

Care Transfers for Patients With Upper Extremity Trauma: Influence of Health Insurance Type

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Purpose To understand the differences in transfer incidence for patients with upper extremity trauma by hospital trauma center designation. We hypothesized that patients with public or no insurance were more likely to be transferred to another facility compared with privately insured patients.

Methods Trauma centers are designated by local authorities and verified by the American College of Surgeons. Using the 2012 National Trauma Data Bank, we examined the probability of being transferred from one center to another for patients who sustained isolated upper extremity trauma. We used multivariable logistic regression with a clustered variance method to adjust for intrahospital correlation to compare risk-adjusted transfer incidence for patients with upper extremity injuries by trauma center designation.

Results In 2012, 6,214 patients ages 18–64 with isolated upper extremity trauma presented to 477 hospitals. Overall, transfer incidence was significantly higher among level III trauma centers (26%) compared with level II (11%) or level I (2%) trauma centers. Adjusting for patient and hospital characteristics patients with Medicaid were more likely to be transferred from level III trauma centers to another center compared with privately insured patients.

Conclusions Current regulations may not prevent unnecessary patient transfers based on insurance status among level III trauma centers. Policy makers should compensate or provide incentives to hospitals that take care of poorly insured patients. (*J Hand Surg Am.* 2016;41(4):516–525. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Economic/decision III.

Key words Upper extremity injury, trauma center, emergency, access, transfer.

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ENACTED IN 1986, THE EMERGENCY MEDICINE Treatment and Active Labor Act (EMTALA) ensures that all patients, regardless of their insurance status, have timely and high-quality access to emergency care.¹ Specifically, EMTALA was proposed in response to inappropriate patient transfers owing to insurance status and ability to pay rather than the medical needs of the patient. EMTALA requires that emergency care facilities that are not equipped to treat a patient should stabilize and transfer the patient to another facility regardless of patient insurance status.²

“Patient dumping” is defined as clinically unjustified transfer of a patient with trauma to another facility for economic reasons.³ The effects of these unnecessary transfers include increased patient mortality and morbidity,⁴ excess cost burden for patients and larger academic hospitals,^{3,5} and most importantly, inequitable access to emergency care.³

In 2006, the Institute of Medicine emphasized the importance of an accountable and equitable emergency care system in the United States.⁶ More than a quarter of a century after the passage of the EMTALA and 9 years after the Institute of Medicine report, there are still substantial variations in delivering an optimal upper extremity trauma care system in the United States.⁵ Currently, the evidence regarding the effect of insurance on hospital transfer incidence is limited to single or multiple academic center studies, and the extent to which this occurs on a population level is unknown.^{7–10}

Although most upper extremity injuries are not life threatening, they have a profound effect on patients’ ability to return to work, accomplish activities of daily living, and resume social and vocational roles.¹¹ Despite the prevalence of upper extremity injuries,¹² little is known about the association between insurance and probability of being transferred to another facility in this population. For patients with upper extremity injuries, unnecessary transfers lead to additional health care expenditures, excessive use of scarce resources at level I trauma centers, and undue burden for postoperative care, which frequently requires occupational therapy and multiple provider visits.^{7–9} In the wake of the Affordable Care Act and expansion of Medicaid in many states, understanding the association between insurance (and type of insurance) and the probability of being transferred to another facility is essential to predict future spending and streamline scarce resources. Using the 2012 National Trauma Data Bank (NTDB), the largest database of registered trauma cases in the United States, we examined the incidence of transfer for patients with isolated upper extremity injuries. We hypothesized that compared with patients with private insurance, patients with public or no insurance were more likely to be transferred to another facility.

MATERIALS AND METHODS

Data source

The NTDB is a national database of all registered trauma centers in the United States.¹³ The American College of Surgeons’ Committee on Trauma collects and manages the NTDB, which includes patient, injury, emergency department, hospital, and discharge

information. In 2012, 67% of registered trauma centers included *International Classification of Diseases, Ninth Revision Codes (ICD-9-CM)* for injury diagnosis.¹⁴ Using the ICD-9-CM diagnosis codes for the upper extremity trauma ([Appendix A](#), available on the *Journal’s* Web site at www.jhandsurg.org), we examined the transfer status of patients whose injuries were captured by the NTDB.

Patient selection

We identified 116,282 patients with any upper extremity injury. We excluded patients who experienced additional injuries beyond upper extremity trauma and identified 8,873 cases of isolated upper extremity injuries presenting to 719 hospitals. We excluded patients 65 years of age or older and patients younger than 18 because practice of geriatric or pediatric trauma care differs from that of working-age adults.¹⁵ After excluding patients who were younger than 18 or older than 64, our final sample included 6,214 patients who were treated in 477 trauma centers across the United States ([Fig. 1](#)).

Explanatory and outcome variables

Dependent variable: Our primary outcome included the probability of being transferred from an emergency department of one facility to another.

Explanatory variables: At the patient level, we included age, sex, race, comorbid conditions at the time of injury, injury severity score (ISS), insurance status, and type of injury. Age was reported as the patient’s age at the time of injury. We measured race by creating 3 distinct categories: whites, African Americans, and others. We did not specify other races, as their sample size was small. In addition, we did not include ethnicity as one of our variables because percentage of missing values was higher than threshold of 20%. Insurance was measured using 5 distinct categories: private, Medicaid, workers’ compensation, other insurance, and self-pay (no insurance), with private serving as the reference category. Upper extremity injury was identified via the ICD-9 diagnosis codes ([Appendix A](#), available on the *Journal’s* Web site at www.jhandsurg.org) and categorized into 3 mutually exclusive groups: open wound injuries, amputation injuries, and others (including burn, crush, sprain, dislocation and fracture, and other unspecified upper extremity injuries), which due to a small number of patients in each category we could not break down further. We constructed a binary variable called “any comorbidity” for reporting hypertension, diabetes, respiratory condition, obesity, blood disorder, or heart

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