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Original Study

Effects of Dementia on Postoperative Outcomes of Older Adults With Hip Fractures: A Population-Based Study

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A B S T R A C T

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Objective: To evaluate the association between dementia and postoperative outcomes of older adults with hip fractures.

Design: Population-based, retrospective cohort study.

Setting: Province of Ontario, Canada.

Participants: All individuals with hip fractures who underwent hip fracture surgery in Ontario, Canada between April 1, 2003 and March 31, 2010 were identified. Physician-diagnosed dementia, prior to hip fracture, was identified using a diagnostic algorithm in the administrative databases.

Measurements: The preoperative characteristics of older adults with and without dementia were compared separately for individuals admitted to hospital from community or long-term care (LTC). Multivariable regression was used to compare postoperative health service utilization, time with LTC admission, and mortality for individuals with and without dementia.

Results: A total of 45,602 older adults had hip fractures and individuals with dementia accounted for 23.9% and 83.5% of all hip fractures from the community and LTC settings, respectively. Compared with those without dementia, individuals with dementia were less likely to be admitted to rehabilitation facilities. Among community-dwelling older adults, dementia was associated with an increased risk of LTC admission [hazard ratio (HR) = 2.49, 95% confidence interval (CI): 2.38–2.61, $P < .0001$]. Dementia was also associated with a higher mortality for older adults from community (HR = 1.47, 95% CI: 1.41–1.52, $P < .0001$) and LTC (HR = 1.10; 95% CI: 1.02–1.18, $P = .005$) settings.

Conclusions: Dementia is common among older adults with hip fractures and associated with poor prognosis following hip fracture surgery. Specialized services targeting the growing number of older adults with dementia may help to prevent hip fractures and optimize postoperative care for this vulnerable population.

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The prevalence of dementia is increasing in most developed countries,^{1,2} and there is a growing need for services to support this population. Given the advanced age at which most individuals develop dementia,³ older adults with dementia have 4 chronic medical conditions⁴ and are prescribed between 5 and 12 medications^{5,6} highlighting their medical complexity. When compared with other populations of older adults, those with dementia have higher rates of outpatient visits to family physicians,^{4,7} greater number of emergency room (ER) visits,^{4,8} higher rates of hospitalization,^{4,7,8} and more prolonged hospital stays.^{8,9} Following hospitalization, older adults with dementia are also at risk for poor outcomes including increased rates of functional decline,¹⁰ higher rates of admission to long-term care (LTC) facilities¹¹ and increased mortality.¹²

Hip fractures are a common acute health condition among older adults and may be particularly challenging to manage among individuals with dementia. Approximately 19% of all older adults with hip fractures have dementia, and up to 40% of individuals with hip fractures having some degree of cognitive impairment that may not meet criteria for dementia.¹³ Individuals with dementia are at increased risk for hip fractures¹⁴ due to their high risk of falls,^{15,16} high prevalence of osteoporosis,¹⁷ and poor preventative care¹⁸ compared with older adults without dementia. They are susceptible to postoperative complications such as delirium¹⁹ and may have reduced access to postoperative rehabilitation²⁰ following hip fracture compared with individuals without dementia.

However, there have been few large-scale population-based studies of dementia in hip fracture populations, and little is known of the perioperative health service utilization, time to LTC admission, and mortality for individuals with dementia. A better understanding of the impact of dementia on outcomes for older adults with hip fractures will help inform strategies to optimize care for this population and provide important prognostic information for clinicians, patients, and their caregivers. In the current study, we evaluated the postoperative clinical course of older adults with dementia who underwent hip fracture surgery and compared this with older adults with hip fractures who did not have dementia.

Methods

Data Sources

We used several linked population-based administrative health-care databases available at the Institute for Clinical Evaluative Sciences in Toronto, Ontario, Canada. Each resident in Ontario has a unique identifier based on their health insurance number that is recorded in each of the databases used in this study. This unique identifier can then be used to link an individual's patterns of care across multiple datasets at Institute for Clinical Evaluative Sciences. The Registered Persons Database contains information on age, sex, and date of death for all Ontario residents. The Canadian Institutes of Health Information—Discharge Abstract Database contains information on all hospital admissions and inpatient hospital-based procedures. The Canadian Institutes of Health Information National Ambulatory Care Reporting System contains information on ER visits. All medically necessary inpatient and outpatient physician visits are insured in Ontario and captured in the Ontario Health Insurance Program claims database. Outpatient prescription medications dispensed to individuals 65 years and older are covered by the Ontario Drug Benefits database. Admissions to inpatient rehabilitation hospitals are captured in the National Rehabilitation System database and admissions to complex continuing care (CCC) are recorded in the CCC Reporting System database. Information on home care services in Ontario are recorded in the Ontario Homecare

Assessment System and Homecare Databases. The accuracy of these databases has been previously described,^{21,22} and our group has used these databases in previous studies of outcomes associated with hip fracture surgery.^{23,24}

Study Population

We included all individuals, aged 66 years or older, who experienced a hip fracture (International Classification of Diseases 10: S72.0, S72.1, S72.2) and who underwent hip fracture surgery in Ontario between April 1, 2003 and March 31, 2010. Each individual included in the cohort had a minimum of 1 year of follow-up data available from the date of the index hospitalization in which to capture postoperative outcomes and individuals were censored after 1080 days follow-up. As the Ontario Drug Benefits database only provides universal drug coverage for adults aged 65 and older, we selected 66 years as the lowest eligible age to allow us to describe prescription patterns in the year prior to hip fracture. We excluded individuals who had pathologic hip fractures, hip fractures associated with major trauma, and hip fractures that occurred while in hospital. For individuals with more than 1 hip fracture during the study period, only the first hip fracture was included in the current analyses.

Definition of Dementia

Individuals in the cohort were categorized as having dementia if they had physician-diagnosed dementia in the 5 years preceding the date of the hip fracture. Physician-diagnosed dementia was defined as any outpatient physician visits or hospital admissions in which dementia were recorded as a diagnosis ([Supplementary Data 1](#)). This definition of dementia has been utilized in previous population-based studies using administrative databases.^{25,26}

Postoperative Outcomes

In Ontario, postoperative care following hip fractures can occur in several settings. Inpatient rehabilitation settings are typically reserved for individuals receiving active rehabilitation programs. CCC often serves as a setting for convalescent care or low-intensity rehabilitation similar to care provided in skilled nursing facilities in the United States. Individuals who are not admitted to CCC or inpatient rehabilitation may receive in-home rehabilitation services through home care. Admission to LTC following hip fracture commonly indicates a permanent transition from the community. In the United States, most individuals with hip fractures are admitted to either skilled nursing facilities or inpatient rehabilitation centers following hip fracture.²⁰ In contrast, there are fewer inpatient rehabilitation and CCC beds than are required to provide postoperative rehabilitation for all individuals that experience hip fractures in Ontario. Community-dwelling individuals that are not admitted to either inpatient rehabilitation or CCC following hip fracture, but who are unable to return home because of a functional decline following hip fracture, often remain hospitalized within acute care hospitals while awaiting permanent placement in LTC. In Ontario, most individuals who reside in LTC prior to their hip fracture are not considered candidates for either inpatient rehabilitation or CCC as their decreased baseline level of functioning is thought to limit their potential postoperative functional gains and some limited rehabilitation services are available to all LTC residents. As a result, LTC residents are frequently transferred back to the LTC facility they were residing in prior to hip fracture within a relatively short period of time following surgery.

We recorded the total length of stay (LOS) for the index hospitalization. We determined the proportion of individuals with and

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