RESEARCH LETTER

Prevalence and risk factors for falls and fall-related injuries in the 2018 National Post-acute and Long-term Care Study

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INTRODUCTION

Falls and related injuries are common and cause significant morbidity and mortality in older adults living in long-term care settings.[1] However, prior epidemiological estimates of falls in this setting are nearly 30 years old and not nationally representative.[2] Contemporary representative data are needed to inform research and policy related to falls. Thus, we evaluated the prevalence and characteristics associated with falls and fall-related injuries using a nationally representative sample of residential care community (RCC) residents in the United States.

METHODS

This study used publicly available data at the resident level from the National Post-acute and Long-term Care Study (NPLTCS), conducted by the National Center for Health Statistics in the US. The NPLTCS draws from a random sample of licensed RCCs in each of the 50 states and the District of Columbia. To be eligible, RCCs had to be state regulated; have four or more beds; provide room, board and meals, 24-hour on-site supervision, and help with personal care or health-related services. RCCs exclusively serving mentally ill, intellectually or developmentally disabled populations were excluded. Two residents were randomly selected from eligible RCCs that agreed to participate. The questionnaire was directed to the administrator at the RCC and conducted via computer-assisted telephone interviews.[3] In this cross-sectional analysis, we used the 2018 survey (conducted between July 2018 and February 2019), including 904 residents from 419 RCCs.[3] Survey weights were applied to yield national estimates for RCCs in the US population.[4]

We conducted descriptive statistics and logistic regression analyses using "svyset" in Stata (MP16).[3] Odds ratios (ORs) and 95% confidence intervals (CIs) were used to estimate residents' demographic or clinical characteristics associated with (1) falls and (2) fall-related injuries, both of which were defined as an occurrence in the past 90 days at the RCC.

RESULTS

After excluding residents with missing values for falls, the final sample included 876 RCC residents, representing a national sample of 895,068 residents. Table 1 describes the sample characteristics overall and by fall status, with mean age of 83.3 years. The prevalence of falls during the past 90 days at the RCC was 26.4%. The occurrence of falls did not differ by sex, race, use of

TABLE 1 Characteristics of the study population

Characteristics or risk factors	Whole sample	Falls	Without falls
Weighted count (observation)	895,068 (876)	264,604 (231)	630,464 (645)
Age (years, standard error)	83.3 (0.5)	84.4 (0.8)	82.8 (0.7)
Sex (%)			
Male	33.1	34.3	32.5
Female	67	65.7	67.5
Race			
White	89.6	89.8	89.6
Black	5.7	5.7	5.7
Hispanic	1.9	0.6	2.5
Others	2.8	4	2.3
Medicaid			
Users	19.5	23.7	17.8
Non users	80.5	76.3	82.3
Number of medications used			
Non-polypharmacy (0–4 meds)	20.3	13.2	23.1
Polypharmacy (5–8 meds)	28.4	25.6	29.6
Hyperpolypharmacy (9+ meds)	51.3	61.2	47.3
Katz ADL scores			
Independent (ADL:6)	16.2	3.7	21.6
Partially dependent (ADL:3–5)	37.8	37	38.1
Dependent (ADL: 2 or less)	46	59.4	40.3
Walking aid			
Need no assistance	31.6	21.2	35.9
Need help or supervision from another person or assistive device or both	68.4	78.8	64.1
Vision impairment			
No vision problem	52.7	48.6	54.4
Some or a lot of vision problems	47.3	51.4	45.6
Cognitive impairment			
No difficulty	32.8	20.4	38.1
Some or a lot of difficulties	67.2	79.6	61.9
Hospital overnight stay or ED admission in past 12 months			
No	68.6	62.2	71.3
Yes	31.4	37.8	28.7
Presence of any verbal or behavioral symptoms			
No	90.4	86.3	92.1
Yes	9.6	13.7	7.9
Number of comorbidities			
0–1	21.2	14.9	23.9
2–5	69.1	73.5	67.3
6 or above	9.7	11.6	8.9
Fall-related injuries			
Yes (minor or major injuries)	10.8	36.4	0
No	89.3	63.6	100

Medicaid, visual impairment, or number of comorbidities. However, a greater proportion of those with falls were prescribed polypharmacy ≥9 medications, dependent per the Katz Index of Independence in Activities of Daily Living (Katz ADL score), requiring a walking aid, or having impaired cognitive function. Additionally, those who fell had a marginally higher proportion of hospital overnight stays or emergency department (ED) visits or had aggressive verbal or behavioral symptoms. Among those who had fallen, 36.4% had fall-related injuries.

Multivariable logistic regression results for falls and fall-related injuries are presented in Table S1. Those who were dependent or partially dependent, measured by the Katz ADL score, had approximately 3.5- and 4.0-fold increased odds of falling, respectively, than those who were independent in daily living. For fall-related injuries, those who were Black residents (OR: 2.07; 95% CI: 1.39, 7.89), with cognitive impairment (OR: 3.88; 95% CI: 1.73, 8.84), experienced a hospital overnight stay or ED visit in the past 12 months (OR: 1.23; 95% CI: 1.82, 7.02), or had 2–5 comorbidities (OR: 3.00; 95% CI: 1.11, 8.11) were more likely to have fall-related injuries.

Subgroup analysis among those with dementia (n = 280, representing 247,021 residents) showed that taking antipsychotics increased the odds of falls more than twofold than those not taking antipsychotics (OR: 2.33; 95% CI: 1.11, 4.90).

DISCUSSION

In this nationally representative cross-sectional study, we found that over one-quarter of RCC residents sustained a fall in the past 90 days, of which over one-third resulted in injury. Our study contributes to the epidemiology of falls in the long-term care setting in recent years. While it is well-known that approximately one-third of community-dwelling older adults report a fall each year, less is known about fall prevalence in long-term care.[5,6] Falls often have serious consequences, especially in frail older residents. Moreover, fall-related injuries reduce the ability to function normally and our analysis shows over 3-fold increased risk of ED visits or hospitalization.

We found that functional and cognitive impairment, multimorbidity, and antipsychotic use increased the likelihood of falls and fall-related injuries. Therefore, appropriate management of these acute and chronic conditions, including reducing inappropriate medication use, is a critical aspect of effective falls prevention.[7–9]

Study limitations include the cross-sectional nature, limiting causal inference for fall risk factors. However,

the survey was obtained through a complex, multistage sample design to capture a national representation of RCC residents. Fall-related injuries were not validated by hospital or ED records. While extrinsic risk factors were not available in the survey, various clinical indicators such as Katz ADL score, vision impairment, walking aid, or cognitive function may negate the confounding concern due to environmental hazards.

In conclusion, our analysis suggests a high national prevalence of falls and fall-related injuries in US RCCs, with over one-quarter of residents having a fall in the past 90 days. In addition, dependence in daily activities and cognitive impairment were key risk factors for falls.

AUTHOR CONTRIBUTIONS

Zachary Marcum and Edwin Tan conceptualized and designed the study. Edwin Tan and Zhaoli Dai acquired study data. Analysis was performed by Zhaoli Dai. All authors participated in drafting and finalizing the manuscript for submission.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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The study was not sponsored by any agency or organization.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Table S1 Odds ratios (95% CI) for the risk factors in association with falls and fall-related injuries