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Comparison of geriatric trauma outcomes when admitted to a medical or surgical service after a fall

Rahman G. Barry, MD, Thao T. Wolbert, MD, Farid B. Mozaffari, MD, FACS, Peter D. Ray, MD, Errington C. Thompson, MD, FACS, FCCM, Todd W. Gress, MD, MPH, and David A. Denning, MD, FACS*

Department of Surgery, Marshall University, Huntington, West Virginia

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ABSTRACT

Background: Blunt trauma in the geriatric population is fraught with poor outcomes, with injury severity and comorbidities impacting morbidity and mortality.

Methods: We retrospectively reviewed 2172 patients aged ≥65 y who fell, requiring hospital admission between January 2012 and December 2016. There were 403 patients in the surgical arm (SA) and 1769 patients in the medical arm (MA). Ground-level falls were the only mechanism of injury included. We excluded all ICU admissions and deaths within 24 h.

Results: There were 5 deaths (1.24%) in the SA and 16 deaths (0.90%) in the MA ($P = 0.57$). The mean trauma injury severity score survival probability prediction in the SA was 96.9% *versus* 97.1% in the MA. MA patients had more comorbidities overall than SA patients. There was no difference in mortality between the SA and MA groups in multiple logistic regression models that accounted for trauma injury severity scores (TRISS) and comorbidities. Unadjusted hospital length of stay was 1 d shorter (median; 95% CI −1.4 to −0.6) in the SA and 0.5 d shorter (median; 95% CI −0.8 to −0.1) when adjusted for TRISS and comorbidities using multiple quantile regression. Finally, patients in the SA were 2.1 (95% CI 1.7 to 2.6) times more likely to be discharged home compared with patients in the MA, and this remained significant (OR 1.9; 95% CI 1.5 to 2.5) with simultaneous adjustment for TRISS and comorbidities using multiple logistic regression.

Conclusions: Geriatric blunt trauma patients admitted to surgical services after mechanical falls have no difference in survival, a shorter median length of stay, and increased likelihood of being discharged home compared with patients admitted to medical services.

Background

Elderly patients represent a significant portion of the trauma population. The most recent 2017 U.S. population census projections data show that there are 47.8 million individuals aged 65 y and above, constituting 14.9% of the total population, and the number is projected to increase to 21% by 2030.[1,2] Traumatic injuries among geriatric individuals are complicated by their overall frailty, preponderance of comorbid medical conditions, and decreased physiologic reserve. Blunt

* *Corresponding author*. Department of Surgery, Marshall University, 1600 Medical Center Dr., Huntington, WV, 25701; Tel./fax: +1(507) 271-8586.
E-mail address: rahmanbarry@gmail.com (R.G. Barry).

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trauma is of particular concern due to its pervasiveness within that community, with the greatest morbidity and mortality seen in the elderly. The consequences of blunt trauma in the elderly are not only experienced by the patient but also by the health care sector due to the high prevalence of geriatric blunt trauma injuries. Elderly trauma patients account for 30% of the national trauma databank and 25% of injury fatalities per year, consuming 33% of total health care resources spent on trauma care.[3,4] It has therefore become essential to optimize geriatric trauma care to improve outcomes.

Traditionally, surgical services coordinate care of the trauma patient, particularly in patients with polytraumatic injuries. The American College of Surgeons (ACS) requires that designated level I and II trauma centers have a trauma surgical service or another surgical subspecialty directly admit at least 90% of trauma patients.[5] The geriatric trauma patient, however, can pose unique challenges, especially when multiple medical comorbidities complicate their traumatic injuries. For this reason, medical services have become increasingly involved in the care of geriatric trauma patients. When compared to their younger counterparts, geriatric trauma patients with multiple comorbidities are more likely to have a longer hospital length of stay (LOS), are more likely to require some degree of assisted living or nursing home care upon discharge, and have an overall higher mortality with injuries of similar severity.[6]

Traumatic injuries superimposed on these medical comorbidities add a layer of complexity to management, with an expected increase in morbidity and mortality in the geriatric age group—especially compared with younger counterparts and patients without these comorbidities.[7-12] The protocols for appropriate management of patients with polytraumatic injuries are well established by the ACS and should ideally be routinely followed by designated trauma centers when admitting patients with traumatic injuries.[5] Nonetheless, these protocols are not always implemented by medical services when caring for trauma patients, the impact of which on a geriatric trauma population has not been well studied.

In this study, we sought to compare the outcomes of geriatric blunt trauma patients on a surgical service with those patients admitted to a nonsurgical (medical) service. Our hypothesis was that patients admitted to a surgical service would have better outcomes regarding mortality, length of stay, and discharge disposition when compared with admission to a medical service.

Methods

We performed a 5-y retrospective chart review, focusing on blunt trauma patients aged 65 y or older who were admitted to an ACS-verified level II trauma center in Huntington, West Virginia, between January 2012 and December 2016. Trauma patients were identified within the hospital trauma registry, through which we determined whether initial admission was to a medical service or to a surgical service. Only patients who had a ground-level fall as their mechanism of injury, and who were admitted to the hospital, were included in this study. Exclusion criteria included patients who died within 24 h of admission, patients who had penetrating injuries, patients who were readmitted to the hospital within 30 d of discharge, patients with mechanisms of injury other than ground-level falls, and patients who transferred services during admission, were transferred to another facility, or who were admitted to the intensive care unit. The initial decision concerning the category of consulted service depended on the nature of the injury and whether the patient presented as an alerted trauma activation. All alerted priority 1 and priority 2 trauma activations mandated timely evaluation by a surgical service; in cases where admission was warranted, these patients would enter a surgical service directly. Table 1 demonstrates Trauma Activation Criteria used by the institution in this study. Determining which initial service to consult for trauma patients who did not meet activation criteria was a task often left to the discretion of the emergency department physician. All patients who were admitted to a trauma service had their medical comorbidities managed solely by the surgery service, with few exceptions.

In total, we collected data on patient demographics—including age and gender for each group—in addition to admission vital signs, Glasgow Coma Scale (GCS) scores, revised trauma scores (RTS) (possible range 0-7.84), and injury severity scores (ISS) (possible range 0-75). Trauma injury severity scores (TRISS) (possible range 0.00-1.00) were calculated using the RTS, ISS, and age. Major pre-existing medical comorbidities for each patient in the medical arm (MA) and surgical arm (SA) groups were documented as well, including hypertension (HTN), diabetes mellitus, coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD), anemia, congestive heart failure (CHF), and dementia. All diagnoses were prevalent conditions present before the traumatic incident, and degree of severity—including use of home oxygen, severity of anemia, CHF or dementia, and interventions for CAD—was not established. We also collected data on mechanism of injury and included only patients who had a ground-level fall resulting in their traumatic injury. The primary outcomes determined were hospital LOS, mortality, and discharge disposition—including discharge to home, rehabilitation or skilled nursing facility placement, and nursing home placement. Patients who died were not considered. In most cases, discharge disposition was based on recommendations from physical therapy and case management.

Categorical variables were compared between two study groups using Chi square test. Continuous variables were compared using the Student's *t*-test (or Wilcoxon's rank sum if distribution was non-normal). Multiple logistic regression was used to examine mortality and home discharge (home discharge vs. other), and quantile regression was used to examine hospital LOS between our study groups. For the regression analysis, we used three models—model 1 was unadjusted, model 2 was adjusted for TRISS, and model 3 was adjusted for both TRISS and medical comorbidities. All statistical analyses were performed using Stata 14.0 (College Station, Texas). Statistical significance was established at a two-tailed *P* value of less than or equal to 0.05. An approved waiver of informed consent was obtained for this study. This study was approved by our Institutional Review Board.