Acute Rehabilitation after Trauma: Does it Really Matter?

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BACKGROUND: The impact of post-discharge rehabilitation care for the trauma patient remains poorly investigated. Here we describe the functional outcomes of trauma patients discharged to an inpatient rehabilitation facility (IRF), and compare the likelihood of discharge home, 1-year rehospitalization, and 1-year mortality between patients discharged to an IRF and a propensity score-matched cohort of patients not discharged to an IRF.

STUDY DESIGN: The Washington State Rehabilitation Registry was used to collect data for all trauma patients discharged to an IRF between 2011 and 2012. These charts were linked to the Washington State Trauma Registry and the Comprehensive Hospital Abstract Reporting System database to obtain detailed patient, injury, and mortality data. Propensity score matching was used to identify a control group of patients who were not discharged to an IRF. Primary outcomes measures were improvement in Functional Independence Measure score with inpatient rehabilitation and the likelihood of discharge home, 1-year rehospitalization, and 1-year mortality.

RESULTS: Nine hundred and thirty-three trauma patients were discharged to an IRF between 2011 and 2012. Total functional independence measure scores improved from 63.7 (SD 20.3) to 92.2 (SD 20.9) ($p < 0.001$) with care at an IRF. When patients discharged to an IRF were compared with the propensity score-matched control patients, rehabilitation was found to significantly increase the likelihood of discharge to home (odds ratio = 9.41; 95% CI, 6.80−13.01) and to decrease 1-year mortality (odds ratio = 0.60; 95% CI, 0.39−0.92).

CONCLUSIONS: Acute trauma patients should be recognized as an underserved population that would benefit considerably from inpatient rehabilitation services after discharge from the hospital. (J Am Coll Surg 2016;223:755−763. © 2016 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

Trauma is the most common cause of significant functional impairment, disability, and mortality worldwide. According to the CDC, the annual work-lost cost in the United States for injured patients who survive to hospital discharge is an astonishing $150 billion.[1] These injured patients are typically motivated and productive members of society who almost universally desire recovery of functional independence and return to community living and work. Helping them regain their functional independence has the potential to improve their quality of life considerably, and also decrease the socioeconomic impact of their injuries. The care of these injured patients does not end on discharge from the acute care hospital, and many of these patients require ongoing rehabilitation after discharge. This rehabilitation can occur in one of several settings, including an inpatient rehabilitation facility (IRF), skilled nursing facility (SNF), or in the outpatient setting. The impact of rehabilitation care for the trauma patient in these varied settings is not completely understood.

CME questions for this article available at http://jacscme.facs.org

Disclosure Information: Authors have nothing to disclose. Timothy J Eberlein, Editor-in-Chief, has nothing to disclose.

Presented at the American College of Surgeons Committee on Trauma 2015 Resident Trauma Paper Competition. The paper won first prize in the clinical research category.

Received July 14, 2016; Revised September 7, 2016; Accepted September 7, 2016.

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http://dx.doi.org/10.1016/j.jamcollsurg.2016.09.001
ISSN 1072-7515/16

Abbreviations and Acronyms

AIS = Abbreviated Injury Score
CMS = Centers for Medicare and Medicaid Services
FIM = Functional Independence Measure
IRF = inpatient rehabilitation facility
ISS = Injury Severity Score
LOS = length of stay
RR = rehabilitation registry
SNF = skilled nursing facility
TBI = traumatic brain injury
TR = trauma registry

Over the past 20 years, there has been a nearly 50% decrease in the number of trauma patients discharged to rehabilitation centers in the state of Washington, with a similar trend on the national level. Today, only approximately 6% of all hospitalized trauma patients in Washington State are discharged to an IRF.[2] No studies to date have evaluated the effect of inpatient rehabilitation after traumatic injury on functional outcomes and the likelihood of subsequent discharge home. Recent evidence does, however, demonstrate that the post-acute care setting can be predictive of long-term outcomes for trauma patients. Specifically, Davidson and colleagues,[2] demonstrate that trauma patients discharged to a SNF are more likely to die after discharge compared with patients discharged home. In contrast, patients discharged to an IRF do not have an increased risk of post-discharge mortality. Despite this, we know from Ayoung-Chee and colleagues,[3] that in the recent past there has been a considerable increase in the number of trauma patients discharged to SNFs compared with IRFs.

In the state of Washington, we now have in place a unique rehabilitation registry that contains demographic and functional outcomes data for all trauma patients discharged to any one of the state's 14 IRFs. Empowered with the ability to track the progress of trauma patients through their rehabilitation course, we sought to describe the characteristics and immediate outcomes of a cohort of trauma patients who received care at an IRF, and to determine the likelihood of eventual discharge home and the likelihood of rehospitalization and death within 1 year for trauma patients who received post-discharge care at an IRF compared with a cohort of propensity score-matched patients who did not receive post-discharge care at an IRF.

METHODS

We performed a retrospective cohort study of injured patients of any age who were treated inclusively at any of the 14 IRFs within the state of Washington during the 2-year period between 2011 and 2012. These data were recorded in a unique Washington State trauma rehabilitation registry (RR) that includes basic demographic data and functional outcomes as measured by the Functional Independence Measure (FIM) score. Patient records from the RR were linked to the Washington State trauma registry (TR), which contains more detailed data for all injured patients admitted to a state-designated trauma hospital (Levels I to V). Washington State does not require that isolated hip fractures in patients older than age 65 years be reported, and primary burn patients were excluded.

The FIM score is a widely used functional assessment scale and has been well validated in the trauma population.[4,5] It consists of 13 motor (eating, grooming, bathing, upper body dressing, lower body dressing, toileting, bladder management, bowel management, bed to chair transfer, toilet transfer, shower transfer, locomotion, stairs) and 5 cognitive (cognitive comprehension, expression, social interaction, problem solving, memory) items designed to assess the amount of functional assistance required for a person to perform basic life activities. Each activity is scored on a scale of 1 to 7, resulting in a total FIM score from 18 to 126, a motor FIM score from 13 to 91, and a cognitive FIM score from 5 to 35. Admission and discharge FIM scores were available for patients in the RR. The modified FIM score is a simplified version of this functional assessment that consists of a 4-point scoring scale assessing locomotion, feeding, and expression, resulting in a total modified FIM score of 3 to 12.[6] The modified FIM score is a variable encoded in the TR and was available for all patients at the time of hospital discharge.

Patient demographics, injury-specific data, and details about the initial inpatient hospitalization were recorded for all injured patients discharged to an IRF in Washington State between 2011 and 2012. This was compared with all trauma patients in the TR during the same period. For patients treated at an IRF after discharge from the hospital, ICD-9 codes from the TR were manually translated into one of several injury categories: traumatic brain injury (TBI), orthopaedic injury (vertebral fracture and/or extremity injury), thoracic injury, abdominal injury, and spinal cord injury. For patients treated at an IRF after discharge from the hospital, FIM scores at the time of admission to, and discharge from, rehabilitation were recorded.

Propensity score matching was used to identify a comparison cohort of patients within the TR who did not receive care at an IRF, despite the same propensity to receive care at an IRF as those who did. Factors used for the propensity score matching included age, insurance