A Public Health Approach to Fall Prevention Among Older Persons in Canada

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Experiencing a fall can have a devastating physical and psychological effect on an older person, resulting in disability, chronic pain, loss of independence, reduced quality of life, and even death. The risk of falling is complex and multifactorial. Reducing the incidence and severity of falls among a rapidly aging population demands a proactive, systematic, and multisectoral approach to prevention.

In Canada, many policy makers, researchers, and practitioners are applying a public health approach to fall prevention, which relies on a careful analysis of the problem

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and its causes in order to develop effective solutions. This approach is well suited to the issue of fall and injury prevention, as it is designed to draw on scientific evidence and professional expertise from a wide range of disciplines to resolve issues that impact large populations. The public health approach as shown here is adapted from the 5-step model used in the Canadian Falls Prevention Curriculum (CFPC) to educate health professionals and community leaders who work with older persons in all health care and community settings and wish to design, implement, and evaluate a fall prevention program. As shown in Fig. 1, this model consists of interconnecting stages that build on each other and exist within a social and policy context. This article describes highlights of how this approach is applied to seniors’ fall prevention in Canada, including the successes, challenges, and recommendations for the future.

SOCIAL AND POLICY CONTEXT

The social and policy context is an important starting point for a discussion of the public health approach as it frames and influences all of the other steps. Like in most nations, the Canadian government uses priority setting to determine resource allocation for health care within the constraint of limited funding. The allocation of resources for all health and community services, including fall prevention programming, is viewed in the context of competing demands. With the rapid aging of the Canadian population, it is becoming increasingly important to make a business case for fall prevention that demonstrates potential cost avoidance and improved health outcomes.

The estimated cost of fall-related injuries to the Canadian health care system in 2004 was more than $2 billion for people aged 65 years and older. Given that the population of those aged 65 years and older in Canada during the year 2004 was just over 4.1 million, or 13% of the total Canadian population, the average cost associated with fall-related injuries in 2004 amounted to approximately $500 per senior.

Government response to the issue of seniors’ falls in Canada has been led by the Division of Aging and Seniors, Public Health Agency of Canada (PHAC; formerly Health Canada). Early efforts go back to the mid-1990s with funding for several studies, including a study of falls in public places, the formation of the Adult Injury

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Fig. 1. A public health approach to fall prevention.
Management Network (AIMNet) at the University of Victoria, and the AIMNet Summit in 1998 for fall prevention stakeholders. These programs were followed in 2001 by the Health Canada and Veterans Affairs Canada Falls Prevention Initiative—a 3-year, $10 million program to launch collaborative fall prevention programs in British Columbia (BC), Ontario, and Atlantic Canada. This initiative marked a turning point in Canada for fall prevention through greater awareness of the issue among the general public, policy makers, and health care providers, and through the creation of a permanent network of fall prevention leaders and champions.

Another policy response to seniors’ falls includes the introduction of the Accreditation Canada Required Organization Practice (ROP) in 2007 for fall prevention. The ROP requires all health service organizations a to implement and evaluate a fall prevention strategy to minimize the impact of client falls to be accredited. Although this requirement demonstrates a considerable advance in attention to this issue, there are still gaps in its uptake. In 2008, a survey b reported that only 42% of 238 organizations were complying with the fall prevention ROPs and that there was a wide range of variability among health care settings in compliance. Residential care c had the highest rate of compliance, at 70%, compared with compliance rates of 36% for acute services and 17% for other health systems.

DEFINING THE PROBLEM c

The first national report that defined the problem of fall and related injuries in Canada was the PHAC Report on Seniors’ Falls in Canada, which was published in 2005 d along with 4 technical reports containing more in-depth analysis. These documents present fall-related morbidity and mortality for seniors, showing a fall-related hospitalization rate of 16 per 1000 age-standardized population for those aged 65 years and older for the year 2002 to 2003. Hospital and mortality data are the best available in Canada for defining the problem, as there are currently no national data repositories for other metrics, such as emergency room data, fall-related physician visits, or fall-related incident reports from acute care or long-term care settings.

Recent mortality findings show that in 2008 to 2009, there were 53,545 fall-related hospitalizations among Canadian seniors, accounting for 85% of all injury-related hospitalizations and 7% of all hospitalizations for this group. Thirty-eight percent of these fall-related hospitalizations involved a hip fracture, 39% involved a fracture other than the hip, and 23% involved a nonfracture injury. Falls accounted for 95% of all hip fractures among seniors in Canada. In addition, 16,916 older Canadians were left with a partial or total permanent disability due to a fall.

The average length of an acute hospital stay for a fall-related injury among seniors in 2008 to 2009 was 15 days compared with 9 days for all other reasons for hospitalization. After treatment was completed, the average length of stay for seniors awaiting an alternate level of care (ALC) d was more than 3 times greater for falls than for other

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a These organizations include Regional Health Authorities; hospitals; community-based programs and services; laboratories and blood banks; and long-term care, home care, and mental health facilities.

b Residential care is also known as long-term care, nursing home, or complex care.

c Data for this section were provided by the Canadian Institutes of Health Information, unless stated otherwise. Rates do not include Quebec data because of differences in data collection. For Manitoba, data on alternative level of care are not included.

d Patients coded as in ALC have finished the acute care phase of their treatment but remain in the acute care bed, awaiting an alternative level of care. (CIHI’s Discharge Abstract Database 2008/09 Abstracting Manual: B.C. Section, p. 13–2.)
reasons for hospitalization (6.5 days vs 2 days). Sixty-seven percent of these ALC days were spent waiting to be transferred into residential care. Twenty-nine percent of those with fall-related hospitalizations who were living outside residential care before their hospitalization were transferred into residential care after their hospitalization. This subpopulation accounted for 68% of all discharges to residential care after a fall-related hospitalization.

Fig. 2 shows the age-standardized rate for fall-related hospitalizations in people aged 65 years and older for 9 of the Canadian provinces (Quebec does not report to the Discharge Abstract Database) and the 3 territories combined (Yukon, North West Territories, and Nunavut). Ninety-five percent confidence intervals are provided to aid interpretation. The width of the error bar illustrates the degree of variability associated with the rate. The rates for each province and the territories can only be compared with the Canadian rate and not with each other. The confidence intervals reflect the variability for the individual province/territory and do not take into account the variability between the provinces and territories.

For 2008 to 2009, the rate of hospitalizations for seniors in the territories was 18.3 per 1000 population compared with the Canadian rate of 15.5 per 1000 population. The territories cover the northernmost area of Canada, where fall prevention efforts are just getting started in isolated pockets. However, these findings should be interpreted with caution because of the small number of cases (0.25% of the total number of cases for Canada, excluding Quebec). Although more investigation of fall prevention efforts in each province is needed before these findings can be fully explained, it may not be a coincidence that well-established fall prevention programming is found in 3 of the provinces with rates that are significantly lower than the Canadian rate—Ontario, Nova Scotia, and BC.

A major challenge in defining the scope of the problem of falls in Canada is a lack of standardization in how data are analyzed and reported. In fact, the results presented here represent one of the first pan-Canadian data analyses on fall-related hospitalizations. Other analyses over the past 5 years include the Report on Seniors’ Falls in Canada and the Economic Burden of Injury in Canada.

Differences in approaches to analysis of the data make it difficult to compare findings across these documents and to determine trends over time. Despite the fact that

Fig. 2. Age-standardized fall-related hospitalization rates for seniors in 2008/2009. PEI, Prince Edward Island.
each of the aforementioned reports use the Discharge Abstract Database\(^6\) for their hospitalization analysis, the methodology of analysis varies between the reports. For example, the Report on Seniors’ Falls in Canada and Economic Burden of Injury in Canada use a separation-based analysis in which each hospital discharge is counted as a case – even those representing transfers for the same fall injury. On the other hand, the recent analysis from the Canadian Institute for Health Information\(^14,15\) uses an episode-based methodology in which all discharges, including transfers related to a given injury, are counted as a single case. This distinction is important, as it can impact the reported number of cases, the length of stay, and the direct costs associated with falls. Specifically, the rates of falls calculated using hospital separations tend to be higher than the rates calculated using episodes of care. This difference can lead to an overestimate of the demand for care for those being discharged from hospital and an underestimate of the resources used when treating falls in acute care hospitals (ie, length of stay). Thus, shifting from separation to episode of care-based analysis provides a more comprehensive view of the extent of acute care involved in treating fall-related hospitalizations.

**ASSESSING RISK**

Fall risk assessment efforts in Canada strive to be consistent with American Geriatrics Societies and British Geriatrics Societies guidelines that recommend tailoring prevention efforts to individualized assessments for factors known to be associated with a high risk for falls.\(^16\) The challenge is to find suitable assessment tools with proven validity and reliability for the setting in which they are applied and that are also user friendly.

A systematic review conducted in Canada\(^17\) on the predictive value of fall risk assessment tools (FRATs) among those aged 65 years revealed that several FRATs exist with moderate to good validity and reliability for use in most health settings. Although these findings brought greater attention to the need to implement validated FRATs tailored to the target population, many FRATs are being used in settings for which the tool has not been tested.\(^9\) A recent study by Wagner and colleagues\(^18\) in Ontario illustrated that there is little consistency in residential care settings in terms of the type of FRAT used and that most of those used were not evidence-based or not tested in that setting.

The interresident assessment instrument (interRAI) minimum data set (MDS) is one of the most widely used assessment and data collection tools in Canada’s health care settings, and its assessment instruments allow care providers to address key factors, including aspects related to a person’s health, function, service use, and quality of life.\(^19\) Subsets of these factors are targeted as client assessment protocol triggers, which link the information to the formation of a care plan to help resolve identified problems. Version 2.0 records prior falls over the past 180 days and can be linked to other health problems for a comprehensive approach to prevention. However, the MDS has some limitations in residential care settings related to fall prevention: (1) it is not implemented immediately on admission; (2) it is only administered every 6 months after the initial assessment; (3) it only records if there were one or more falls in the past 30, or 31 to 180, days; (4) it does not automatically record the circumstances that contributed to prior falls or the total number of falls. The MDS does,

\(^6\) Discharge Abstract Database: This database captures administrative, clinical, and demographic information on inpatient events from acute care hospitals in Canada. Quebec does not report to the DAD.
however, have the potential for linking a wide range of fall risk factors that can be used to tailor prevention.

To augment data collected with the MDS tool, another FRAT for residential care has been developed in Canada through a partnership between researchers and practitioners. This tool, known as the Scott Fall Risk Screening Tool, has been accepted by staff and has shown to be valid in predicting risk based on known risk factors. The tool is currently undergoing interrater reliability testing. The tool includes prevention strategies based on universal precautions (in which all residents are considered to be at risk) and links specific prevention strategies to individually identified risk factors. The universal precautions include generic recommendations for the reduction of risk for all residents, with emphasis put on those with multiple risk factors. The tool also links prevention strategies to specific risk factors, such as poor mobility, agitation, incontinence or urgency, poor vision, poor cognition, weakness, dizziness, and inappropriate use of medications, and it is designed for ease of administration on admission and at times of change in health.

IMPLEMENTING BEST PRACTICES

The generation and dissemination of best practice evidence is a key component of the public health approach. Several Canadian researchers are recognized internationally for innovations in the development of best practice evidence in seniors’ falls, many of whom are leading studies currently being funded by the Canadian Institutes of Health Research (CIHR) and other major funding agencies. Some examples of major CIHR research initiatives on seniors’ fall prevention and mobility are included in Table 1.

Some of the most cutting-edge research for fall and fall-related injury prevention in Canada is being conducted by Dr Stephen Robinovitch from the Injury Prevention and Mobility Laboratory at Simon Fraser University. Researchers at this laboratory are pioneering research on new technologies, such as video capture, wearable sensors, compliant flooring, and hip protectors in long-term care facilities. An example is a recent study showing that compliant flooring can reduce the impact of a fall on the hip bone by up to 50%. Another example of innovative approaches to fall prevention is research being conducted in Ontario by Drs Maki and Mansfield at the Sunnybrook Health Sciences Center on falls, balance, mobility, and assistive technologies in aging. Some of their most recent work is paving the way in the areas of age-related balance-recovery reactions, visuomotor tracking and lateral stability in relation to fall risk, new approaches to the study of the neuromusculoskeletal system, and the efficacy and effectiveness of balance-enhancing insoles.

In addition to generating new evidence, an important step in promoting best practices in fall prevention is to ensure that research findings are made accessible to practice and that research responds to practice-based questions. To this end, a new center was created in April 2009, known as the Center of Excellence on Mobility, Fall Prevention and Injury in Aging (CEMFIA). The mandate of this center is to promote collaboration for the generation, translation, and uptake of best practice evidence. The first of its kind in Canada, CEMFIA is housed at the Center for Hip Health and Mobility situated at the Vancouver General Hospital campus in BC. This center 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 Canadians. 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 regional
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<td>Mobility, balance, musculoskeletal health in aging</td>
<td>Maki, Duval, Edwards, Speechley, Boissy, Jog, Raina, Kirkland, Wolfson, Miller, Birch, Demers, et al, Guy, Wang, Webber</td>
<td>Sunnybrook Health Sciences Center, Ontario, Université du Québec à Montréal, Quebec, McMaster University, Ontario, University of British Columbia, BC, University of British Columbia, BC, University of Manitoba, Manitoba</td>
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<td>Risk factors for injurious falls</td>
<td>Khan, Marra, Liu-Ambrose, McKay, Li</td>
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<td>Physical exercise to reduce falls in older adults with type 2 diabetes</td>
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and national coordinating role so that researchers from relevant and diverse backgrounds can connect with each other and speed the process of knowledge translation.

To bring a wider and more comprehensive perspective to evidence-based best practices in Canada, there is also considerable international collaboration on fall prevention research and programming. International partners include (1) the Division of Unintentional Injury Prevention, United States National Center for Injury Prevention and Control, with fall prevention expert Dr Judy Stevens30; (2) California’s Fall Prevention Center of Excellence, led by Dr Jon Pynoos31; (3) the Falls and Balance Research Group, headed by Dr Stephen Lord in New South Wales, Australia32; (4) the Falls Free Coalition in the United States, led by Ms Bonita Beattie33; and (5) the Prevention of Falls Network Europe, directed by Dr Chris Todd in Manchester, United Kingdom.34

Extensive work has also taken place with the World Health Organization (WHO). In 2008, a WHO technical meeting on seniors’ fall prevention was hosted by the BC Ministry of Health and the PHAC, in Victoria, BC. The meeting brought together experts from around the world to discuss international fall and fall-related injury data and best practice evidence, with a goal of developing practical recommendations for all countries to improve the flow of information leading to action on fall and injury prevention. The result was a report titled *World Health Organization Global Report on Falls Prevention in Older Age*.35

**TRANSLATING KNOWLEDGE**

Sustainable fall prevention programming depends on the integration of evidence into routine practice and policy. After defining the problem through epidemiologic analysis, assessing the individual and population-based risk factors, and identifying proven prevention strategies, researchers, clinicians, and policy makers are often challenged by the step of translating the research knowledge to effective policies and practices.

A survey of fall prevention initiatives for seniors in BC36 found that the following factors were most often reported as important for successful planning and implementation: (1) examining preconditions and identifying the nature of the need; (2) encouraging local champions; (3) forming partnerships, such as coalitions and networks; (4) securing sustainable funding; (5) strong leadership with decision-making capacity; (6) shared values, motives, and respect for diversity; and (7) gaining community or organizational buy-in.

In Canada, there are many examples of successful fall prevention programming that reflect these factors at national, provincial, and regional levels. The common themes of these initiatives are well-integrated partnerships among researchers, policy makers, practitioners, and seniors, combined with multisectoral collaboration for resource allocation and integration of new strategies with current practice.

An example is seen in the province of Alberta, where the “Finding Balance Alberta” fall prevention program has been successfully implemented.37 This program focuses on proactive fall prevention through a social marketing campaign using television and radio messaging, targeting a wide audience with 3 key messages: (1) check your medications; (2) stay active; (3) watch your step. This initiative is made possible through the collaboration of many stakeholders, including the Alberta Center for Injury Control and Prevention, the Government of Alberta, Global TV Edmonton, and several provincial professional organizations.

Another successful initiative operated through the province of Nova Scotia is the Provincial Falls Prevention Network, which focuses on fall prevention in health care delivery. Changes in health care include a collaborative effort to reduce falls in acute
care settings through the implementation of new fall prevention policies, tools, resources, data collection, and practice strategies. At the community level, Nova Scotia has implemented the “Preventing Falls Together” network38 to build the capacity of organizations working with older adults to make fall prevention a part of their policies, programs, and routine activities. Stakeholders include local community groups, seniors’ associations, and emergency services personnel. Regional coalitions have been formed throughout Nova Scotia to provide information and resources to older adults and local businesses on topics such as weather-specific fall prevention, how to fall-proof one’s business for older customers, and how to encourage older adults to share their fall prevention tips with each other.

In BC, there has been a steady increase in fall prevention funding, support, and buy-in over the past 20 years.39,40 A survey of fall-prevention initiatives showed a ninefold increase between 1990 and 2005, going from 12 to 116 initiatives.36 The number continues to grow, with many reaching the ultimate goal of being integrated into routine practice. The greatest influences on this integration have been the appointment of dedicated fall prevention leads in each of BC’s five Health Authorities and the formation of the BC Fall and Injury Prevention Coalition (BCFIPC). Established in 2005, the BCFIPC is composed of over 50 fall prevention stakeholders with a mandate for reducing the number and severity of falls among older adults in BC.41 Highlights of successful fall prevention initiatives by BCFIPC members include (1) the Promoting Active Living: Best Practice Guidelines for Fall Prevention in Assisted Living42; (2) Strategies and Actions for Independent Living—a fall prevention education program for community care workers and health professionals working with clients of home support services43; and (3) the Fraser Health Authority fall prevention mobile clinics, which are operated in partnership with local community settings in which seniors gather, such as places of worship, seniors’ centers, or shopping malls.44

At the national level, a leading initiative in the translation of knowledge for fall prevention is the Canadian Falls Prevention Curriculum (CFPC),3 developed with the funding from the Population Health Fund of the PHAC. The CFPC is designed to provide community leaders and those who provide health and social services to older persons with the skills needed to design, implement, and evaluate evidence-based fall prevention programs. The course is offered both as a face-to-face workshop and a web-based e-learning course. This award-winning e-learning course45 is available in English through the University of Victoria46 and in French through the University of Alberta’s Campus Saint-Jean.47

Through the development of the CFPC, the Canadian Fall Prevention Education Collaborative (CFPEC) was formed. This collaborative consists of provincial/territorial leads from each region and all past participants of the CFPC course; to date this totals over 1350 participants.3 The CFPEC provides a platform for sharing information on fall prevention programming successes and challenges, updating evidence on fall prevention, guiding ongoing revisions to the CFPC, and supporting evaluation of the CFPC.

**EVALUATING PROGRAMS**

Evaluation of fall prevention programs is important to determine what has been accomplished, to increase understanding about what works or does not work, and to increase the effectiveness of future programs. On a national level, evaluation of fall prevention programming in Canada is conducted through empirical studies, national inventories, epidemiological analyses of fall-related morbidity and mortality, and government monitoring of programs.
Examples of some of these methods include the PHAC inventories of Canadian fall prevention programs. The purpose of these inventories is to monitor growth in the number, location, and type of programs, and to foster collaboration and the sharing of resources. The first inventory in 2000 of community-based programs received reports of 58 fall prevention programs across Canada, with 22 responses from Western Canadian provinces, 31 from Central Canadian provinces, and 5 from Atlantic Canada. There were no programs reported from the northern territories. In 2003, a second inventory reported a total of 123 programs, with the majority from the province of Ontario in Central Canada. This is likely a reflection of the fact that Ontario has the largest population of seniors, accounting for 38% of the senior population in Canada for that year. A third inventory in 2005 found a total of 195 programs; however, this was the first inventory to include programs in institutional as well as community settings and cannot be directly compared with the other reports, as it does not provide a breakdown by location. A fourth inventory, released in the spring of 2011 reported a total of 282 fall prevention initiatives in Canada, with one or more from each province and the northern territories. Most of the initiatives were for “frail community-dwelling seniors” (28%) or “well community-dwelling seniors” (24%), with 13% from “long-term care” settings, 10% from “acute care” settings, 7% that targeted seniors in “all settings” and another 7% reported as “other”.

In addition, fall prevention projects funded through the PHAC and other funding agencies are required to include an evaluation of the project process and outcomes. An example of evaluation strategies applied to projects supported by the PHAC is the evaluation of the development and implementation of the CFPC project, which included the pilot testing of a draft version of the curriculum in 3 regions of Canada. In addition, evaluation of the final product was conducted to determine the impact of training on practice. This evaluation consisted of a participant survey that found that 64% of those who took the CFPC course have subsequently been involved in implementing a new fall prevention program, and 83% have shared their new knowledge of fall prevention within their organizations or community. In addition, most survey respondents (74%) indicated that they believed they had gained the skills through CFPC training to bring about lasting changes in their organization or community.

Another method of monitoring the impact of fall prevention efforts in Canada is through the analysis of morbidity and mortality data that are covered in the section on defining the problem, thus demonstrating the cyclical nature of the public health approach and the importance of data in both defining the problem and determining the impact of interventions.

SUMMARY

Considerable progress has taken place over the past 2 decades of fall prevention efforts in Canada, reflecting the 5 steps of the public health approach. However, there is still a long way to go for full integration of evidence-based strategies into routine care for older persons. The pressing need for stronger efforts is in part being driven by the demographics. In 2006, there were 4.3 million Canadians older than 65 years, making up 13% of the population, and this number is expected to increase to 9.1 million or 23% of the population by the year 2031. Efforts are underway in all provinces and territories to address this issue.

Some provinces are working on changing social attitudes and beliefs through social marketing campaigns on the preventability of falls. However, more needs to be done at a national level, particularly in targeting high-risk or marginalized populations, such
as those with dementia, seniors living in remote communities, and Aboriginal seniors. Increased pressure is also needed to influence policy makers to entrench fall prevention in all jurisdictions that affect the health and safety of older adults, which includes improved building codes to reduce injury from falls caused by faulty stair design or lack of sidewalk maintenance.

To better define the problem of falls in Canada, efforts are underway to promote Canada-wide standardized reporting of fall-related injury data, which includes efforts to resolve issues such as using separation analysis that reports each hospital separation as an individual case even if it is for the same fall injury, and instead using an episode of care analysis that counts transfers between acute hospitals as part of a single case.

To improve fall risk assessment, centers such as CEMFIA continue to promote the use of validated FRATs and their application in fall prevention planning for individuals and across health care settings. Recommendations also include better use of existing data, such as data collected on the InterRAI MDS assessment tool, and the application of this rich data set to tailored fall prevention strategies.

Although a great deal of evidence exists on effective fall prevention strategies, more research is needed to better understand how to apply this knowledge to practice and to tailor it for use among specific populations. Canadian researchers are responding to the new directions from major funding organizations, such as CIHR, to build proactive knowledge translation strategies into all phases of their studies rather than just relying on dissemination through peer-reviewed publications long after the conclusion of a study.

Efforts are also underway to address the final step in the public health approach to fall prevention—evaluation of fall prevention programs through a move toward greater accountability to government funders of health care services. This step takes us back to the first steps of the public health model of defining the problem and risk assessment, as it is only through the generation of good data that we can know if prevention efforts have made a difference.

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