A Study of Falls in Long-Term Care and the Role of Physicians in Multidisciplinary Evidence-Based Prevention

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Introduction

Residents of long-term care (LTC) facilities are not only more susceptible to falls, they are more susceptible to injury. On average, approximately 1.5 falls occur per bed each year in LTC facilities.\(^3\) Compared with older adults who live in the community, residents of LTC facilities fall two to four times more often and are twice as likely to injure themselves.\(^2\) Hip fractures occur almost four times more often in residential settings than in the private home environment,\(^5\) and <15% of facility residents who sustain a hip fracture regain pre-injury ambulation status.\(^4\) In addition, approximately 20% of all fall-related deaths among older adults occur among the less than 8% of older adults living in residential care settings.\(^5\) In addition to these worrisome statistics, studies have shown that older individuals enter residential care facilities with a more complex clinical profile, marked by the presence of multiple coexisting fall risk factors\(^6\) that may predispose the older individuals to even higher rates of falls and related injuries.

Falling is a complex problem influenced by many factors, including functional limitations, medications, cognitive impairment, comorbid conditions, environmental hazards, and fear of falling.\(^7\) Existing literature provides various promising and effective fall-prevention strategies, which include exercise programs, assessment of environmental hazards with modification, vitamin D and calcium supplementation, the use of hip protectors, behavioural and educational strategies, and multifactorial approaches targeting one or more known risk factors.\(^8–14\) Best practice guidelines that reflect clinical expertise and practical issues for implementation to prevent falls in LTC facilities recommend multifactorial intervention programs that target the broad range of risk factors in the prevention of falls and fall injuries for all residents in LTC facilities through comprehensive, multidisciplinary, facility-wide programs.\(^15,16\) Within the context of a multidisciplinary approach, physicians play a pivotal role in addressing the growing number of falls and related injuries among residents of LTC facilities. However, the role physicians can play in preventing, monitoring, and managing falls in LTC has been hampered by the lack of pertinent falls and clinically related information on their patients.

This article presents the findings of a multisite study designed to test the effec-
tiveness of a clinically relevant, evidence-based and multidisciplinary fall-prevention intervention for reducing falls and related injuries among LTC residents. In addition, it reports on the various fall-prevention initiatives undertaken by physicians and other care staff at a patient-specific level. This study applies a standardized fall surveillance tool to examine the scope and nature of falls and related injuries, with baseline data used to design a collaborative, multidisciplinary approach to prevention.

Methods
Study Design
Five facilities were selected for regional diversity—with sites in British Columbia, Ontario and Nova Scotia; and for cultural diversity, with one Francophone site. Data were collected by facility personnel through the use of a standardized surveillance tool to track falls, fall injuries, and contributing factors over 15 months. Using a pre-/post-test design, surveillance data were recorded over two sets of 180 days each. The second 180 days were preceded by staff training and collaboration on the design of strategies for implementing multifactorial interventions. The criteria for interventions were based on current evidence for effective strategies, 180 days of baseline surveillance data for their site, and feasibility of implementation. Interventions included a multidisciplinary approach to fall risk assessment and monitoring, environmental modifications, exercise, and education strategies. Rates for falls, fallers, and fall injuries were compared between the two phases.

Each site established a fall-prevention team consisting of physicians, pharmacists, facility managers, nurses, care aids, residents, family members, volunteers, and allied health and social service providers. Each facility had a designated falls coordinator who organized team meetings, oversaw data collection, and sent monthly reports to the research team. Figure 1 outlines the steps taken in the study.

Data were analyzed using Statistical Package for Social Sciences (SPSS Version 14.0). Ethics approval was received from the University of British Columbia Department of Ethics Review and the relevant ethics at the study sites in the other provinces prior to data collection. Confidentiality of the residents was protected through the use of a unique subject identifier.

Interventions
Interventions varied across the five facilities depending upon local resources and priorities; however, the following describes the core interventions implemented to varying degrees at all sites.

Multifactorial Fall Risk Assessment and Management
Physicians, nurse managers, and case workers undertook a review of resident charts for use of medications, mobility aids, and balance assessments. This information was applied to individualized care plans that also reflected residents’ prior fall history and surveillance findings on contributing factors to prior falls. Risk assessments were conducted using Berg Balance Scale and the Falls Efficacy Scale II to identify those at greatest risk for falling. Those deemed by a physician to be at risk for hip fractures were provided with hip protectors. Restraint reduction policies were implemented facility-wide and on a physician-approved, resident-by-resident basis. Vitamin D and calcium supplements were added to resident diets in powdered milk sprinkled on breakfast cereal or mixed with puddings. Medications known to be associated with a high risk of falling, including benzodiazepines, tranquilizers, and sedatives, were reviewed by a pharmacist or physician with a view to reducing the number or dose. At one site, physicians were alerted if a patient had fallen multiple times in order to prompt further clinical investigations regarding a potential underlying cause or causes such as changing clinical status.

Environmental Assessment and Modifications
Individual environmental assessments were undertaken for residents who were identified as having fallen during phase one (first 180 days) or who were identified as being at high risk through risk-assessment findings. If the fall occurred in either the resident’s bedroom or bathroom, staff posted symbols in highly visible locations for staff and family to identify the resident as at risk of falling while toileting or transferring. Bed

Figure 1: Project Design

| Planning and Process National and regional advisory committees |
| Sample Selection and Surveillance Training 5 long-term care sites in Western, Central, and Eastern Canada Staff training on use of surveillance tool |
| Phase One: Surveillance (180 days) Staff training on falls surveillance report |
| Transition (120 days) Cross-site workshop and on-site training on current literature and surveillance findings |
| Phase Two: Intervention (180 days) Collaborative process for intervention implementation Surveillance of falls and injuries continue |
| Project Closure (1) Site focus groups (2) Data analysis (3) Dissemination of revised falls surveillance report, prevention guidelines and final report |
heights were adjusted and fall obstacles removed. In some cases, bed alarms were introduced for residents with wandering tendencies. General environment assessments included the repair of uneven surfaces, better lighting, and improvements to the accessibility of handrails. One facility used coloured push-pins on an enlarged facility floor plan to increase staff awareness of high-density fall locations.

Exercise and Activity
For those deemed by a physician to be able to participate in physical activities, seated chair exercise programs were introduced for nonambulatory residents and walking was encouraged for those who were ambulatory. Some facilities created marked walking routes inside and outside facilities, using volunteers or family members to guide residents and track progress. Individual interventions included one-on-one therapy sessions for range-of-motion exercises with occupational therapists or physiotherapists.

Education
Informational brochures and newsletters regarding falls were created by facility personnel and distributed by mail, and on site, to staff and families to update the project’s progress and for falls education. At some sites, information regarding the locations of falls was made available through the posting of a facility falls map on walls near staff meeting rooms.

Data Collection
Data were collected by facility personnel trained in the use of a standardized surveillance tool to track falls, fall injuries, and contributing factors. Data were collected continuously over a total of 16 months, with two phases of consecutive data of 180 days each used to compare pre- and post-intervention findings. The first 180 days of data followed a lead-in time for training and quality control on the use of the surveillance tool. The intervention phase consisted of 180 days of data taken following a transition period for a cross-site workshop and on-site time to review the surveillance phase data, design of an intervention plan, and staff training on the implementation of the plan.

The falls surveillance tool was designed by experts in injury, epidemiology, and gerontology and then reviewed and pilot-tested by LTC clinicians and care providers. A fall was defined using a modified Kellogg definition as unintentionally coming to rest on the ground, floor, or other lower level, whether or not the person is injured. Variables included in the surveillance tool reflect those

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Phase 1: Surveillance</th>
<th>Phase 2: Intervention</th>
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</thead>
<tbody>
<tr>
<td>Number of resident beds (including respite beds)</td>
<td>466 (3)</td>
<td>459 (2)</td>
</tr>
<tr>
<td>Full-time equivalent staff-to-bed ratio</td>
<td>0.49:1</td>
<td>0.54:1</td>
</tr>
<tr>
<td>Age range of residents (years)</td>
<td>49–105</td>
<td>54–102</td>
</tr>
<tr>
<td>Mean age of residents (years)</td>
<td>85.0</td>
<td>83.9*</td>
</tr>
<tr>
<td>Female residents</td>
<td>77%</td>
<td>76%</td>
</tr>
<tr>
<td>Residents with dementia</td>
<td>76%</td>
<td>74%</td>
</tr>
<tr>
<td>Ambulatory residents</td>
<td>42%</td>
<td>39%</td>
</tr>
</tbody>
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*<i>p</i> ≤ .05; **<i>p</i> ≤ .001.

<table>
<thead>
<tr>
<th>Surveillance</th>
<th>Intervention</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Bed-days*</td>
<td>83,880</td>
<td>82,620</td>
</tr>
</tbody>
</table>

Falls

| Number | 707 | 645 | \(\chi^2 = 1.999, p = .157\) |
| Rate/1,000 bed-days | 8.4 | 7.8 |

Fallers

| Number | 259 | 281 | \(\chi^2 = 1.264, p = .261\) |
| Rate/1,000 bed-day | 3.1 | 3.4 |
deemed clinically relevant and consistent with the known risk factors for falling, including fall location, resident activity, environment, use of assistive devices, medication use, and health conditions at the time of the fall.16,19–22

**Facility Characteristics**

At the start of each of the surveillance and intervention phases, each facility provided information on the number of beds, staff ratio, and a general profile of residents (Table 1). There were no significant differences between phases one and two, with the exception of the mean age of residents, which was lower at the start of phase two (85.0 years versus 83.9 years, \( p < .5 \)).

**Results**

Results include the falls surveillance report findings on falls, fallers, injuries, and resident and incident circumstances at the time of the fall. Unless otherwise stated, only the pooled data from the five facilities are reported, with comparisons from the 180 days of phase one (surveillance) and the 180 days of phase two (intervention). To accommodate for the difference in the number of beds, rates are calculated using the number of falls per 1,000 bed-days.

**Rates of Falls and Fallers**

As shown in Table 2, there was a decrease in both the absolute number of falls and the rate of falls over the study period. The number of falls decreased from 707 during surveillance to 645 during intervention. The rate of falls decreased between the surveillance and intervention phases but the number of residents who fell once or more (i.e., fallers) increased. The rates of falls and fallers per 1,000 bed-days was not significantly different between surveillance and intervention. There was a downward trend in the number of falls over both the surveillance and intervention phases, as shown in Figure 2.

**Rates of Fall-related Related Injuries**

Injurious falls made up approximately one third of all falls in both the surveillance and intervention phases. As shown in Table 3, both the percentage and rate per 1,000 bed-days of injurious falls were significantly lower during intervention than during surveillance, with 13 fewer injurious falls. Severe injuries (i.e., those requiring medical treatment on site or transfer out for medical treatment) also decreased significantly between the two phases.

**Discussion**

The results showed a decrease in the number of falls and serious injuries among LTC residents. The fall and injury rates in this study are comparable to those in other studies that have examined falls among LTC residents using multifactorial prevention strategies.11–13,23 The increase in the number of fallers post intervention was unexpected. Possible explanations include the increase in activity promoted through the intervention phase. It is also interesting to note that falls decreased in both the surveillance and interventions phases, implying a possible effect of surveillance only on reducing falls.

The interventions implemented in this study are similar in scope to those
The findings of this study highlight that a multidisciplinary and multifactorial approach to fall prevention in LTC is feasible and point to the need for guidelines outlining the specific roles of each discipline. The American Geriatrics Society recommends that all individuals over 65 years of age be asked annually by their physician whether they have fallen; as cited in Rubenstein et al., it further recommends that fallsers with impaired gait and balance be evaluated for postural hypotension, arthritis, muscle weakness, low vision, home safety, and use of multiple medications, particularly psychotropic medications. Despite these recommendations, Wenger et al. reported that only 37% of older adults were asked about falls by their primary care provider.

The role of health care personnel, including physicians, in the identification and management of falls and injuries is critical. However, few studies have examined the role of physicians in falls prevention in LTC settings, and the response rates of physician participation in studies has been low. While more research on the physicians’ roles relating to the identification and management of falls among LTC residents is needed, specific roles within the scope of practice for physicians include the identification of comorbidities and underlying medical contributors to poor balance and judgment, medication review, and management—particularly related to the use of psychotropic drugs, assessment of mobility, and gait abnormalities—along with suitable clinical interventions and appropriate referrals to address one or more of these falls risks.

This study points to the importance of physicians as part of a multidisciplinary approach to fall prevention, with decisions made in collaboration with staff, residents, and their families. Barriers to such collaboration identified by Chou et al. include availability of physicians in the LTC setting, insufficient reimbursement, a lack of patient compliance, and logistical factors such as difficulty integrating fall risk evaluation and management into clinical practice. Actions required to decrease the incidence of falls in LTC should include surveillance on the incidence and contributing factors of falls, clear referral protocols, and strategies to enhance resident compliance.

Future studies are needed to examine interventions over a longer period of time, with randomly selected facilities and control sites. Limitations of this study include a potential reporting bias, including reluctance among staff to report falls due to perceived negative consequences or as a result of reporter fatigue (where interest in reporting falls may wane over time).

Despite the limitations in study design, these findings emphasize that falls in LTC facilities are a major public health problem, with almost one third of all falls among LTC residents resulting in injury. The multidisciplinary approach applied in this study has the benefit of addressing the wide range of risk factors that contribute to falls and draws on the skills of all those who work with LTC residents and the knowledge of residents themselves and their family members.

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References