Hip fracture outcomes in the household population

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According to national information based on hospital records (see *Data sources*), during the 2003/2004 fiscal year, 23,621 Canadians aged 60 or older were discharged from acute care hospitals after being treated at least once for a hip fracture (data not shown). They accounted for 3% of all patients in this age group discharged from such hospitals over this period.

In addition to the expense of initial hospitalization, the ongoing health and social services care for individuals with fractured hips is very costly; one study has placed the cost at $650 million annually.[1] For many people, hip fractures result in a permanent loss of function, dependency on others, or a move out of the community to an institution. However, according to a recent Canadian study, 59% of patients continued to reside in households one year after a hip fracture.[1] Although significant declines in independence and increases in need for support were noted, these people were able to rejoin the household population.[1]

This article presents a profile of Canadians aged 60 or older who had sustained a hip fracture and were living in a household during the year after that fracture. The information is based on nationally representative data from the 2003 Canadian Community Health Survey (CCHS) (see *Data sources*).

Most hip fractures at or near home

To assess the burden of hip fracture, the outcomes for people aged 60 or older who had suffered a hip fracture are compared with those for four other groups in the same age range (Table 1). Those who had sustained another type of fracture that could potentially impair mobility and functionality make up two of these groups. Another comprises those who were coping with the effects of a stroke that had occurred sometime in the past, as stroke is another major source of disability in older adults. And, finally, a "control group" captures those who reported no fracture in the past year and no effects of a stroke.

The median age of the adults who had suffered a hip fracture was 80—older than those in any of the other comparison groups. Over a third of the people (37%) who had sustained a hip fracture in the past year were living alone at the time of the survey (data not shown). (Information on individuals' living arrangements at the time of the fracture is not available from the CCHS.) Most of their hip fractures (53%) had occurred at or close to home, often while they were doing household chores or other unpaid work (38%; data not shown). Nearly all the hip fractures (93%) had resulted from a fall, and just over half (53%) of those injured had tripped, slipped or stumbled on some type of surface other than snow or ice. These findings are consistent

Table 1

Estimated number and median age of adults aged 60 or older, by fracture and/or effects of stroke status, household population, Canada, 2003

	Estimated number '000	Median age (years)
Fracture in past year and/or effects of stroke		
Hip fracture, no stroke†	12	80
Thigh, knee, lower leg, ankle, or foot fracture, no stroke	25	70*
Shoulder, arm, wrist, or hand fracture, no stroke	44	71*
Effects of stroke, no fracture	175	75*
No fracture, no effects of stroke	4,575	69*

* significantly different from corresponding estimate for reference category ($p < 0.05$)
† reference category
Source: 2003 Canadian Community Health Survey.

with those reported in a previous study of injuries among seniors.[2]

Fracture and chronic condition(s)

Two-thirds of people aged 60 or older (66%) who had suffered a hip fracture also reported having arthritis or rheumatism, as did approximately half of those who had some other kind of limb fracture (Table 2). The presence of arthritis is not unexpected in either group, as the condition is relatively common at older ages and has been implicated as a risk factor for fall-related fractures in the elderly.[3] By comparison, individuals who were living with the effects of a stroke and those who reported no serious injury/fracture were much less likely to have reported arthritis or rheumatism than were those who had fractured a hip.

About 7 in 10 members of the hip fracture group (71%) also had at least one of 17 selected chronic conditions captured by the CCHS. More than a third (37%) reported two or more such conditions. The presence of chronic conditions was similar in the other comparison groups, except stroke survivors, who were more likely to have at least one, as well as more than one, chronic condition.

Table 2

Percentage of adults aged 60 or older with chronic condition(s), by fracture and/or effects of stroke status, household population, Canada, 2003

	Arthritis/ Rheumatism	Chronic condition(s)	
		1 or more	2 or more
Fracture in past year and/or effects of stroke			
Hip fracture, no stroke†	66	71	37E
Thigh, knee, lower leg, ankle, or foot fracture, no stroke	54	65	40
Shoulder, arm, wrist, or hand fracture, no stroke	51	74	47
Effects of stroke, no fracture	51*	91*	64*
No fracture, no effects of stroke	43*	66	34

* significantly different from corresponding estimate for reference category ($p < 0.05$)
† reference category
E use with caution (coefficient of variation 16.6% to 33.3%)
Source: 2003 Canadian Community Health Survey.

Importance of mental health

The people who lived in households after a hip fracture must have retained enough functionality and

Data sources

Numbers of acute care hospital patients for the 2003/2004 fiscal year are based on information extracted from the *Health Person-oriented Database (HPOI)*, which is maintained by Statistics Canada. Records of individual patients were linked to produce patient-oriented data. The HPOI represents a subset of information from a national database of hospital discharge records, the *Hospital Morbidity Database (HMDB)*. The HMDB is constructed annually and maintained by the Canadian Institute for Health Information. The reported number of hip fracture patients excludes those admitted to non-acute hospitals or acute-care settings that were not part of the Discharge Abstract Database (DAD) frame in 2003/2004 (e.g., psychiatric hospitals). This analysis used only HPOI records with valid person identifiers that were constructed, in part, from health insurance numbers. For the 2003/2004 fiscal year, less than 2% of the HPOI acute care discharge records for patients aged 60 or older did not have a valid person identifier.

The information on members of the household population who had sustained hip or other fractures is based on data from the 2003 *Canadian Community Health Survey* (CCHS), cycle 2.1. The CCHS covers the household population aged 12 or older in all provinces or territories, except residents of institutions, all members of the regular Armed Forces, people living on Indian reserves and some remote areas, and civilian residents of military bases. Cycle 2.1 began in January 2003 and ended in December that year. The response rate was 80.6%, yielding a sample of 135,573 respondents. More information on the CCHS can be found in a published report.[4]

A total of 34,743 respondents aged 60 or older provided information on their most serious injury and presence/absence of stroke effects; they represent an estimated 4.8 million people. Previous research indicates that the risk of hip fracture begins to increase substantially at age 60 (data not shown). In this analysis, several potentially confounding factors that may influence health or health care use were taken into account. Aspects of Andersen's behavioural model of medical care utilization[5] were used to select pertinent variables available from the CCHS: sex, age, education and living arrangements, and presence of chronic conditions.

Variance on estimates and on differences between estimates was calculated using the bootstrap technique, which accounts for the complex sampling design of the survey.[6,7]

mental resilience, and had sufficient support, to do so. Indeed, the odds of household residents aged 60 or older who had sustained a hip fracture reporting "very good" or "excellent" mental health were similar to those for people without a serious injury or the effects of a stroke (Table 3). A similar pattern emerged for being "somewhat" to "very satisfied" with life in general. Feelings of community connection may have played a role. The odds of reporting excellent or very good mental health were 80% higher for those declaring a "very strong" sense of community belonging, compared with those whose attachment to the community was not as strong.

Despite positive feelings about their mental health and satisfaction with life in general, the odds of seniors who had fractured a hip reporting their general health as "fair" or "poor" were nearly three times as high as those for the reference group (no fracture and no effects of stroke), and their odds

Table 3

Odds ratios relating fracture and/or effects of stroke status and other selected characteristics to self-perceived health and life satisfaction, adults aged 60 or older, household population, Canada, 2003

	Excellent or very good self-perceived mental health		Somewhat to very satisfied with life		Fair or poor general health		Health is somewhat or much worse than 1 year ago	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Fracture in past year and/or effects of stroke								
Hip fracture, no stroke	0.6	0.3 to 1.1	0.4	0.2 to 1.0	2.9*	1.6 to 5.3	5.3*	2.9 to 9.8
Thigh, knee, lower leg, ankle or foot fracture, no stroke	0.8	0.6 to 1.3	0.7	0.4 to 1.4	0.9	0.5 to 1.6	1.8*	1.2 to 3.0
Shoulder, arm, wrist or hand fracture, no stroke	1.2	0.8 to 2.0	0.5	0.3 to 1.0	1.1	0.7 to 1.8	1.2	0.8 to 1.9
Effects of stroke, no fracture	0.5*	0.4 to 0.6	0.3*	0.3 to 0.5	3.5*	2.8 to 4.4	1.7*	1.4 to 2.2
No fracture, no effects of stroke†	1.0	...	1.0	...	1.0	...	1.0	...
Age‡	1.0*	1.0 to 1.0	1.0*	1.0 to 1.0	1.0*	1.0 to 1.0	1.0*	1.0 to 1.0
Sex								
Men	0.9	0.9 to 1.0	1.0	0.9 to 1.2	1.1	1.0 to 1.2	0.8*	0.7 to 0.9
Women†	1.0	...	1.0	...	1.0	...	1.0	...
Living arrangements								
With kin	1.1	1.0 to 1.2	1.8*	1.6 to 2.1	1.0	0.9 to 1.0	1.0	0.9 to 1.1
With others, other living arrangements	0.9	0.8 to 1.1	1.4*	1.0 to 1.8	1.2	0.9 to 1.4	1.0	0.8 to 1.3
Alone†	1.0	...	1.0	...	1.0	...	1.0	...
Very strong sense of community belonging								
Yes	1.8*	1.6 to 1.9	2.1*	1.8 to 2.5	0.7*	0.6 to 0.8	0.7*	0.6 to 0.8
No†	1.0	...	1.0	...	1.0	...	1.0	...
Education								
Postsecondary graduation†	1.0	...	1.0	...	1.0	...	1.0	...
Some postsecondary	1.1	0.9 to 1.3	0.8	0.6 to 1.1	1.0	0.8 to 1.3	1.1	0.9 to 1.4
Secondary graduation	0.9	0.8 to 1.0	0.8*	0.7 to 1.0	1.2*	1.0 to 1.3	1.0	0.9 to 1.2
Less than secondary graduation	0.5*	0.5 to 0.6	0.6*	0.6 to 0.8	1.9*	1.7 to 2.2	1.3*	1.2 to 1.5
Chronic condition(s)								
None or one†	1.0	...	1.0	...	1.0	...	1.0	...
Two or more	0.6*	0.6 to 0.7	0.4*	0.4 to 0.5	4.4*	4.0 to 4.8	2.2*	2.0 to 2.5

* significantly different from estimate for reference category ($p < 0.05$)
† reference category
‡ continuous variable
... not applicable
Note: Because of rounding, some odds ratios with 1.0 as the lower/upper confidence interval are statistically significant.
Source: 2003 Canadian Community Health Survey.

The questions

Respondents to the 2003 Canadian Community Health Survey (CCHS) were asked if they had suffered an injury in the past 12 months. Those who had were then asked about the nature of the most serious injury. Respondents whose most serious injury involved broken or fractured bones were asked which body part was involved. Three groups were used for this analysis: *hip fracture; thigh, knee, lower leg, ankle or foot fracture*; *shoulder, arm, wrist or hand fracture*.

A dichotomous variable for the *effects of a stroke* was created from responses to a question asking if the respondent was currently experiencing such problems. Those who were and who also belonged to one of the identified fracture comparison groups were excluded from the analysis; thus the fracture groups represented those with these injuries, but without the compounded effects of a stroke. Respondents with missing information about injuries or stroke were excluded from the analysis; this amounted to 241 respondents, or 1% of the weighted sample of respondents aged 60 or older.

Chronic condition(s) indicates the self-reported presence of one or more of the following, as asked of CCHS respondents: asthma, high blood pressure, chronic bronchitis, emphysema, diabetes, heart disease, heart attack (ever), angina, congestive heart failure, cancer, ulcers, bowel disorder, dementia, thyroid condition, schizophrenia, mood disorder, or anxiety.

For *living arrangements*, respondents were categorized as living with kin if they were living with their spouse or partner with or without their children, with children only, or with a parent. Living with others captures those who were unattached but living with others, or had some arrangement other than "alone" or "with kin."

Needed help with ADL or IADL tasks was based on responses to several CCHS questions. Two questions captured activities of daily living (ADL): "Because of any physical condition or mental condition or health problem, do you need the help of another person with personal care such as washing, dressing, eating or taking medication?" and "Because of any physical condition or mental condition or health problem, do you need the help of another person with moving about inside the house?" The instrumental activities of daily living (IADL) were covered by asking: "Because of any physical condition or mental condition or health problem, do you need the help of another person with preparing meals? . . . getting to appointments and running errands such as shopping for groceries? . . . doing normal everyday housework? . . . doing heavy household chores such as spring cleaning or yard work? . . . looking after your personal finances such as making bank transactions or paying bills?". Needing help was a dichotomous variable coded as '1' if respondents answered "yes" to any one of these questions. If a response was not provided, the respondent was excluded from the analysis of this needs variable.

A very strong sense of *community belonging* represents those who selected the first response when asked, "How would you describe your sense of belonging to your local community? Would you say it is very strong, somewhat strong, somewhat weak, very weak?".

Receipt of government-subsidized home care was determined by asking if respondents had "received any home care services within the past 12 months, with the cost being entirely or partially covered by government?"

of feeling that their health was "somewhat worse" or "much worse" than it had been a year earlier were five times as high—even when taking into account the effects of other potentially confounding variables.

Needing help

It is likely that compromised independence plays a role in negative self-perceived health among the hip fracture group. Among adults aged 60 or older who had had such an injury, the odds of needing help with various activities of daily living (ADL) or with activities that were instrumental to daily living (IADL) were four times as high as those for their non-injured counterparts. For ADL involving personal care such as bathing or dressing, the odds of needing help were eight times as high (Table 4).

Consistent with their needs for assistance, the odds that the hip fracture group was receiving government-subsidized home care were 10 times those of the non-injured group, and over three times those of stroke survivors. The adults who had

Limitations

Interviews for 1,300 Canadian Community Health Survey (CCHS) respondents aged 60 or older (5.6% of the weighted total used) were completed by proxy; therefore, the accuracy of the responses about self-perceived general health and health status compared with one year earlier cannot be determined. Questions about mental health, life satisfaction and sense of community belonging were not asked in proxy interviews and were coded as "not stated."

CCHS information was self-reported and there was no external validation of responses. No information was available on the chronology of injury events or past stroke. The data are cross-sectional; no inferences about temporal ordering or causality can be made. While living arrangements may suggest social support, this variable does not measure frequency or quality of contact, or whether support or assistance was provided.

fractured a hip in the 12 months before the CCHS interview may have been more closely tied to health care and social assistance providers than were those who had had a stroke at some (unknown) time in the past.

Challenges

If hip fractures are viewed as part of a continuum that begins with efforts to prevent such injuries in the first place, then this examination of CCHS respondents represents the later effects of the injury, but not the end of the story. For older Canadians, avoiding a move to an institution can be a goal worth pursuing.

The population aged 60 or older examined in this analysis likely represents the "best" hip fracture cases discharged from acute care hospitals since they subsequently rejoined the household population. Despite their relatively higher perceptions of poor health and dependence on others, they were still just as likely as uninjured adults these ages to report very good or excellent mental health and being somewhat or very satisfied with life. This is important, as evidence suggests that good mental health is

Table 4

Odds ratios relating fracture and/or effects of stroke status and other selected characteristics to the need for assistance with activities of daily living, activities instrumental to daily living and receipt of government-subsidized home care, adults aged 60 or older, household population, Canada, 2003

	Needed help with ADL or IADL tasks		Needed help with ADL tasks		Received government-subsidized home care	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Fracture in past year and/or effects of stroke						
Hip fracture, no stroke	4.1*	2.0 to 8.5	7.9*	3.6 to 17.5	10.1*	5.2 to 19.5
Thigh, knee, lower leg, ankle or foot fracture, no stroke	1.3	0.8 to 2.0	1.8	0.8 to 4.2	2.6*	1.5 to 4.4
Shoulder, arm, wrist or hand fracture, no stroke	1.4	1.0 to 2.1	1.4	0.8 to 2.5	2.8*	1.8 to 4.5
Effects of stroke, no fracture	4.1	3.2 to 5.2	4.9*	3.4 to 7.0	2.9*	2.2 to 3.8
No fracture, no effects of stroke†	1.0	...	1.0	...	1.0	...
Age‡	1.1*	1.1 to 1.1	1.1*	1.1 to 1.1	1.1*	1.1 to 1.1
Sex						
Men	0.4*	0.4 to 0.4	0.8	0.6 to 1.1	0.9	0.8 to 1.0
Women†	1.0	...	1.0	...	1.0	...
Living arrangements						
With kin	0.8*	0.7 to 0.9	1.0	0.8 to 1.3	0.6*	0.5 to 0.7
With others, other living arrangements	1.2	1.0 to 1.5	1.9*	1.3 to 2.8	0.8	0.6 to 1.1
Alone†	1.0	...	1.0	...	1.0	...
Very strong sense of community belonging						
Yes	0.8*	0.8 to 0.9	0.8*	0.6 to 1.0	1.0	0.9 to 1.2
No†	1.0	...	1.0	...	1.0	...
Education						
Postsecondary graduation†	1.0	...	1.0	...	1.0	...
Some postsecondary	0.9	0.7 to 1.1	1.0	0.6 to 1.6	0.9	0.6 to 1.2
Secondary graduation	0.9	0.8 to 1.0	1.3	1.0 to 1.9	1.1	0.9 to 1.4
Less than secondary graduation	1.2*	1.1 to 1.3	1.6*	1.3 to 2.1	1.3*	1.1 to 1.6
Chronic condition(s)						
None or one†	1.0	...	1.0	...	1.0	...
Two or more	2.8*	2.6 to 3.1	2.0*	1.6 to 2.5	2.2*	2.0 to 2.6

* significantly different from estimate for reference category ($p < 0.05$)
† reference category
‡ continuous variable
... not applicable
Note: Because of rounding, some odds ratios with 1.0 as the lower or upper confidence interval are statistically significant.
Source: 2003 Canadian Community Health Survey.

protective against institutionalization.[8] Perhaps the very strong sense of community belonging reported by those who had suffered a hip fracture may provide the thread.

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