Raising the Index of Suspicion for Elder Abuse: Cognitive Impairment, Falls, and Injury Patterns in the Emergency Department

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Cognitive impairment limits older adults' abilities to advocate for themselves, thus heightening their risk for abuse. Some older adults with cognitive impairments who seek emergency department (ED) services may present with injuries suspicious of abuse. A portion of these injuries may be erroneously attributed to accidents such as falls. A retrospective analysis of 2 years of ED data using *International Classification of Diseases, Ninth Revision* (ICD-9) codes was conducted focusing on characteristics of injuries sustained by persons with co-occurring cognitive impairment and fall status. Cognitive impairment was not significantly related to falls ($P = .533$). Findings suggest that persons with cognitive impairment have unique injury patterns based on fall status, which has implications for elder abuse screening. Injuries for persons with no fall history included injury to the upper limb ($P = .004$), contusions ($P = .012$), and open wounds ($P = .000$). An increased recognition of common injuries in older adults can aid in elder abuse assessment by providing a reference point for uncommon injuries. (*Geriatr Nurs* 2012;33:105-112)

The National Centers for Health Statistics estimated that 22.6% of ED visits among older adults were due to an injury.[1] In 2009, approximately 3.4 million persons age 65 years and older were seen in emergency departments (ED) for an injury.[2] Furthermore in 2007, unintentional injury was the 9th leading cause of death for persons age 65 and older.[3] Few studies have examined injuries in older adults who present to the ED, focused specifically on incidence, unintentional injuries and home accidents.[1,4,5]

However not all injuries are accidental or unintentional. In 2009, falls were the leading cause of unintentional injury but also the seventh leading cause of a violence-related injury in persons aged 65 and older.[2,3] Additionally, research estimates that 12.6% of older adults experience physical abuse in their lifetime.[6] Research on younger populations suggests some injury presentations are more suspicious for physical abuse than others, information that can be used by clinicians in developing assessment protocols. Few similar studies exist focusing on older adults, particularly older adults with cognitive impairments. Cognitive impairment limits older adults' abilities to advocate for themselves and possibly heightens their risk for abuse. A portion of the injuries occurring to older adults with cognitive impairment who present in the ED may be caused by abuse, but erroneously attributed to accidents, such as falls. Current research offers little direction to clinicians for ways to differentiate between accidental injury and injuries that are suspicious for abuse. Therefore, the purpose of this study was to describe the injury presentations in EDs of persons aged 65 years and older, with and without cognitive impairments, and to explore the relationship of injury presentation to injury etiology among those with and without cognitive impairments.

Background

Injury Presentation

Injury presentation is defined as the pattern of injury sustained by individuals including the type of injury (e.g., bruise, fracture, abrasion) and body location (e.g., torso, upper arm, head). Studies in intimate partner violence and child abuse have found trends in the injury presentation

of victims in the ED. For instance, research has shown head and neck injuries are the most common type of injury experienced by women during intimate partner violence.[7-9] Specifically, one study found the most common head and neck injury among intimate partner violence victims was a soft tissue injury (61%), often involving the middle third of the face (69%).[7] Furthermore, children aged less than 18 months old who have experienced abuse have significantly higher odds of presenting to the ED with rib fractures (odds ratio [OR] 23.7), tibia/fibula fracture (OR 12.8), humerus fractures (OR 2.3), and femur fractures (OR 1.8) compared with children younger than 18 months injured through unintentional means.[10] These studies suggest certain injury presentations are more common among those who are abused versus those who are not.

Currently, there are a few studies on the types of injuries that victims of elder abuse sustain. One study using ED data from older persons seen in trauma centers found that victims of severe traumatic elder abuse were significantly more likely to have penetrating injuries compared with older adults who were injured by other means.[11] The 3 most common types of injuries identified were open wounds (56.1%), internal injuries (24.4%), and fractures (22%). Additionally victims of severe elder abuse were more likely to suffer injuries to the head and torso compared with older adults with non-abuse-related injuries.[11] Another study used chart abstraction to examine ED use for a 5-year period by known victims of elder abuse and found that 15.4% of visits were for chief complaints of injuries, and for 19.4% of the visits, the discharge diagnosis was an injury.[12] However, the study found no common pattern to the injuries, although the authors noted their sample size was small.[12] These 2 studies provide evidence that injury can be the result of elder abuse and that severe traumatic abuse may lead to specific injury presentations. However, the findings conflict likely because of differences in study designs (use of administrative data vs chart abstraction) and samples (victims of several traumatic elder abuse vs all victims). In addition, 2 studies provide a scant body of evidence on which to base assessment protocols.

Etiology of Injury

Injury etiology is defined as the mechanism of injury, specifically the circumstances and forces that caused the injury, such as fall or assault. Examining relationships between specific injuries and etiologies can aid in distinguishing common accidental injuries from intentional injuries by increasing the understanding of injury potential following an event. For example, an analysis of facial fractures by etiology found that motor vehicle collisions and gunshots are significant predictors of panfacial fractures, sports are a significant predictor of isolated midface fractures, and assaults are a significant predictor of mandible fractures.[13] A comparison of closed-head trauma among older and younger adults found differences in the injury etiology for the age groups.[14] Injury etiology for older adults with closed-head trauma included falls (59%), motor vehicle collision (20%), and pedestrian accident (13%); whereas younger adults sustained closed-head trauma from motor vehicle collision (37%), assault (28%), and falls (23%).[14]

Analyzing injuries by their etiology also helps establish the circumstances that are necessary to produce a certain injury. For example, a study of falls among young children from their hospital beds and cribs found that short-distance falls did not produce enough energy for multiple or visceral injuries.[15] Out of 235 young children who fell from a distance of 25 to 54 inches, only 13% resulted in injuries, and only 2 injuries were clinically significant (linear skull fracture and fractured clavicle).[15] Therefore, because short-distance falls tend not to produce multiple or severe injuries, children who present to an ED with complex injuries and history of short-distance falls likely incurred the injuries through other means.

Injury and Cognitive Impairment

Little is known about the role of cognitive impairment in injury presentations or etiology. Because of the nature of the pathological process, persons with cognitive impairments may experience unique or an increased rate of injuries related to wandering, behavioral symptoms, and problems with judgment[16]; thus, they may be more likely to sustain falls or experience accidental injury. Moreover, persons with cognitive impairment are thought to be at a greater risk for elder abuse then the general older adult population[17]; however, little is known about injuries from elder abuse in this population.

One study interviewed caregivers of persons with Alzheimer's disease by telephone and

recorded details of the 2 most recent injuries.[16] The study found that falls were the most common mechanism of injury and were responsible for the greatest proportion of these injuries (43.8%),[16] although the study did not distinguish which specific injuries were sustained through falls. One study reports that persons with cognitive impairment are at a 3 times greater risk for an injurious fall, and the risk for an injurious fall increases with age compared with older adults with no cognitive impairment.[18] Research that examines whether falls by persons with cognitive impairment have distinct injury presentations and whether injuries between those with and without cognitive impairment are different is needed. Examining differences in injury patterns on the basis of cognitive impairment and fall status has the potential to challenge assumptions about the causes of injury in older adults and aid in identifying potential victims of elder abuse.

Methods

This study involved a retrospective secondary data analysis of an administrative data set containing ICD-9 diagnostic codes for ED visits to a large urban ED between 2006 and 2008 by persons age 65 years and older. The ICD-9 is maintained by the World Health Organization and provides an international system used for billing and quality assurance as well as epidemiological surveys. A complete list of codes can be found at *http://icd9cm.chrisendres.com*. The data included 31637 visits (n = 13252, 41.9% men; n = 18377, 58.1% women) by 18344 unique older adults (age 65+), representing 5345 incidents of injuries. For each ED visit or encounter, older adults were given from 1 to 74 ICD-9 codes representing diagnoses. The unit of analysis was injury incidents, so a single elder could be presented more than once in the analysis if they presented with multiple injuries.

Using ICD-9 codes, three variables were constructed. *Injury presentation* was operationalized using the diagnostic codes that designated both the type of injury and the injury location (e.g., contusion to breast, open wound to head), allowing for an examination of specific injury presentations. Given the limitations of ICD-9 codes, overall categories were also made to examine specific injuries regardless of location (e.g., any contusion), specific injured body locations regardless of type of injury (e.g., any injury to upper limb), and the presence of having any injury diagnosis regardless of type or location. *Etiology of injury* was operationalized using "E codes" that designated the cause of the injury focusing specifically on fall-related and non-fall-related injuries. Falls were operationally defined by E codes 880-888.99 and included all codes under the heading of "fall." Cognitive impairment was operationally defined as a co-diagnosis from the list of ICD-9 diagnoses provided for the older adult in each encounter, which included dementia and conditions that could be representative of dementia. Coding for cognitive impairment was challenging because cognitive problems can be denoted by multiple and unrelated ICD-9 codes (e.g., senility, dementia with psychotic features, Alzheimer's, mild cognitive impairment). The following ICD-9 codes were used to denote cognitive impairment: 290.00-290.9, 294.10-294.11, 294.9, 310.1, 331.00-331.20, 331.7-331.9, 437.0-437.1, 797, 294.9, 780, 293.1, 780.97, 780.93, 780.02, 348, 349, 292.81, 438.0, 293.00-239.9.

Data Analysis

Nonparametric statistics were used for data analysis. Frequency data were used to describe and compare injury presentations and injury etiologies for persons with and without cognitive impairment co-diagnosis and with and without a fall E code. Pearson's chi-square was used to test the relationship of cognitive impairment to injury presentation and injury etiology for incidents that did or did not have a fall E code.

Results

Of the total sample (n = 18344), 2575 encounters involved persons aged 65 and older who had a cognitive impairment (n = 1024, 39.8% men; n = 1551, 60.2% women). Falls were more frequent among persons with a cognitive impairment (n = 287, 11.1%) versus persons without a cognitive impairment (n = 3035, 10.4%); however, the difference was not statistically significant (P = .533). Of total encounters, 5345 (16.7%) involved injuries. Although persons with a cognitive impairment had proportionally fewer encounters for injuries (14.8%, n = 382) compared with those without a cognitive impairment (16.9%), the difference was not statistically significant (Table 1). In addition, persons with a cognitive impairment had a similar distribution of

Table 1.
Injuries Locations for Persons Aged 65 Years by Cognitive Impairment

	≥65 years	≥65 years and Cognitive Impairment Diagnosis	
Location of Injury	*N* = 31637 (%)	*N* = 2575 (%)	Cognitive Impairment Injury Location
Head/neck/face	1596 (5.0)	138 (5.4)	.838
Trunk	1100 (3.5)	98 (3.8)	.991
Upper limb	1646 (5.2)	94 (3.7)	.012*
Lower limb	1779 (5.6)	138 (5.4)	.931
Injury—site not otherwise specified	728 (2.3)	30 (1.2)	.011*
Any injury	5345 (16.9)	382 (14.8)	.463

*$P < .05$.

injury presentation by body location compared to persons without a cognitive impairment with 2 exceptions. Cognitive impairment was significantly related to injury to the upper limb ($P = .012$) and injury site not specified ($P = .011$).

Falls occurred among 11.1% ($n = 287$) of the older adults with a cognitive impairment, and of those 94% ($n = 270$) resulted in injury. When viewing fall as an injury etiology, having a fall E code was not significantly related to having any injury diagnosis ($P = .613$). Injuries sustained by persons with a cognitive impairment during falls affected the head/neck/face ($n = 103$, 35.8%), trunk ($n = 66$, 23.0%), upper limb ($n = 69$, 24.0%), lower limb ($n = 104$, 36.2%), and location not specified in 18 (6.3%) incidents (Table 2). Additionally, occurrence of a fall was not significantly related to any specific injury location.

Injuries occurred among 4.9% ($n = 112$) of persons with a cognitive impairment who did not endure a fall. For persons with a cognitive impairment, the relationship between having an injury diagnosis and having a non-fall-related etiology was found to be statistically significant ($P = .001$). Injuries sustained by persons with a cognitive impairment from a non-fall etiology were located at the head/neck/face ($n = 36$, 1.6%), trunk ($n = 32$, 1.4%), upper limb ($n = 25$, 1.1%), lower limb ($n = 34$, 1.5%), and at a site not specified ($n = 12$, 0.5%). A non-fall etiology was significantly related to injury to the upper limb ($P = .004$).

Analysis of specific injuries suggests that there are certain injuries endured by persons with cognitive impairment that may be related to specific etiologies including falls and to cognitive impairment itself. When injury presentations were limited to the presence of an E code indicating a fall, cognitive impairment was significantly related to contusion to breast ($P = .011$), spine fracture ($P = .008$), upper limb dislocation ($P = .011$), and injury—not otherwise specified ($P = .014$). When injury presentations were limited to cases involving a non-fall etiology, cognitive impairment was significantly related to contusions to lower limb ($P = .014$), any contusion ($P = .012$), open wound upper limb ($P = .002$), open wound lower limb ($P = .026$), any open wounds ($P \leq .001$), and any sprain/strains ($P = .030$). Regardless of fall status, cognitive impairment was significantly related to internal injury to thorax and abdomen (Table 3).

Discussion

It is important to understand attributes of common injuries sustained by older adults so that uncommon injuries, such as those sustained during elder abuse, can be identified. This analysis described common injuries in a group of older adults with a co-diagnosis of cognitive impairment and found that there are distinctive injury patterns based on fall status.

Data analysis of the no-fall group shows a significant relationship between cognitive impairment and open wounds. Research[1,4,5] suggest open wounds are a common injury among older adults, and common mechanisms of injury include motor vehicle accidents and accidents with machinery or sharp objects. Theoretically, persons with a cognitive impairment are unlikely to be driving vehicles or working with machinery

Table 2.
Injuries Locations for Persons Aged ≥ 65 Years with a Cognitive Impairment (CI) Diagnosis

	With Fall		Without Fall	
Injury Location	*N* = 287 (%)	χ^2 CI Injury Location	*N* = 2288 (%)	χ^2 CI Injury Location
Head/neck/face	103 (35.8)	.696	36 (1.6)	.690
Trunk	66 (23.0)	.403	32 (1.4)	.955
Upper limb	69 (24.0)	.140	25 (1.1)	.004*
Lower limb	104 (36.2)	.711	34 (1.5)	.134
Injury—site not otherwise specified	18 (6.3)	.095	12 (0.5)	.068
Any injury diagnosis	270 (94.0)	.613	112 (4.9)	.001*

*$P < .05$.

and tools. However, these possibilities cannot be totally excluded and may have implications for safety education. Additionally, "accidentally struck by or against another person or object" is a common mechanism of injury,[1,4] the second most commonly cited by the Centers for Disease Control.[19] The significant relationship between cognitive impairment and open wounds may be related to increased home accidents in persons with cognitive impairment or the increased prevalence or elder abuse in persons with cognitive impairment. Further research is needed to determine the injury etiology for open wounds in older adults with cognitive impairment, because it may be different from the general older adult population.

Cognitive impairment was significantly related to internal injuries to the thorax, abdomen, and pelvis, a severe injury. Of the 19 cases of internal injury, 14 were to the pelvis, bladder, and ureter. Although internal injury to the pelvis, bladder, and ureter are associated with pelvic fracture, the associated pelvic fractures are typically caused by high force and occur with multiple traumatic life-threatening injuries.[20] In this sample of 14 older adults with internal injuries to the pelvis, bladder, and ureter, 1 also sustained a fall with contusions to the head/neck/face, 1 a fall with a fracture to the upper limb, and 1 a fracture to the lower limb. Abusive or neglectful care from staff in institutions or caregivers cannot be ruled out. A study of elder abuse in long-term care found that 4.2% of residents had experienced physical abuse, and multiple types of abuse was experienced by 29.1%.[21] Additionally, 12.7% of residents had experienced caretaker abuse, defined as intentional punitive actions toward an elder.[21]

Previous research has found that bruises to the posterior torso and lateral right arm are significantly related to elder abuse and distinct from bruises sustained accidentally.[22] In this sample, older adults with cognitive impairment and no fall history were significantly more likely to have injuries to their upper arm ($P = .004$), including contusions ($P = .012$), which might have been indicative of unrecognized elder abuse.

Study Limitations

An important consideration in this analysis is the reliability of the data. The ICD-9 codes are used inconsistently and subjectively by clinicians based on time and organization pressures, and their knowledge, sources of information, and awareness of the most likely billable diagnostic codes.[23,24] For example, clinicians in the ED may not recognize or make note of a cognitive impairment.[25] Therefore, the data may be an underrepresentation of the cognitive impairment present in this sample. Similarly, clinicians often rely on the person accompanying the elder to the ED for the historical background of the injury. Reporting the injury to be the result of a fall or other accident is socially acceptable, but it may not clearly represent what occurred. If the person is unaccompanied, she or he may be unwilling or unable to accurately describe what occurred. Therefore, some of the sample representing "falls" may actually represent cases of elder

Table 3.
Injuries for Persons Aged ≥65 Years with a Cognitive Impairment (CI) Diagnosis

	With Fall (n = 287)		Without Fall (n = 2288)	
Injury Diagnosis	*N*	CI Injury	*N*	CI Injury
Internal injury to thorax, abdomen, pelvis	5	.003*	14	.000*
Intracranial injury without skull fracture	12	.794	4	.732
Contusions to head/neck/face	36	.539	10	.491
Contusion to breast	2	.011*	0	.916
Contusion to upper limb	17	.117	6	.582
Contusion to lower limb	27	.877	4	.014*
Any contusion diagnosis	71	.210	21	.012*
Skull/face fracture	11	.619	4	.810
Spine fracture	28	.008*	7	.889
Rib/larynx/trachea fracture	11	.738	2	.262
Pelvic fracture	14	.280	4	.933
Upper limb fracture	30	.194	11	.658
Lower limb fracture	64	.018	14	.720
Any fracture	140	.123	34	.481
Upper dislocation	2	.011*	0	.517
Lower dislocation	1	.984	1	.871
Any dislocation	3	.126	1	.522
Open wound head/neck/face	38	.365	14	.325
Open wound upper limb	11	.804	7	.002*
Open wound lower limb	4	.615	3	.026*
Any open wound	52	.419	24	.000*
Superficial injury to head/face/neck	19	.074	7	.842
Superficial injury to upper limb	11	.826	4	.500
Superficial injury to lower limb	9	.836	8	.843
Any superficial injury	37	.210	17	.203
Any sprain/strain	7	.051	9	.030*
Injury not otherwise specified or classified	15	.014*	11	.082

*$P < .05$.

abuse, because older adults may get shoved, pushed, or dropped. According to the National Center for Injury Prevention and Control,[19] in 2009, there were 681 incidents of "violence-related" falls among persons aged 65 years and older. Furthermore, according to data from 2007, assault-related fall is the eighth leading cause of nonfatal violent injury in persons aged 65 years and older.[19] Generalizability is limited because these data were from only 1 urban hospital. Findings would need to be validated in other settings. The data also represent incidents of injuries; therefore, a single person with multiple injuries can be represented more than once. The analysis is limited to the information provided by the ICD-9 codes, so additional information on the circumstances of the injury that may be recorded in the ED chart may not be captured by the codes. Lastly, the data were uniquely coded, which can limit comparison to studies that use the National Center for Health Statistics method for grouping ICD9 codes.

It is important to recognize that accidents and injuries are important reasons for older adults to seek care in EDs. It is also important to recognize the injury patterns from common mechanisms of injuries, such as falls, because these patterns provide a reference point for uncommon injuries, such as those involving abuse. ED staff often compare subjective histories with patient injuries in ruling out child abuse and domestic violence, and with an increased knowledge of common injuries in older adults, the same technique can be used in elder abuse assessment. For those working in EDs, it is important to be aware that although accidents are legitimate cause of injury

for older adults with cognitive impairments, not all injuries are the result of accidents. Even falls can be related to assaults and violent attacks. Elder abuse among persons with dementia is a prevalent phenomenon.[17,26,27] Although 14.8% of older adults with a cognitive impairment diagnosis in this sample also had an injury diagnosis, there were only 2 persons identified as victims of elder abuse with an E code. This low rate may well be due to lack of screening for abuse and/or a low index of suspicious among health professionals.

The Joint Commission has established standards that require hospitals to have written criteria to identify all victims of violence, including elder abuse.[28] The standard recognizes that victims of violence access health care for various reasons, and it takes assessment by trained health care professionals to identify them.[28] It is the responsibility of every ED nurse to know his or her ED's elder abuse assessment protocol and to implement them objectively at every encounter.

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