

# The Evolution of Falls and Injury Prevention Among Seniors In British Columbia, Canada

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**Abstract:** The need to prevent falls and related injuries among seniors is a significant public health issue in Canada and all nations where an aging demographic puts higher numbers at risk. In British Columbia (BC), falls are the leading cause of injury-related hospitalization and death among seniors. Seniors are BC's fastest growing age group, with one in four reaching the age of 65 or older by 2036. To address this costly and complex problem, a sustained collaboration has occurred over the past 20 years among fall prevention leaders within government, the health system, academia and local communities. This article summarizes key elements of a coordinated, province-wide public health approach to reduce falls and related injuries among those aged 65 years and older in BC. Historical records of the interventions are recorded in two influential reports that have also helped to galvanize this province-wide collaborative effort. Outcomes include a significant reduction in fall-related hospitalization and death rates, with a parallel growth in fall prevention programs and services for those at risk. This article concludes with a summary of the key developments in the evolution of fall prevention activities in the province over the past two decades and how the sustained, collaborative efforts have resulted in BC emerging as an example of success in the formation of comprehensive networks and the integration of evidence-based fall prevention into health service delivery for seniors. However, more needs to be done to ensure integrated and sustained results.

**Keywords:** Injury prevention, unintentional falls, fall prevention, seniors, aging.

## INTRODUCTION

It can happen in an instant: standing on a wobbly stool, tripping over a sidewalk crack, slipping on a rug or patch of ice, or getting up from a bath, a toilet or a chair. It can happen in a person's home, residential care facility, in the community or while a patient is in hospital. There are numerous ways a person can suddenly lose his or her balance and fall. The result is often an injury, hospitalization, disability or even death.

Falls are by far the leading cause of injury among BC seniors, and can cause long-term disability, chronic pain, and even death [1]. Prospective studies show that between one-third and one-half of those aged 65 years and older fall at least once each year and approximately half of these experience multiple falls [2, 3]. The Canadian and international statistics on the scope of this problem are robust. Unintentional injuries from falls among older Canadians account for 84 percent of all injury-related hospitalizations [4]. Even without an injury, a fall can have a lasting impact on a senior's independence and quality of life. The proportion of people having a fall resulting in an injury is 9 times greater among those aged 65 years and older compared to those younger than 65 [5]. Almost half of all seniors who fall

experience a minor injury and 5 to 25 percent sustain a major injury such as a fracture or sprain [6]. Falls cause approximately 95 percent of all hip fractures among persons aged 65 years and older and 20 percent die within a year of the fracture [7, 8]. In addition, falls are directly accountable for 26 to 40 percent of admissions to long-term care facilities [9, 10].

Few population-based studies exist that report on multi-strategy fall prevention efforts for large geographic areas. In a review by McClure *et al.* (2005), five studies were found that applied a population-based approach to determine the effectiveness of multi-strategy fall prevention interventions. All showed improvements over time compared to control groups (relative reductions of 6 to 33 percent in population-level fall injury indicators), though some were not statistically significant [11]. Due to the scarcity of information provided in the reviewed studies on the nature of the activities undertaken to reduce falls, the authors conclude that more studies are needed to uncover the barriers and facilitating factors in population-based interventions.

The interventions and initiatives described in this paper represent the collaborative efforts of many champions and leaders dedicated to seniors' health and injury prevention in the province of BC. These efforts reflect two decades of work on multiple initiatives conducted in "real-life" settings through coordinated and collaborative efforts among researchers, clinicians, policy makers and community advocates for seniors' health. Cumulatively, this work represents a broad public health approach including strategies that reflect the dynamics of evolving evidence, the availability of

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human and financial resources, and responsiveness to opportunities for action.

### Objective

The objective of fall prevention efforts in BC is to reduce the number and severity of falls among those aged 65 years and older. The urgency of this issue is reflected in the fact that the population of BC, as in most parts of the world, is rapidly aging. In 2007/08, seniors represented 14.3 percent (N=617,399) of the BC population. From 2007/08 to 2036/37, the number of seniors within BC is estimated to increase by 135 percent to 1,449,867, or 24 percent of the total BC population [12].

### THE EVOLUTION OF THE INTERVENTIONS

Interventions to address the incidence and severity of falls among older persons in BC reflect a sustained public health approach that has been taking place since the late 1980s. This approach relied on a careful analysis of the problem and its causes in order to develop effective solutions [13].

The context for these solutions is outlined in the following overview of historical milestones that laid the groundwork for BC's success. This work reflects the efforts of many stakeholders, including champions within the Canadian and BC governments who made possible the funding and support for important provincial and national initiatives. Government agencies responsible for this support include the Public Health Agency of Canada (PHAC) [formerly Health Canada], Veterans Affairs Canada, and the BC Ministry of Health Services (formerly Ministry of Healthy Living and Sport). Efforts were also enhanced and influenced by key national policy frameworks and campaigns. Concurrently, a philosophical shift was occurring away from a disease model of health to one that encompasses a broad range of health determinants, including biological, environmental, social and behavioral factors.

#### The Early Years: 1986–2000

In the late 1980s, efforts to recognize falls among seniors as a problem in BC commenced with the Inter-Ministerial Committee on Seniors Issues (IMCSI). This led to an IMCSI-hosted provincial workshop in 1990. From this workshop, a research group was formed to conduct the *Falls Intervention Trial* study [14] and produce the video *Head Over Heels* [15]. This was the first of a series of studies in the 1990s, conducted primarily by the University of Victoria. At the same time, funding from Health Canada Health Promotion Branch supported the formation of the Adult Injury Management Network (AIMNet) [16], the first province-wide initiative for the coordination of and collaboration on fall prevention activities.

Government initiatives at this time included the formation of the Ministry of Health's Office of Injury Prevention and subsequently, the formation in 1998 of the government funded BC Injury Research and Prevention Unit (BCIRPU) that operates in affiliation with the University of British Columbia (UBC). The primary purpose of the BCIRPU is the reduction of injuries through the support and evaluation of effective prevention measures and the establishment of ongoing injury surveillance across the province.

In 2000, groundwork for future initiatives was also laid through partnership funding from Health Canada and Veterans' Affairs community-based health promotion initiative, which launched 25 fall prevention projects across Canada, including 5 in BC. These projects helped to identify effective fall prevention strategies for veterans and seniors and set the stage for future collaboration and new initiatives in BC and across Canada [17].

#### Recent Initiatives: 2001–2007

Since 2001, a number of significant changes have occurred, starting with the establishment of a new position, titled Senior Advisor on Fall and Injury Prevention, within the BCIRPU and BC Ministry of Health. The goal of this position, which continues to this day, is the coordination and integration of fall prevention across health and community services for older persons in BC. Through the leadership of an expert in fall prevention selected for this position, the momentum of efforts across BC has been intensified. In 2003, the Interior Health Authority became the first of BC's five regional health authorities to officially appoint a regional fall prevention manager and to fund the development of a regional fall prevention strategic plan. Today, all five of BC's regional health authorities have a designated manager for fall prevention strategic planning and programming. These managers were instrumental to the formation of the BC Fall and Injury Prevention Coalition (BCFIPC) in 2005. This multi-sectoral collaborative now represents every health authority in BC, as well as many professional, government and community agencies and organizations concerned with seniors' health and fall prevention. Through networking, education, collaboration and research for implementation of evidence-based prevention, members of the BCFIPC aim to effect change in policy and programming at local, regional and provincial levels in order to reduce the rate and severity of falls and related injuries among older adults.

A pivotal event that drew unprecedented attention to the issue of falls among older persons in BC and strongly influenced the creation of regional fall prevention managers and the BCFIPC was the development and publication of the 2004 Provincial Health Officer's (PHO) report on the prevention of falls among the elderly [18]. Under the leadership of the then-Deputy Provincial Health Officer, Dr. Shaun Peck, the report covered a comprehensive overview of the impact and seriousness of this issue, including a thorough review of known risk factors, proven interventions, and the epidemiology and economic burden of falls in BC. The importance of the issue was made evident to regional leaders by identifying that in 2001, 771 seniors died as a result of a fall, and that for every death, there were approximately 34 hospitalizations and 56 seniors treated and released for a fall injury from emergency departments. Another motivating factor is increasing demands on the health care system, including for seniors who sustain a fall injury. These health care needs are reflected by the fact that the length of hospital stay for a fall is over twice as long compared to all other causes of hospitalization for those aged 65 years and older and, for those over the age of 85 years, falls account for 11 percent of all reasons for being hospitalized and 24 percent of all hospital days [19].

**Table 1. Major BC Fall Prevention Initiatives 1989 to 2006 [22]**

Year	Initiative	Type of Initiative	Impact	Lead Funding Agency
1989-1990	Inter-ministerial Committee on Seniors Issues	Policy	Prompted BC fall-related hospitalizations workshop. First time falls was profiled in B.C. as a serious public health issue.	Federal/ Provincial/ Territorial (F/P/T) Governments
1991-1993	Fall intervention trial and Head Over Heels video	Research	Initiated randomized controlled trials on falls in BC. "Head Over Heels" video is still widely used.	Health Canada
1992	Office of Injury Prevention (OIP) formed	Policy /Practice	Ministry of Health formalized its commitment to reducing injuries by establishing the OIP.	BC Ministry of Health
1994-1997	Seniors Task Force for Environmental Protection (STEPS) project	Research /Practice /Policy	First published study on the epidemiology of falls in public places and subsequent video - "Stepping Out: Preventing Falls in the Community"; and "Taking STEPS" - a safety manual for planning, building, and maintaining public places.	Health Canada's Seniors Independence Program and Disabled Persons Participation Program
1997	Mortality and Morbidity Related to Injuries from Falls in British Columbia	Research	First published epidemiological overview of falls among seniors in BC.	Social Sciences and Humanities Research Council
1997	OIP and the Deputy Provincial Health Officer create the BC Injury Research and Prevention Unit (BCIRPU).	Research /Practice	Established to reduce the societal and economic burden of injury among all age groups in BC through research, surveillance, education and knowledge transfer, public information and the support of evidence-based, effective prevention measures.	BC Ministry of Health and research grants from various sources
1998	Formation of Adult Injury Management Network (AIMNet) and BC AIMNet Summit on Falls Prevention	Practice	Province-wide coalition of key stakeholders to increase the awareness of adult injury, promote networking and sharing of resources. AIMNet Summit held in 1998 resulted in resolution to government regarding the need for major efforts to reduce falls among seniors.	Health Canada's Seniors Independence Program
2000-2006	Simon Fraser University studies	Research	Essential past and ongoing contributions to evidence-based fall and injury prevention in BC, including studies on biomechanics of falls and hip fractures, and floor stiffness and risk of hip fracture.	Canadian Foundation for Innovation, Canadian Institutes of Health Research, Michael Smith Foundation and other sources
2001	Office of Injury Prevention and the Office for Seniors jointly created Falls Prevention Specialist position (recruitment of Dr. Vicky Scott)	Practice	Jointly identified the need for priority focus and investment on fall prevention among older persons and this led to the recruitment of the Senior Advisor on Falls and Injury Prevention.	BC Ministry of Health
2001	Health Canada and Veterans Affairs Falls Prevention Initiatives	Research /Practice	3-year pilot program funded in BC, Ontario and Atlantic. BC was selected, as substantial experience, activity and collaborative partnerships existed.	Health Canada and Veterans Affairs Canada
2002	Conference: Research, Policy and Practice to Reduce Falls in the Elderly	Research /Policy /Practice	Held in Victoria, BC, this conference proceeded from the International Association of Gerontology Conference in Vancouver BC, the first international conference held in Canada to explore prevention of falls and fall-related injuries among seniors.	BC Ministry of Health and various other sources.
2003	"Stepping In": Fall Prevention in Long-Term Care	Research	A two-part national study to: a) test a surveillance tool for falls in long term care facilities and explore the impact of a variety of interventions; and b) study risk factors for injurious falls among residents in long-term care facilities.	Health Canada

(Table 1). Contd.....

Year	Initiative	Type of Initiative	Impact	Lead Funding Agency
2003-2005	Strategies and Actions for Independent Living (SAIL)	Research /Practice	Three study phases, including a controlled trial exploring fall prevention among clients of publicly funded home support services leading to the integration of fall prevention training and programming in home support services across BC.	Vancouver Foundation, Canadian Nurses Foundation, BC Ministry of Health, and Interior Health Authority
2003-2006	University of BC studies	Research	Essential past and ongoing contributions to evidence-base fall and injury prevention in BC including studies on: risk reduction for women with osteoporosis; emergency department fall outcomes; strength and balance in reducing falls; and fall risk for women with visual impairment.	Canadian Institutes of Health Research, Michael Smith Foundation for Health Research
2005	BC Fall and Injury Prevention Coalition formed	Practice	A new coalition of key partners from health authorities, universities, provincial organizations and BC Government.	Public Health Agency of Canada (Western Region); BC Ministry of Health
2005	Environmental Scan: Seniors and Veterans Falls Prevention Initiatives in BC	Research /Policy	An update of the 2001 inventory showing a 9-fold increase in fall prevention initiatives in BC.	Public Health Agency of Canada (Western Region); BC Ministry of Health
2005-2006	BC regional health authorities establish fall prevention plans	Policy /Practice	Each of the five regional health authorities document fall and injury prevention plans outlining goal, objectives and put actions into place to reduce the incidence and severity of falls among older persons in their regions. Strategies are targeted towards community, home, residential care and acute care settings.	BC health authorities and partner organizations
2006	Centre for Hip Health and Mobility (CHHM) opens on the Vancouver Hospital Campus.	Research /Practice	CHHM goals include the generation of new knowledge and translation of research that is relevant, effective and sustainable into programs, practices and policies. Areas of study include: Enhancing bone strength in older women; Home-based strength and balance training to reduce falls; Recent history of multiple falls as an early indication of cognitive dysfunction.	Canadian Institutes of Health Research; Michael Smith Foundation; Heart and Stroke Foundation; Vancouver Foundation; and the Natural Sciences and Engineering Research Council of Canada

The 2004 PHO report helped to galvanize action among health care providers and the general public through the collaborative process used to develop the report. This involved in-depth consultations and draft content reviews among target audiences in each of the province's five health regions. The report concluded with 31 recommendations for action that emerged from the collaborative process, including specific actions to be taken by health providers, community leaders and fall prevention researchers. The success of the PHO report was enhanced by its widespread dissemination to key audiences and by the launch of a complimentary social marketing campaign consisting of extensive media coverage and the production of a widely publicized video and series of public service announcements on a local public television network [20].

The PHO report provided the rationale needed by regional leaders to present a sound business case for investing in fall prevention by their regional health authorities, which

led to new resource allocation for prevention efforts, the formalizing of dedicated positions for Regional Fall Prevention Managers, and the eventual formation in 2005 of the BCFIPC (also known as the Coalition).

Between 2001 and 2004 (when collaboration on the development of the PHO report was underway), there was a nine-fold increase throughout the province in programs designed to reduce falls and injuries among seniors [21]. Since the release of the PHO report, the number of programs has continued to grow and the ultimate goal of true integration to practice is beginning to be achieved through the spread of onsite staff training, risk assessment, evidence-based interventions and ongoing evaluation. This is largely due to the work of the Coalition and collaborators who have expanded their work in the areas of fall prevention research, policy and practice at an unprecedented rate. Highlights of these activities are presented in Table 1, including the impact and funding sources for these milestones.

Many of the developments and initiatives listed in Table 1, and the history that led up to them, are outlined in the second pivotal document, the 2006 *Evolution of Seniors' Falls Prevention in British Columbia* [23]. This report details the history of fall prevention efforts since the late 1980s, showing that the groundwork for current prevention efforts is based on various key historical milestones.

In addition to advances in practice and education, research initiatives targeting falls and fall-related injuries among seniors in BC increased at a dramatic rate between 2001 and 2007. Of particular note is the work at the University of British Columbia by Dr. Karim Khan and his colleagues on the effectiveness of exercise for reducing falls and injuries [24, 25]; the work of Dr. Stephen Robinovitch and the team at Simon Fraser University on the prevention of hip fractures [26]; and research conducted by Dr. Scott and the fall prevention team at the BCIRPU, such as the studies among home support clients [27] and those living in assisted living residences [28].

These two decades culminated with a landmark event in 2007, when the BC government proclaimed the first week of November as the inaugural Seniors' Fall prevention Week in BC, thereby demonstrating political support for fall prevention as a major public health issue.

In addition to the many BC-based studies and programs, BC researchers and policy makers also contributed leadership roles on a number of key national fall and injury prevention initiatives that impacted fall prevention in BC and across Canada. In 1999, the BC Office for Seniors led the F/P/T Safety & Security Working Group in the production of a white paper focused on seniors' injury, abuse and crime, which set the stage for the 2000 F/P/T declaration of fall prevention among the elderly as a priority public health issue. In 2001, BC researchers were lead authors on the Health Canada funded projects: "Best Practices Guide for the Prevention of Falls among Seniors Living in the Community" and the "Inventory of Canadian Falls Prevention Programs." In 2005, BC researchers also led on the production of the Public Health Agency of Canada funded "Report on Seniors' Falls in Canada."

Despite the appearance of these activities being a smooth escalation of initiatives each building on the other in a planned progression, this was far from the case. Barriers, challenges and roadblocks were met in all fronts of policy, research and practice. In the policy setting, seniors' fall prevention was not identified as a priority issue for health service delivery within the health authorities. Contributing factors to this included competing demands for scarce health care resources – human and financial – combined with competing priorities, such as perceptions of greater urgency for injury prevention among younger age groups. In the early years, there was also a dearth of performance measures from the province to the health authorities for seniors' injury prevention, which subsequently led to a lack of understanding of the magnitude and consequences of the problem.

In the practice setting, it was often a challenge to convince health care providers that strategic steps were needed to prevent falls that went beyond typical routine practice. This included convincing staff of the need to implement a structured public health approach to fall prevention, which

involves recording data on all falls and injuries, assessing the nature of fall risk, implementing evidence-based preventions tailored to risk profiles, collaborating across disciplines, and evaluating and strengthening their efforts.

Barriers to effective research in fall and injury prevention among older persons stemmed largely from a lack of recognition among granting agencies for the need to focus on seniors, injury prevention and translational research methods. This is gradually changing, however, as many new grants have targeted injury prevention, mobility in aging and most recently, a knowledge translation grant has been provided by the Canadian Institutes for Health Research.

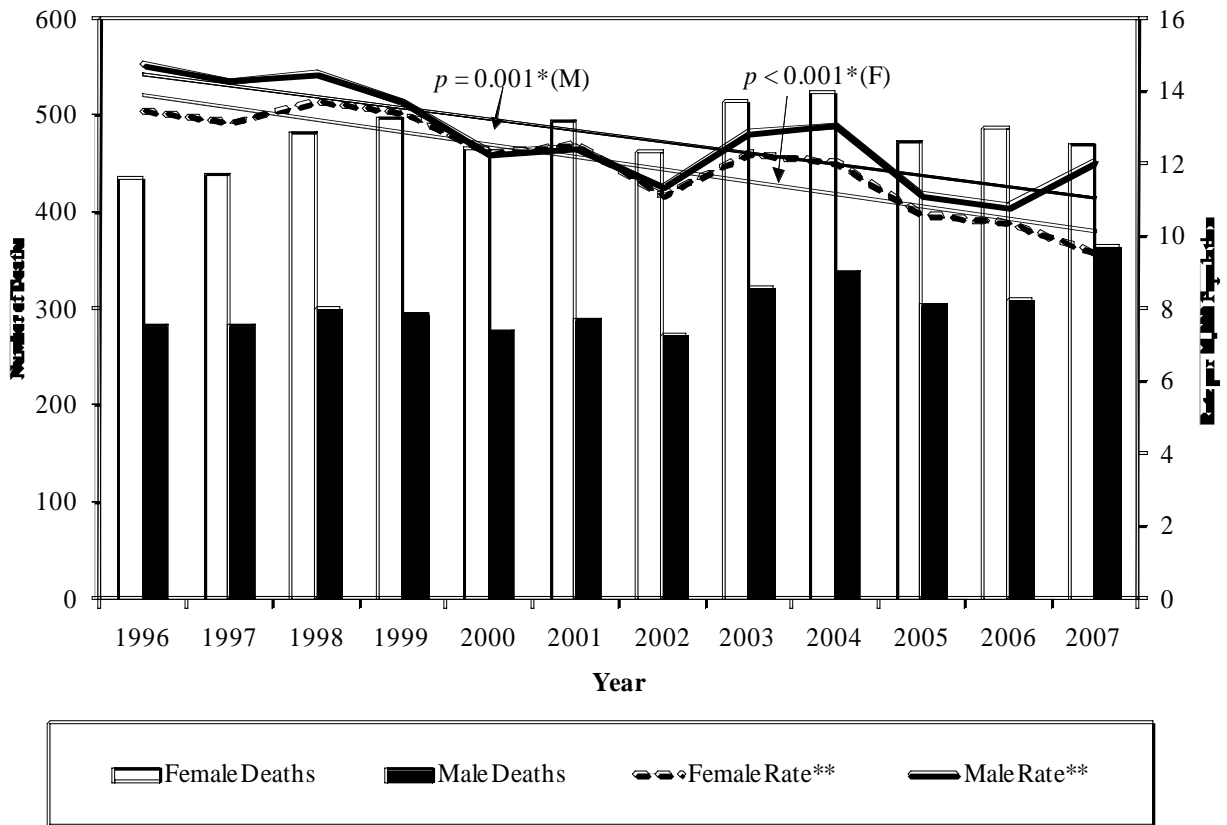
The lessons learned over the two decades of fall and injury prevention for older persons in BC can be attributed to the sheer determination of a core group of dedicated individuals. These were people working in areas of policy, research and practice who saw the tragic outcomes of injurious events and knew that they were proven to be preventable. It was just a matter of convincing others.

### Future Plans

Plans for a third major document are now underway. A document titled "*A Blueprint for the Prevention of Falls and Related Injuries Among Older Persons in British Columbia*" was designed through a collaborative process and has the goal of improving links between proven best practices for fall prevention and all health and community services for older adults. Through this integration of evidence with practice, it is hoped that fall prevention will become embedded in the everyday care of older persons and be no longer seen as a program to be "added on" to routine care.

In March 2009, the BC Ministry of Health Services took steps to further enhance the platform that unites fall prevention policy, practice and research in BC by funding the establishment of the Centre of Excellence on Mobility, Fall Prevention and Injury in Aging (CEMFIA). Housed at the Centre for Hip Health and Mobility (CHHM) situated at the Vancouver General Hospital campus, CEMFIA's mission is to generate, translate and promote the uptake of best practice evidence for the enhancement of mobility and the reduction of the incidence and severity of falls and fall-related injuries among older persons in BC. CEMFIA represents a unique collaborative of researchers, health care providers and policy makers who have a shared goal of improving the health and safety of older British Columbians. With the rapidly expanding body of research being generated locally and internationally on seniors' falls and fall-related injuries, CEMFIA meets the need to provide a first-of-its-kind national and provincial coordinating role so that researchers from relevant and diverse backgrounds can connect with each other and speed the process of knowledge translation.

A new education program is also being disseminated across Canada and internationally through the *Canadian Fall Prevention Curriculum (CFPC)* [29]. This evaluated, evidence-based course is offered as a two-day workshop or as an on-line distance education course through the University of Victoria (in English) and the University of Alberta's Campus Saint-Jean (in French). The course is designed to enhance the capacity of health care professionals and community care providers to develop, implement and evaluate



**Fig. (1). Direct and indirect deaths due to falls among seniors, by gender, B.C., 1996 to 2007.**

Notes:

\* Statistically significant ( $p < 0.05$ ).

\*\* Age-Standardized to B.C. 1991 population.

Direct cause of death = the underlying cause of death or what the person died of.

Indirect cause of death = contributing, associated, or antecedent causes to the underlying cause of death.

Falls = ICD-9 E880 - E888, ICD-10 W00 - W19.

Source: B.C. Vital Statistics Agency; Vital Statistics mortality data produced by Health Sector IM/IT Informatics group, July 2009.

Prepared by: Population Health Surveillance and Epidemiology, Ministry of Health Services, 2009.

effective fall prevention strategies for integration into health services and community settings.

**OUTCOMES**

The growth in evidence-based fall prevention programs and services described above is paralleled by a significant reduction in fall-related hospitalization and death rates in BC. However, it is difficult to directly attribute the reductions to specific interventions across the province.

Data reported here are from fall-related hospital separations<sup>1</sup> (Discharge Abstract Database, Canadian Institute for Health Information, acute and rehabilitation hospital separations only), and fall-related deaths (BC Vital Statistics Agency, direct and indirect causes of death, ICD-9 E880 – E888, ICD-10 W00-W19). Data were prepared by the Population Health Surveillance and Epidemiology Branch of the Ministry of Health Services. Hospital data do not include Alternate Level of Care (ALC) days, which reflect time

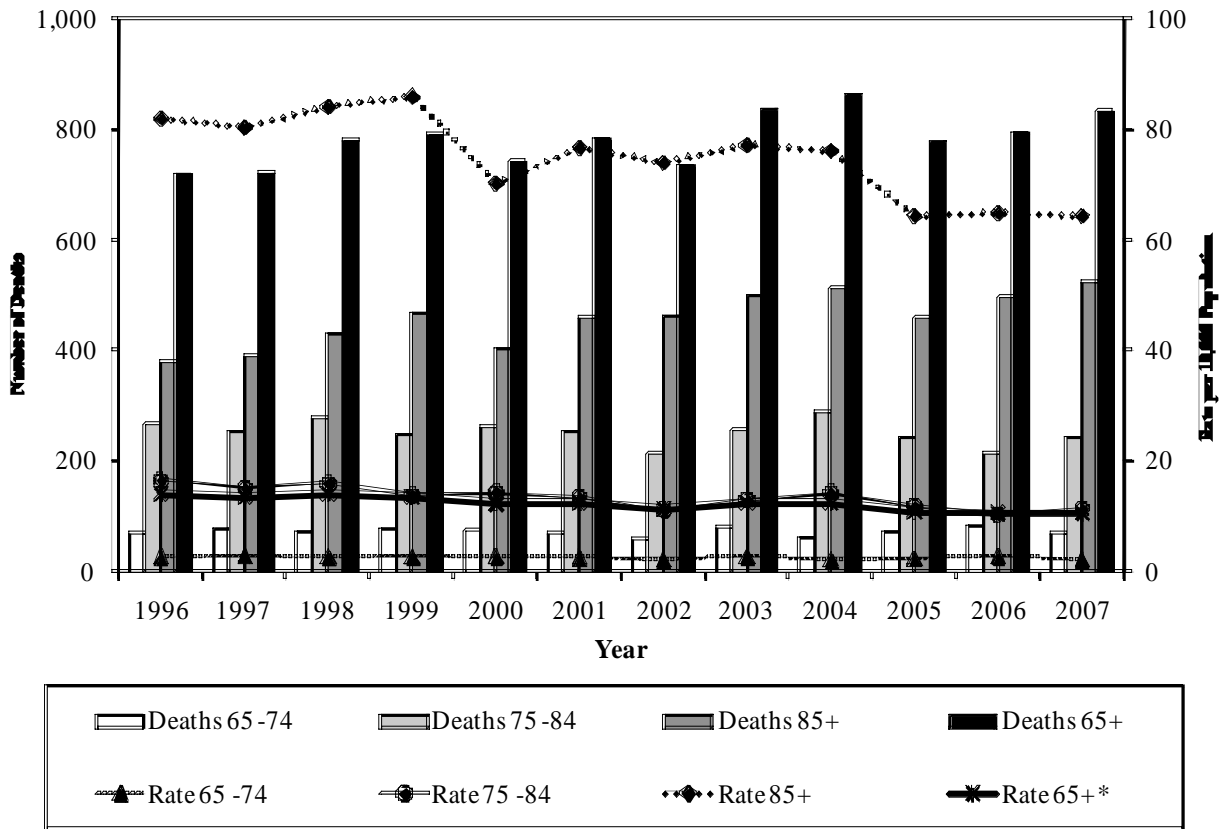
when the patient has finished the acute care phase of his/her treatment but remains in the acute care bed awaiting transfer to long-term care or discharge to their home.

**British Columbia Fall-Related Mortality and Hospitalization Epidemiological Data**

As shown in Fig. (1), during the period 1996 to 2007, there was a general growth in the absolute number of seniors who died as a direct or indirect result of a fall, and these numbers are highest among the females. The data also show that over the last decade in BC there has been a statistically significant reduction among females ( $p < 0.001$ ) and males ( $p = 0.001$ ) in the rate of indirect and direct deaths due to falls among seniors.

For deaths attributed directly or indirectly to a fall injury by age group, Fig. (2) shows that in 2007, the rate of death among those aged over 85 years (64.4 per 10,000 standardized population) is more than six times higher than for those aged 65+ (10.6 per 10,000 standardized population). This figure also shows that the overall death rate directly or indirectly due to a fall among seniors has decreased significantly

<sup>1</sup>Separations represent those discharged from hospital (acute and rehabilitation) and those who die while in hospital.



**Fig. (2). Direct and indirect deaths due to falls among seniors, by age group, B.C., 1996 to 2007.**

Notes:

\* Age-Standardized to B.C. 1991 population.

Direct cause of death = the underlying cause of death or what the person died of.

Indirect cause of death = contributing, associated, or antecedent causes to the underlying cause of death.

Falls = ICD-9 E880 - E888, ICD-10 W00 - W19.

Source: B.C. Vital Statistics Agency; Vital Statistics mortality data produced by Health Sector IM/IT Informatics group, July 2009.

Prepared by: Population Health Surveillance and Epidemiology, Ministry of Health Services, 2009.

for all age groups (85+  $p=0.001$ ; 74-85  $p<0.001$ ; 65+  $p<0.001$ ) except 65-74 ( $p=0.141$ ) from the period 1996 to 2007.

Fig. (3) illustrates that the age-standardized rate of hospital cases per 1,000 standard population for those over age 65 showed a small but highly statistically significant ( $p<0.001$ ) decline over the past decade (17.8 in 1996/97 down to 15.2 cases per 1,000 standard population in 2007/08). This decline in the rate of hospital cases from falls is also statistically significant ( $p<0.005$ ) in all three senior age groups.

As shown in Table 2, hip fractures are the most costly of fall-related injuries, with an estimated average hospital cost of \$17,886 and an annual average cost of approximately \$75 million for all hip fracture hospitalization cases among seniors in BC. Hip fractures are also the most common fall-related injury, comprising 41 percent of all fall-related cases among BC seniors.

The total estimated cost due to fall-related injury hospitalizations among seniors in BC for 2007/08 was \$156 million. These costs far outweigh the costs for those aged less than 65 years at \$49 million for the same year. In order to

compare estimated hospital costs across multiple years, the estimated cost from 2007/08 was retroactively applied to all years shown in Fig. (4) to allow for consistent comparison over time. As shown in Fig. (4), between 2003/04 and 2007/08, the estimated annual direct hospital cost of fall-related injuries among seniors in BC has increased by \$17 million (11 percent). This increase reflects the rapidly aging population in BC and subsequent rise in the number of hospitalization cases due to fall-related injuries among seniors. As mentioned earlier, these growing trends highlight the urgent need to enhance fall prevention efforts in BC.

**DISCUSSION**

This examination of the cumulative contribution of 20 years of fall prevention in BC shows considerable growth in programs, research, supportive policies, social marketing, and collaboration across sectors. This is paralleled by statistically significant reductions in fall-related death and hospitalization rates among older persons in BC over the last decade. However, the link between this public health approach to fall prevention and the significant reductions is strong but cannot be considered causal.

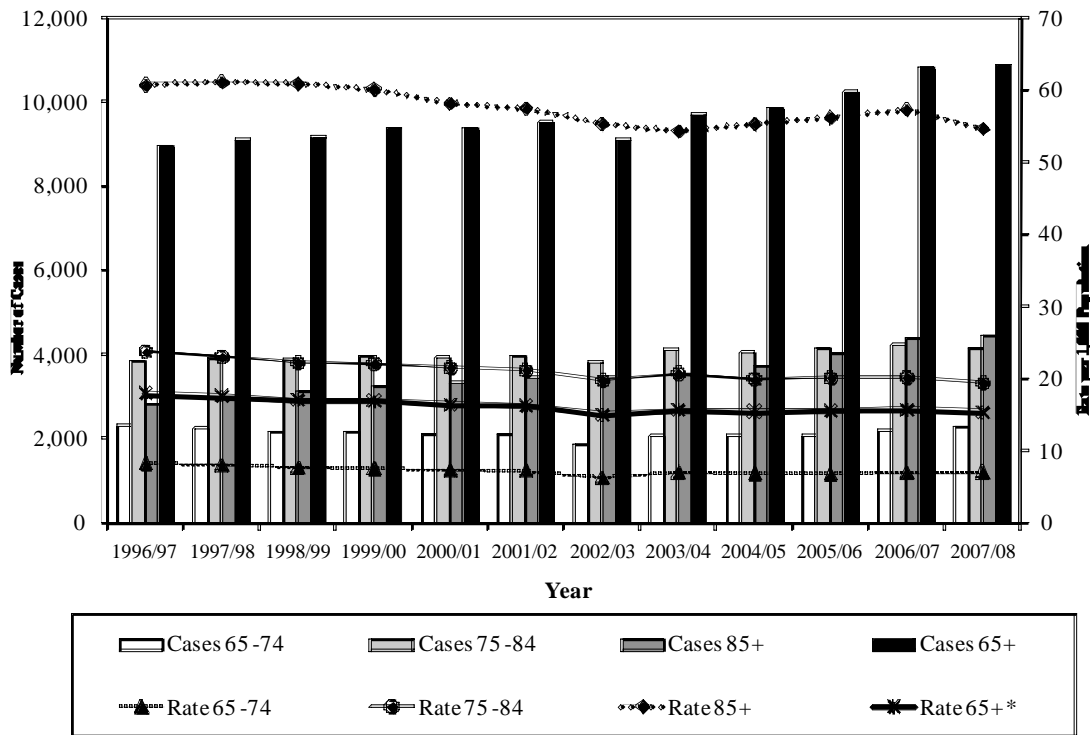


Fig. (3). Fall-related hospital cases and rates among seniors, B.C., 1996/97 to 2007/08.

Notes:

\* Standardized to the B.C. 1991 population.

Source: Acute/rehab separations from the 1996/97 to 2007/08 Canadian Institute of Health Information Discharge Abstract Dataset.

Prepared by: Population Health Surveillance and Epidemiology, Ministry of Health Services, 2009.

Table 2. Hospital Costs for Selected Fall-Related Injuries Among Seniors, BC, 2003/04 to 2007/08

Injury	ICD 10 Codes	Average Hospital Cost per Injury Case	Average Annual Hospital Cost for All Cases
Hip Fracture	S72.0-S72.2	\$17,886	\$75,019,774
Upper Limb Injuries	S40-S49, S50-S59	\$10,640	\$14,386,862
Head Injuries	S00-S09	\$12,736	\$14,638,261
Abdomen, Lower Back, Lumber Spine and Pelvis Injuries	S30-S39	\$13,168	\$14,832,822

Notes:

Data prepared by the Population Health Surveillance and Epidemiology Branch of the BC Ministry of Health Services, 2009. Source: Acute/rehabilitation separations from the 2003/04 to 2007/08 Canadian Institute of Health Information Discharge Abstract Dataset. Costing based on 2006 dollar.

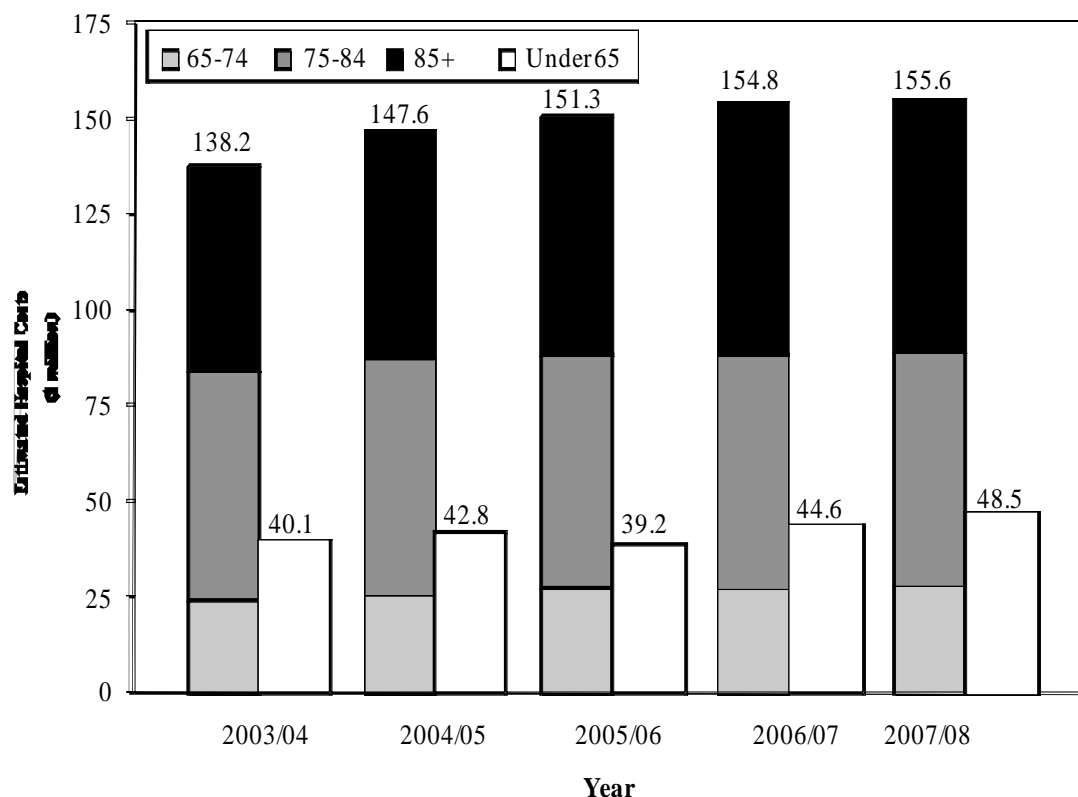
It is unclear whether the declines in hospital rates indicate fewer fall-related injuries requiring hospitalization or changes in hospital management, such as an increased tendency wherever possible to treat and release all patients including seniors in the emergency department and to support them at home. Understanding this potential shift in treatment of fall-related injuries is hampered by the lack of emergency department data in BC. Alternative explanations for declines in fall-related hospital rates are improved fall prevention strategies in BC combined with an increase in outpatient services and a decrease in hospital beds per capita. However, the declines in the rate of death are less influenced by alternative explanations.

Unlike the studies reviewed by McClure *et al.* (2007), this examination of fall prevention interventions and fall injury outcomes in BC was not a controlled trial. More multi-intervention, population-based studies are needed with matched control groups. In addition, studies are needed that examine data to better reflect the impact of shifts in the treatment of fall-related injuries and where cost-benefit analyses are applied to specific interventions in order to determine the most effective and efficient strategies for reducing falls and related injuries.

**CONCLUSIONS**

The key elements of the BC approach to fall prevention can be summarized through the application of a public health





**Fig. (4). Costs associated with fall-related injury hospitalizations, by age group, B.C., 2003/04 to 2007/08.**

Notes:

Cost estimates from 2007/08 retroactively applied to all years shown in Fig. (4) to allow for consistent comparison over time.

Source: Acute/rehab. separations from the 2003/04 to 2007/08 Canadian Institute of Health Information Discharge Abstract Dataset.

Prepared by: Population Health Surveillance and Epidemiology, Ministry of Health Services, 2009.

approach, including establishing a business case for fall prevention through epidemiological updates, standardized fall prevention training, a focus on targeting those most at risk, a collaborative approach to the integration of evidence with existing practice, and a cycle of improvement based on evaluation. Successful application of this approach was made possible through those who worked to generate and translate new evidence, the dedication and leadership of policy makers, health care providers and community leaders, and the support and resources provided by federal, provincial and regional governments.

In spite of the many efforts of governments, universities, health authorities and individual organizations, we still have a long way to go. The imperative challenge is to build on existing collaborative efforts to continue the downward trend in rates for fall-related deaths and hospitalizations. Without this investment, the rapidly aging population will result in a much higher burden of falls and related disability and death in BC. With the continued support and commitment from the Public Health Agency of Canada, the BC Ministry of Health Services, health authorities, and members of academia, the community and the private sector, there is a strong potential for major rewards in the future.

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