



Variations in Utilization of Inpatient Rehabilitation Services among Pediatric Trauma Patients

Huong T. Nguyen, BA^{1,2}, Christopher Newton, MD, FACS, FAAP¹, Elizabeth A. Pirrotta, MS², Christine Aguilar, MD³, and N. Ewen Wang, MD²

Objective To assess clinical and nonclinical characteristics associated with the use of pediatric inpatient rehabilitation services among children with traumatic injuries. We hypothesized there would be no nonclinical variations in the use of pediatric inpatient rehabilitation services.

Study design Retrospective analysis of 1139 patients who were injured seriously (0-18 years of age) from our institutional trauma registry (2004-2014). Patients' nonclinical and clinical characteristics were analyzed. We used a full matching technique to compare characteristics between those admitted to rehabilitation (cases) to those discharged home (controls). We matched patients by age category, sex, maximum Abbreviated Injury Scale, and body region of maximum Abbreviated Injury Scale. We used survey-based multivariate logistic regression to identify characteristics associated with inpatient rehabilitation services, controlling for multiple injuries, distance from home to rehabilitation center, year of service, hospital length of stay, and clinically relevant interactions.

Results Ninety-eight patients (8.6%) were admitted to inpatient rehabilitation and 968 (85.0%) were discharged home. Black and other minority patients had increased odds of receiving inpatient rehabilitation compared with white patients (OR, 7.6 [$P < .001$] and OR, 1.6 [$P = .03$], respectively). Patients with private compared with public insurance had increased odds of receiving inpatient rehabilitation (OR, 2.4; $P < .001$).

Conclusions Pediatric inpatient rehabilitation beds are a scarce resource that should be available to those with the greatest clinical need. The mechanism creating differences in the use of inpatient rehabilitation based on nonclinical characteristics such as race/ethnicity or insurance status must be understood to prevent disparities in access to inpatient rehabilitation services. (*J Pediatr* 2017;182:342-8).

Trauma continues to be the leading cause of death and disability for children in the US.¹ For several conditions, including traumatic brain injury (TBI),²⁻⁶ spinal cord injury,^{2,7} and hip fracture,^{2,8} rehabilitation has been shown to improve quality of life and outcomes in both adults and children.

Inpatient rehabilitation services are a critical component of care for children with trauma. Children who sustain traumatic injuries may experience long periods of disability before regaining developmental skills mastered before the trauma. A lack of rehabilitative resources could delay attainment of developmental milestones, and result in an increased dependence on caregivers. Multidisciplinary inpatient rehabilitation services are capable of improving functional outcomes,⁹ and should be available ideally for children with severe injuries. It is reasonable to expect that the lack of access to inpatient rehabilitation is detrimental to children with trauma because the presence of inpatient rehabilitation has clearly benefitted children with severe TBI.⁴⁻⁶ Rehabilitation programs also teach families to care for a child, help with the adjustment to a child's injury, and promote patient and family re-integration into the community.¹⁰

Nonclinical disparities in access to rehabilitation services, as well as functional outcomes after trauma, are documented among the adult population. Adult patients with TBI have disparities in access to rehabilitation by race/ethnicity¹¹⁻¹³ and insurance status.^{11,12} Disparities in functional outcomes during or postrehabilitation are also observed by older age, sex,¹⁴ and Hispanic ethnicity.¹⁵ The literature on pediatric inpatient rehabilitation is limited. Haider et al¹⁶ showed that black children with TBI had decreased clinical and functional outcomes upon hospital discharge than their white and Hispanic counterparts. A more recent study demonstrates that Hispanic children with TBI experienced lower cognitive and motor functional independence scores upon discharge from rehabilitation compared with white children.¹⁷ The etiology of poorer outcomes is not understood clearly. Outcomes could be due to poorer baseline health, worse injuries, poorer quality of inpatient care, or perhaps decreased access to rehabilitation services. We are not aware of any studies that have addressed pediatric use of inpatient rehabilitation specifically.

From the ¹Divisions of Pediatric Surgery and Trauma Services, University of California, San Francisco Benioff Children's Hospital Oakland, Oakland, CA; ²Department of Emergency Medicine, School of Medicine, Stanford University, Stanford, CA; and ³Division of Pediatric Rehabilitation Medicine, UCSF Benioff Children's Hospital Oakland, Oakland, CA

The authors declare no conflicts of interest.

Portions of this study were presented at the meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery, September 9-12, 2015, Las Vegas, NV.

0022-3476/\$ - see front matter. © 2016 Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.jpeds.2016.11.039>

AIS	Abbreviated injury scale	MVC	Motor vehicle collision
ISS	Injury Severity Score	TBI	Traumatic brain injury
LOS	Hospital length of stay		

We performed a retrospective study at our free-standing level I pediatric trauma center, with an inpatient rehabilitation center, to identify whether variations in the use of pediatric inpatient rehabilitation were present. We hypothesized that, after controlling for clinical characteristics, race/ethnicity, and socioeconomic characteristics would not influence the use of pediatric inpatient rehabilitation services.

Methods

We examined a retrospective cohort of patients from the UCSF Benioff Children's Hospital, Oakland institutional trauma database from 2004 to 2014. We analyzed records of children (0-18 years of age, inclusive) who were admitted to our level I pediatric trauma center located in a free-standing, urban, children's hospital. Our hospital has 12 inpatient rehabilitation beds, making it the largest pediatric inpatient rehabilitation center in Northern California. This study was approved by our institutional review board.

The trauma registry contained 4252 records. Visits of patients older than 18 years of age and with an Injury Severity Score (ISS) of less than 10 were excluded, resulting in 1139 records. There was no minimum age for our data. The investigators categorized characteristics of age (0-5, 6-14, and 15-18 years of age), race/ethnicity (white, black, Hispanic, and other race), and payer source (private insurance, public insurance, and other/unknown). We stratified injury mechanism into 6 subgroups: blunt (fall, motor vehicle collision [MVC], other), penetrating (gunshot wounds, other), and both penetrating and blunt (blunt-related injuries with impalement by a sharp objects). Of note, in California, patients with burns are cared for in regional burn centers, and we had no children with serious burns in our study. Body region injured was grouped into 4 categories (head, neck, and face; chest; abdomen; and extremities). Abbreviated Injury Scale (AIS) scores were obtained from the trauma database. Injury severity was categorized by the ISS, a consensus-based, nonlinear, and discontinuous score derived from the sum of the squares of the highest AIS scores of the 3 most severely injured body regions.¹⁸ Severity of injury was categorized into 2 groups based on convention in the literature: moderate (ISS 10-14) and severe (ISS > 15).^{19,20}

Patient discharge status categories included disposition to home (home, foster care), admission to inpatient rehabilitation, died, or other (transfers to acute care and skilled nursing facility, left against medical advice, and custody). Of note, 3 of the 98 patients who went to inpatient rehabilitation were transferred to inpatient rehabilitation at a different facility. All patients admitted to inpatient rehabilitation, including those transferred to a different inpatient rehabilitation center, are examined by our inpatient rehabilitation team. Because the 3 patients who were transferred met the criteria for admission to inpatient rehabilitation and were offered inpatient rehabilitation services at our facility, we chose to include them in the study cohort. Hospital length of stay (LOS) was defined as the number of days a patient stayed at the hospital until discharged or transferred to inpatient rehabilitation. The LOS did not include inpatient rehabilitation length of stay.

Distance in miles to our institution from zip code of patient residence was calculated and categorized as: less than 11, 11-26, 26.1-51, and 51.1 and greater miles. Patients with an unknown residential zip code were grouped under unknown. Counties of residence were categorized as with and without the presence of a pediatric inpatient rehabilitation center.

The primary outcome variable was disposition to pediatric inpatient rehabilitation versus home.

Statistical Analyses

The ratio of children with serious injuries who were discharged home compared with those who were admitted to inpatient rehabilitation services was 10:1. We used a full matching technique to compare nonclinical and clinical characteristics between those admitted to rehabilitation (cases) and those discharged home (controls).^{21,22} (As opposed to 1:n matching, full matching techniques allows the use of all records in an available sample.) We matched patients by age category, sex, maximum AIS, and body region with maximum AIS. All possible matches (6900) were generated, using 96 of 98 cases and 815 of 968 controls. We confirmed that the match was robust by comparing the ISS between the 2 groups, with median ISS of 23 (IQR, 16-27) for children admitted to rehabilitation and median ISS 21 (IQR, 15-26) for children discharged home. This matched dataset was analyzed using survey methods, with match criteria as strata and clustering on controls, resulting in a weighted frequency of 96 for both outcomes.

To describe the overall population, we summarized categorical nonclinical and clinical characteristics by emergency department discharge disposition. For the matched dataset, we similarly summarized characteristics by disposition, comparing categorical variables using the Rao-Scott χ^2 test, and f-tests on univariate regression analysis to determine significance for continuous variables (age, LOS, and distance of residence zip code to rehabilitation center).

Based on characteristics found in our univariate analysis, survey-based multivariate logistic regression was used to identify the characteristics associated with inpatient rehabilitation services. With an outcome sample size of 96, we restricted the multivariate analysis to 9 independent variables.²³ Characteristics in the model included race/ethnicity, payer source, injury mechanism, LOS, distance to rehabilitation center from patient residence zip code, and presence of pediatric inpatient rehabilitation center in county of patient residence. The race/ethnicity category for the multivariate analysis was collapsed from 4 levels to 3 levels, namely, white, black, and other, where "other" included all other race/ethnicity categories (Hispanic, Asian and Pacific Islander, and other race), to reduce the number of covariates.

Because no child without insurance was admitted to rehabilitation, only patients with private or public insurance were included in the model. Thus, only 6723 of 6900 matches were used in the modeling process. The model was adjusted for year of service and clinically relevant interactions (race vs mechanism of injury and race vs insurance type). We a priori designated a $P < .05$ as significant.

Download English Version:

<https://daneshyari.com/en/article/5719696>

Download Persian Version:

<https://daneshyari.com/article/5719696>

[Daneshyari.com](https://daneshyari.com)