

**Technical report: Hospitalizations due to falls among
Canadians age 65 and over**

**an analysis of data from the
Discharge Abstract Database
as presented in:**

Report on Seniors' falls in Canada (section 2.2)

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Introduction

It is estimated that one in three people over the age of 65 will fall at least once each year, a rate that increases to one in two people over the age of 80 (Tinetti, Speechley and Ginter, 1988; O'Loughlin et al., 1993). In Canada, this means that an estimated 1.3 million Canadians over age 65 are likely to fall this year. Almost half of those who fall experience a minor injury and between 5% and 25% sustain a serious injury, such as a fracture or a sprain (Alexander, Rivara and Wolf, 1992; Nevitt, Cummings and Hudes, 1991). However, even without an injury, a fall can cause a loss in confidence, increased fear and curtailment of activities, which can lead to a decline in health and function, which may in turn lead to future falls with more serious outcomes. If the fall results in a serious injury, this can lead to long-term disability or even death.

In 1996, fall-related injuries for Canadians of all ages accounted for 57% of all direct health care costs for unintentional injuries, for a total of \$2.8 billion (Angus et al., 1998). Of this amount, 41% was for falls among seniors, with approximately 75% of this for direct costs related to fall injuries among elderly women. Falls are also directly accountable for over 40% of all admissions to nursing homes (Rawsy, 1998).

In 2001, there were over 430,000 Canadians age 85 years and over and this number is expected to increase to 1.6 million by 2041 (Health Canada, 2002). Given the fact that increasing age is highly associated with higher rates of injury due to a fall (Canadian Institute for Health Information, 2004a, 2004b; Scott, Peck and Kendall, 2004), the problem of fall-related injuries among older adults will escalate rapidly if strategies for prevention are not put in place.

With these changing demographics, there are growing numbers of older people with chronic health problems and disabilities living longer lives and choosing to remain in community settings. In order to target resources effectively to the prevention of falls and related injuries, a better understanding is needed of the scope and nature of the problem of falls among older adults in Canada. Reliable sources for tracking this information in Canadian provinces and territories include vital statistics and hospital separation data. These sources can be used to compare rates between regions and within regions, and can be used to set and monitor targets for fall-related injury reduction.

Two recently released National Trauma Registry reports include sections on fall-related injuries among older Canadians – *Major injury in Canada* (Canadian Institute of Health Information, 2004a) and *Injury hospitalizations* (Canadian Institute of Health Information, 2004b).

Major injury in Canada focuses on causes of severe injuries for all ages. People with severe injuries are defined as those with an “injury severity score” of greater than 12 who were admitted to hospital, treated and released from an emergency department (ED), or died in an ED from their injuries. Findings based on 2002/03 data showed that falls accounted for 29% of severe injuries for all ages – second only to motor vehicle

collisions at 47% – and that almost one half (45%; N = 1,313) of all falls resulting in severe injuries occurred among those aged 65 years and older.

Injury hospitalizations for 2001/02 showed that falls accounted for 57% (N = 114,262) of all hospital injury admissions in Canada, contributing to over 1.4 million days in hospital, and that 59% (N = 67,876) of the fall-related hospital admissions were for people age 65 years and over.

These reports provide a good overview of fall-related injuries compared to all other causes of injury for all ages. However, neither report provides in-depth analysis of fall-related hospitalizations for those aged 65 years and over.

The purpose of this study was to obtain, analyze and interpret data from the Canadian Institute for Health Information (CIHI) Discharge Abstract Database (DAD) pertaining to acute care hospitalizations for falls among older adults in Canada. This report covers hospitalization cases and rates, length of stay, injury type, place of occurrence, and differences by age group and gender for seniors age 65 years and over for the years 1998/99 through 2002/03.

N. B.: The figures in this document refer to the figures in the *Report on Seniors' falls in Canada*.

Methods

Data from the Canadian Institute for Health Information (CIHI) Discharge Abstract Database (DAD) from 1998/99 through 2002/03 were requested for this study. All acute care inpatient discharges, where diagnostic information indicates an accidental fall was involved in the episode, were obtained for adults age 65 and over. No limitations were placed on the request with regard to position of the diagnosis in the diagnostic field. Specific International Classification of Disease 9th revision (ICD 9) codes included E880-E888 and, where appropriate, a translation of ICD 10 codes to ICD 9 codes was used. See Appendix 1 for details of the data request.

The DAD was originally developed in 1963 to collect data on hospital discharges in Ontario. Over time, the mandate of the DAD has expanded in scope, as determined by each Provincial and Territorial Ministry of Health. The DAD includes hospital inpatient data, as recorded in their discharge records, from all acute care hospitals across Canada, with the exception of Quebec hospitals and rural hospitals in Manitoba.

Definitions and data

Revisions to codes in the International Classification of Disease (changes from ICD 9 to ICD 10) greatly affected the coding of data in hospitals around the world and affected data on fall injuries. Therefore, care must be taken in comparisons of data based on the two different classifications. The ICD 10 classification for hospitalization data is being implemented gradually in Canada during the 2001-2006 period.

ICD 9 and ICD 10

- The ICD 9 and ICD 10 provide for classification of a wide variety of falls including:
- fall on same level from slipping, tripping and stumbling;
- fall on same level due to collision with, or pushing by, another person;
- fall on and from stairs and steps;
- fall on and from ladder or scaffolding;
- fall from, out of or through building or structure;
- other fall from one level or another; and
- other/unspecified fall.

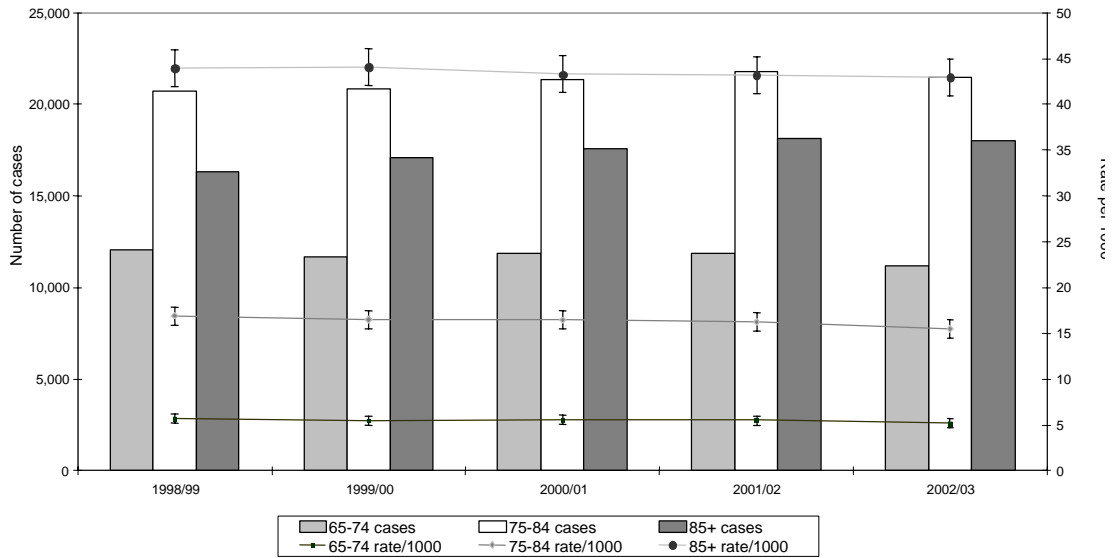
This report:

- reflects the number of hospital discharges rather than the number of patients;
- includes post-admission injury deaths occurring during the hospital stay (injury deaths that occur at the scene, during transport to hospital or in the Emergency Department before admission to hospital are not included);
- identifies causes of injury by any documented External Cause of Injury Code unless otherwise specified;
- excludes cases with unknown age; and
- shows 95% confidence intervals where appropriate.

Findings

Figure 6 shows the trend in fall-related hospital cases and rates for those age 65 and over in Canada during 1998/99 and 2002/03. On an age-specific basis, the fall-related hospitalization rates for the 65-74 and 75-84 age groups were stable at about 6 and 16 per 1000 population respectively during that period. The 85+ age group was also stable during this period at about 43 per 1000.

Figure 6– Fall-related hospital cases and rates, age 65+, Canada, 1998/99 to 2002/03



Source: *Acute separations from 1998/99 to 2002/03*, Canadian Institute for Health Information Discharge Abstract Database. Confidence intervals are 95% confidence intervals.

The following table shows the actual numbers and rates for fall-related hospital cases and rates. There was an overall increase of 1,593 cases for fall-related hospital admissions among those aged 65 and over for the period 1998/99 through 2002/03. Most of this increase is represented by those age 85 and over, who showed an increase of 1,729 admissions over this period, while those age 65 to 74 showed a decrease of 859 in fall-related admissions. The overall age-standardized rate for those age 65 and over is steady at about 16 per 1000 population.

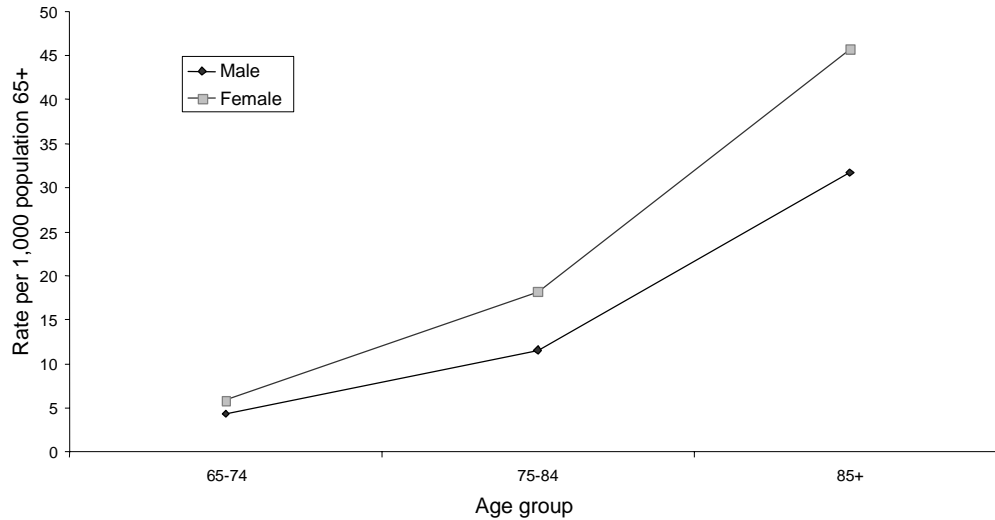
**Fall-related hospital cases and rates,* age 65+,
Canada, 1998/99 to 2002/03**

	65-74	75-84	85+	65+	65-74	75-84	85+	65+
	cases	cases	cases	cases	rate/1000	rate/1000	rate/1000	rate/1000
1998/99	12,051	20,741	16,318	49,110	5.7	16.9	43.9	15.5
1999/00	11,720	20,842	17,096	49,658	5.5	16.5	44.1	15.7
2000/01	11,864	21,372	17,580	50,816	5.5	16.4	43.3	16.0
2001/02	11,898	21,792	18,134	51,824	5.5	16.2	43.2	16.3
2002/03	11,192	21,464	18,047	50,703	5.1	15.5	42.9	16.0

*All rates are age-standardized.

Figure 7 shows fall-related hospitalization rates by gender and age groups for Canadians age 65 and over for the year 2002/03. Men and women both had increasing rates of hospitalization with age. Women age 65-74 had rates of about 6 per 1000 population increasing to 46 per 1000 in the 85 and over age group. Men had a similar rate to women in the 65-74 age group (4 per 1000) but increased to only 32 per 1000 in the 85 and over age group. For all those age 65 and over, women had a rate of hospitalization of about 16 per 1000 and men of 9 per 1000.

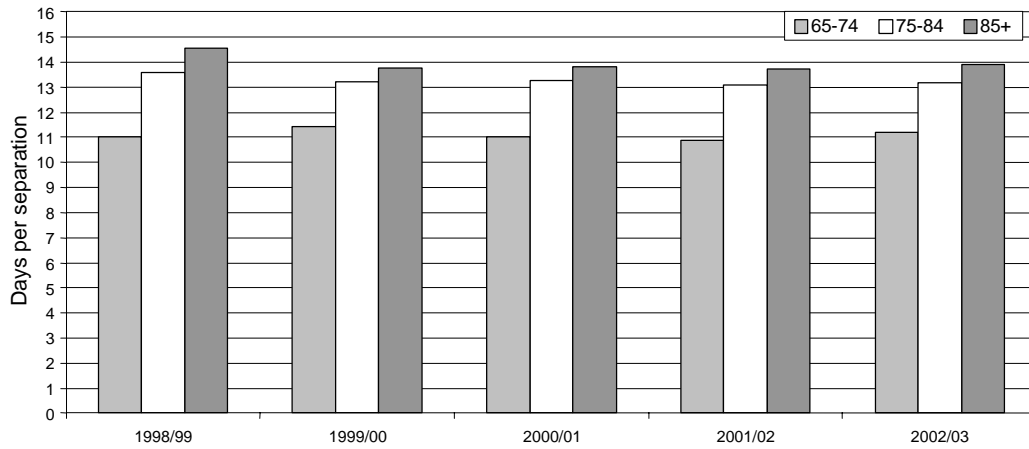
Figure 7- Fall-related hospitalization rates, by gender and age group, age 65+, Canada, 2002/03



Source: *Acute separations from 1998/99 to 2002/03*, Canadian Institute for Health Information Discharge Abstract Database.

Figure 8 illustrates that, generally, the older the person, the longer their length of hospital stay for a fall-related injury. It also shows that the average length of stay for all age groups was relatively stable for the period 1998/99 through 2002/03. Over the five years, on average, those aged 65-74 had hospital stays of 11 days after a fall, those aged 75-84 had stays of 13 days, and those aged 85 and over had stays of nearly 14 days. Nationally, the average number of total hospitalization days for fall-related injuries among seniors was 273 per 1000 population age 65 and over.

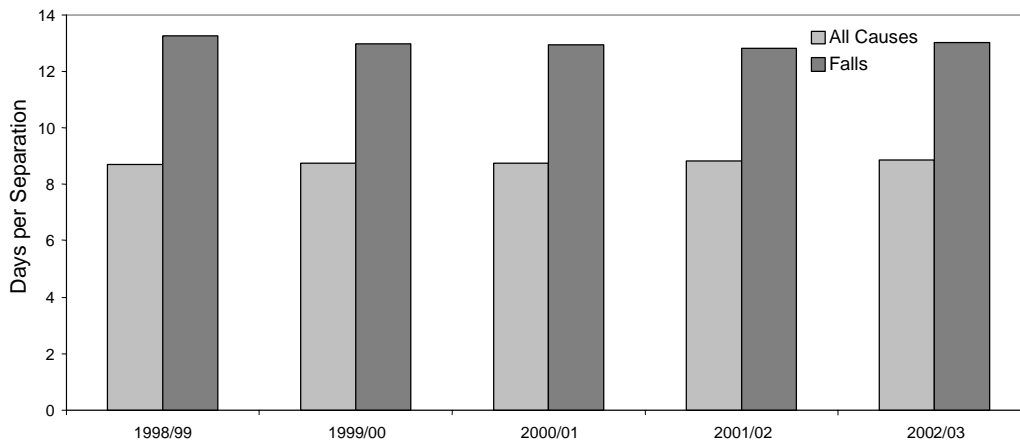
Figure 8 – Fall-related hospitalizations, average length of stay per case, age 65+, by age group, Canada, 1998/99 to 2002/03



Source: *Acute separations from 1998/99 to 2002/03*, Canadian Institute for Health Information Discharge Abstract Database.

Figure 9 shows that the average length of hospital stay for a fall injury was consistently about 40% longer than the average length of stay for all causes of hospitalization for seniors age 65 and over. The average length of stay for both falls and all causes showed little change from 1998/99 through 2002/03.

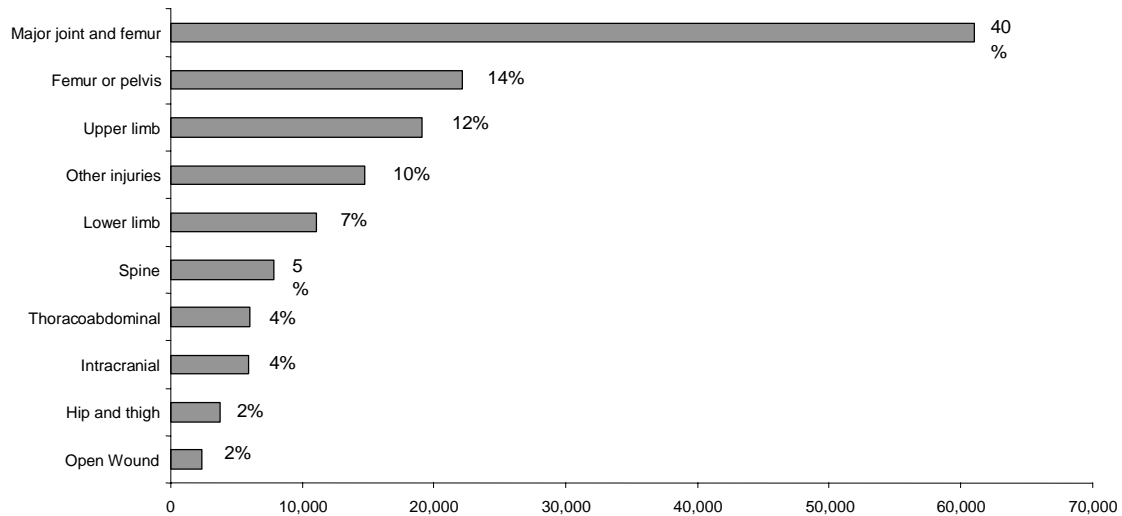
Figure 9 Average length of stay per case, all causes and fall-related hospitalizations, age 65+, Canada, 1998/99 to 2002/2003



Source: *Acute separations from 1998/99 to 2002/03*, Canadian Institute for Health Information Discharge Abstract Database.

Figure 10 shows that, over the five years from 1998/99 to 2002/03, nearly 85,000 Canadians age 65 and over had injuries to their femur, pelvis, hip or thigh, accounting for 56% of all fall-related injuries among seniors treated in hospital. Injuries to an upper limb, a lower limb, or the spine accounted for 24% of fall-related hospitalizations.

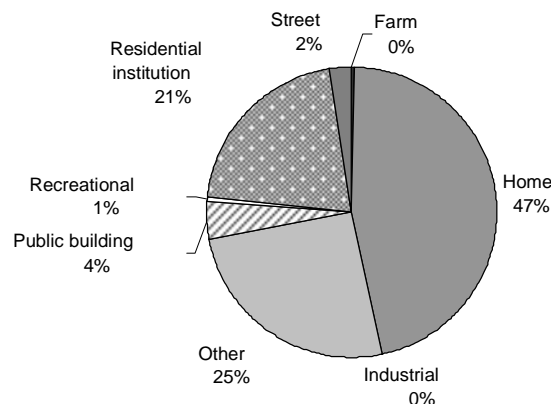
Figure 10 – Number and percent of fall-related hospital cases, by injury type, age 65+, Canada, 1998/99 to 2002/03



Injury type as classified in Major Clinical Category 25: Significant Trauma. Number of cases
 Source: *Acute separations from 1998/99 to 2002/03*, Canadian Institute for Health Information Discharge Abstract Database.

Figure 11 shows the place of occurrence of falls that led to a hospitalization among Canadian seniors age 65 and over for the period 1998/99 through 2002/03. Nearly half (47%) of these falls occurred in or around the home. Falls in residential institutions accounted for 21% of hospitalizations and falls in a public building or on a street, together, accounted for 6%.

Figure 11 – Fall-related hospital cases, by place of occurrence of fall, age 65+, Canada, 1998/99 to 2002/03



Source: *Acute separations from 1998/99 to 2002/03*, Canadian Institute for Health Information Discharge Abstract Database.

Discussion

For all seniors age 65 and over, this study reveals that, for the period 1998/99 through 2002/03, fall-related hospitalization cases have shown a small increase and age-adjusted rates have remained relatively steady. However, for those aged 85 years and over, the increase in the number of cases is considerably higher than for other age groups. The anticipated growth among the 85 and over age group in Canada from 430,000 in 2001 to 1.6 million by 2041 (Health Canada, 2002), together with the fact that people are living longer with chronic conditions, suggests that the number of fall-related hospitalizations for this age group will continue to increase.

Unlike the increases seen among the older age groups, those aged 65 to 74 years are showing a small decrease in both the number and rate of fall-related hospitalizations. This may reflect hospital policies designed to address bed shortages by restricting admission to those with only the most severe injuries or complex health problems. In 1987/88, the fall-related hospitalization rate for those aged 64 to 74 years was 9.59 per 1000 population (Health Canada, 1994) compared to the rate from this study of less than 6 per 1000 population from 1998/99 to 2002/03. However, falls as a portion of all hospital admissions have remained the same over 1998/99 to 2002/03, which likely indicates that screening for the most acute cases is occurring across all hospitalizations.

Canadian fall-related hospitalization rates among those age 65 and over (15.5 per 1000 population in 1998/99 and 16 per 1000 population in 2002/03) are slightly lower and are increasing more slowly compared to hospitalization rates for seniors in other countries. For example, from 1993/94 to 1997/98, the fall-related hospitalization rates in Australia for those aged 65 and over increased from 17.54 per 1000 population to 18.49 per 1000 population (Cripps and Carman, 2001).

Fall-related hospitalizations in Canada show higher rates for females than males and this gender difference increases with advancing age. These findings are consistent with other studies that show a strong correlation between female gender, older age and the risk of injurious falls (Fletcher and Hirdes, 2002; Peel, Kassulke and McClure, 2002; Scott, Peck and Kendall, 2004). Conditions known to be associated with aging, such as the effects of a stroke, dementia and diabetes are all known to increase the risk of falling and being injured (Oleske et al., 1995; Lamb et al., 2003). Females are known to be at higher risk due to the higher rates of osteoporosis among women, which put them at greater risk of sustaining a serious fracture from a fall (Osteoporosis Society of Canada, 1996).

The higher rates found for females compared to males are consistent with those in Australia, although the Canadian rates are somewhat lower. In Australia in 1997/98, the rates for females and males were 23 and 12 per 1000 population respectively (Cripps and Carman, 2001) compared to 16 and 9 per 1000 population respectively in Canada in 2002/03.

Length of stay due to a fall-related hospitalization is also a factor of age, with those aged 65 to 74 years staying for an average of 11 days compared to those aged 85 and over who

stay an average of almost 14 days. These findings differ from Australia, where the average length of stay is 7 to 8 days for those aged 65 to 69 years and 12 days for those aged 85 years and over (Cripps and Carman, 2001).

In Canada, injuries to major joints and the femur are the leading cause of fall-related hospitalizations for those aged 65 years and over, followed by injuries to the femur or pelvis. The majority of these injuries are likely associated with hip fractures, which other studies have shown contribute up to 40 % of all fall-related hospitalizations for this age group (Peel, Kassulke and McClure, 2002; Scott, Peck and Kendall, 2004).

Forty-seven percent of fall injuries occurred in the home and 21 percent in residential institutions. Although the home is the more frequently reported location, it is important to note that only about 7 % of those aged 65 years and over live in residential care institutions (Lindsay, 1999) and are therefore contributing a far larger portion to hospital admissions compared to seniors living in other settings (Canadian Institute for Health Information, 2004b). However, this is to be expected given that seniors living in residential care institutions are older and have more chronic health conditions that put them at much greater risk for falls compared to those living in the community.

Proven prevention strategies for reducing the risk of fall injuries in residential care institutions include exercise (Campbell et al., 1999), nutritional supplements such as vitamin D and calcium (Chapuy, Arlot and Dubouef, 1992), medications to treat osteoporosis (Black, Cummings and Karpf, 1996; McClung et al., 2001), and the use of hip protectors (Parker, Gillespie and Gillespie, 2002). However, a more proactive approach is to implement programs to reduce a broader range of fall risks among those aged 65 years and over in all settings. The risk factors for falling include biological (acute and chronic health problems), behavioural (medications, wearing inappropriate footwear, risk-taking behaviours), environmental (hazards such as unsafe stairs, uneven surfaces, poor lighting), and social factors (unsafe housing, lack of social supports, lack of access to health services) (Scott, Peck and Kendall, 2004). To reduce the effects of these factors, a multifactorial and multidisciplinary approach to falls prevention is needed that includes thorough clinical assessments with appropriate follow-up to address identified individual risks.

The overall increase in fall-related hospitalizations among Canadians age 65 years and over highlights the need to address this problem. Those aged 85 years and over are a rapidly growing segment of the Canadian population. This cohort also tends to have more chronic health problems that put them at greater risk for fall-related injuries. Prevention strategies are needed that are tailored to the risk factors of this population.

Limitations

This report uses the DAD data pertaining to acute care hospitalizations for falls among persons age 65 years and over in Canada. These data provide a good estimate of all falls resulting in serious injury for this population. However, this data source does not capture information on injurious falls of lesser severity, which may be treated at hospital emergency departments or physicians' offices, or falls for which medical treatment was not sought.

Rural hospitals in Manitoba and all hospitals in Quebec do not submit their hospitalisation data to the DAD. In addition, Nunavut Territory did not submit data to the DAD in 2002/03. However, Nunavut represented only 0.05% of national abstracting data in 2001/02 and, therefore, the exclusion in 2002/03 would have a minor impact on the national total for that year.

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Appendix 1 – Details of the data request

Details of Request:

- Report on the number of acute cases, in seniors (age = 65+ yrs on admission), with a diagnosis related to falls. Grouped by Case Mix Group (CMG).

Report: Distribution of Acute Cases with Fall Related Injuries for Patients Age 65 and Older on Admission – Identifies the number of acute inpatient cases and acute days with a fall related diagnosis, based on ICD-9, ICD-9-CM and ICD-10 codes, for each Province, grouped by Fiscal Year and Classification Version (ICD-9, ICD-9 CM, ICD-10).

Inclusions:

- Patient's Age is 65 years or over on day of admission.
 - Age Code = Y(ears) or E(stimated) **AND**
 - Age units = 65 or greater.
- Gender/Sex = M(ale), F(emale) or O(ther) - ICD-9 = "Blank", ICD-10 = "O".
- Canadian residents only, based on Postal Code field.
 - ICD-9 / ICD-9-CM:
 - Use first character of Postal Code to determine if Canadian resident. Characters include: A, B, C, E, G, H, J, K, L, M, N, P, R, S, T, V, X and Y; **OR**
 - If no Postal Code is available then search for mini-code. Canadian mini-code includes: 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 14 and 15.
 - ICD-10:
 - Use first character of Postal Code to determine if Canadian resident. Characters include: A, B, C, E, G, H, J, K, L, M, N, P, R, S, T, V, X and Y; **OR**
 - If no Postal Code is available then search for mini-code. Canadian mini-code includes: NF, NS, NB, PE, QC, ON, MB, SK, AB, BC, YT, NT and NU.
- All records (including deaths) with a fall related diagnosis, in any position within the diagnoses fields. Falls are indicated as follows:
 - ICD-9 / ICD-9-CM:
 - Diagnosis Prefix Code = "E" (External Cause of Injury Code) **AND**
 - Diagnosis Code = "880" to "888", inclusive (Falls) **AND**
 - Diagnosis Type Code = "9".
 - ICD-10:
 - Diagnosis Code = "W00" to "W19", inclusive **AND**
 - Diagnosis Type Code = "9".

Grouped by:

- Fiscal Year = Fiscal Year of Discharge (e.g. 1998).
- Province/Territory = Province/Territory in which the institution is located. Territories include Northwest Territory, Nunavut and the Yukon. Use full provincial name, e.g. Ontario. Sort in ascending order.
- Place of Occurrence = Identifies the place where the accident occurred, e.g. 0 – home (provide coded value only). Only identifies the first Place of Occurrence, when multiple places of occurrences are recorded. Sort in ascending order. Place of Occurrence is coded as follows:
 - ICD-9:

- Diagnosis Code = “880” to “888”, inclusive.
- Diagnosis Suffix Code = “0” to “9” (Place of Occurrence) or “Blank” if not recorded.
- Place of Occurrence Codes are as follows:
 - 0 – Home
 - 1 – Farm
 - 2 – Mine and quarry
 - 3 – Industrial place and premises
 - 4 – Place for recreation and sport
 - 5 – Street and highway
 - 6 – Public building
 - 7 – Residential institution
 - 8 – Other specified places
 - 9 – Unspecified place
 - BLANK – Not Recorded.
- ICD-9-CM:
 - Diagnosis Code = “880” to “888”, inclusive, **CODED IN CONJUNCTION WITH**
 - Diagnosis Prefix Code = “E” (External Cause of Injury Code) **AND**
 - Diagnosis Code = “849.0” to “849.9”, inclusive **AND**
 - Diagnosis Type = “9”.
 - Place of Occurrence Codes are as follows:
 - E849.0 – Home
 - E849.1 – Farm
 - E849.2 – Mine and quarry
 - E849.3 – Industrial place and premises
 - E849.4 – Place for recreation and sport
 - E849.5 – Street and highway
 - E849.6 – Public building
 - E849.7 – Residential institution
 - E849.8 – Other specified places
 - E849.9 – Unspecified place
 - **NOTE:** If no accompanying code (E849.0 to E849.9) then record as “Not Recorded”.
- ICD-10
 - For Diagnosis Code = “W00” to “W19”, inclusive, **CODED IN CONJUNCTION WITH**
 - Diagnosis Code = “U98.^” (Place of Occurrence) **AND**
 - Diagnosis Type Code = “9”.
 - Place of Occurrence Codes are as follows:
 - U98.0 – Home
 - U98.1 – Residential institution
 - U98.2 – School other institution and public area
 - U98.3 – Sports and athletics area
 - U98.4 – Street and highway
 - U98.5 – Trade and service area
 - U98.6 – Industrial and construction area
 - U98.7 – Farm
 - U98.8 – Other specified place of occurrence

- U98.9 – Unspecified place of occurrence
- Institution From Type = Identifies the level of care of the facility from which the patient was transferred from, e.g. 4 - nursing home facility (provide coded value only). Sort in ascending order. Institution From Type code is as follows:
 - 1 – Acute Care
 - 2 – General Rehabilitation Facility
 - 3 – Chronic Care Facility
 - 4 – Nursing Home
 - 5 – Psychiatry Facility
 - 6 – Unclassified or other type of Facility
 - 7 – Special Rehabilitation Facility
 - 8 – Home Care
 - 9 – Home for the Aged
 - A – Day Surgery
 - E – Emergency Room
 - O – Organized Outpatient Department of Reporting Facility
 - BLANK – No Patient Transfer
- Case Mix Group (CMG) = Identifies the CMG assigned to the record, e.g. 356 – Repair Hip and Femur Procedure (use English descriptors). Sort in ascending order.
- Gender/Sex = Male, Female or Other (sort in ascending order).
- Age Group = Provided by Amaranth Consulting, based on age at admission. Sort in ascending order.
 - 65 – 69
 - 70 – 74
 - 75 – 79
 - 80 – 84
 - 85+

Exclusions:

- Admit Category = S(Stillbirths) or R(Cadaver).
- Patient's Age is less than 65 years on day of admission.
 - Age Code = Y(ears), E(stimated), M(onths), D(ays), New(B)orn/Stillbirth or Age (U)nkknown **AND**
 - Age units = 0 to 64, NB, SB or U.
- Postal Code = Mini-code = XX - Transients/homeless (ICD-10).

Format of Output:

- The report will be presented in three Excel Workbooks (ICD-9, ICD-9-CM and ICD-10) and formatted as shown below. Each fiscal year will be represented by a separate worksheet within the workbook.

Fiscal Year	Province/Territory	Place of Occurrence	Instit from Type	CMG	MALE			FEMALE			OTHER		
					Age Group	Number of Cases	Total Acute Days	Age Group	Number of Cases	Total Acute Days	Age Group	Number of Cases	Total Acute Days
1998/99	Province 1	7	4	356 - Repair Hip and Femur Procedures	65 - 69	52	365	65 - 69	25	250	65 - 69		
					70 - 74	25	250	70 - 74	10	150	70 - 74		
					75 - 79	18	134	75 - 79	10	175	75 - 79		
					80 - 84	15	194	80 - 84	15	200	80 - 84		
					85+	5	90	85+	5	90	85+		
					115	1033		65	865		0	0	
	Province 2	0		356 - Repair Hip and Femur Procedures	65 - 69	30	241	65 - 69	15	162	65 - 69	1	15
					70 - 74			70 - 74			70 - 74		

Notes:

To comply with CIHI's Privacy and Confidentiality Policies, in instances in which there are fewer than 5 cases to report in a cell, the number of cases will be suppressed.

Cases from the Yukon, Northwest Territories and Nunavut will be grouped, due to the low number of facilities in these provinces / territories.