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# Trauma recidivists: surprisingly better outcomes than initially injured trauma patients

Shanteria D. Dixon, M.D., M.P.H., John J. Como, M.D., M.P.H.\*, Aman Banerjee, M.D., Jeffrey A. Claridge, M.D., M.S.

MetroHealth Medical Center, Cleveland, OH, USA

## KEYWORDS:

Trauma recidivism;  
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## Abstract

**BACKGROUND:** The purpose of this study was to determine if there was a difference in hospital outcomes between trauma recidivists (RCID) and nonrecidivists (NRCID).

**METHODS:** Outcomes of RCID and NRCID were compared. A recidivist was defined as a patient with a history of hospital evaluation for injury within the prior 5 years. Patients with good functional status had a Glasgow Outcome Score of 4 to 5.

**RESULTS:** Of the 2,127 patients admitted, 466 (22%) were RCID. NRCID were more likely to have Injury Severity Score >25 (12% vs 8.6%;  $P = .04$ ) than RCID. Eighty-eight percent of RCID were discharged with a good functional status compared with 83% of NRCID ( $P = .02$ ). NRCID were more likely to be admitted to a critical care unit (43% vs 36%;  $P = .01$ ), but there was no significant difference in hospital mortality.

**CONCLUSION:** RCID were less severely injured and had better hospital outcomes than NRCID.

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Traumatic injury is the leading cause of death in the first four decades of life in most developed countries.<sup>1</sup> It is also the third leading cause of all-age mortality behind only cancer and heart disease if unintentional injury and homicide are grouped together.<sup>2</sup> Since the population affected by trauma is younger than for many other diseases, traumatic injury affects the potentially most productive members of society, thus the economic aspect of injury is staggering.

A *trauma recidivist* (RCID) is defined as a patient who presents on multiple occasions for different injury events. We have previously found that 25.2% of trauma patients

in our institution had a previous injury requiring hospital evaluation in the prior 5 years.<sup>3</sup> Trauma could thus be considered as a chronic disease with a risk of recurrence, as many injuries are not isolated, random events. Prior series have demonstrated many characteristics of trauma RCID; some of these include young age, men, racial minority, lack of health insurance, low socioeconomic status, substance abuse, and criminal activity.<sup>4,5</sup> Many authors have addressed the issue of trauma recidivism, but most studies have been small retrospective series.

Little is known about the outcomes of trauma RCID. It is our belief that many trauma care providers assume that RCID have poorer outcomes. This study was meant to evaluate the hospital outcomes of RCID and compare them with first-time trauma patients (NRCID).

## Patients and Methods

All patients who were trauma activations admitted to a surgical service at MetroHealth Medical Center, the level 1

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\* Corresponding author. Tel.: +1-216-778-4979; fax: +1-216-778-1351.

E-mail address: [jjc0965@aol.com](mailto:jjc0965@aol.com)

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trauma center in Cleveland, Ohio, from May 4, 2009 to May 31, 2010, were included. Patients admitted directly to the hospital without being seen first in the Emergency Department (ED) were excluded.

Each patient was asked if, in the past 5 years, he or she had been evaluated in an ED for an injury, whether this patient was admitted to the hospital or not. A positive response to this inquiry identified the patient as RCID. Patients who could not be asked this question on admission for any reason were asked at a later point in their hospital course. If a response still could not be obtained, a review of the electronic medical record was performed to evaluate if the patient had been treated at our hospital for an injury in the last 5 years.

Information for this study was obtained from the electronic medical record and the Northeastern Ohio Trauma System patient registry. Study variables for hospital outcomes included mortality, disposition, functional status, total length of stay, intensive care unit (ICU) length of stay, tracheostomy necessity, and ventilator days. Injury subgroups included vehicular, interpersonal violence (IPV), fall, and other. The IPV category included assaults, stab wounds, and gunshot wounds. The other category included self-inflicted wounds, bicycle crashes, industrial injuries, sporting mishaps, boating collisions, burns, bites, abuse, hangings, drownings, and smoke inhalation.

Hospital mortality was assessed by noting deaths that occurred before the patient was discharged from the trauma center. Disposition was recorded as home, rehabilitation facility, coroner/hospice, or other long-term facility. The patients' disposition from the ED was also recorded as floor, ICU, or operating room (OR). Patients who went directly to the angiography suite were included in the OR group.

Functional status was measured on the basis of the Glasgow Outcome Score (GOS) as described by Jennett and Bond.<sup>6</sup> Patients who returned to an essentially normal life (with perhaps some minor deficits) were given a score of 5 for "good recovery." Patients who were disabled but independent (ambulatory with assistance at the time of discharge) were given a score of 4 for "moderate disability." Patients who were conscious but disabled (wheelchair-bound or bed-bound with intact mental capacity) were given a score of 3 for "severe disability." Patients who were minimally responsive (wheelchair-bound or bed-bound without intact mental capacity) were given a score of 2 for "persistent vegetative state." Patients who did not survive their hospitalization were given a score of 1 for "death." These patients were then grouped into a "functional" or "poor functional" status based on their GOS. Those with a GOS of 4 to 5 were said to have a "good functional status," while those with a GOS of 1 to 3 had a "poor functional status."

Categorical variables were analyzed with chi-square tests or Fisher's exact test, while continuous variables were analyzed with the Student *t* test. Multivariable logistic regression analysis was used to calculate the adjusted odds ratios. Significance was attributed to a *P* value of <.05. All

analysis was conducted with SPSS version 17.0 (SPSS Inc, Chicago, IL). This study was approved by the Institutional Review Board at MetroHealth Medical Center.

## Results

Of the 2,127 patients admitted to the hospital during the study period, 466 (22%) were RCID and 1,661 (78%) were NRCID. Fourteen RCID and 28 NRCID died in the ED, leaving 2,087 patients for analysis.

NRCID tended to be slightly older than RCID ( $44.2 \pm 23.9$  vs  $42.1 \pm 20.9$  years;  $P = .07$ ) (Table 1). Black patients accounted for 27% of RCID and 21% of NRCID ( $P = .03$ ). White patients represented 69% of RCID and 74% of NRCID ( $P = .02$ ). The majority of both groups were men with 76% in the RCID group and 69% in the NRCID group ( $P = .05$ ). The NRCID tended toward a higher mean injury severity score (ISS) of  $12.2 \pm 10.1$  compared with RCID, who had an average ISS of  $10.9 \pm 8.1$  ( $P = .08$ ). There were more penetrating injuries among the RCID (21% vs 11%;  $P < .001$ ). There were also significant differences among the causes of injuries, with significantly more RCID having injuries resulting from IPV (25% vs 14%;  $P < .001$ ), while more NRCID sustained injuries from vehicular collisions (37% vs 27%;  $P < .001$ ). There was no difference in the prevalence of falls between RCID and NRCID.

Following the initial evaluation in the trauma bay, RCID tended to go directly to the regular patient floor (50% vs 46%;  $P = .07$ ), while significantly more NRCID went to the ICU (43% vs 36%;  $P = .01$ ). No significant difference was found in direct OR admission between RCID and NRCID. At the time of hospital discharge, significantly more RCID than NRCID were sent to their homes (72% vs 66%;  $P = .01$ ), while more NRCID went to either skilled nursing facilities, rehabilitation centers, or other long-term facilities (28% vs 24%;  $P = .05$ ). There were no significant differences in the hospital length of stay, ICU days, ventilator days, or need for a tracheostomy between RCID and NRCID.

Unadjusted analysis revealed that RCID had 48% higher odds of leaving the hospital with a good functional status compared with NRCID ( $P = .02$ ; Table 2). After controlling for sex, race, age, and ISS, RCID had 13% higher odds of having a good functional status at discharge compared with NRCID, but this was no longer significant. There was no significant difference in hospital mortality between the two groups.

Analysis of hospital outcomes in the subgroup analysis revealed that the IPV, fall, and vehicular subgroups all had a higher proportion of RCID with a good functional status at discharge and of NRCID with a poor functional status at discharge, but this only reached significance in the fall subgroup. There was no significant difference in hospital mortality between RCID and NRCID in the subgroup analysis.

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