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Functional outcomes after inpatient rehabilitation for trauma—improved but unable to return home

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ABSTRACT

Background: Twenty-five percent of trauma patients are discharged to postacute care, indicating a loss of physical function and need for rehabilitation. The purpose of this study was to quantify the functional improvements in trauma patients discharged from inpatient rehabilitation facility (IRF) and identify predictors of improvement.

Materials and methods: A retrospective cohort study of trauma patients aged ≥ 18 years were admitted to an IRF after discharge from a level-1 trauma center. Data included demographics, injury characteristics, hospital, and IRF course. The functional independence measure (FIM) was used to measure change in physical and cognitive function.

Results: There were 245 patients with a mean age of 55.8 years and mean injury severity score (ISS) of 14.7. Fall was the leading mechanism of injury (45.7%). On IRF admission, 50.7% of patients required moderate or greater assistance. On discharge, the mean intra-individual change in FIM score was 29.9; 85.4% of the patients improved by ≥1 level of functioning. Before injury, 99.6% of patients were living at home, but only 56.0% were discharged home from the IRF, despite 81.8% requiring minimal assistance at most (23.5% to skilled nursing; 19.7% readmitted). Increasing age and lower ISS were associated with less FIM improvement, and increasing ISS was associated with increased FIM improvement.

Conclusions: More than 80% of the trauma patients experienced meaningful functional improvements during IRF admission. However, only half were discharged home, and a quarter required further institutional care. Further research is needed to identify the additional impediments to return to preinjury functioning.

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Introduction

Most patients (99.4%) survive traumatic injuries and are discharged from acute care alive.[1] However, despite functioning independently at the time of injury, many patients are unable to be discharged directly to home, indicating some level of functional decline. In 2010, injury was responsible for more than 500,000 years of life lived with disability in the United States,[2] indicating that long-term outcomes should include a functional measure and not focus solely on mortality.

Varying outcomes after discharge from postacute care are seen with respect to mortality and functional outcomes.[3-6] Trauma patients discharged to skilled nursing facilities (SNFs) have a higher risk of postdischarge mortality compared with patients discharged home or to inpatient rehabilitation facilities (IRFs).[3] Stroke patients discharged to IRFs had greater gains in mobility, self-care, and cognitive function, compared with similar patients discharged to SNF or home with home-based health care.[6] However, for patients who had lower extremity joint replacements, discharge to SNFs was associated with greater functional gains compared with discharge to IRFs after adjustment for functional status on discharge from acute care.[4]

Given this disease-specific variability, outcomes cannot be generalized across diagnoses. An improved understanding of the functional recovery experienced by injured adults can inform the discharge planning process and help provide better counseling for patients and their families. The purpose of this study was to describe the epidemiology of posttrauma rehabilitation in a population of adult patients discharged from an urban level-1 trauma center and assess variables associated with functional improvement and a discharge to home.

Materials and methods

This was a retrospective chart review of 245 patients aged ≥18 years, admitted to Bellevue Hospital Center (BHC) with a traumatic injury from January 2012 to December 2013 and discharged to inpatient rehabilitation at BHC. BHC is an urban, level-1 trauma center in New York. The Institutional Review Board at the New York University and the BHC Research Review Committee approved this study.

Data were collected from the electronic medical record system and the Uniform Data System for Medical Rehabilitation database, a data management tool based at the State University of New York, Buffalo, and used by the majority of IRFs in the United States to track both administrative and outcomes data.[7] Study data were collected and managed using the Research Electronic Data Capture tool hosted on servers at New York University.[8] The Research Electronic Data Capture is a secure, Web-based application designed to support data capture for research studies.[8]

Demographic data included age, sex, ethnicity, marital status, insurance status, highest level of education, employment status, and preinjury living situation. Patients were considered to live at home if they were living alone, with or without family or agency support, or if they were homeless, based on an assumption of independence. Baseline health data included medical history and the ability to complete activities of daily living (as documented in the initial physical therapy [PT] evaluation). Injury characteristics included mechanism, systolic blood pressure (SBP) on presentation, and initial Glasgow Coma Score (GCS). Injuries, based on physical examination and radiographic findings, and comorbidities were coded based on the International Classification of Diseases, version 9. Charlson Comorbidity Score and Injury Severity Score (ISS) were calculated for each patient. Primary injury (PI) was defined as the body region (head, neck, and face; chest; abdomen; or extremities and bony pelvis) with the highest Abbreviated Injury Scale (AIS) score. Hospital data included length of stay (LOS), intensive care unit (ICU) admission, number of operations, and total duration of rehabilitative therapies (PT and occupational therapy [OT]) during the acute admission. IRF data included IRF LOS, Functional Independence Measure (FIM) scores on admission and discharge, total duration of PT and OT during inpatient rehabilitation, and discharge disposition.

Functional independence was measured using the FIM scoring system. The FIM score is a validated tool used in 70% of rehabilitation facilities in the United States and assesses the ability of a patient to independently complete activities of daily living.[9-11] It is administered and scored by trained therapists and has been found to be internally consistent and sensitive to changes over time.[11] The FIM assesses 13 motor and 5 cognitive domains, each of which is scored from one, total assistance, to seven, total independence. The total FIM score is the sum of the 18 domain scores and ranges from 18 to 126. Based on the Burden of Care model, total FIM score can be used to anticipate the hours of care a patient will require at home.[12] For example, a total FIM score >108 corresponds to 0 hours and a score <18 indicates a need for ≥ 8 hours of assisted care. Seven levels of independence are defined in the Burden of Care model (Table 1).[12]

The primary outcome, change in FIM score, was calculated as the difference between FIM scores on IRF admission and discharge. Descriptive statistics were calculated using means

Table 1 – Burden of Care (BOC) at Admission *versus* BOC at discharge ($n = 233$*).

BOC (FIM score range)	Admission, *n* (%)	Discharge, *n* (%)
Total assistance (18-35)	33 (14.2)	14 (6.0)
Maximal assistance (36-53)	26 (11.2)	8 (3.4)
Moderate assistance (54-71)	59 (25.3)	20 (8.6)
Minimal assistance (72-89)	92 (39.5)	30 (12.9)
Supervision/set-up (90-107)	22 (9.4)	42 (18.0)
Modified independence (108-125)	1 (0.4)	119 (51.1)
Complete independence (126)	0 (0)	0 (0)

* Eleven patients lost to follow-up because of transfer to other rehabilitation facilities (1 due to patient preference and 10 due to Hurricane Sandy), and one patient did not have complete FIM data.

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