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Pre-Hip Fracture Falls: A Missed Opportunity for Intervention

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Abstract

Introduction: The purpose of this study is to examine utilization of acute care services in the year prior to hip fracture to inform development and implementation of an intervention to prevent subsequent falls and hip fracture that targets high-risk patients. **Methods:** Elderly patients (age >55) with hip fractures managed at a level one trauma center during 1 year (n = 134) were included. All "preadmissions," defined as an emergency department (ED) visit or inpatient admission within our hospital system in the year before fall with fracture, were documented. Proportion of patients with a "preadmission," reason for "preadmission," demographic characteristics, medical comorbidities, history of falls with fracture, cause of fracture, and time between preadmission and fracture were documented and described. **Results:** Of all, 45.5% of patients (n = 61) had a preadmission. Falls was the reason for presentation in 27.5% of the preadmission encounters, and the median interval between preadmission and fracture was 217 days. Only 8% of the patients presenting for falls in the ED received falls counseling. Patients who experienced preadmission were younger, had a higher Charlson Comorbidity Index, and were more likely to be male. Seventy-nine percent were community dwelling at the time of preadmission, and 68% were discharged home. **Discussion:** Nearly half of hip fracture patients were seen in a high acuity care environment in the year prior to fracture. A quarter presented for falls, supporting previous findings that history of falls is an important risk factor for future falls and injury. However, very few received falls counseling, documenting a major missed opportunity to address falls prevention in the acute care setting. **Conclusions:** Preventing subsequent falls and hip fractures in a targeted, high-risk population in the year prior to potential hip fracture has important implications for improving individual morbidity and mortality and population health. Community-based falls prevention programs are a viable option for this high-risk, community-dwelling population. Collaborative interventions are needed to actively link patients to evidence-based community resources.

Keywords

geriatric trauma, falls, prevention, hip fracture, older adults

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Introduction

Falls are the largest cause of injury for older adults.[1] The morbidity, mortality, reduced function, cost, and loss of independence associated with falls are well recognized. Experts report up to a 40% prevalence of ground-level falls among community-dwelling elderly adults, with an even higher fall rate among nursing home residents.[2,3] The risk factors for falls in this population are well-documented,[2] and rates of hip fracture among individuals with known risk factors, such as older age, medical comorbidities, and low socioeconomic status, are 30% higher than those without.[4-6] Many modifiable risk factors can be addressed with primary and secondary prevention, including poor vision, environmental hazards, muscle weakness, fear of falling, depression, and medication use.[7-9] In contrast, much of the acute care medical literature focuses on hip fracture management and prevention of subsequent hip fracture. Ninety-five percent of hip fractures are caused by falls, and the adverse impact on both health and health-related quality of life is much higher for fracture than for fall alone.[10] However, ground-level falls not resulting in fracture are more common than those that do; therefore, falls without fracture

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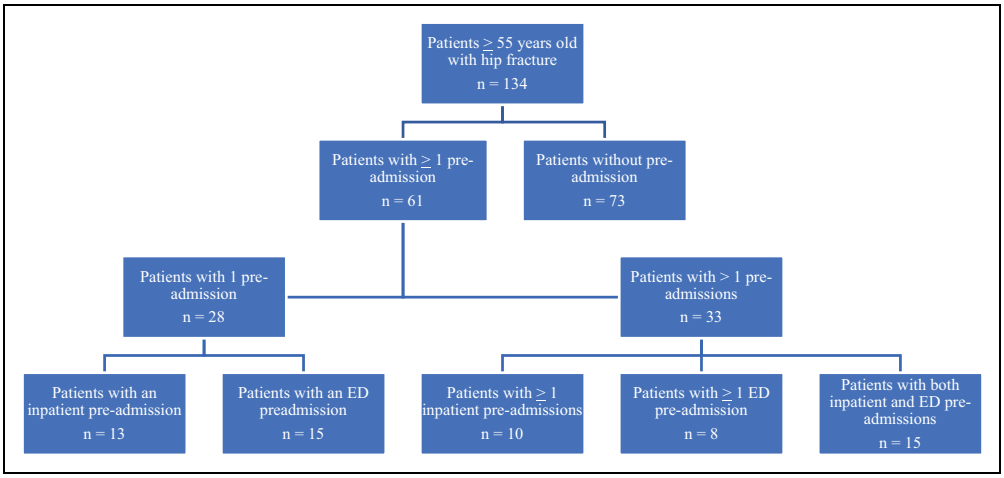

Figure 1. Patient inclusion diagram.

present an opportunity for identification of and intervention for the at-risk patient.

In women over age 70, only 6% of falls result in major injuries, and over half do not result in any injury.[11] Since falls without injury greatly outnumber falls with injury, falls which require treatment at a medical facility are appropriate candidates for falls prevention interventions, such as referral to exercise programs with balance training, assistive devices, mediation modification, environmental hazard modification, and/or treatment for postural hypotension or cardiovascular disorder.[2] Targeting patients who present to a health-care facility for a fall may be an efficient way to identify high-risk patients and deliver evidence-based, secondary prevention of subsequent falls resulting in serious injury.

The purpose of this study is to (1) describe utilization of acute care services in the year prior to hip fracture in our facility, (2) identify the extent to which instructions in falls prevention were provided, and (3) describe characteristics of this population. This information has potential to inform the development of a falls prevention program for this population.

Methods

This study is a retrospective review of elderly patients with hip fractures managed at a level one trauma center. The study protocol was approved by the Institutional Review Board (#05-11-08E) prior to data collection and granted a waiver of informed consent. Patients treated by the orthopedic trauma service during a 1-year period were identified retrospectively from the institution's prospectively captured geriatric fragility fracture registry. Patients included in the registry were at least 55 years old and had a femoral neck or intertrochanteric femur fracture, "hip fracture," resulting from a low-energy mechanism of injury (eg, ground-level fall).

A "preadmission" was defined as an emergency department (ED) visit (including 24-hour observation in the ED holding unit) or an inpatient admission to facilities in our hospital system in the year *before admission* for fall with fracture. Patients

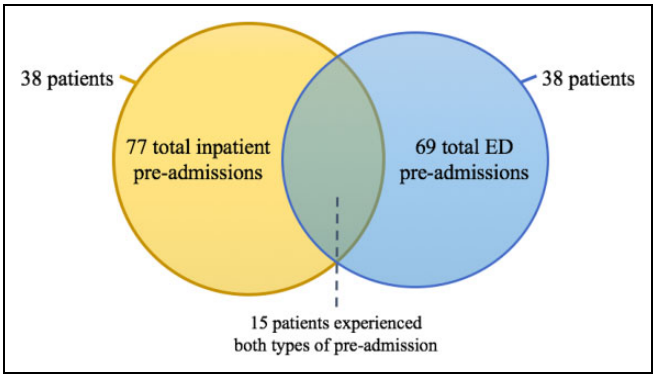

Figure 2. Types of preadmissions. Thirty-eight patients accounted for a total of 77 inpatient hospital stays, 38 patients accounted for a total of 69 ED visits, and 15 patients experienced both types of preadmissions. ED indicates emergency department.

who experienced one or more "preadmissions" within 1 calendar year prior to the index hip fracture (fracture admission) were identified by review of the medical records. Demographic information, social history, medical history, and event characteristics were abstracted from the medical record for all preadmissions and for the fracture admission.

Statistical Analysis

Data were compiled in the REDCap database[12] and exported to SAS software for analysis (SAS version 9.4, Copyright © 2012 SAS Institute Inc, Cary, North Carolina). Descriptive statistics were used to report the proportion of patients with preadmissions, demographic characteristics, medical comorbidities, history of fall with fracture, cause of fall with fracture, time between preadmission and fracture, and inpatient stay details.

Results

One hundred thirty-four patients aged older than 55 years with a hip fracture treated at our hospital during a 1-year period were

Table 1. Demographic Characteristics by Preadmission Status.

	All, N = 134	Preadmission, n = 61	No Preadmission, n = 73
Age, mean (SD)	79.3 (10.9)	76.9 (11.0)	81.3 (10.4)
Female, n (%)	87 (64.9%)	35 (57.4%)	52 (71.2%)
White, n (%)	108 (80.6%)	51 (83.6%)	57 (78.1%)
Other race, n (%)	26 (19.4%)	10 (16.4%)	16 (21.9%)
Hispanic, n (%)	2 (1.5%)	0	2 (2.7%)
BMI,[a] mean (SD); 95% CI	23.3 (4.7); (22.4-24.0)	23.6 (5.3); 22.3-25.0	22.8 (4.0); 21.9-23.8
Charlson Score, mean (SD); (range; 95% CI)	2.6 (2.3); (0-15; 2.2-3.0)	3.3 (2.5); (0-15; 2.7-3.9)	2.1 (1.9); (0-8; 1.6-2.5)
History of fall with fracture, n (%)	23 (17.2%)	14 (23.0%)	9 (12.3%)
Home medications			
None, n (%)	6 (4.5%)	1 (1.6%)	5 (6.9%)
Opioids, n (%)	26 (19.4%)	18 (29.5%)	8 (11.0%)
Benzodiazepines, n (%)	28 (20.9%)	16 (26.2%)	12 (16.4%)
Other CNS agent, n (%)	76 (56.7%)	37 (60.7%)	39 (53.4%)

Abbreviations: BMI, body mass index; CI, confidence interval; CNS, central nervous system; SD, standard deviation.
[a]BMI data were missing for 1 patient.

included in our hospital's geriatric fragility fracture registry (Figure 1). Sixty-one (45.5%) of 134 patients experienced 146 preadmissions in 365 days prior to fall with fracture. Among these, 38 patients accounted for a total of 77 inpatient hospital stays, 38 patients accounted for a total of 69 ED visits, and 15 experienced both types of preadmissions (Figure 2). Of the 61 patients with at least 1 preadmission, nearly half (n = 28, 45.9%) had a single preadmission while the remainder had 2 or more preadmissions of any type. Patients who experienced at least 1 preadmission had a mean of 2.4 preadmissions (range, 1-20 preadmissions of any type).

Patient Characteristics

This patient group had a mean age of 79.3, with majority female (64.9%) and white (80.6%), had a mean body mass index of 23.3, a mean Charlson Comorbidity Index score of 2.6, and 17.2% had a history of fall with fracture (Table 1). Many patients were admitted on prescription opioids (19.4%), benzodiazepines (20.9%), or other central nervous system agents (56.7%) which might impact balance. There was a significant difference in opioids, with more patients with preadmissions on prescription opioids (29.5%) as compared to patients without preadmission (11.0%, $P = .007$). Most patients (78.8%) were living independently at the time of preadmission encounter ($P = .87$ between the 2 preadmission cohorts). Sixty-eight percent of patients were discharged home after preadmission encounter.

Reason for Preadmission

The most common chief complaints at the time of preadmission are illustrated in Figure 3. Patients' primary complaint differed by type of preadmission. Falls were most common among ED encounters (27.5%; n = 19). Cardiopulmonary complaints such as dyspnea, chest pain, or dysrhythmia were most prevalent for inpatient admissions (35.1%; n = 27), but 19% of inpatient admissions were due to falls. The difference in reason for preadmission was statistically different between the 2 cohorts ($P = .02$). Approximately one-quarter (23.3%) of all preadmission encounters were due to a fall. Only 8.3% (n = 5) of patients with an ED preadmission received falls precaution education in the ED. This was measured as whether falls

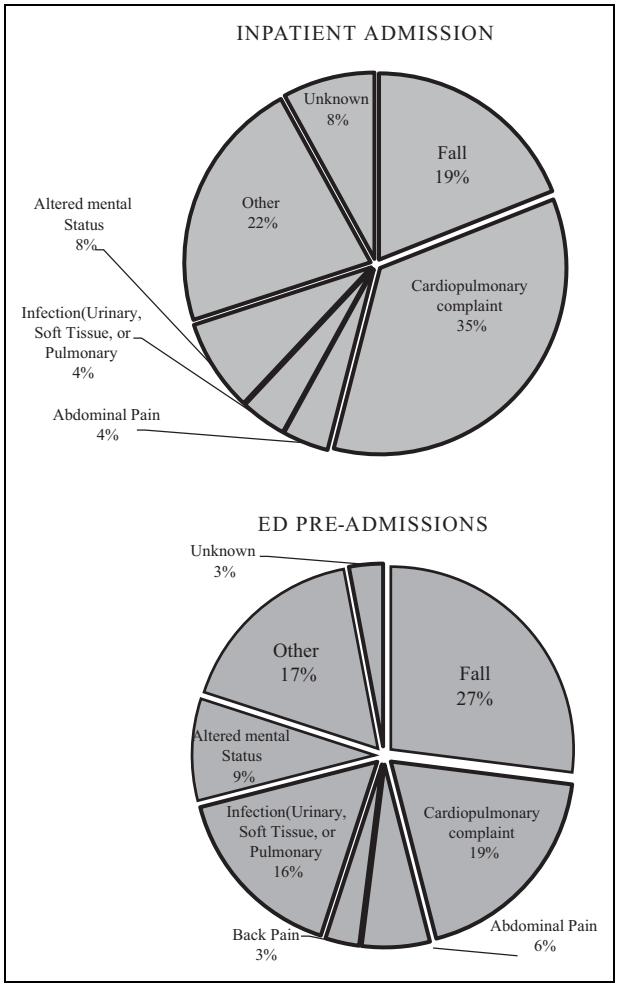

Figure 3. Chief complaint, by type of preadmission.

Table 2. Presenting Complaint for Fragility Fracture Encounters.

	All, N = 121	Preadmission, n = 61	No Preadmission, n = 73
Any fall, n (%)	120 (99.2%)	61 (100%)	72 (98.6%)
Mechanical fall, n (%)	111 (82.8%)	53 (86.9%)	58 (79.4%)
Syncopal fall, n (%)	9 (6.7%)	5 (8.2%)	4 (5.5%)
Unwitnessed fall, n (%)	13 (9.7%)	3 (4.9%)	10 (13.7%)
Other/unknown, n (%)	1 (0.8%)	0	1 (1.4%)

education was included in the patient's discharge material. This is standard educational material which includes tips such as suggesting a cane, ensuring shoes fit properly and have nonslip bottoms, and clearing walkways of objects that may be trip hazards. No referrals to additional information or resources are included. Due to the retrospective nature of this study, we do not know whether a health-care professional discussed this information with the patient or elaborated further.

Preadmission Timing

The median interval between first preadmission and fracture was 217 days (range, 4-356 days). Among all patients with a preadmission (n = 61), 68.9% had their first preadmission 90 or more days prior to their fracture. Only 8 (13.1%) were within 30 days of fracture.

Fracture Encounter

At the time of fracture, 82.8% of all patients were admitted following a mechanical fall, 6.7% following a syncopal fall, 9.7% following an unwitnessed fall, and 0.8% (n = 1) with fall from wheelchair (Table 2).

Discussion

This study identified a high rate of acute care visits by elderly patients in the year prior to sustaining a hip fracture. Nearly half of the patients in this series had an ED visit or inpatient admission in the year prior to their index hip fracture (preadmission). While comorbidities were the primary drivers of preadmission encounters and may not be actionable for the acute care physician, one quarter of preadmissions were related to falls. This supports previous findings that history of falls serves as an important risk factor for future falls and injury, including hip fracture.[13-15] Additionally, prescription opioids were more common in the preadmission group than the group without preadmission. This may be a modifiable risk factor to address to prevent future falls. Only 8% of the patients presenting for falls in the ED received falls counseling, documenting a major missed opportunity to address falls and hip fracture prevention in the acute care setting. Incorporating evidence-based falls prevention interventions in the inpatient and ED setting would target resources to older adults with high risk of future hip fracture.

Furthermore, the majority of patients were community dwelling prior to and following discharge from the preadmission and over two-thirds of fractures occurred greater than 90 days prior to the fracture, highlighting a period in which a community-based fall prevention intervention could have been implemented and potentially reduced falls risk. Several cost-effective community-based falls-reduction interventions for seniors have been identified and include, but are not limited to, falls education, in-home safety evaluations, and balance training.[16-18] Many of these interventions are widely available and delivered in sites that directly interface with the elderly population (eg, health departments, area agencies on aging, community/senior centers, nursing facilities). The health-care system can leverage these existing resources to prevent subsequent injury in patients presenting for falls. Since many of these interventions can be implemented in as little as 2 to 6 months, 217 days—the median interval between preadmission and fracture in the current study—is more than sufficient time to institute a falls-reducing intervention for this vulnerable population. Therefore, brief falls prevention education and referral to community resources should be included in the treatment of all older adult falls in the ED. Since most of the fracture population had a medical preadmission, hospitals may consider incorporating falls risk assessment in discharge planning for all older adults.

This study has several limitations. The current study was limited to ED and inpatient encounters and did not capture or analyze outpatient visits. Outpatient encounters represent another venue for falls prevention; however, given the acuity of the inciting event or injury, patients presenting to the ED or admitted to the hospital may represent a group more amenable to participating in an intervention and/or at higher risk of falls or fracture. Our data collection was limited to preadmissions within our health-care system, which may have underestimated the true preadmission rate.[19]

Conclusion

To our knowledge, this study is the first to characterize health-care encounters prior to hip fracture in the older adult population. Previous studies have demonstrated that hospitalization increases the risk of subsequent hip fracture. This study demonstrates that nearly half of hip fracture patients were seen in a high acuity care environment in the year prior to fracture. A quarter of these patients were seen for a fall in the year prior to fracture, and very few received any falls prevention intervention or education. Identifying and preventing hip fractures in a population at high risk of falls in the year prior to potential hip fracture has important implications for improving individual morbidity and mortality and could positively impact our overburdened health-care system. Future work should include development of collaborative interventions to actively link patients to evidence-based falls prevention programs in the community to prevent falls and reduce incidence of hip fracture in this at-risk population.

Declaration of Conflicting Interests

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