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Differences in fall-related emergency departments visits with and without an Injury, 2018

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Abstract

Background: Falls, with or without an injury, often affect the health of older adults (65+).

Methods: We used the 2018 Healthcare Cost and Utilization Project to describe older adults' fall-related ED visits. We defined fall-related ED visits as those with a fall external cause of morbidity code and fall-injury related ED visits as those with an injury diagnosis code and a fall external cause of morbidity code. Percentages of fall-related and fall-injury related ED visits were analyzed by select characteristics.

Results: Over 86% of fall-related ED visits were fall-injury related. A higher percentage of females (87%) and rural (88%) older adults' fall-related ED visits were fall-injury related compared to males (85%) and urban older adults (86%). A higher percentage of fall-related ED visits without a coded injury (33%) were hospitalized compared to those with a coded injury (29%).

Conclusion: The majority of fall-related ED visits included an injury diagnosis.

Practical applications: Researchers can consider which method of measuring ED visits related to falls is most appropriate for their study. Limiting fall-related ED visits to only those where an injury diagnosis is also present may underestimate the number of fall-related ED visits but may be appropriate for researchers specifically interested in fall injuries.

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Practical applications

Including only visits with a documented injury diagnosis may underestimate the number of fall-related ED visits among older adults but may be appropriate if researchers are measuring the impact of fall injuries specifically. Researchers using ICD-10-CM codes to analyze fall-related ED visits should consider which method is most appropriate for their study.

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Previous presentations of the work

None.

Keywords

Elderly; Fall injuries; Falls; ICD-10-CM; Older adults

1. Introduction

Falls among older adults (aged 65 and older) impose a significant burden on healthcare systems. Older adult falls result in over three million emergency department (ED) visits annually (Centers for Disease Control and Prevention [CDC] 2013). Injuries from falls include bruises and scrapes and more serious injuries such as traumatic brain injuries and hip fractures (Bentler et al., 2009; Haddad, Shakya, Moreland, Kakara, & Bergen, 2020; Peterson, Xu, Daugherty, & Breiding, 2019). Falls that do not result in physical injury can result in psychological effects, such as fear of falling, and may produce prolonged disability, loss of independence, and declining mental and physical health (Scheffer, Schuurmans, van Dijk, van der Hooft, & de Rooij, 2008; Schoene et al., 2019).

Surveillance of older adult falls rely on records from ED visits and hospitalizations. The International Classification of Disease 10th revision Clinical Modification (ICD-10-CM) is used in healthcare systems to document morbidity. Older adult falls are characterized by two types of ICD-10-CM codes: injury diagnosis codes and external cause of morbidity codes. Injury diagnosis codes provide information about the type of injury (e.g., hip fracture) and external cause of morbidity codes describe the mechanism of injury (e.g., fall, motor vehicle crash). External cause of morbidity codes mainly provide information about injuries, however they can be used with any diagnosis code. For example, overexertion leading to a heart attack may have a diagnosis code of heart attack and an external cause of morbidity code of overexertion, without a documented injury (Centers for Medicare and Medicaid Services [CMS] and National Center for Health Statistics [NCHS], 2021). The surveillance case definition for fall-related ED visits using ICD-10-CM includes any visit with an external cause of morbidity code for a fall, regardless if there is an injury diagnosis code documented (Hedegaard, Johnson, & Ballesteros, 2017). This differs from previous definitions that define fall-related ED visits as visits where both an injury diagnosis and a fall external cause of morbidity code are included (Moreland, Burns, & Haddad, 2021). The objective of this study is to describe the difference between fall-related ED visits (without recorded injury) and fall-injury related ED visits (with coded injury) among older adults.

2. Methods

We analyzed data from the 2018 Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), to describe fall-related ED visits among older adults (Agency for Healthcare Research and Quality [AHRQ], 2021). HCUP-NEDS is a nationally representative sample and includes data from over 35 million ED visits from 990 EDs in the United States (AHRQ, 2021). When weighted, this represents approximately 145 million ED visits. Data were obtained from the Agency for Healthcare Research and Quality (AHRQ). Institutional Review Board (IRB) approval is not required because HCUP data-bases are classified as limited data sets. HCUP data is publicly available

for purchase for researchers who complete a data use agreement. Fall-related ED visits were analyzed by sex, age group, urban/rural residence, and disposition.

Fall-injury related ED visits were defined as ED visits with an injury diagnosis code (S00-S99; T07-T34; T36-T50 with a sixth character of 1,2,3,4 except T36.9, T37.9, T39.9, T41.4, T42.7, T43.9, T45.9, T47.9, and T49.9 with a fifth character of 1,2,3,4; T51-T76; T79; and M97; all codes had a 7th character of A,B,C or missing to reflect an initial encounter) in any position. Fall-injury related ED visits also required a fall external cause of morbidity code (V00.11-V00.89 with sixth character of1; W00-W17 where the W16 codes include a sixth character of 2 except W16.4 and W16.9 which must include a fifth character of 2; W18.1-W18.3; and W19; all codes had a 7th character of A or missing to reflect an initial encounter) in any position (Table 1) (Hedegaard et al., 2017; Moreland et al., 2021).

Fall-related ED visits were defined as a visit with a fall documented as an external cause of morbidity in any position, regardless if an injury diagnosis code was present (Table 1). We classified the patient's county of residence urban or rural based on federal classifications (Ingram & Franco, 2013). ED disposition was categorized as the following: treated and released, hospitalized (same hospital or transferred to a different hospital), home healthcare, other transfers (skilled nursing facility, intermediate care, other facilities), or other/unknown (unknown disposition, left against medical advice, transferred to law enforcement). Analysis was limited to adults aged ≥65 years. ED visits in which a patient died were excluded.

Weights from NEDS (AHRQ, 2018) were used to calculate weighted estimates and corresponding 95% confidence intervals using SAS 9.4 survey procedures and SUDAAN (version 11; Research Triangle Institute) to produce estimates representative of the U.S. population and to account for the complex survey design. Rates were calculated using vintage 2018 bridged race population estimates from NCHS (NCHS, 2019). Two-sample t-tests were used to compare rates and Wald chi-squares were used to compare percentages.

3. Results

In 2018, there were an estimated 3,531,165 fall-related ED visits among older adults. Of these, approximately 3,049,421 visits (86.4% of fall-related ED visits) had an injury diagnosis coded in the record (Table 2). Females had a higher rate of fall-injury ED visits (6,850 95% CI: 6,477, 7,223 per 100,000) and fall-related ED visits (7,868 95% CI: 7,442, 8,294 per 100,000) than males (Fall-injury ED visits: 4,523 95% CI: 4,278, 4,768 per 100,000; fall-related ED visits: 5,318 95 %CI: 5,032, 5,604 per 100,000). A larger percentage of older female fall-related ED visits (87.1%; 95% CI 86.6%, 87.5%) included an injury diagnosis code compared to older males (85.1%; 95% CI: 84.5%, 85.6%) (Table 2).

The rates of fall-injury ED visits (3,389 per 100,000 adults aged 65–74 years; 6,816 per 100,000 adults aged 75–84 year; 14,771 per 100,000 adults aged 85 years and over) and the rates of fall-related ED visits (3,934 per 100,000 adults aged 65–74 years; 7,890 per 100,000 adults aged 75–84 years; 17,069 per 100,000 adults aged 85 and over) increased with age (Table 2). The percentages of fall-related ED visits with an injury code did not significantly vary by age group.

Rural older adults had a higher rate of fall-injury ED visits (6,526 95% CI: 6,098, 6,954) compared to urban older adults (5,651 95% CI: 5,290, 6,012). A higher percentage of rural older adults fall-related ED visits included an injury diagnosis (87.5%; 95% CI: 86.8%, 88.1%) compared to urban older adults (86.1%; 95% CI: 85.6%, 86.6%) (Table 2).

A higher percentage of older adults with a fall-injury visit (65.3%; 95% CI: 64.6%, 66.0%) were treated in the emergency department and released compared to those with a fall-related ED visit without a coded injury (57.9%; 95% CI: 56.5%, 59.4%) (Fig. 1). A higher percentage of fall-related ED visits among older adults without an injury coded were hospitalized (32.7%; 95% CI:31.2%, 34.2%) or were transferred to another facility such as a skilled nursing facility (7.1%; 95% CI: 6.5%, 7.6%) compared to those with a fall-injury visit (hospitalized: 28.5%; 95% CI:27.9%, 29.1%; transferred to other facility: 5.0%; 95% CI:4.7%, 5.3%) (Fig. 1).

4. Discussion

Over 86% of fall-related ED visits were among older adults who had an injury diagnosis. Defining an ED visit as fall-related only when an injury diagnosis code is included may underestimate the burden falls have on EDs up to 14%. Current coding guidance allows for use of external cause of morbidity codes with any diagnosis code (CMS & NCHS, 2021). In a study of sport-related injuries, about 6% of sport-related ED visits were coded using external cause of morbidity codes without an injury diagnosis (Weiss & Elixhauser, 2016). Common non-injury diagnoses coded along with sports-related injuries included joint disorders, headache, and syncope. These diagnosis codes could be associated with fall external cause of morbidity codes in the absence of a coded injury. For example, if the fall resulted in joint pain but not a contusion or fracture it would only be included if fall-related ED visits were not limited to those with a diagnosed injury.

We found a higher percentage of fall-related ED visits without an injury diagnosis were hospitalized compared to fall-injury ED visits with an injury diagnosis included. In 2018, the leading causes of hospitalizations among older adults were septicemia and heart failure (AHRQ, 2018). It is possible that these conditions may cause the patient to collapse, which could be documented as a fall. This could contribute to the higher percentage of non-injurious falls requiring hospitalization that we observed in the data. These types of falls may not be prevented by traditional fall prevention interventions such as strength and balance exercises, or home modifications (Gillespie et al., 2012).

We found that a higher percent of female fall-related ED visits and a higher percent of rural older adults fall-related ED visits were associated with injury diagnosis compared to males and urban older adults, respectively. Previous studies reported that most fall-related ED visits in community-dwelling older adults were for females (Haddad et al., 2020), and that females have higher rates of reported fall injuries compared to males (Haddad et al., 2020; Moreland, Kakara, & Henry, 2020). Rural older adults also report higher rates of falls compared to urban adults (Moreland et al., 2020). Rural adults may lack access to primary care services and rely more on the ED compared to urban counterparts or may be more likely to delay or avoid care for non-urgent injuries (Venkatesh et al., 2020).

This study has several limitations. First, by design, our study excluded deaths and limited visits to only initial encounters, therefore our results should not be used to estimate the overall burden of fall-related ED visits. Additionally, external cause of morbidity codes are missing for about 10% of injury-related ED visits leading to further underestimations of fall-related ED visits, regardless if an injury diagnosis code was present. Second, because we did not limit disposition to treated and released, our findings may differ from other studies using the same dataset. Third, data from EDs, including a patient's chief complaint and notes from providers could better describe circumstances around fall-related ED visits without an injury diagnosis, however these data are not available from HCUP-NEDS.

5. Conclusion

Most fall-related ED visits included an injury diagnosis. A higher percentage of older female fall-related ED visits included an injury diagnosis compared to older male visits. Additionally, a higher percentage of rural older adult's fall-related ED visits included an injury compared to urban older adult's visits. A higher percentage of older adults with a visit without an injury coded were hospitalized compared to older adults with a fall injury visit. Future studies that investigate chief complaints, notes from providers, and additional diagnosis codes used in conjunction with fall cause of morbidity codes are needed to better describe fall-related ED visits in the absence of an injury diagnosis code.

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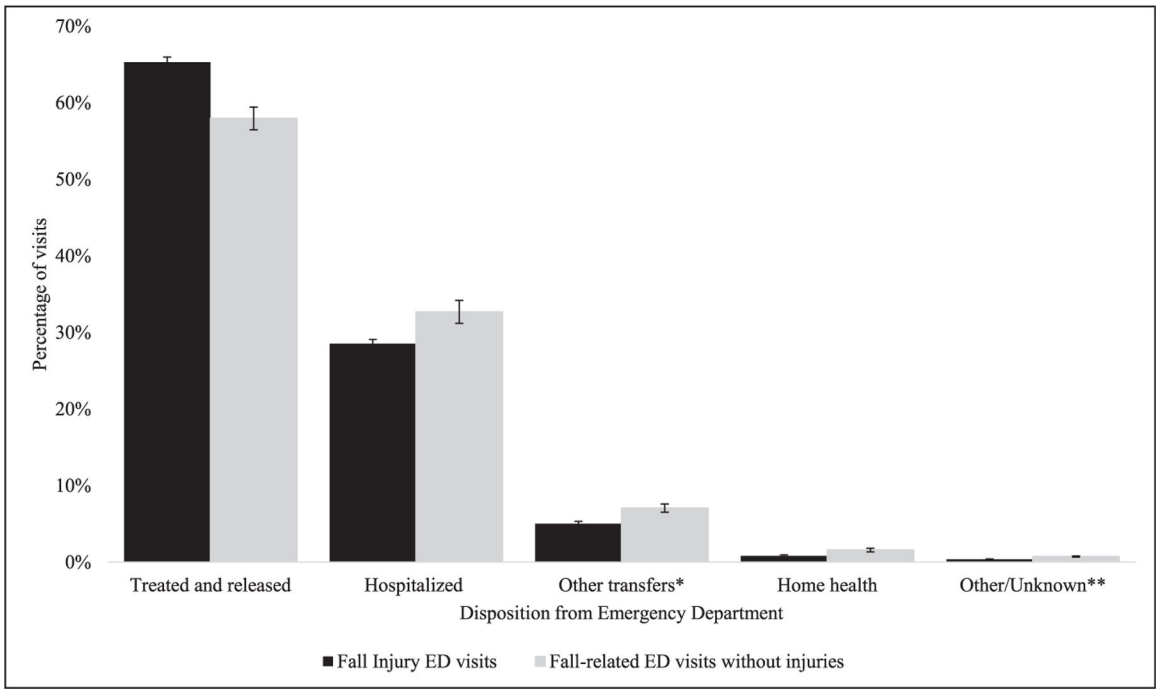

Fig. 1.

Percentage of fall-related ED visits with and without an injury diagnosis among older adults by disposition, Healthcare Cost and Utilization Project-Nationwide Emergency Department Sample, 2018, *Transfer to skilled nursing facility, intermediate care, or other facility, **Unknown disposition, against medical advice, or discharged/transferred to court/law enforcement.

Table 1

International classification of diseases, 10th revisions, clinical modification (ICD-10-CM) coding for fall-related and fall-injury related ED visits.

	Diagnosis Codes [a]	**External Cause of Morbidity Codes** [b]
Fall-injury ED Visits [c]	• S00-S99 • T07-T34 • T36-T50 *Must include a sixth character of 1,2,3,4 except T36.9, T37.9, T39.9, T41.4, T42.7, T43.9, T45.9, T47.9, and T49.9 which must include a fifth character of 1,2,3,4* • T51-T76 • T79 • M97	• V00.11-V00.89 *Must include sixth character of 1* • W00-W17 *W16 codes must include a sixth character of 2 except W16.4 and W16.9 which must include a fifth character of 2.* • W18.1-W18.3 • W19
Fall-related ED Visits [c]	Any Diagnosis Code	• V00.11-V00.89 *Must include sixth character of 1* • W00-W17 *W16 codes must include a sixth character of 2 except W16.4 and W16.9 which must include a fifth character of 2.* • W18.1-W18.3 • W19

[a] 7th character of A, B, C, or missing reflects an initial encounter.

[b] 7th character of A or missing reflects an initial encounter.

[c] Diagnosis and external cause of morbidity codes can occur in any position.

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Table 2

Rates and percentages of nonfatal fall-related emergency department (ED) visits with and without an injury diagnosis among older adults, Healthcare Cost and Utilization Project-Nationwide Emergency Department Sample, 2018.

	Fall-injury ED visits			Fall-related ED visits without injuries			Total fall-related ED visits	
	Weighted N	Rate* (95% CI)	% (95% CI)	Weighted N	Rate* (95% CI)	% (95% CI)	Weighted N	Rate* (95% CI)
Total **	**3,049,421**	**5,816 (5,501, 6,131)**	**86.4 (85.9, 86.8)**	**481,744**	**919 (861, 977)**	**13.6 (13.2, 14.1)**	**3,531,165**	**6,735 (6,373, 7,097)**
Sex								
Male	1,054,262	4,523 (4,278, 4,768)	85.1 (84.5, 85.6)	185,295	795 (744, 846)	14.9 (14.4, 15.5)	1,239,557	5,318 (5,032, 5,604)
Female	1,995,050	6,850 (6,477, 7,223)	87.1 (86.6, 87.5)	296,432	1,018 (953, 1,083)	12.9 (12.5, 13.4)	2,291,482	7,868 (7,442, 8,294)
Age Group								
65–74	1,033,431	3,389 (3,216, 3,563)	86.2 (85.6, 86.7)	166,099	545 (508, 581)	13.8 (13.3, 14.4)	1,199,530	3,934 (3,733, 4,135)
75–84	1,049,307	6,816 (6,444, 7,188)	86.4 (85.9, 86.9)	165,262	1,074 (1,005, 1,142)	13.6 (13.1, 14.1)	1,214,569	7,890 (7,462, 8,317)
85+	966,683	14,771 (13,885, 15,657)	86.5 (86.1, 87.0)	150,383	2,298 (2,147, 2,449)	13.5 (13.1, 14.1)	1,117,066	17,069 (16,054, 18,083)
Urban/Rural								
Urban	2,456,575	5,651 (5,290, 6,012)	86.1 (85.6, 86.6)	396,596	912 (847, 978)	13.9 (13.4, 14.4)	2,853,171	6,564 (6,149, 6,978)
Rural	584,844	6,526 (6,098, 6,954)	87.5 (86.8, 88.1)	83,884	936 (853, 1,019)	12.5 (11.9, 13.2)	668,729	7,462 (6,970, 7,954)

*Crude rate per 100,000 older adults.

**Columns may not add to the total due to missing values for sex or urban/rural status.