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Injury Diagnosis and Affected Body Part for Non-Fatal Fall-Related Injuries in Community-Dwelling Older Adults Treated in Emergency Departments.

Yara K. Haddad, PharmD, MPH[1], **Iju Shakya, MPH**[2], **Briana L. Moreland, MPH**[3], **Ramakrishna Kakara, MPH**[2], **Gwen Bergen, PhD, MPH, MS**[4]

[1]Pharmacist Consultant. TJFACT. Division of Injury Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, GA

[2]Research Fellow. Oak Ridge Associated Universities (ORAU). Division of Injury Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, GA

[3]Public Health Analyst. Synergy America Inc. Division of Injury Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, GA

[4]Behavioral Scientist. Division of Injury Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, GA

Abstract

Objective: To estimate frequency and type of older adult fall-related injuries treated in emergency departments (EDs).

Methods: We used the 2015 National Electronic Injury Surveillance System: All Injury Program. Patient data were abstracted from the narratives describing the circumstance of injury. Data for community-dwelling older adults (n= 34,336) were analyzed to explore differences in injury diagnosis by demographic characteristics, location of fall, and disposition.

Results: 70% of head-related injuries were internal injuries, suggestive of a traumatic brain injury. Most hip injuries were fractures or dislocations (73.3%). Women had higher percentages of fractures/dislocations, but lower percentages of internal injuries than men. About a third of fall-related ED visits required hospitalization or transfer.

Discussion: Falls in older adults result in array of injuries and pose a burden on the healthcare system. Understanding how fall injuries vary by different characteristics can help inform targeted prevention strategies.

Corresponding author: Yara K. Haddad, PharmD, MPH, BCGP, TJFACT/ Centers for Disease Control and Prevention, 4770 Buford Hwy NE, Mailstop S106-9, Chamblee, GA 30341, yhaddad@cdc.gov, Phone 404-498-5142.

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Keywords

Fall injuries; elderly; emergency departments; hospitalizations

Introduction:

Each year, one in 10 older adults (ages 65 and older) reports a fall injury requiring medical attention or limiting activity for at least a day (Bergen et al., 2016). Older adult falls result in an estimated US$50 billion in medical costs annually (Florence et al., 2018). In 2018, falls accounted for more than 60% of all older adult unintentional injury-related Emergency Department (ED) visits (WISQARS, 2018). About three million older adults were treated for an unintentional fall in an ED and 30% of those treated required hospitalization (WISQARS, 2018).

Previous reports indicate that the most common body part injured is the head (Miu et al., 2016; Sterling et al., 2001). The majority of hip fractures (95%) in older adults are due to falls, and falls result in approximately 80% of traumatic brain injury (TBI)-related ED visits, hospitalizations, and deaths in older adults (Peterson et al., 2019). Injury diagnosis varies with age and women experience more fractures, including hip fractures, from a fall than men (Greenspan et al., 2006; Orces, 2013; Stevens et al., 2005). Defining differences in injury diagnosis and affected body part by demographic characteristics can be used to both target further research to understand the underlying risk factors for these differences and develop effective prevention strategies for older adults at higher risk of severe injury or hospitalization (Greenspan et al., 2006).

Understanding differences in injury diagnosis and affected body part by demographic characteristics may help identify subsets of older adults who are more susceptible to severe fall injuries. Healthcare providers can use this information to target and tailor fall prevention strategies, and investigators can focus further research on risk factors and interventions applicable to these higher risk groups.

Our study aims to build the evidence base by exploring differences in injury diagnosis (e.g., fracture, internal injury) and affected body part by gender, age, and location (e.g., indoor, outdoor) of medically treated fall-injuries. We also explore differences in disposition after care received in the ED by type of injury and affected body part.

Methods

Data Source

We used data from the 2015 National Electronic Injury Surveillance System: All Injury Program (NEISS-AIP) (most recent dataset available at initiation of study) to determine the injury diagnosis, body part affected, and discharge disposition among older adults treated in the ED for falls. NEISS-AIP, a nationally representative system operated by the US Consumer Product Safety Commission and the Centers for Disease Control and Prevention (CDC), collects ED data from a probability sample of 66 out of 100 NEISS-participating hospitals in the United States and territories. Data are weighted to represent the U.S.

population using the inverse probability of hospital selection in each stratum and adjusted for non-response (Schroeder & Ault, 2001). NEISS-AIP data include initial visits for all types and causes of injuries treated in EDs. Patient information from ED records include date of treatment, age, sex, injury diagnosis, disposition, precipitating cause, intent of injury, and narratives that describe the circumstance of injury in a two-line free-text format. Only ED visits in which the precipitating cause, as noted in the ED record, was an unintentional fall were included in the analysis.

Sample Description

The 2015 NEISS-AIP dataset contained 38,654 visits with narratives describing circumstances of older adult unintentional falls treated in EDs. We used the text narratives to code new variables for this analysis. Four researchers read the first 100 narratives to develop an initial codebook and divided the remaining narratives among them for coding. To check for coding consistency, 10% of all narratives were randomly chosen and coded by one other researcher. Coding discrepancies were discussed until agreement was reached among all four researchers and the codebook was updated after every 2,000 narratives as needed. All narratives were re-coded based on updates made to the codebook (Appendix A).

Measures

Fall Injury Variables.—We used the narratives to create new variables for primary body part injured (e.g. head, face, upper extremity, lower extremity, hip, pelvis, spine and back, upper trunk, and unknown). Principal diagnosis was re-categorized from existing NEISS-AIP variables based on organ type affected or perceived severity. Categories included 1) fracture/dislocation, (2) superficial injury (including contusion, abrasion, and hematoma); (3) internal injury (including concussion or TBI), (4) flesh wound (including laceration, puncture wound, and avulsion); (5) strain/sprain, and (6) other (e.g., burn, amputation, foreign body, nerve damage, and dental injury). Both injury diagnosis and primary body part affected were regrouped using a modified Barell Matrix.(Barell et al., 2002) The Barrell Matrix is an injury diagnosis matrix that classifies injury by body region and nature of the injury based on International Classification of Diseases, Clinical Modification coded data (Barell et al., 2002). The Matrix is useful to characterize patterns of injury using diagnoses and can serve as a standard definition for comparison across time (Barell et al., 2002). We used disposition as coded in NEISS-AIP. Disposition was regrouped into treated/released, hospitalized/transferred, and other (including observation only, left against medical advice, and unspecified).

Other variables.—We derived the following new variables from the narratives: residential status (community dwelling, facility living, or in prison) and location (indoor, outdoor, and unknown) of fall (Appendix A). For residential status any narrative that did not specifically indicate facility or prison as residence were coded as community dwelling. We used age and sex as coded in the NEISS-AIP data and categorized age into three age groups (65–74, 75–84, 85+).

Data Analysis

For our study, we excluded older adults living in a facility (n = 4,309, 11.2%) or prison (n = 9, 0.02%). A final sample of 34,336 unintentional fall-related ED visits by community-dwelling older adults (aged 65 and older) that did not result in death on arrival or death in the ED was included in the analysis.

To consider the variability that can occur when subsets of data are analyzed, domain analysis was used with the NEISS-AIP survey weights to produce national estimates of fall-related ED visits. All statistical analyses were performed using survey procedures in SAS 9.3 and sample weights were assigned. Weighted frequencies, percentages, and their corresponding 95% confidence intervals (CI) were calculated for type of injury, body part affected, and disposition. Type of injury diagnosis, body part affected, and disposition were analyzed by sex, age group, and location of fall. A linear trend test for age group was conducted by modeling the variable as continuous in a logistic regression model. Narratives with unknown location were excluded from the analysis involving the location variable (n = 13,720, 40%). Narratives with unknown primary body part or multiple body parts were coded as other and included in the analysis (n=124, 0.3%).

Results

The majority of fall-related ED visits for community-dwelling older adults were for female patients (65.0%) (Table 1). The most common injury diagnosis for a visit was fracture/dislocation (35.0% CI: 34.3, 35.6) followed by superficial injury (24.7% CI: 24.1, 25.3). The three leading diagnoses were the same for males and females, but females were more likely than males to have a fracture/dislocation (38.4% CI: 37.6, 39.2 versus 28.6% CI: 27.6, 29.6) and less likely to have an internal injury (17.3% CI: 16.7, 17.9 versus 20.0% CI: 19.1, 20.9). For the total population, the head was the most common primary body part injured (25.7% CI: 25.2, 26.3) followed by upper extremity (19.9% CI: 19.4, 20.4%) and lower extremity (14.2% CI: 13.7, 14.7). Males were more likely to have an injury to the head (28.3% CI: 27.3, 29.3) compared to females (24.4% CI: 23.7, 25.1). A higher percentage of females had injuries to an upper extremity (20.7% CI: 20.0, 21.4), lower extremity (15.3% CI: 14.7, 15.9), or hip (12.7%; CI: 12.2, 13.3) compared to males (18.4% CI: 17.5, 19.3; 12.1% CI: 11.4, 12.8; and 10.7% CI: 10.0, 11.4) (Table 1). The majority of hip (73.3% CI: 71.6, 75.1) and pelvis (60.5% CI:56.5, 64.5) injuries were fractures or dislocations and the majority of head injuries (70.1% CI: 68.9, 71.3%) were TBI defined as internal injury or concussion of the head (Figure 1).

Patients aged 85+ had a higher percent of visits for fracture/dislocation (38.1% CI: 36.9, 39.3) compared with those 65–74 (32.9% CI: 31.8, 33.9) and 75–84 (34.4% CI: 33.3, 35.5) (Table 2). Head was the most affected body part for adults aged 75–84 (27.3 % CI: 26.3, 28.3) and 85+ (28.2% CI: 27.1, 29.3), compared to adults ages 65–74 with head (22.1% CI: 21.2, 23.1) or upper extremity (22.9% CI: 22.0, 23.9) as the leading body parts.

As age increased, there were more ED visits for hip related injuries; 8.3% (CI: 7.6, 8.9) of adults 65–74 year had a hip injury compared to 12.1% (CI: 11.4, 12.9) for those 75–84 and 16.4% (CI: 15.4, 17.3) for adults age 85+. Additionally, as age increased, there were fewer

ED visits for upper extremity injuries; 22.9% (CI: 22.0, 23.9) of adults 65–74 year had an upper extremity injury compared to 19.2% (CI:18.3, 20.1) for those 75–84 and 17.1% (CI:16.1, 18.0) for adults age 85+. Both age trends were statistically significant ($p<0.0001$).

A higher percent of falls that occurred indoors resulted in internal injuries (22.0% CI: 21.1, 22.8) compared to outdoors (16.9% CI: 15.8, 18.0) (Table 3). There was a higher percent of visits for fracture/dislocation (35.8% CI: 34.4, 37.3) for outdoor falls compared to indoors (33.0% CI: 32.0, 33.9). Indoor falls had a higher percent of head (30.9% CI: 29.9, 31.8) and hip (13.3% CI: 12.6, 14.0) injuries compared to outdoor falls (23.3% CI: 22.0, 24.5) and (8.9% CI: 8.1, 9.8) respectively. Outdoor falls had a higher percent of upper extremity (23.9% CI: 22.6, 25.1) and lower extremity injuries (15.2% CI: 14.1, 16.2) compared to indoor falls (16.2% CI: 15.5, 17.0) and (11.0% CI: 10.3, 11.6) respectively.

Most (68.7% CI: 68.1, 69.4) older adults with a fall-related ED visit were treated and released with about a third hospitalized or transferred (29.9% CI: 29.3, 30.5). The percent of ED visits requiring hospitalization/transfer increased from 22.2% (CI: 21.3, 23.2) for those 65–74 years to 31.0% (CI: 29.9, 32.0) for those 75–84 and 37.9% (CI: 36.7, 39.1) for those 85 and older; and was higher for falls that occurred indoors (34.3% CI: 33.3, 35.3) compared to outdoors (23.3% CI: 22.0, 24.6) (Figure 2). The majority of hip injuries (71.5% CI: 69.7, 73.3) and almost half of pelvis injuries (49.6% CI: 45.6, 53.6) required hospitalization/transfer. For injuries requiring hospitalization/transfer, the leading injury diagnoses were fractures/dislocation (61.9% CI: 60.0, 62.4) and internal injuries (21.5% CI: 20.5, 22.5). For injuries treated in the ED and released, the leading injury diagnosis was contusion/hematoma (31.4% CI: 30.7, 32.2).

Discussion

Our study used national data to measure non-fatal, unintentional fall-related injuries treated in the ED among older adults. We found gender differences in fall injury patterns with women having higher hip and pelvis injuries and higher fracture diagnoses compared to men. This is consistent with previous research that showed fracture rates from a fall were twice as high for women compared to men (Stevens & Sogolow, 2005), and that three quarters of hip fracture patients were women (Bentler et al., 2009). Multiple studies have indicated that women have twice the fracture risk, including hip fractures, compared to men after accounting for age and body size (Cummings et al., 2006; Nguyen et al., 2007). Although postmenopausal women have a higher prevalence of osteoporosis compared to older men, fracture risk between men and women depends less on bone mass density measurement and more on differences in bone size, bone strength, and bone geometry (Schlecht et al., 2015; Cawthon, 2011; Riggs et al., 2004; Sigurdsson et al., 2006). Other factors such as the direction, location, and timing of the fall, underlying fear of falling, and the action than led to the fall may relate to risk of fracture (Barry et al., 2008; Leavy et al., 2013; Boye et al., 2014). Further studies on gender-specific fracture risks are warranted in order to understand these risk factors. For example, studies on fear of falling and the action leading to the fall by gender could offer additional insight on how to prevent these injuries.

Our results show that the majority of hip fractures resulted in being hospitalized or transferred. Hip fractures in older adults are associated with high morbidity with more than half of older adults with a hip fracture being discharged to a long term nursing facility post hospitalization (Bentler et al., 2009). Hip fractures in older adults are also associated with high mortality with approximately 25% of older adults dying within one year of a hip fracture (Coutinho et al., 2012).

Our findings show that more than two-thirds of all head injuries could be considered TBIs, as defined in a previous study (Sarmiento et al., 2019), and men had a higher number of TBI diagnoses compared to women. TBIs are identified in NEISS-AIP as a combination of the primary body part injured as the head combined with an injury diagnosis of internal injury or concussion. Previous research shows that falls are the leading cause of TBIs in older adults resulting in about 80% of TBI-related ED visits, hospitalizations, and deaths in older adults in 2014 (Peterson et al., 2019), and that the rate of older adult fall-related TBIs increased steadily between 2007 and 2013 (Taylor et al., 2017). TBIs can have serious and long-term consequences including prolonged motor and cognitive deficits and an increased incidence of neurodegenerative diseases (Bramlett & Dietrich, 2014; Selassie et al., 2008). Additionally, in older adults receiving anticoagulation therapy a fall related TBI may result in severe adverse sequalae such as delayed intracranial hemorrhage, permanent nerve damage, and increased mortality (Chauny et al., 2016; Beynon et al., 2012)

A previous fall is the strongest predictor for a subsequent fall in older adults (Gassmann, Rupprecht, & Freiberger, 2009). This further increases the risk of a repetitive TBI (Thompson, et al., 2006). About three in four older adults with a fall related TBI had a chronic medical condition prior to injury (Thompson et al., 2006). Therefore, targeting primary fall prevention in older adults with chronic medical conditions may reduce fall risk.

There were notable age differences in fall injury patterns. Advancing age was associated with more injuries affecting head, hip, and pelvis and higher fracture injuries. Previous research indicates that in older adults, advancing age was associated with a steady increase in reported falls and reported fall injuries (Bergen et al., 2016), and an increase in medically treated hip fractures (Greenspan et al., 2006). Older adults often live with multiple comorbidities, and many require a disproportionally high number of daily medications compared to younger counterparts (Ambrose et al., 2013; Barnett et al., 2012; Qato et al., 2016), both of which may increase fall risk. Additionally, health status and medication use in older adults may affect response to physiological stress from trauma such as fall injuries (McGwin et al., 2004), resulting in higher risk of severe injury, and mortality (Joseph et al., 2014; Perdue et al., 1998).

Most fall injuries treated in an ED did not require hospitalization/transfer, but hospitalizations/transfers were found to increase with advancing age. This is consistent with previous research that reported an increase in fall-related hospital admissions with older ages (Greenspan et al., 2006; Hartholt et al., 2010). Having a history of an ED visit for a fall is also associated with an increased risk of recurrent fall injuries requiring hospitalization (Pohl et al., 2014). These hospitalizations often result in long-term loss of independence, frailty, and health status decline (Gill et al., 2013).

We found that injuries from falls occurring indoors were more likely to result in hospitalizations/transfers compared to those occurring outdoors. Several factors may influence the consequence of a fall in an indoor versus outdoor setting including age, health status, and activities performed (Boye et al., 2014; Satariano et al., 2017). Previous research have identified risk factors for indoor falls including advancing age, inactive lifestyles and poor health status, whereas outdoor falls were commonly associated with being physically active, healthy, and younger age (Boye et al., 2014; Satariano et al., 2017; Kelsey et al., 2010; Duckham et al., 2013).

Older adult falls pose a significant burden on health systems. The United States spends an estimated $50 billion each year on older adult falls; $12.9 billion of which is for hospital expense (Florence et al., 2018). An unintentional fall injury treated in an ED costs about $4,800 in direct medical expenses (Burns et al., 2016). Serious fall-related injuries requiring hospitalization cost approximately $30,000 in medical costs and the average cost of treatment increases with age and is higher for women compared to men (Burns et al., 2016). Part of this increased cost may be explained by hip fractures being more common in women compared to men and the oldest age adults (85+) experience more severe injuries such as fractures and dislocation compared to younger counterparts, likely requiring surgery and rehabilitation.

While fall injuries in older adults are a common and serious health concern (Bergen et al., 2016; Burns & Kakara, 2018), many falls can be prevented. To prevent falls, providers can use CDC's STEADI (Stopping Elderly Accidents, Deaths, and Injuries) initiative. STEADI offers healthcare providers tools and resources to assist with fall prevention (www.cdc.gov/STEADI). Specifically, STEADI includes a clinical algorithm to help identify how and when to screen for fall risk, how to assess for modifiable risk factors (e.g., gait impairments, medications with fall-related side effects, and home hazards), and which evidence-based interventions can be used for each modifiable risk factor to reduce fall risk. In New York, United Health Services created a STEADI-based fall prevention program among its primary care clinics. After implementation they found a 40% reduction in fall-related hospitalizations (Johnston et al., 2018). Our findings identified which older adults may be at elevated risk for sustaining severe injuries because of a fall. For example, women may sustain more fractures, and hospitalizations may be more common among the oldest of the age groups. In addition, older adults who had previously had a TBI may be at greater risk for severe injury. Conducting fall risk screening, assessment, and intervention in older adults could prevent falls, including some of the more severe falls that result in hospitalization.

Our study had limitations. First, we assumed place of residence was community dwelling unless the narrative specifically mentioned that the patient lived in a prison or nursing home. Second, for approximately 40% of the sample the fall location (indoor/outdoor) was unknown, therefore results for location of a fall should be interpreted cautiously. Third, because coders recorded only the most severe injury diagnosis and only one body part associated with the most severe injury, injuries that involved multiple body parts or multiple injury types were not captured in detail. Fourth, hospitalization/transfer was used to define occurrence of a severe injury. This approach excludes severe injuries that resulted in death on arrival or those that do not require hospitalization/transfer but do require prolonged

outpatient medical care. Finally, NEISS-AIP does not allow us to report differences in injury type or severity among those who fall for the first time compared to those who fall more than once.

Conclusion

Falls in older adults result in array of injuries and pose a burden on the healthcare system. While many fall injuries are treated in the ED, about a third required additional medical attention and were hospitalized or transferred. Given that the older adult population in the United States is growing, there may be a rising burden on the healthcare system if effective fall prevention strategies are not implemented (Houry et al., 2015; Wiener, 2002). Understanding fall-injury trends by different characteristics may help inform targeted prevention strategies and allow for identification of older adults at highest risk including women and adults in the oldest age categories.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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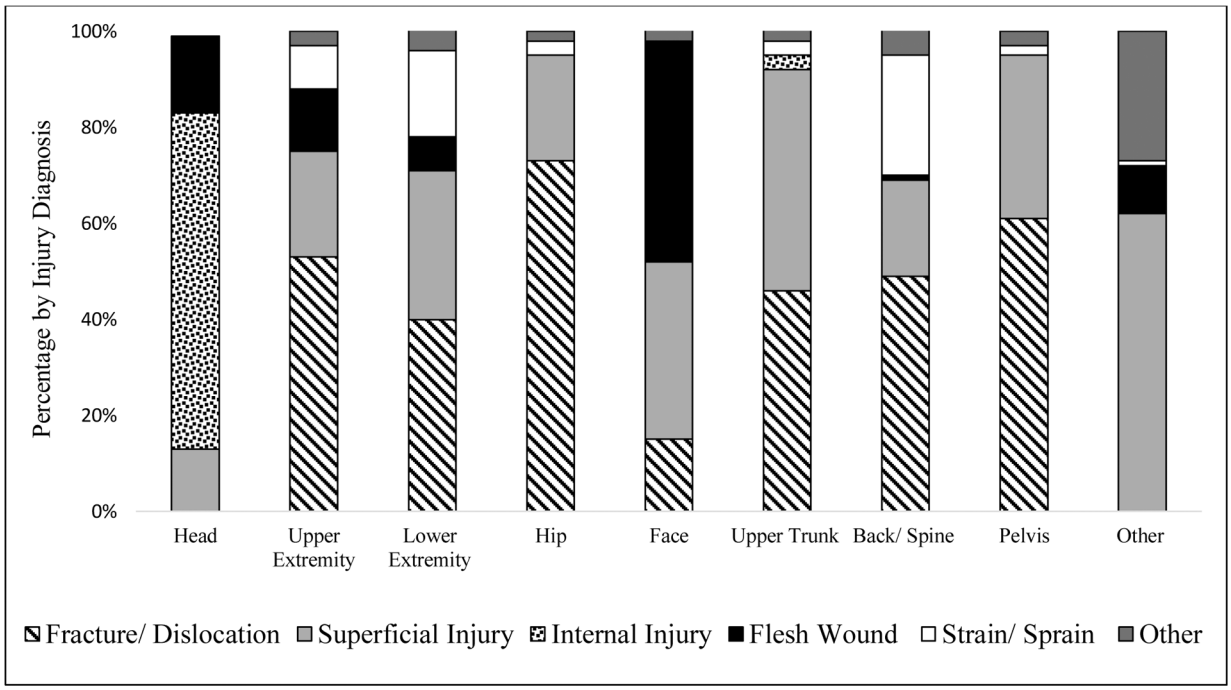

Figure 1:

Injury diagnosis[a] by primary body part injured[b] among community-dwelling persons ages 65 years or older treated at an Emergency Department for non-fatal fall injuries – United States, 2015 National Electronic Injury Surveillance System-All Injury Program.

[a]Injury diagnosis defined as (1) fracture/dislocation, (2) superficial injury (including contusion, abrasion, hematoma), (3) internal injury (including concussion), (4) flesh wound injury (including laceration, puncture wound, and avulsion), (5) strain/sprain, and (6) other (e.g., burn, amputation, foreign body, nerve damage, dental injury).

[b]Refer to appendix for description.

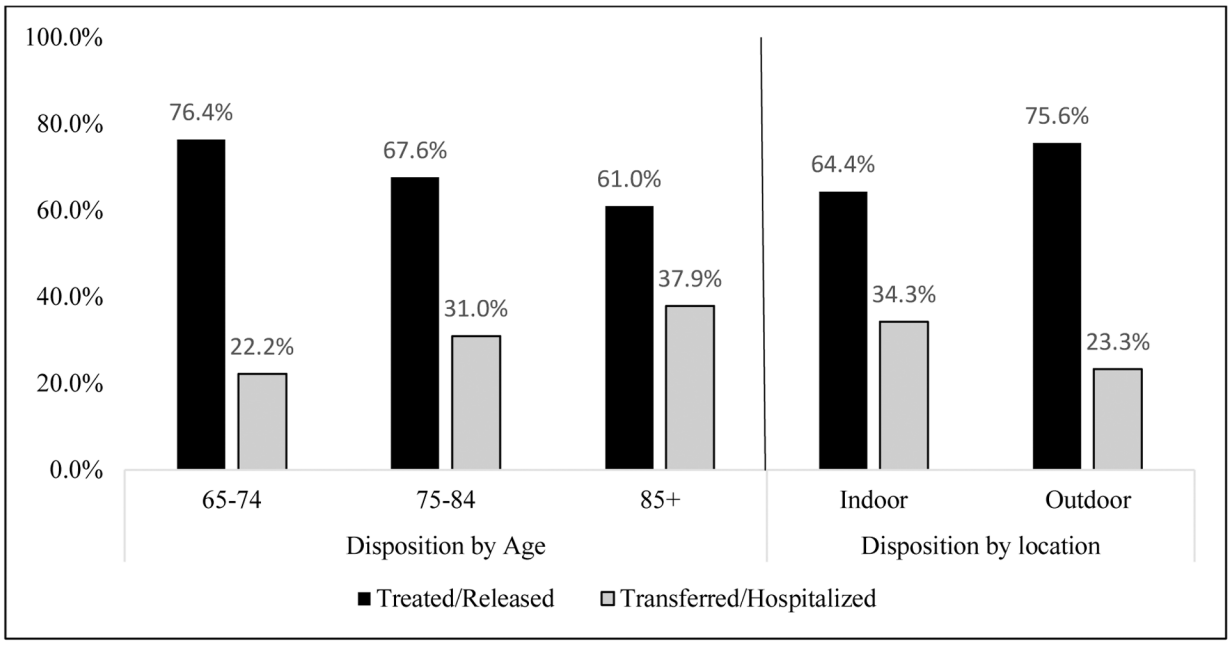

Figure 2:

Community-dwelling older adult disposition[a] after fall injury treated in Emergency Department by age group and location of the fall, United States, 2015 National Electronic Injury Surveillance System-All Injury Program.[b]

[a]Disposition percentages do not add up to 100% per category because other (e.g. left against medical advice, unknown) are not included.

[b]Weighted percent reported.

Table 1:

Number (n) and weighted percentage (%) of non-fatal fall injuries among community-dwelling persons ages 65 years or older treated at an Emergency Department by sex, and selected injury characteristics – United States, 2015 National Electronic Injury Surveillance System-All Injury Program.

	Total			Male			Female		
	n	%	95% CI[a]	n	%	95% CI[a]	n	%	95% CI[a]
Age									
Total	34,336	-	-	12,083	35.0	34.4, 35.6	22,253	65.0	64.4, 65.6
65–74	12591	35.5	34.8, 36.1	4919	38.5	37.4, 39.6	7672	33.8	33.0, 34.6
75–84	11716	35.0	34.3, 35.6	4218	35.8	34.7, 36.9	7498	34.5	33.7, 35.3
85+	10029	29.6	28.9, 30.2	2946	25.7	24.7, 26.7	7083	31.7	30.9, 32.4
Injury diagnosis[b]									
Fracture/Dislocation	12014	35.0	34.3, 35.6	3547	28.6	27.6, 29.6	8467	38.4	37.6, 39.2
Superficial injury	7842	24.7	24.1, 25.3	2733	24.7	23.7, 25.6	5109	24.7	24.0, 25.4
Internal injury	7201	18.2	17.7, 18.7	2787	20.0	19.1, 20.9	4414	17.3	16.7, 17.9
Flesh wound	4152	13.0	12.5, 13.4	1904	17.1	16.2, 17.9	2248	10.8	10.2, 11.3
Strain/Sprain	2226	6.5	6.2, 6.9	765	6.8	6.2, 7.4	1461	6.4	6.0, 6.8
Other	901	2.6	2.4, 2.8	347	2.9	2.5, 3.2	554	2.5	2.2, 2.7
Primary body part injured[c]									
Head	9682	25.7	25.2, 26.3	3727	28.3	27.3, 29.3	5955	24.4	23.7, 25.1
Upper extremity	6574	19.9	19.4, 20.4	2110	18.4	17.5, 19.3	4464	20.7	20.0, 21.4
Lower extremity	4764	14.2	13.7, 14.7	1433	12.1	11.4, 12.8	3331	15.3	14.7, 15.9
Hip	3904	12.0	11.6, 12.5	1180	10.7	10.0, 11.4	2724	12.7	12.2, 13.3
Face	3791	11.3	10.8, 11.7	1454	12.3	11.5, 13.0	2337	10.7	10.2, 11.2
Upper trunk	2401	7.2	6.8, 7.5	1095	9.2	8.5, 9.8	1306	6.1	5.7, 6.5
Back/Spine	2171	6.6	6.3, 6.9	815	7.0	6.4, 7.5	1356	6.4	6.0, 6.8
Pelvis	925	2.9	2.6, 3.1	217	1.8	1.5, 2.1	708	3.4	3.1, 3.7
Other	124	0.3	0.2, 0.3	52	0.3	0.2, 0.4	72	0.2	0.2, 0.3

[a] CI= Confidence Interval

[b] Injury diagnosis defined as (1) fracture/dislocation, (2) superficial injury (including contusion, abrasion, hematoma), (3) internal injury (including concussion), (4) flesh wound injury (including laceration, puncture wound, and avulsion), (5) strain/sprain, and (6) other (e.g., burn, amputation, foreign body, nerve damage, dental injury).

[c] Refer to appendix for description.

Table 2:

Number (n) and weighted percentage (%) of non-fatal fall injuries among community-dwelling persons ages 65 years or older treated at an Emergency Department by age, and selected injury characteristics – United States, 2015 National Electronic Injury Surveillance System-All Injury Program.

	65–74 years old (n=12,591; 35.5%)			75 −84 years old (n=11,716; 35.0%)			85 + years old (n=10,029; 29.6%)		
	n	%	95% CI[a]	n	%	95% CI[a]	n	%	95% CI[a]
Injury diagnosis[b]									
Fracture/Dislocation	4169	32.9	31.8, 33.9	4063	34.4	33.3, 35.5	3782	38.1	36.9, 39.3
Superficial injury	3103	26.4	25.5, 27.4	2668	24.8	23.8, 25.8	2071	22.4	21.3, 23.4
Internal injury	2314	16.0	15.2, 16.8	2599	19.3	18.4, 20.2	2288	19.6	18.6, 20.5
Flesh wound	1352	11.4	10.6, 12.1	1452	13.4	12.6, 14.2	1348	14.4	13.5, 15.2
Strain/Sprain	1244	10.0	9.3, 10.7	639	5.6	5.1, 6.2	343	3.5	3.0, 4.0
Other	409	3.3	2.9, 3.7	295	2.4	2.0, 2.7	197	2.0	1.7, 2.4
Primary body part injured[c]									
Head	3068	22.1	21.2, 23.1	3490	27.3	26.3, 28.3	3124	28.2	27.1, 29.3
Upper extremity	2795	22.9	22.0, 23.9	2150	19.2	18.3, 20.1	1629	17.1	16.1, 18.0
Lower extremity	2325	18.9	18.0, 19.8	1449	12.7	11.9, 13.4	990	10.4	9.6, 11.1
Hip	954	8.3	7.6, 8.9	1367	12.1	11.4, 12.9	1583	16.4	15.4, 17.3
Face	1404	11.2	10.5, 11.9	1361	11.9	11.2, 12.7	1026	10.6	9.8, 11.4
Upper trunk	957	7.8	7.2, 8.4	813	7.2	6.6, 7.8	631	6.3	5.7, 6.9
Back/spine	790	6.4	5.8, 6.9	721	6.5	5.9, 7.1	660	7.0	6.3, 7.6
Pelvis	250	2.1	1.8, 2.4	323	2.9	2.5, 3.2	352	3.8	3.3, 4.2
Other	48	0.3	0.2, 0.4	42	0.2	0.1, 0.3	34	0.3	0.2, 0.4

[a] CI= Confidence Interval.

[b] Injury diagnosis defined as (1) fracture/dislocation, (2) superficial injury (including contusion, abrasion, hematoma), (3) internal injury (including concussion);(4) flesh wound injury (including laceration, puncture wound, and avulsion), (5) strain/sprain, and (6) other (e.g., burn, amputation, foreign body, nerve damage, dental injury).

[c] Refer to appendix for description.

Table 3:

Number (n) and weighted percentage (%) of non-fatal fall injuries among community-dwelling persons ages 65 years or older treated at an Emergency Department by location of the fall and selected injury characteristics – United States, 2015 National Electronic Injury Surveillance System-All Injury Program.[a]

	Indoor (n=14131; 68.2%)			Outdoor (n=6485; 31.8%)		
	n	%	CI[b]	n	%	CI[b]
Injury diagnosis[c]						
Fracture/Dislocation	4659	33.0	32.0, 33.9	2364	35.8	34.4, 37.3
Superficial injury	3208	24.8	23.9, 25.7	1420	24.0	22.7, 25.3
Internal injury	3557	22.0	21.1, 22.8	1286	16.9	15.8, 18.0
Flesh wound	1762	13.9	13.1, 14.6	835	14.1	13.0, 15.2
Strain/Sprain	675	4.6	4.2, 5.1	421	6.7	5.9, 7.5
Other	270	1.7	1.5, 2.0	159	2.5	2.0, 2.9
Primary body part injured[d]						
Head	4736	30.9	29.9, 31.8	1647	23.3	22.0, 24.5
Upper extremity	2212	16.2	15.5, 17.0	1507	23.9	22.6, 25.1
Lower extremity	1533	11.0	10.3, 11.6	966	15.2	14.1, 16.2
Hip	1797	13.3	12.6, 14.0	534	8.9	8.1, 9.8
Face	1436	10.9	10.2, 11.6	984	15.4	14.3, 16.5
Upper trunk	997	7.3	6.7, 7.8	429	6.9	6.1, 7.7
Back/spine	950	7.1	6.6, 7.6	273	4.3	3.7, 4.9
Pelvis	414	3.1	2.7, 3.4	130	1.9	1.5, 2.3
Other	56	0.3	0.2, 0.4	15	0.2	0.1, 0.4

[a] This table excludes unknown location (40% of sample).

[b] CI= Confidence Interval

[c] Injury diagnosis defined as (1) fracture/dislocation, (2) superficial injury (including contusion, abrasion, hematoma), (3) internal injury (including concussion), (4) flesh wound injury (including laceration, puncture wound, and avulsion), (5) strain/sprain, and (6) other (e.g., burn, amputation, foreign body, nerve damage, dental injury).

[d] Refer to appendix for description.