a psychiatric diagnosis compared with trauma patients without a