Begin risk assessment for falls in women at 45, not 65

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ABSTRACT

The clinical and epidemiological literature provides guidelines for fall prevention starting at age 65; however, the focus on age ≥65 is not evidence based. Therefore, this study examined state-wide North Carolina emergency department visit data to examine the characteristics of falls across the age spectrum, identify the age at which the incidence of fall-related emergency department visits started to increase and determine whether these trends were similar for men and women. We determined that incidence rates of fall-related emergency department visits began to increase in early middle age, particularly for women. Since fall risk assessment and prevention activities should be initiated prior to an injurious fall, we recommend beginning these activities before age 65.

INTRODUCTION

According to the CDC, falls are a top three leading cause of unintentional injury death starting with adults 35 years of age and older.[1] While the literature is replete with epidemiological reports on the risk assessment, morbidity and mortality of falls in the 'elderly' population, typically defined as ≥65 years of age, few studies have examined falls across the lifespan. Studies typically assess risks and outcomes in those ≥65 years of age, or in those with psychomotor disabilities.[2–5] Rather than based on scientific evidence, fall injury risk screening appears to be driven primarily by Medicare requirements.[6] The few studies that have examined fall morbidity across the lifespan have relied on data older than 10 years and/or survey data.[7 8] In addition, few studies have identified the age at which the risk of having a fall requiring medical attention begins to increase, and if this risk differs by sex. Furthermore, risk factors of falling, such as type II diabetes and other health comorbidities, are increasing in prevalence among younger individuals.[9 10] Therefore, we questioned the appropriateness of fall risk assessment based on the definition of 'elderly' in the USA. In order to better identify the age at which to begin risk assessment activities for fall prevention, we examined state-wide North Carolina (NC) emergency department (ED) visit data.

METHODS

We conducted a descriptive epidemiological study using ED visit data obtained from NC's state-wide syndromic surveillance system, NC DETECT. During the years 2010–2014, NC DETECT collected ED visit data from all 125 twenty-four-seven, acute care, hospital-affiliated, civilian EDs, capturing over 99% of all ED visits in the state.[11]

We examined all ED visits from 1 January 2010 to 31 December 2014 that met the CDC's National Center for Injury Prevention and Control's definition of a fall with unintentional intent (E880.0–E886.9, E888).[12] We assessed fall incidence rates in adults beginning with age 20, the age which typically defines young adulthood and at which people have maximal muscle strength.[12] We used the National Center for Health Statistics Bridged Race Population estimates for the denominator in all rate calculations.[13]

We performed analyses using SAS V.9.4 (SAS Institute), calculating frequency tables and unadjusted annual incidence rates with 95% CIs.

RESULTS

From 2010 to 2014, NC DETECT collected records for 18.5 million ED visits among adults >20 years of age, of which 986 024 ED visits (5.3%) were fall related. Table 1 displays the average annual incidence rate of fall-related ED visits among the NC population stratified by sex and age group. Among adults >20 years of age, the average annual incidence rate of fall-related ED visits was 27.4 (95% CI 27.4 to 27.5) ED visits/1000 person-years. The average annual incidence rate was 55% greater among women (33.0 (95% CI 32.9 to 33.1) ED visits/1000 person-years) than among men (21.3 (95% CI 21.3 to 21.4) ED visits/1000 person-years).

Throughout the adult lifespan, fall incidence rates in women exceeded those in men (figure 1). For the age group 20–44, fall rates in women were 23% higher than in men. Starting at age 45, fall rates in women continued to exceed fall rates in men, climbing each year, while rates in men remained stable until after age 65.

DISCUSSION

Our study suggests that falls are an important cause of morbidity and mortality in all age groups. However, starting in the decade between ages 45 and 55, the risk of having a fall requiring medical treatment in the ED begins to increase, particularly in women. This contrasts with men, for whom the risk of having a fall requiring treatment in the ED does not begin to increase until around age 65.

While the incidence rate of fall-related ED visits increases with age, this is just one measure of describing the fall burden among adults. For example, the CDC WISQAR's estimated annual

Table 1 Frequencies and population-based incidence rates of emergency department visits due to falls stratified by sex and age group among adults >20 years of age: North Carolina, 2010–2014

	20–44 years (n=319 291)	45–64 years (n=276 146)	65–84 years (n=266 101)	≥85 years (n=124 486)	Total (n=986 024)
Sex					
Women, n (%)	176 788 (55.4)	166 257 (60.2)	181 243 (68.1)	97 726 (76.1)	619 014 (62.8)
Men, n (%)	142 489 (44.6)	109 873 (39.8)	84 836 (31.9)	29 756 (23.9)	366 954 (37.2)
Missing (sex)	14	16	26	4	56
	Unadjusted incidence rates per 1000 person-years (95% CI)				
Sex					
Women	21.5 (21.4 to 21.6)	24.9 (24.8 to 25.0)	55.0 (54.8 to 55.3)	178.4 (177.3 to 179.5)	33.0 (32.9 to 33.1)
Men	17.6 (17.5 to 17.7)	17.8 (17.7 to 17.9)	32.0 (31.8 to 32.3)	119.0 (117.7 to 120.4)	21.4 (21.3 to 21.4)
Total	19.5 (19.5 to 19.6)	21.5 (21.4 to 21.5)	44.8 (44.6 to 45.0)	156.0 (155.2 to 157.0)	27.4 (27.4 to 27.5)

average combined medical and work loss costs (in 2010 dollars) for a non-fatal ED visit due to an unintentional fall was $6831, $6504, $4486 and $4001 for adults aged 20–44, 45–64, 65–84 and ≥85 years, respectively. While medical costs increased with age, this increase was offset by reductions in work loss costs.[14]

To date, very little has been reported regarding falls in non-elderly adults, men or women.[15] Risk assessment and fall prevention efforts focus on older adults; the American Geriatrics Society, British Geriatrics Society and CDC guidelines all advocate fall risk screening in those ≥65 years of age.[16] Falls are typically assumed to be an affliction of the frail, elderly or those with underlying psychomotor dysfunction. However, many fall-related risk factors, such as lack of physical activity, poor muscle strength, low body mass index, low calcaneal bone mineral density and certain prescription medications, are not limited to the elderly.[17] Among women, the relative frequency of these risk factors increases after menopause.[18] Expanding the scope of fall risk injury screening would be the first step to prevent unintentional injury. One potential screening option would be to adapt the popular CDC Stopping Elderly Accidents, Deaths, and Injuries programme to the non-elderly at-risk population.[19] Information and fall screening tools contained in the primary care electronic health record could be leveraged to screen younger patients in a primary care setting with minimal additional resource utilisation.

Limitations

NC DETECT ED visit data are collected primarily for hospital administrative purposes. Their use for public health surveillance is a secondary function. However, in our analyses, missing data for key variables such as age, sex and discharge disposition were low (<5%).

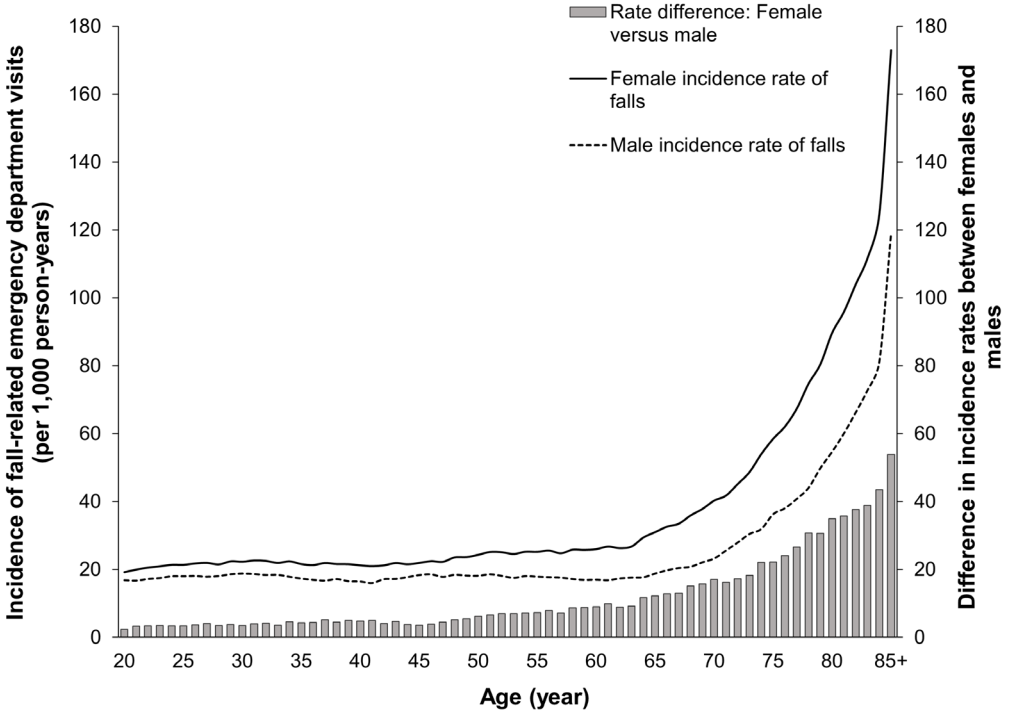

Figure 1 Population-based incidence rates (per 1000 person-years) and rate differences of fall-related emergency department visits among adults >20 years of age: North Carolina, 2010–2014.

A second limitation is generalisability. While the use of state-wide population-based data has many inherent benefits, results from this study may not be generalisable to all US jurisdictions. However, similar to NC, most states have a rapidly ageing population and will need to consider the implications for fall prevention.[20]

CONCLUSION

Fall risk assessment should begin with middle-aged women, so that prevention strategies, including gait, balance and strength training, can be initiated *before* fall risk accelerates. Our study suggests that waiting until age 60 or 65 to screen for fall risk is too late for women; or alternatively, that screening should begin much earlier, about age 45 for women.

What is already known on the subject

- Falls are a major cause of injury morbidity and mortality among adults.
- Fall screening and other prevention programmes have been demonstrated to reduce fall morbidity and mortality; however, these activities are rarely initiated in adults under the age of 65.

What this study adds

- This study examined the incidence of fall-related emergency department visits across the lifespan.
- Throughout the entire adult lifespan, the incidence of fall-related emergency department visits among women exceeded the rate of fall-related emergency department visits among men.
- The incidence of fall-related emergency department visits started to increase in early middle age among women and somewhat later for men.

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Contributors AH, AEW, AI and JET conceived the work. KJH performed the statistical analyses and drafted the first version of the manuscript. AH, AEW, AI and JET assisted with the literature review, contributed to the interpretation of the results and assisted with manuscript revisions. All authors approved the submitted version of the manuscript.

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Disclaimer The NC DETECT Data Oversight Committee does not take responsibility for the scientific validity or accuracy of methodology, results, statistical analyses or conclusions presented.

Competing interests None declared.

Patient consent Not required.

Ethics approval The study was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill. This study was also reviewed and approved by the North Carolina Division of Public Health.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement The data used in this study are owned by the North Carolina Division of Public Health and are not available for sharing.

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