

**Technical report: Hospitalizations due to falls among
Canadians age 65 and over living in
residential care facilities**

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

Report on Seniors' falls in Canada (section 2.3)

This Technical report was prepared for the Public Health Agency of Canada by:

Vicky Scott, PhD, RN
Senior advisor on falls prevention
British Columbia Injury Research and Prevention Unit, and
Ministry of Health Services
1515 Blanshard Street
Victoria, BC V8W 3C8

Marty Pearce, MPH
Amaranth Consulting Group Ltd.
502 – 1405 Douglas Street
Victoria, BC V8W 2G2

Cate Pengelly, BSc
Amaranth Consulting Group Ltd.
502 – 1405 Douglas Street
Victoria, BC V8W 2G2

Introduction

Approximately 50% of all long-term care residents fall each year, and of these, 40 percent fall twice or more each year (Aronow and Ahn, 1997; Kiely et al., 1998). Approximately 10% of these falls result in serious injury, including up to 5% resulting in bone fractures (Butler et al., 1996; Thapa, et al., 1998). The risk of sustaining a hip fracture is 10.5 times higher for women who are in facilities than for women living in the community, and less than 15% of facility residents who sustain a hip fracture regain pre-injury ambulation status (Folman et al., 1994).

Fall-related injuries among those aged 65 and older in residential care appear to be far more frequent than among those who are not in residential care (Scott, Peck and Kendall, 2004). Seniors in residential care account for approximately 7% of the population age 65 and over but account for 15% of all fall-related hospitalizations for that age group.

In 2001, the Canadian population age 65 and over was approximately 3.9 million people and of these, it is estimated that 7.4% or approximately 287,500 were living in health care institutions. They represented 9.2% of senior women and 4.9% of senior men. This is a decline since 1981, when 10.5% of senior women and 6.7% of senior men lived in these facilities. Living in health care institutions is most common for the oldest seniors, those aged 85 years and older. However, despite the growing numbers in the 85 and over age group, the proportion of men age 85 and over in these facilities dropped from 29% in 1981 to 23% in 2001, and the proportion of women age 85 and over dropped from 41% in 1981 to 35% in 2001 (Statistics Canada, 2001).

As demand for care exceeds available spaces, adults who are now admitted to residential care facilities tend to have more complex health challenges, such as advanced dementia, multiple chronic health conditions and limited mobility. These same conditions are also associated with high rates of falls and injury. In addition, many long-term care (LTC) facilities built in prior decades were not designed to meet the needs of this frailer population and the physical environment is proving to be another contributor to fall risk. Unfortunately, staffing levels are not being increased to parallel these challenges and training in falls prevention for care providers is seldom considered a priority.

There is a growing body of evidence that demonstrates the magnitude of the problem of falls among older adults and the effectiveness of strategies proven to reduce fall risk. Between 1985 and 2005, there has been a 300% increase in publications specific to this area (Close, 2005). A key issue arising from this research is that nursing home residents are not only more susceptible to falling but also more susceptible to injury when they fall. Compared to older adults who live in the community, residents of long-term care facilities fall between two to four times more often and are twice as likely to injure themselves (Lord et al., 2003; Luukinen et al., 1995). Hip fractures occur almost four times more often in residential settings compared to the private home environment (Norton et al., 1998) and about 20% of all fall-related deaths among older adults occur among the 7% of older adults living in residential care settings (Rubenstein, 1997).

Predictors of falls and fall-related injury risk among LTC residents include medication side effects such as dizziness, syncope, hypotension, balance and gait disturbances, confusion and frequent urination (Kallin et al., 2002; Myers et al., 1991; Ray, Thapa and Gideon, 2000), increased gait and mobility impairment (Kiely et al., 1998), the use of assistive devices (Graafmans et al., 2003) and dementia or cognitive impairment (Krueger, Brazil and Lohfeld, 2001; Rubenstein, Josephson and Robbins, 1994; van Doorn et al., 2003). Environment and staffing issues are also indicated as contributing to falls (Fleming and Pendergast, 1993; Hofmann et al., 2003).

There is good evidence supporting the prediction and prevention of falls among seniors in the community (Gillespie et al., 2004). However, less is known about the prevention of falls among residents of long-term care facilities. Existing studies include those employing a multifactorial approach of staff education, environment modifications, hip protector use, medication reviews and exercise (Jensen et al., 2003; Becker et al., 2003; Ray et al., 1997). Vitamin D and calcium supplements have shown promise as a potential strategy for falls prevention (Bischoff et al., 2003) and exercise has been linked to falls prevention through improvements in mobility (Mulrow et al., 1994; Graafmans et al., 2003). However, direct evidence on the reduction of falls through exercise in this setting is not yet available.

Studies on the prevention of injury due to falls among LTC residents show promise but are not conclusive. The use of hip protectors has shown moderate reductions in the risk of fall-related hip fractures but compliance issues are still problematic (Parker, Gillespie and Gillespie, 2004). Taking bone enhancing medications, such as bisphosphonates, is also shown to be associated with a decrease in fracture risk (Adachi, 1998) but studies mostly focus on non-residential settings.

An important consideration in the promotion of an effective prevention plan for residential care facilities is the capacity of those providing care to embrace falls prevention as an important issue. Highlighting the growing magnitude of the problem through hospitalization records is one way to do this.

The purpose of this study was to 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 living in residential care facilities in Canada. This report covers hospitalisation cases, length of stay, and injury type for inpatients from residential care facilities, with some comparisons to those not from residential care facilities 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 living in residential care facilities in Canada. 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 gradually implemented 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.

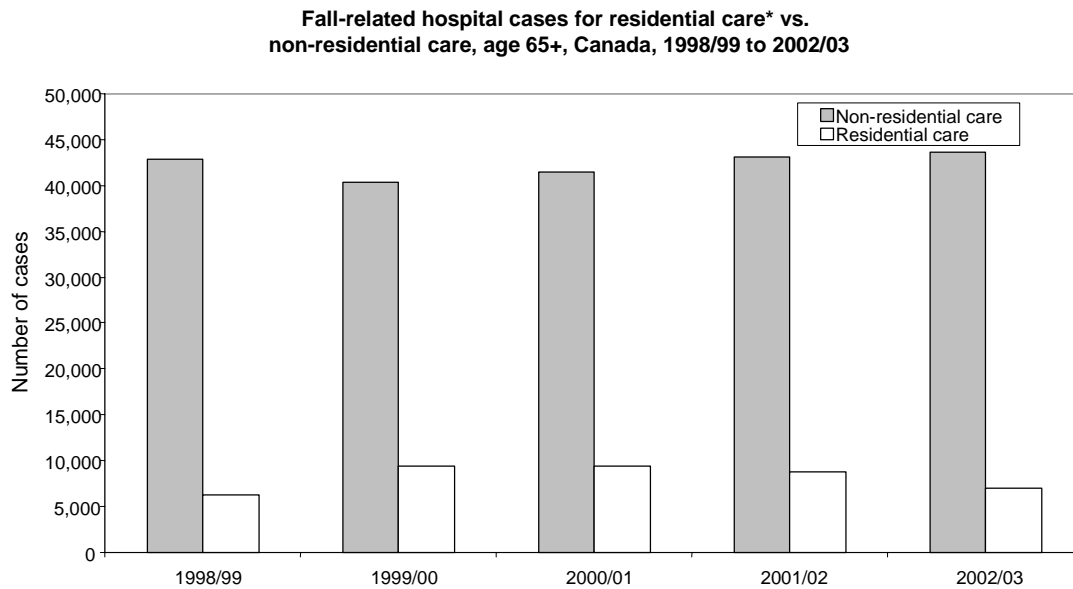
This report:

- includes hospitalization data for persons for whom “place of occurrence” of the fall was designated as “Residential Institution,” and the place they were “transferred from” to hospital was “Chronic Care Facility,” “Nursing Home” or “Home for the Aged”;
- 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);
- does not include residents of care facilities under age 65 years;
- does not include falls while outside the residential care facility (this could be a source of underreporting for this population); and
- does not include a calculation of any rates, due to a scarcity of information on total populations living in residential care facilities for the years 1998/99 through 2002/03.

Findings

The figure below shows that fall-related hospitalization cases for seniors not in residential care ranged between 40,000 and 43,000 per year through the period. Fall-related hospitalizations for seniors in residential care ranged from about 6,000 to 9,000 per year. Seniors age 65 and over who live in residential care facilities and who fall represent about 12% to 15% of all fall-related hospitalizations among those age 65 and over across the country from 1998/99 through 2002/03.

Over the 1998/99 to 2002/03 period, the number of fall-related hospital cases for those age 65 and over living in residential care increased from about 6,000 to 7,000 with the greatest number seen in 2000/01 at about 9,000 cases.



*Residential care homes include chronic care facilities, nursing homes, home for the aged.

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

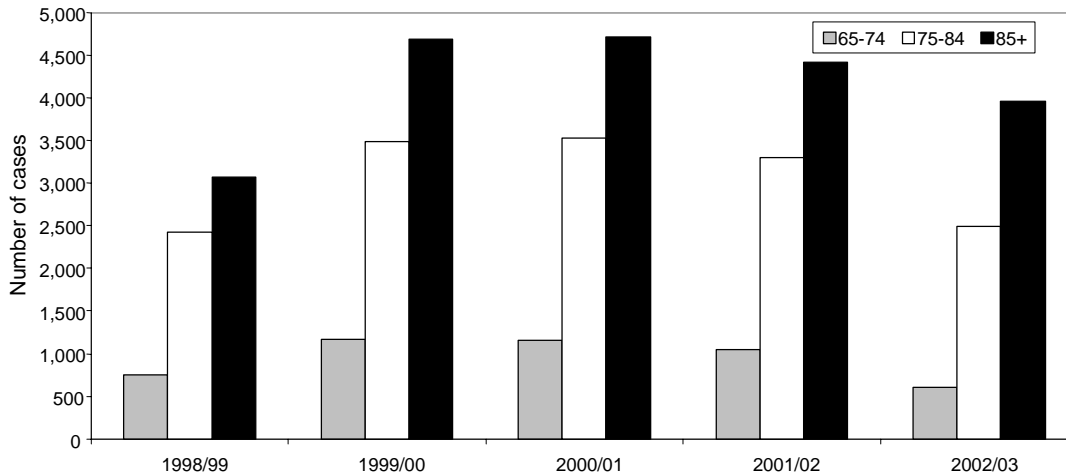
Table 1 shows that, from 1998/99 through 2002/03, there were over 40,000 fall-related hospitalizations among Canadians age 65 and over living in residential care. This is the equivalent of approximately 8,000 hospitalizations due to falls per year.

Table 1 – Fall-related hospital cases for seniors in residential care, by age group, age 65+, Canada, 1998/99 to 2002/03

	65-74	75-84	85+	65+
1998/99	747	2,417	3,076	6,240
1999/00	1,166	3,488	4,692	9,346
2000/01	1,158	3,534	4,721	9,413
2001/02	1,044	3,305	4,417	8,766
2002/03	599	2,487	3,959	7,045
Total				40,810

The figure below shows the number of hospitalizations increased with age in all years shown. The number of cases among those aged 65 to 74 increased to over 1000 per year in 2000/01 with a decrease in the final two years. The number of cases among those aged 75-84 increased to about 3,500 per year in 2000/01 with a decrease in the final two years. For those aged 85 and older, there was an increase in hospitalizations due to falls to 4,500 in 2000/01 followed by a decrease over the next two years.

Fall-related hospital cases for residential care,* age 65+, by age group, Canada, 1998/99 to 2002/03

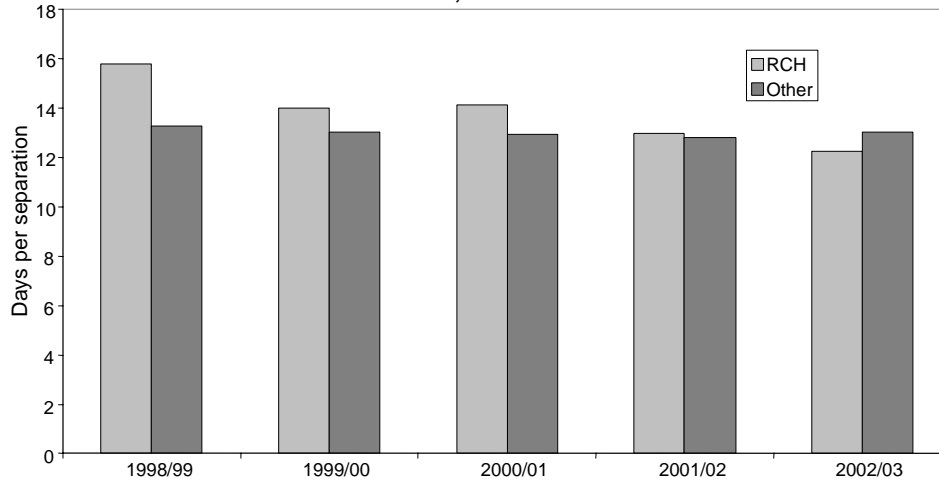


*Residential care homes include chronic care facilities, nursing homes, home for the aged.

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

The figure below shows that in 1998/99, the average length of stay for fall-related hospitalizations for those aged 65 years and older living in a residential care facility was about 19% longer than the average length of stay for those not living in residential care. This gap narrowed over the five years and, by 2002/03, those not living in residential care had longer stays on average compared to those living in residential care. The average length of stay for falls for patients not living in residential care facilities has shown little change from 1998/99 through 2002/03.

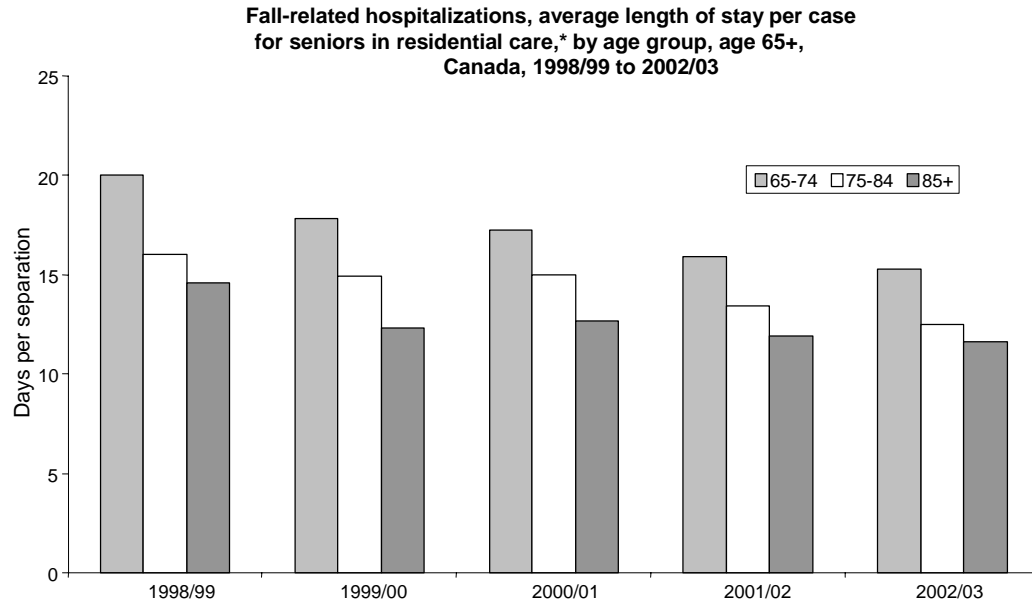
Fall-related hospitalizations, average length of stay per case for residential care* vs. non-residential care, age 65+, Canada, 1998/99 to 2002/03



*Residential care homes include chronic care facilities, nursing homes, home for the aged.

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

The figure below illustrates that, for those aged 65 and over living in residential care facilities, the older the person is, the shorter the stay in hospital. On average, those 65 to 74 years of age stay in hospital 15 to 20 days after a fall, while those 75 to 84 stay 13 to 15 days and those aged 85 and over stay 12 to 14 days. The average length of stay in all age groups declined over the five-year period. This contrasts with the non-residential care population that showed a relatively stable average length of stay over the period.

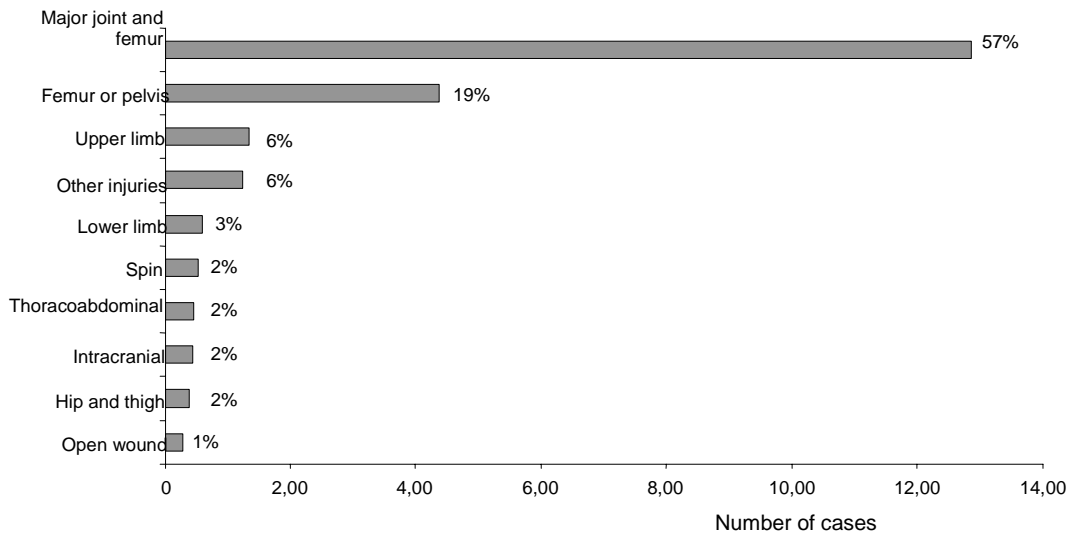


*Residential care homes include chronic care facilities, nursing homes, home for the aged.

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

Figure 16 shows that, over the five-year period, nearly 17,000 Canadians age 65 and over living in a residential care facility were hospitalized for fall-related injuries to a major joint, femur, pelvis, hip or thigh, and these account for more than 75% of all fall-related injuries among those of this group who were treated in hospital. Injuries to the upper limbs, lower limbs or spine accounted for 11% of fall-related hospitalizations for this age group. Most injuries were to the lower limbs.

Figure 16 – Number and percent of hospital cases associated with falls in residential care by injury type, age 65+, Canada, 1998/99 to 2002/03



Injury type as classified in Major Clinical Category 25: Significant Trauma.

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

Table 2 compares hospitalizations due to a fall by province and territory for older adults in residential care. Quebec and Manitoba are not included because hospitals in Quebec and rural hospitals in Manitoba do not submit data to the DAD. The numbers in the table are not adjusted for population size.

Table 2 - Fall related hospital cases, days, and average length of stay, residential care, age 65+, Canada, aggregated 1998/99 to 2002/03

	Cases	Days	ALOS	Number (%) population 65+ by P/T*
Territories	54	1,174	21.7	4.5 (3.4)
British Columbia	8,737	128,552	14.7	574.4 (13.7)
Alberta	5,349	85,192	15.9	332.9 (10.4)
Saskatchewan	2,149	26,847	12.5	147.5 (14.8)
Ontario	20,842	246,548	11.8	1,580.5 (12.8)
New Brunswick	1,289	25,936	20.1	103.3 (13.7)
Nova Scotia	1,333	24,638	18.5	131.8 (13.9)
Prince Edward Island	207	2,449	11.8	19.2 (13.9)
Newfoundland	657	11,134	16.9	66.5 (12.9)
Total	40,617	552,470	13.6	4,141.0 (13.0)

*Number (thousands) and percent of population age 65 years or over by provinces and territories (Statistics Canada, 2004).

Discussion

These findings confirm that fall-related injuries among those age 65 years and older in residential care are far more prevalent than among those in non-residential care (Scott, Peck and Kendall, 2004), with approximately 7% of the population aged 65 and over representing 15% of all fall-related hospitalizations.

Although slight decreases are seen in fall-related hospital cases over the final two years between 1998/99 and 2002/03, this may reflect the decrease in residential care beds rather than a decrease in fall-related injury rates in these settings. Decreases in hospital admissions might also be a factor of increasing frailty of this population, with more deaths due to falls occurring prior to hospital admission, either on site, during transfer or in emergency departments.

It is also interesting to note the differences in length of hospital stay for fall-related injuries among those from residential care compared to those not living in residential care. Over the five years from 1998/99 to 2002/03, the average length of stay for falls among those from residential care settings has decreased, while the days for those not from residential care have remained the same. Possible explanations for these differences might be that the falls among the increasingly frail residential care population are more severe and result in more deaths while in hospital. An alternative explanation might be increased hospital stays due to the difficulty in finding residential care placement for non-residential care patients, who are unable to return to the community due to complications after their fall injury.

Length of stay also varies considerably among the provinces and territories, with the Territories having the longest average length of stay of 21.7 days compared to Ontario and Prince Edward Island with the shortest stays at 11.8 days each. However, interpretation of these differences is limited by the lack of information on the number of persons in residential care settings compared to the total population of those aged 65 years and older for each province and territory.

The leading type of fall-related injury causing hospitalization for those aged 65 and over living in residential care in Canada is injuries to major joints and the femur, followed by injuries to the femur or pelvis. The majority of these injuries are likely hip fractures, which are shown in other studies to contribute up to 40% of all fall-related hospitalizations for this age group (Peel, Kassulke and McClure, 2002; Scott, Peck and Kendall, 2004). The majority of injuries to the lower limbs are likely due to greater impact on the lower body during a fall due to diminished reflexes and poor upper body strength typically found among frail seniors.

Clinical implications of findings from this study highlight the growing pressures of the problem of fall-related injury in residential care settings and the urgent need for comprehensive falls prevention planning. Components of a comprehensive plan include risk assessment and follow-up, system-wide review of risk reduction policies and procedures, standardized protocols for falls reporting, and on-going input from those

affected by the problem and those with the capacity to reduce the risk of falling (Scott et al., in review). Strategies for falls reduction also should reflect current evidence for best practices in prevention, with consideration for practical application and local resources. Selecting the appropriate prevention strategies is best done through a multidisciplinary collaborative process that reflects the risk profiles of individual residents and the unique characteristics of the facility. Success of such a plan is dependent upon effective leadership and the involvement of those with the ability to build on existing strengths and capacities within each setting.

Limitations

This report is limited to the DAD data pertaining to acute care hospitalizations for falls among persons age 65 years and older who were living in residential care facilities in Canada at the time of their fall. The DAD includes hospital inpatient data from all acute care hospitals, with the exception of Quebec hospitals and rural hospitals in Manitoba, which do not submit 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.

The data for this study exclude falls that occurred outside the facility and those among residents who were under the age of 65 years. These restrictions likely underestimate the magnitude of fall injuries among the residential care population.

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Appendix 1 – Details of 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)nknown **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	Insttit from Type	CMG	MALE			FEMALE			OTHER		
					Age	Number	Total	Age	Number	Total	Age	Number	Total
					Group	of Cases	Acute Days	Group	of Cases	Acute Days	Group	of Cases	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	30	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.