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Outcomes in elderly fall victims: what happens after hospital discharge?

Lance M. Larson, M.D.[a], Robert Sliter, M.D.[a], Stephen D. Helmer, Ph.D.[a], Jared Reyes, M.Ed.[a], Greg Crawford, B.A.[b], James M. Haan, M.D.[a,c,*]

[a]Department of Surgery, The University of Kansas School of Medicine – Wichita, 929 N. Saint Francis St., Room 3082, Wichita, KS 67214, USA; [b]Kansas Department of Health and Environment, Topeka, KS, USA; [c]Department of Trauma Services, Via Christi Hospital Saint Francis, 929 N. Saint Francis St., Room 3082, Wichita, KS 67214, USA

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Elderly fall;
Mortality;
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Abstract

BACKGROUND: Falls are the leading cause of trauma-related death in the elderly, but postdischarge outcomes' data are lacking. The purpose of this study was to evaluate 12-month postdischarge mortality and causes of death.

METHODS: A retrospective review was conducted of patients 65 years and older admitted for a fall and discharged alive. Data collection included demographics, injury characteristics, hospitalization details, and outcomes. A state death database and hospital records were queried to identify patients who died within 12 months of hospital discharge.

RESULTS: Of 347 patients meeting inclusion criteria, 74 (21.3%) died within 12 months postdischarge. These patients were older than those who survived (83.4 vs 79.1 years, $P < .001$). Most injury patterns were not predictive of postdischarge death, whereas several comorbidities were more common in those who died. Death was fall-related in 13 of 74 (17.6%) who died.

CONCLUSIONS: Injury characteristics do not predict postdischarge mortality. However, pre-existing comorbidities, including advanced age were predictive of postdischarge mortality. Further study is needed to determine whether a focus on medical optimization can reduce 1-year postdischarge death.
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The average age of the United States population has been increasing and will continue to increase over the next 30 years.[1] Predictions for population growth by the year 2050 put the number of people age 65 and over at 83.7 million. This would represent a nearly 100% increase in the size of this population when compared to the 43.1 million people in this age group in 2012.[1] Currently, there are over 2 million falls among this population each year.[2] Although a majority of falls do not result in evaluation by a trauma team, falls remain the number one trauma injury mechanism in this population.[3,4] Thus, it is predicted that

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* Corresponding author. Tel.: +1-316-268-5538; fax: +1-316-291-7892.

E-mail address: James.Haan.Research@viachristi.org

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the number of patients aged 65 and older presenting to trauma centers after a fall will also increase as this population continues to age.[2,5]

In the 2015 National Trauma Data Bank, there were approximately 256,000 trauma incidents involving patients older than 65, and this age group accounted for 47% of all trauma-related deaths.[3] This is in contrast to 171,000 trauma incidents and 39% of all trauma-related deaths in 2011.[4] Thus, both the number of trauma incidents as well as proportion of deaths from this age group are rising. Furthermore, falls are the leading cause of death in this age group, with about 56 unintentional deaths per 100,000 incidents after a fall.[2] Decreased physiologic reserve and increased number of chronic illnesses contribute to the increased morbidity and mortality seen in this population.[5]

Many studies address how increasing age and additional comorbidities can adversely affect morbidity, mortality, and functional outcomes, but these studies focus mainly on these measures at hospital discharge.[5–9] Although the in-hospital mortality for elderly falls has been reported at 18.7%,[3] no studies specifically address long-term postdischarge outcomes and mortality. The purpose of this study was to, therefore, evaluate mortality rates of fall victims within 12 months of discharge and causes of death within this time frame.

Methods

Patients and setting

The trauma registry at our American College of Surgeons—verified level 1 trauma center was used to identify all patients 65 years of age and older who were involved in traumatic falls and evaluated by the trauma team from January 1, 2012 to December 31, 2012.

Data collection

After patient identification, a retrospective review was conducted of patient medical records within the trauma registry as well as the patient chart for data collection. Data collected included demographics, admission vitals, comorbid condition history, preadmission medications, injury severity, injury details, hospitalization details, discharge destination, and outcomes. For those patients who were discharged alive from the hospital, death records were sought from the Kansas Department of Health and Environment to determine if the patient had died within the 12 months after hospital discharge. Cause of death was derived from several fields on the death record. The physician completing the death record entered the immediate cause of death (final disease or condition resulting in death) and was then able to enter several medical factors or consequences that result in the cause of death. These included diseases or injury, if any, that initiated the events resulting in death. In addition, the physician was able to list any other significant conditions contributing to death but not resulting in the underlying cause of death. These fields were reviewed, and from these, determination was made as to whether or not the death was related to the patient's fall. In order for the death to be considered as related to the fall, the death had to be either related to an injury from the fall or a complication during the hospital course. Decisions regarding death being related to the injury were made cooperatively between two of the authors (L.M.L. and J.M.H.).

Analysis

For univariate analyses, comparisons of continuous and categorical data were conducted using t tests and chi-squared analysis, respectively. For continuous variables that were not normally distributed, a Mann–Whitney U test was used to compare medians.

Multivariable analysis was conducted using a complete case analysis. Variables associated with postdischarge mortality during univariate analyses were used in a logistic regression to obtain adjusted associations. The logistic regression model was evaluated for accuracy using a receiver operating characteristics curve. The accuracy of the model for predicting 12-month mortality from traumatic falls in an elderly population was determined by the area under the curve. A Kaplan–Meier survival analysis was conducted to compare postdischarge survival between males and females.

All statistical tests were 2-sided, and analyses were considered significant when the resultant P value was $\leq .05$. All analyses were conducted using SPSS release 19.0 (IBM Corp, Armonk, NY).

Results

There were a total of 383 elderly falls admitted for the period beginning January 1, 2012 to December 31, 2012, and 361 of these patients were discharged alive (5.7% in-hospital mortality rate). Fourteen patients were discharged to hospice and subsequently died within 2 weeks of discharge, so these patients were excluded from analyses. Therefore, the remaining 347 patients were included in this study for data analysis. Nearly all falls were from standing (60.9%). Most patients studied were female (55.6%) and white (94.5%) with an average age of 80.2 $\pm$ 8.0 years. Of the 347 patients discharged from the hospital and not to hospice, 273 (78.7%) were still alive 1 year later and 74 (21.3%) died within 1 year of hospital discharge. Among those who died within 1 year of hospital discharge, death most often occurred within the first 3 months postdischarge (n = 43, 58.1%). Thirteen (17.6%) deaths were determined to be fall-related, with the average time to death being 51 days. Regardless of whether the death was related to the fall, the average time to death was 111 days.

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