Published in final edited form as:

Acad Emerg Med. 2015 April ; 22(4): 461–467. doi:10.1111/acem.12634.

Evaluation of Older Adult Patients With Falls in the Emergency Department: Discordance With National Guidelines

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Abstract

Objectives: The objective was to examine whether the emergency department (ED) evaluation of older adult fallers is concordant with the Geriatric Emergency Department Guidelines.

Methods: This study was a chart review of randomly selected older adult ED fall patients from one urban academic teaching hospital. Patients 65 years and older who had ED fall visits in 2012 and who had primary care physicians within our hospital network during the past 3 years were included. Transferred patients were excluded. The data collection instrument was adapted from ED fall evaluation recommendations.

Results: There were 350 patients in this study. The mean ($\pm$ SD) patient age was 80.1 ($\pm$ 8.8) years, 124 (35%) were male, 327 (93%) were white, and 298 (85%) were community dwelling. The range with which history and physical examination findings were concordant with fall guidelines was 1% to 85%. Cause and location of fall were the two most frequently reported history items (85 and 81%, respectively), while asking about baseline vision was only reported 1% of the time. Evaluating for sensory deficits and muscle strength were the two most frequently reported physical examinations (63 and 48%, respectively), while balance was evaluated with the lowest frequency (1%). Patients who received more guideline-recommended evaluations were older with more comorbid conditions and were transferred to an observation unit or admitted to the hospital more frequently. Overall, more than half of these elderly patients (56%) were discharged from the ED to their place of preadmission residence.

Conclusions: The current ED evaluation of older adult fallers is discordant with general and ED-specific fall guidelines. Future studies are warranted to investigate ways to successfully implement fall evaluation guidelines.

More than 30% of adults aged 65 years and older in the United States fall annually.¹ In 2005, there were an estimated 20,000 fatal falls and 7.9 million nonfatal falls in the United

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The authors have no potential conflicts to disclose.

States, costing approximately \$5.7 billion and \$68.4 billion, respectively.² Falls represent the most common reason for unintentional injury-related emergency department (ED) visits for all ages,³ producing 749,000 visits by older adults to the ED in 2009–2010.⁴ Adults aged 65 years and older represent a growing portion of ED patients, and treating them requires more ED resources and incurs greater cost than caring for younger patients.^{5,6} Considering that the older adult population is estimated to double in the next 25 years,⁷ the appropriate ED evaluation of older adults who have fallen will become increasingly important to reduce morbidity and mortality among this population.

There is a robust literature on the evaluation of older adult patients to prevent future falls.^{8–14} However, there have been few studies regarding the evaluation of older adults who have fallen and present to the ED.^{15,16} Various fall guidelines exist, such as those published by the American Geriatrics Society (AGS) in 2001;^{8,10,15} however, there is a lack of widely accepted and implemented guidelines for the ED evaluation of older adult fallers.^{17,18} A previous study¹⁵ suggested a guideline for the evaluation and treatment of older adult fallers in the ED, but found no reduction in subsequent falls.¹⁹ Another study examined fall risk factors assessed in the ED, but did not specifically evaluate the rate of adherence to the guideline they used.¹⁶ The American College of Emergency Physicians, AGS, Emergency Nurses Association, and Society for Academic Emergency Medicine recently (2013) published a comprehensive guide-line for the care of geriatric patients in the ED based on topics including staffing, necessary equipment in a geriatric ED, and standard procedures for the treatment of geriatric patients, among others.¹⁸ It is not known how well the current evaluation of older adult fallers in the ED is concordant with AGS and Geriatric Emergency Department Guidelines (GEDG) recommendations. In this study, we examined the extent to which the ED evaluation of older adult fallers is concordant with AGS and GEDG guidelines.^{8,18}

METHODS

Study Design

This was a retrospective study in which we collected data through chart review of older adult patients who presented to an urban, Level I trauma center teaching hospital ED that averages 100,000 annual ED visits. The hospital's institutional review board approved this study.

Study Setting and Population

We included all patients aged 65 and older who presented to the ED for falls between January 1, 2012, and December 31, 2012. This time period was chosen to exclude any seasonal bias in demographics of older adult fall patients or causes of falls. It was also the most recent complete calendar year at the time of data collection. We compiled a list of each patient aged 65 and older who presented to our ED, who had an admitting International Classification of Diseases, revision 9 (ICD-9) "E" code of an accidental fall (E880–E886 and E888) and had been seen by a primary care physician affiliated with this hospital in the past 3 years (to improve the likelihood that we would be able to collect follow-up data after the patient's discharge from the ED, as well as to improve the validity of patient comorbidities). We excluded patients who were transferred to our ED from other hospitals

because these patients are more likely to have missing data and a higher likelihood of not following up within our network. We listed patients by ED visit dates and then selected patients based on a random-number generator.

Study Protocol

Our instrument was adapted from the recommendations of the AGS and the British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons, 2010,⁸ and the GEDG.¹⁸ These guidelines recommend multifactorial fall risk evaluations for well-known modifiable and nonmodifiable factors such as orthostatic hypotension,^{11,15,20–22} vision,^{11,21,23–27} hearing,^{25–27} balance and gait,^{11,15,20–22,28,29} medication,^{15,20–23,25,27–33} activities of daily living (ADLs) and instrumental ADLs (IADLs),^{15,27,34} cognition,^{11,15,21,25,27} depression,²¹ neurological and musculoskeletal function,^{21,23,27,34} muscle strength,^{15,20,22,23,35} alcohol use,^{15,25} certain comorbidities and health problems,^{21,32,34,36} review of lighting in the environment and other environmental hazards,^{15,21–25,28,29,37} fall history,^{11,15,27,28,30,36,37} exercise,^{20,24,25,29,30,38} behavior modification,^{20,23,37} feet,^{15,21} footwear,²¹ and assistive devices.^{21,27,37}

Certain items from the guidelines on which our instrument was based were modified or omitted due to the availability of corresponding data within patient charts. Asking for falls within the prior 12 months was changed because certain nursing forms at our hospital asked about fall history in the previous 3 months, as well as a 3-month fall history timeline recommended by the study conducted by Baraff et al.¹⁵ We did not record any data relating to heart rate and blood pressure responses to carotid sinus stimulation as recommended, because that information was not readily available. We altered “change in mental status” into a more comprehensive “cognitive assessment.” The categories for “cause of fall” were taken from Baraff et al.’s ED practice guideline for elder falls.¹⁵ “Cause of fall” categories are further delineated in Baraff et al.’s article (e.g., aging/functional decline includes weakness, poor balance, impaired proprioception or sensation, vision problems, and hearing problems). Data for “cause of fall” were taken from the “history of present illness” section of the physician note. If there was an attempt to explain the circumstances of the fall, but the reviewers could not fully understand those circumstances, the cause of fall was marked “unclear.” Some indication of the mechanism of the fall had to be present in the ED chart for a cause to be assigned to it. We included “sports or occupation” from the physician assessment of cause to the “environmental (extrinsic factors)” category of cause of fall, and moved “nutritional deficiency” from the physician assessment to the “other medical problems” category cause of fall. Categories presented in “causes of falls in older persons” that had no results were not reported. All other data were collected from any relevant note relating to patients’ care in the ED.

All laboratory reference ranges were taken from the laboratory and hospital standard reference ranges. Hemoglobin was used as a surrogate for a full complete blood count (CBC). Orthostatic hypotension was defined as a 20 mm Hg drop in systolic blood pressure or a 10 mmHg drop in diastolic blood pressure.³⁹ Diagnostic imaging was labeled abnormal only for acute abnormalities or new findings. We weighed comorbidities according to the Charlson comorbidity index.⁴⁰

Our study initially focused on the concordance of care with the AGS guidelines due to the fact that no widely accepted ED-specific guidelines existed. However, the GEDG was released in 2013 after we had nearly finished our data collection. Given that the GEDG guidelines were ED-specific, we decided to abstract additional data to see how our ED evaluation compared to the GEDG. Data were collected on the rate at which 16 items recommended by the AGS and GEDG guidelines had been performed in the ED. We then categorized patients by the number of guideline variables performed and reported differences in demographic data and disposition.

Data collection was performed by a physician and a research assistant. To establish reliability, a random sample of 5% of the 350 randomly selected charts was reabstracted and the results obtained by the two data collectors were compared. Data were collected and managed using REDCap electronic data capture tools.⁴¹ REDCap is a secure, Web-based application designed to support data capture for research studies (www.project-redcap.org).

Data Analysis

Data were summarized as mean $\pm$ standard deviation (SD) or percentages. We analyzed patient characteristics according to how many guideline items were performed. All analyses were performed using STATA (version 13.0), and a p-value of <0.05 was used to indicate statistical significance. A one-way analysis of variance was used for continuous data and chi-square tests were used for categorical variables.

RESULTS

There were 350 patients in the final analysis. A total of 981 patients met the eligibility criteria, of whom a random sample of 450 older adult ED patients were taken; of these 450 patient visits, 40 (9%) were excluded because of improper identification or improper use of ICD-9 code, 29 (6%) for improper documentation of patients transferred from other hospitals, 22 (5%) for repeat visits for the same fall in which no new events had occurred, eight (2%) duplicate charts were identified, and one (0%) chart that could not be examined due to legal reasons. The kappa value was 0.87 (95% confidence interval [CI] = 0.63 to 1.00) for signs of apparent trauma and 0.76 (95% CI = 0.46 to 1.00) for cause of fall, the two most subjective aspects of the instrument.

Characteristics of Older Adult Fallers and Falls

The mean ($\pm$ SD) age of patients was 80.1 ($\pm$ 8.8) years, 35% were male, and most patients (298, or 85%) were “community-dwelling” (living at home) at the time of their fall. Most patients were white (93%), spoke English (91%), lived with relatives (52%), and had Medicare as their primary insurance (87%). Patients who received more of the recommended guideline assessments were more likely to be older, have higher Charlson comorbidity index scores, and reside in assisted living more often, but live in a private home with relatives less often, than those patients who had less comprehensive evaluations (Table 1).

Guideline Care

The frequency of concordance to the AGS/GEDG guidelines is presented in Table 2. The cause and location of falls were the most frequently reported items in ED documentation at 85 and 81%, respectively. An evaluation of gait, balance, footwear, feet, and baseline vision; the amount of time on the ground or floor; and the inquiry of a recent history of melena were all present in less than 5% of patient charts (Table 2).

Prevalence of Key History and Physical Elements

The location of the fall was noted for 282 (81%) falls, and 211 of the 282 (75%) falls occurred indoors. The next most frequently reported history item was the presence of visual or neurological impairments (36%) in patients' automatically populated past medical history. Despite this frequency of sensorimotor impairment, only three (1%) patients were asked about their baseline vision. History of falls in the past 3 months, impairment with IADLs, and a history of diabetes were reported in a quarter or more of patients. Forty-three patients (12%) were evaluated for orthostatic hypotension, and 12 of 43 (28%) had abnormal results.

Suggested Diagnostic Tests

Equal numbers of patients had CBC and electrolyte tests (57%), while only 16 patients (5%) had toxicology screens. Radiographs were the most common diagnostic test performed on these patients (79%); the number of patients with CT scans (50% had head CTs) was higher than the number of patients with MRIs (53% vs. 1%, respectively).

Cause of Fall

An attempt at an explanation of the circumstances precipitating the fall was reported for 299 patients (85%). The most common cause of falls was environmental factors (43%), usually uneven or slippery surfaces, followed by aging/functional decline (28%). These falls were often described as idiopathic losses of balance and possibly loss of balance upon standing. For 21% of these patients the cause of fall was unclear. In addition, for 218 (62%) patients, the fall was described as a "mechanical fall."

Disposition

As shown in Table 3, more than half of all older adult fallers were discharged home; patients with fewer guideline recommendations performed were discharged home more often than patients with greater investigations. A quarter of patients were admitted to the hospital, and 18% were admitted to the ED observation unit. Patients with greater numbers of guideline recommendations performed were more likely to be admitted. Only 1% of patients were discharged directly to new, long-term nursing homes directly from the ED (Table 3), and only one patient was discharged to a new nursing home from the ED observation unit. No patients died during their ED visits.

DISCUSSION

Our study shows that the ED evaluation of older adult patients with falls was discordant with geriatric fall guidelines. Half of the elements in the guidelines were recorded in fewer than

20% of patients. Patients who had more guideline recommendations recorded were older, had a slightly higher Charlson comorbidity index score (which is weighted by age), and were discharged home much less frequently than patients who had fewer guideline recommendations performed.

Older patients with more comorbid conditions may have received more thorough fall evaluations for several reasons. They may have stayed in the ED longer so perhaps had more time to have consulting specialists evaluate them. Clinicians may also be biased to giving older patients with more illnesses more comprehensive evaluations. Last, older patients with more comorbid conditions may have presented with more severe acute complaints. We did not analyze the outcomes of these patients, which should be the subject of future studies.

Our findings support those of other studies, although this study reports certain findings in greater detail. A study by Salter et al.⁴² showed that adherence to the AGS guideline is low in the ED and that patients who did not receive care consistent with the guideline had a worse fall risk profile 6 months following discharge. However, our study improves upon the Salter et al. study by reporting whether care was consistent with each element, as opposed to reporting *complete, partial, or no guideline care* received. The study by Salter et al. also only included patients who were discharged into the community, while this study did not exclude any patients based on their dispositions from the ED. Our findings illuminate which elements may need to be emphasized in the training and the implementation process.

Medical care is often inconsistent with guidelines. Even among health care providers who received training in evidence-based fall prevention strategies, practice adherence with their guideline was not 100%,⁴³ nor is this a realistic goal, particularly in the ED. Moreover, the study performed by Fortinsky et al.⁴³ included a small number of queried ED physicians, of whom fewer than half (five of 11) completed the study survey, indicating a need for further research on care concordant with guideline recommendations. Baraff et al.¹⁷ examined the ED adherence rate to a custom fall guideline for older adult patients in three EDs in southern California. The overall adherence rate for the 14 history and physical examination items included in the study by Baraff et al. was 29% before receiving the guideline. After training, there was a wide range of adherence to the elements of the guidelines. The largest improvement was in the documentation of history items, with modest but significant improvements in two of the four recommended physical examination elements of their guideline. Compliance with medical guidelines may be poor in general; a review of compliance rates to practice guidelines endorsed by official organizations in a range of medical and surgical fields found that the mean compliance rate with 143 clinical recommendations was 54.5%.⁴⁴

Clinical care may not be very concordant with the recommendations of fall guidelines for a number of reasons. These guides were not distributed to ED staff; this study examined how closely usual care of older adult fallers corresponds to guideline care and is not meant to be a test of implementation nor an evaluation of the content of either guideline. The documentation of history items pertinent for older adult falls was shown to marginally increase¹⁷ when a custom practice guideline for older adult falls¹⁵ was distributed to a group of California EDs, although the custom guideline did not produce a reduction in subsequent

falls, hospitalizations, or injuries. Second, although the AGS guideline was initially released in 2001, the GEDG was not released until early 2013, although it references fall literature which had been available since 2011 at the latest. Widespread training will be needed to make ED practice concordant with the AGS and GEDG guidelines. Furthermore, busy ED clinicians may not practice concordantly with guidelines if they find it time-consuming to conduct all recommended elements. Future studies should examine methods to implement the guidelines while minimizing the burden on ED clinicians. Solutions may include using patient survey forms as surrogates for certain elements (e.g., vision, fall history) and/or using electronic reminders to prompt clinicians to conduct fall evaluations in certain older adult patients.

While it may not be realistic to have emergency physicians follow every fall recommendation, there is significant room for improvement. Multiple elements could be implemented with relatively little effort. Asking about baseline vision, evaluating patients' feet, and asking about fall history could all improve the care and outcomes for older adult fallers. Multiple literature reviews⁴⁵⁻⁴⁷ state that the risk of injury, chiefly due to falls, is higher for the visually impaired older adult than the general population. Self-assessed visual impairment may not be a reliable indicator for future fall risk,⁴⁸ but patients' knowledge of their formal visual assessments may indicate if further intervention is necessary. Furthermore, despite being recommended by both AGS and GEDG and being a predictor of 30-day readmission,⁴⁹ only 79 patients (23%) were asked about their fall histories. Also, foot problems, which may include systemwide disorders such as arthritis and complications due to diabetes, and inappropriate footwear have consistently been shown to contribute to falls in older adults.⁵⁰⁻⁵² These, among other elements of the recommendations, could be integrated into clinical practice with minimal effort. Moreover, many of these assessments will yield potentially modifiable conditions that could be readily treated in the ED or may be referred to the appropriate outpatient services to reduce the future risk of recurrent falls and associated injuries. It is unclear which recommended assessments could have the greatest effect for reducing modifiable risk factors and preventing future falls, and further research may be warranted. Further, our study did not focus on which elements should be implemented, and future studies need to determine which modifiable risk factors warrant ED intervention given the EDs' fast-paced nature.

LIMITATIONS

As with any chart review, we were limited to the data recorded and the accuracy of that chart data. It is possible that providers did perform elements of the falls assessment but did not record them in the chart. Some fallers may not have been identified if they were not assigned corresponding ICD-9 codes. Also, given that we conducted this study at a single site with patients who had affiliations with our hospital network's primary care physicians (to minimize unrecorded guideline elements), findings may not be generalizable to other EDs. Including only patients with primary care providers within our health care network, which includes over 1000 affiliated primary care doctors, may have introduced bias toward patients living relatively locally, as well as with patients who have regular medical care.

CONCLUSIONS

The current evaluation of older adult fallers in the ED is discordant with general and ED-specific fall guidelines. Older adult falls are a challenge for the entire health care system. Future studies should examine how to intervene after an abnormality is found on the falls assessment. EDs are an ideal place to intervene given that older adults present there so frequently with falls, and they may be more open to interventions because of their visits. While ED screening needs to be improved, further research is needed to determine which factors are modifiable and amenable to ED interventions or need to be referred for outpatient evaluation and whether they can improve outcomes for older adult patients in the ED.

Acknowledgments

Funded by the Hartford Foundation's Center of Excellence.

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Table 1

Demographics of Elderly Fallers

Guideline Items Reported	Overall (n = 350)	0–3 Items (n = 97)	4–6 Items (n = 181)	7 Items (n = 72)	p-value
Age (yr), mean (95% CI)	80.1 (79.2–81.0)	77.9 (76.4–79.5)	80.0 (78.7–81.3)	83.2 (81.2–85.1)	0.0006
Charlson comorbidity index, mean ($\pm$ SD)	7.6 ($\pm$ 2.9)	6.9 ($\pm$ 2.9)	7.8 ($\pm$ 2.9)	8.2 ($\pm$ 2.9)	0.013
Sex (male)	35 (30.4–40.7)	39 (29.4–49.6)	34 (27.4–41.7)	33 (22.6–45.4)	0.656
Race/ethnicity					
White	93 (90.3–95.8)	94 (87.0–97.7)	93 (88.7–96.5)	93 (84.5–97.7)	0.98
Black	3 (1.4–5.2)	2 (0.2–7.2)	3 (0.9–6.3)	4 (0.9–11.6)	0.762
Hispanic	3 (1.4–5.2)	3 (0.6–8.7)	3 (0.9–6.3)	3 (0.3–9.7)	>0.99
Asian	1 (0.3–2.9)	1 (0–5.6)	2 (0.3–4.8)	0 (0–5.0)	0.815
Other	0 (0–1.6)	0 (0–3.7)	1 (0–3.0)	0 (0–5.0)	>0.99
Education level					
Completed high school or less	59 (53.5–64.1)	55 (44.2–64.8)	62 (54.4–69.0)	57 (44.7–68.6)	0.471
Completed college or postgraduate	41 (35.4–45.9)	44 (34.2–54.8)	38 (30.5–45.1)	43 (31.4–55.3)	0.489
Not reported	1 (0.3–2.9)	1 (0–5.6)	1 (0–3.0)	0 (0–5.0)	>0.99
Primary language					
English	94 (91.3–96.5)	93 (85.7–97.0)	94 (90.1–97.3)	96 (88.3–99.1)	0.683
Non-English	6 (3.5–8.7)	7 (2.9–14.3)	6 (2.7–9.9)	4 (0.9–11.70)	0.683
Marital status					
Married	38 (32.6–43.0)	44 (34.2–54.8)	37 (30.0–44.5)	31 (20.2–42.5)	0.181
Widowed	32 (26.9–36.9)	30 (21.1–40.0)	30 (23.3–37.0)	39 (27.6–51.1)	0.34
Single	20 (15.9–24.6)	15 (8.9–24.2)	23 (17.3–30.0)	18 (10.0–28.9)	0.275
Divorced	11 (7.6–14.3)	10 (5.1–18.1)	10 (6.0–15.3)	13 (5.9–22.4)	0.833
Residence					
Home with relative(s)	52 (46.6–57.3)	63 (52.5–72.5)	46 (39.0–54.0)	51 (39.3–63.3)	0.032
Home alone	33 (28.2–38.3)	28 (19.2–37.8)	37 (30.0–44.5)	31 (20.2–42.5)	0.262
Assisted living	12 (9.0–16.2)	5 (1.7–11.6)	15 (10.1–20.9)	15 (7.9–25.7)	0.042
Skilled rehab facility	1 (0.3–2.9)	2 (0.2–7.2)	1 (0–3.0)	3 (0.3–9.7)	0.224
Acute rehab facility	0 (0–1.6)	0 (0–3.7)	1 (0–3.0)	0 (0–5.0)	>0.99
Homeless	0 (0–1.6)	0 (0–3.7)	1 (0–3.0)	0 (0–5.0)	>0.99

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Guideline Items Reported	Overall (<i>n</i> = 350)	0–3 Items (<i>n</i> = 97)	4–6 Items (<i>n</i> = 181)	7 Items (<i>n</i> = 72)	p-value
Not reported	1 (0.3–2.9)	2 (0.2–7.2)	0 (0–2.0)	0 (0–5.0)	0.118

Data are reported as % (95% CI) unless otherwise noted.

Table 2**ED Adherence to Guidelines**

GEDG Guideline	AGS Guideline	Our Instrument	ED Adherence, n (%)
Location of fall		Fell indoor/outdoor	282 (81)
Cause of fall	Environmental hazards	Cause of fall	299 (85)
Near/syncope/orthostasis	Postural hypotension	Orthostatic vital signs	43 (12)
Fall in the previous (XX time)	Two or more falls in prior 12 months	Was fall history asked about?	79 (23)
Time spent on the floor or ground		Time of floor/ground noted	13 (4)
Melena		Asked about recent melena	10 (3)
Visual or neurological impairments	Other neurological impairments	Patient evaluated for sensory deficits	220 (63)
	Visual acuity	Was baseline vision asked about	3 (1)
	Heart rate and rhythm	ECG	127 (36)
Activities of daily living		Evaluation of ADLs	150 (43)
		Evaluation of IADLs	148 (42)
Difficulty with gait and/or balance	Difficulty with walking or balance	Gait evaluation	59 (17)
	Evaluate gait and balance	Balance evaluation	4 (1)
Appropriate footwear	Feet and footwear	Foot problems	5 (1)
Presence/absence of proximal motor strength		Proximal motor strength evaluated	52 (15)
	Muscle strength	Muscle weakness	168 (48)

ADL = activities of daily living; AGS = American Geriatric Society; ECG = electrocardiogram; GEDG = Geriatric Emergency Department Guidelines; IADL = instrumental activities of daily living.

Table 3

Disposition From the ED

Guideline Items Reported	Overall (<i>n</i> = 350)	Number of Items			p-value
		0–3 Items (<i>n</i> = 97)	4–6 Items (<i>n</i> = 181)	7 Items (<i>n</i> = 72)	
Discharge to place of preadmission residence	53 (48.4–58.7)	86 (77.0–91.90)	50 (42.2–57.2)	19 (11.0–30.5)	<0.001
Admit to hospital	26 (21.7–31.2)	4 (1.1–10.2)	31 (24.8–38.8)	43 (31.4–55.3)	<0.001
Transfer to observation	19 (15.2–23.7)	9 (4.3–16.9)	17 (11.9–23.4)	38 (26.4–49.7)	<0.001
Discharge to (new) nursing home	1 (0.3–2.9)	1 (0–5.6)	2 (0.3–4.8)	0 (0–5.0)	0.815

Data are reported as % (95% CI).