

# Revisit, Subsequent Hospitalization, Recurrent Fall, and Death Within 6 Months After a Fall Among Elderly Emergency Department Patients

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**Study objective:** We seek to describe the risk during 6 months and specific risk factors for recurrent falls, emergency department (ED) revisits, subsequent hospitalizations, and death within 6 months after a fall-related ED presentation.

**Methods:** This was a secondary analysis of a retrospective cohort of elderly fall patients who presented to the ED from one urban teaching hospital. We included patients aged 65 years and older who had an ED fall visit in 2012. We examined the frequency and risk factors of adverse events (composite of recurrent falls, ED revisits, subsequent hospitalization, and death, selected a priori) at 6 months.

**Results:** Our study included 350 older adults. Adverse events steadily increased, from 7.7% at 7 days, 21.4% at 30 days, and 50.3% at 6 months. Within 6 months, 22.6% of patients had at least one recurrent fall, 42.6% revisited the ED, 31.1% had subsequent hospitalizations, and 2.6% died. In multivariable logistic regression analysis, psychological or sedative drug use predicted recurrent falls, ED revisits, subsequent hospitalizations, and adverse events.

**Conclusion:** More than half of fall patients had an adverse event within 6 months of presenting to the ED after a fall. The risk during 6 months of these adverse events increased with psychological or sedative drug use. Larger future studies should confirm this association and investigate methods to minimize recurrent falls through management of such medications. [Ann Emerg Med. 2017;■:1-6.]

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## INTRODUCTION

### Background

Fall and fall-related injuries are a major public health problem and a leading cause of morbidity and mortality among elderly patients.<sup>1</sup> Fall-related death rates have increased among older persons worldwide. Furthermore, serious injuries after a fall, such as hip fractures, subdural hematomas, serious soft tissue injury, and head injury, occur in 5% to 11% of older individuals.<sup>2</sup>

### Importance

The emergency department (ED) is often the first place where patients with fall-related injuries receive care. Approximately 2.4 million older adults visit the ED each year, and more than 28% of these patients are admitted to the hospital.<sup>3</sup> Overall, 16% of elderly ED patients experience adverse events within 30 days of discharge, and 27% experience adverse events within 90 days.<sup>4</sup> One study found that indoor falls, hospital

admissions, and a Barthel Index of activities of daily living less than or equal to 18 were associated with increased 1- and 3-year mortality rates after patients visited the ED.<sup>5</sup> A recently published large database study identified that male sex and comorbidities increased ED revisit and death within 1 year.<sup>6</sup> However, to our knowledge there is no ED-based study that examines how risk factors according to recent geriatric ED guidelines predict recurrent falls, as well as subsequent ED visits, subsequent hospitalizations, and death, after a visit to the ED for a fall among older adult patients.

### Goals of This Investigation

The objective of this study was to determine the risk during 6 months and specific risk factors for recurrent falls, ED revisits, subsequent hospitalizations, and death within 6 months after an older adult ED fall visit.

**Editor's Capsule Summary***What is already known on this topic*

There are few studies quantifying risk factors for outcomes of elderly patients presenting to the emergency department (ED) after a fall.

*What question this study addressed*

This was a retrospective evaluation of 350 patients aged 65 years and older who presented after a fall at a single hospital. Within 6 months of ED discharge, 23% of patients had recurrent falls, 43% had recurrent ED visits, and 32% had subsequent hospitalizations; 50% had the composite outcome of these 3 events.

*What this study adds to our knowledge*

In addition to confirming diabetes and polypharmacy as risk factors, prescribed psychoactive or sedating medications were predictive of the composite outcome. A history of fractured hip or falls in the past 3 months was predictive of recurrent falls, but not subsequent use of the ED or hospital.

*How this is relevant to clinical practice*

This study reinforces that there is an influence of psychoactive or sedating medications on adverse outcomes after a fall.

**Methods of Measurement**

The instruments of this study were adapted from geriatric ED guidelines<sup>8</sup> and the American Geriatrics Society/British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons<sup>9</sup> (Appendix E1, available online at <http://www.annemergmed.com>). Data were abstracted from medical records after training by one emergency physician and one research assistant who were not blind to the study hypothesis. We collected key history elements of the elderly ED fall patients' data, which included the location of fall, specific comorbidities, dementia, Parkinson's disease, stroke, diabetes, previous hip fracture, depression, fall history, loss of consciousness or alteration of mental status immediately before or after the fall, activities of daily living, previous visual acuity test within 1 year, alcohol consumption, vitamin D or calcium supplement, polypharmacy (5 or more medications use), psychoactive or sedative drug use, antidiabetic (noninsulin) drug use, cardiovascular drug use, anticoagulant drug use, and antiepileptic drug use. Key elements of the physical examination included vital signs, an examination of gait, balance, foot problems, orthostatic hypotension, muscle strength, cognition, and sign of apparent trauma. Finally, key elements of the safety assessment before discharge included a physical therapy evaluation before disposition from the ED. We randomly selected 5% of subjects and tested the interrater reliability with  $\kappa$  analysis. The  $\kappa$  value was 0.87 (95% confidence interval 0.63 to 1.00 for signs of apparent external trauma, 0.76 95% confidence interval 0.46 to 1.00 for the cause of fall).

**Outcome Measures**

Primary outcomes, which were determined from medical chart review, were the prevalence of adverse events, which we defined as recurrent falls, ED revisits, subsequent hospitalizations, and death at 7 days, 30 days, and 6 months after the fall, that resulted in medical evaluation. The composite outcome was selected a priori.

We also examined risk factors for these postfall adverse events.

**Primary Data Analysis**

We first determined the distribution of variables; data were presented as mean with SD if normally distributed, medians with interquartile ranges if non-normally distributed, and frequency (percentage) for categorical data. We compared categorical data with  $\chi^2$  or Fisher's exact tests. We then compared patients who had adverse events (composite of recurrent falls, ED revisits,

**MATERIALS AND METHODS****Study Design and Setting**

This study was a secondary analysis of a retrospective cohort study at one urban, academic teaching hospital that explored the standard ED evaluation of elderly fall patients. Details of the study protocol have been described elsewhere.<sup>7</sup> This study was approved by our institutional review board.

**Selection of Participants**

Briefly, eligible subjects were patients aged 65 years and older who had presented to the ED after a fall (*International Classification of Diseases, Ninth Revision* diagnosis E-code of an accidental fall [E880 to E886 and E888]) from January 1, 2012, to December 31, 2012, and had visited a primary care physician affiliated with the hospital network in the past 3 years (to improve the gathering of follow-up data). Patients were excluded if they were transferred from other hospitals to reduce missing data.

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