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Restriction in activity associated with fear of falling among community-based seniors using home care services

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Abstract

Background: fear of falling may lead to avoidance of activities for seniors, even though they may be able to perform these activities. Specific risk factors for fear of falling that are amenable to change among various populations have been identified within the literature; however, detailed information about the risk factors for fear of falling, specifically among community-based seniors receiving home care services, is limited.
Objective: the aim of this cross-sectional study was to examine the factors associated with restriction of activity resulting from fear of falling among 2,300 seniors receiving home care services.
Participants: all participants (n = 2,304) in this study were receiving home care services between 1999 and 2001 from a sample of 10 volunteering community-based agencies (Community Care Access Centres) representing the major geographic regions of Ontario, Canada. Community care access centres act as gatekeeping organisations assessing need and contracting out for a broad range of community-based services.
Measurements: the Minimum Data Set for Home Care, a comprehensive and standardised assessment tool used to evaluate the needs and ability levels of older adults utilising home care services, covers several key domains, such as service use, function, health and social support. Nurses trained to administer the Minimum Data Set for Home Care assessed each of the participants within their homes.
Results: of the 2,304 seniors within the study, 41.2% of participants expressed they restricted their activity for fear of falling. Percentages reporting fear of falling within the literature are considerably lower than the present findings, and probably attributable to the frailer, home care population within the present study. In the final logistic regression model, being female, having various impairments/limitations, lack of support and being a multiple faller significantly increased risk of fear of falling, whereas individuals that used antipsychotics and individuals that had Alzheimer's disease were less likely to report restricting their activity.
Conclusions: the results from this study provide information about a group void in the literature pertaining to activity restriction from fear of falling – community-based seniors receiving home care services. The comprehensive nature of the Minimum Data Set for Home Care allowed for a myriad of factors to be assessed and subsequently analysed with respect to the outcome variable. The inclusion of items on falls, fear of falling, and risk factors for both adverse outcomes means that home care professionals using this instrument will have a unique opportunity to identify and respond to problems that have an important impact on the client's quality of life.

Keywords: *fear of falling, risk factors, community-based seniors, home care population*

Introduction

About one-third of seniors experience a fall annually [1–3]. Falling is also the leading cause of injury admissions to acute care hospitals and in-hospital deaths [4, 5]. Although the majority of falls do not lead to serious injury, hospitalisation or death [6, 7], seniors that do survive from falling may experience a number of complications, including

restricted activity, soft tissue injuries or fractures [8–10]. Additionally, psychological trauma, often referred to as fear of falling [11, 12], may develop after a fall, and lead to self-imposed restriction of activity and loss of confidence despite the fact that the injuries experienced may not be functionally limiting [13, 14]. Activity restriction may also lead to other negative outcomes, such as balance deterioration [11], functional decline [15], emotional/psychological changes (i.e., anxiety) [16] or decreases in social contacts or leisure activities [17, 18].

Although fear of falling is recognised as a negative consequence of falling, inadequate research has been done on predicting individuals that are fearful [16]. Vellas *et al.* [16] reported the following risk factors for fear of falling: advanced age, female gender, balance abnormalities, gait abnormalities, impaired mental status, decreased economic resources, and poor physical health. Burker *et al.* [19] found that ADL scores, depression scores and stability when standing with feet together predicted fear of falling for seniors with chronic dizziness. Other multivariate analyses determined that decreased life satisfaction, increased frailty, depressed mood, and recent fall history predicted moderate levels of fear of falling; however, extreme fear of falling was predicted by the same four factors, in addition to decreased mobility and social activities [17]. Howland *et al.* [20] found that being female, having few social contacts and a history of falls were significant predictors for fear of falling, while multivariate analysis by Kressig *et al.* [21] determined depression, slow gait speed, use of a walking aid, and being African American to be predictive of fear of falling. Murphy *et al.* [22] revealed that physical frailty, comorbidity and depression differentiated individuals with fear of falling that restricted their activity in comparison to individuals with only fear of falling. Further, Bruce *et al.* [23] concluded that fear of falling is a significant psychological barrier affecting participation in recreational physical activity and consequently overall health status.

These studies provide a growing body of initial evidence regarding fear of falling, but this research is in its infancy compared to the research on risk factors for falling [6, 24, 25]. Few studies have examined fear of falling using comprehensive, multidisciplinary assessments [21, 22, 26], and many studies have relied on surveys of all community-based elderly persons, not necessarily the more impaired individuals that home care agencies, for example, may be more likely to see. The frail elderly will have a substantially higher rate of fear of falling because of the interaction of medical comorbidities, functional impairments, environmental and psychosocial concerns. It would not be reasonable to assume that studies of the general population of well-elderly individuals will necessarily be generalisable to home care clients. As such, this study was designed to determine risk factors for activity restriction resulting from fear of falling among community-based seniors receiving home care services using the Resident Assessment Instrument – Home Care (RAI-HC), a comprehensive assessment tool. The RAI-HC is now being implemented as an assessment and care planning instrument in nine US states and five Canadian provinces/territories, making it an important potential information source both for risk factors and for fear of falling in this population. This study is important given community-based seniors receiving home care services have received little attention in the fall prevention literature. In addition, it adds new evidence to address the issue of fear of falling.

Methods

Subjects and data collection measure

Participants ($n = 2{,}304$) who were recipients of home care from ten community-based agencies (Community Care Access Centres or CCACs) in Ontario, Canada, were assessed by professional care managers implementing the RAI-HC as their standard clinical assessment on a pilot basis. [Ethics review for the study protocol was conducted by the University of Waterloo's institutional review board. The committee considered the study to be a secondary analysis of health record data, hence it was not deemed to require client consents on the provision that personal identifiers were encrypted.] Ontario's 44 CCACs serve as gatekeeper agencies responsible for assessing needs and contracting community-based services, ranging from homemaking to intensive nursing and/or rehabilitation. In addition, CCAC staff also determine eligibility and manage waiting lists for long term care facility placement. The CCACs that volunteered to participate in this RAI-HC pilot study include agencies from all of the major geographic regions in Ontario. Data were gathered between 1999 and 2001. All clients normally expected to receive an intake assessment or reassessment (if already on service) during the study period were assessed with the RAI-HC. The RAI-HC is a comprehensive and standardised assessment tool used to evaluate the needs and ability levels of older adults utilising home care services [27]. It takes about 1 hour to complete and consists of two core components: the Minimum Data Set for Home Care (MDS-HC) and the Clinical Assessment Protocols (CAPs). The MDS-HC is the assessment form of the instrument, which serves as a brief assessment instrument covering several key domains, such as service use, function, health and social support. In addition, data from the MDS-HC can be used to identify individuals that may benefit from more extensive evaluation and care planning through 30 problem-oriented Clinical Assessment Protocols or CAPs (for more information see Fletcher and Hirdes [24]; Morris *et al.* [27, 28]). Prior to data collection the case managers were trained to administer the MDS-HC and they assessed each of the participants in their homes. For further discussion on the RAI-HC the following articles are suggested [27, 29–31].

The independent variables representing the risk factors for fear of falling can be grouped into: (1) socio-demographic and social relationship variables (age, gender, marital status, education, living arrangements, amount of time alone during the day; hours of informal support received over the last week; hours of formal support received over the last week); (2) measures of frailty (various chronic diseases, perceived health status; instrumental activities of daily living); and (3) exposure to risk variables (gait disturbance, medication use, history of falls). Informal support is

measured in the MDS-HC based on the amount of time the individual received assistance for instrumental help and activities of daily living over the last 7 days, from family, friends and neighbours. Formal support deals with the extent of care management in the last 7 days from any of the following: home health aide, visiting nurse, homemaking services, meals, volunteer services, physical therapy, occupational therapy, speech therapy, day care or day hospital or social worker in the home. Scores ranged from 0 to 6, indicative of the number of days one or more of these services were received. The Instrumental Activity of Daily Living (IADL) summary score is based upon a sum of 7 items from the MDS-HC: meal preparation, ordinary housework, managing finances, medications, phone use, shopping and transportation. Each item is summed to produce a scale which ranges from 0 to 42, with higher scores indicative of greater difficulty in performing IADL. Unsteady gait deals with gait that places the client at risk of falling (e.g., unbalanced or walk with a sway, uncoordinated or jerking movements, fast gaits with large, careless movements; abnormally slow gaits with small shuffling steps). The MDS-HC includes data on the categories of psychotropic medications used, as well as a drug-by-drug inventory of all medications used by the client. The individual medication data were not available for this analysis. The MDS-HC defines a fall as an unintentional change in position where the elder ends up on the floor or ground. A fall may result from intrinsic or extrinsic causes or both.

The home care clients in Ontario tend to have relatively mild impairments in cognitive function or activities of daily living compared with their counterparts in the US or Italy [32]. The IADL Summary Scale was used as a measure of impairment in the present analyses because it is expected to be more sensitive to differences in function among mildly impaired home care clients. Information on disease diagnoses (i.e., Alzheimer's disease) is included in the MDS-HC. Diagnoses are only noted if they are the subject of active treatment or monitoring; however, there is no requirement for additional verification of diagnosis beyond the information available to the assessor.

The dependent variable utilised for data analysis is fear of falling. Specifically individuals were asked whether they limited going outdoors due to fear of falling (e.g., stopped using bus, goes out only with others). The outcome variable was dichotomised into limits activity as a result of fear of falling or does not limit activity as a result of fear of falling.

When conducting an MDS-HC assessment, case managers use all sources of information available to them in order to evaluate a client's status. This includes direct observation and interviews with the client, examination of existing clinical records (e.g., other assessment, charts, clinical communication), interviews of informal caregivers and consultation with other professionals. The ability to use alternative sources of information allows the case managers to assess all clients including those with serious cognitive, psychiatric and/or communication impairments.

Data analysis

The data were analysed using logistic regression. Stepwise methods were not used in the logistic regression analyses because they may be biased by order of entry/deletion effects and collinearity (see, for example, the discussion by Leigh [33]). Instead a variety of alternative models were examined prior to specification of the final model. For example, if two independent variables were closely related conceptually (suggesting a risk of collinearity) and one or both of these variables had marginal P values, models excluding each of these variables individually were compared to assist in selecting the final model. Fear of falling was the dependent variable, and only independent variables found to be significant at the bivariate level were examined in the multivariate models (data available upon request). The final logistic regression model was used to estimate the adjusted odds ratios for the main and interactive effects for the measures investigated.

Results

Univariate results

The univariate independent variable results for the 2,304 participants sampled have been summarised in Tables 1 and 2. With respect to the dependent variable, approximately 41% of the sample reported restricting their activity because of

Table 1. Percentage (frequency) distribution of sociodemographic variables and social relationship variables utilising the MDS-HC (n = 2,304)

Variables	Percentage (frequency)
Age	
65–69 years of age	7.8 (179)
70–74 years of age	13.9 (321)
75–79 years of age	23.1 (531)
80–84 years of age	25.7 (591)
85 years of age and older	29.6 (682)
Gender	
Females	71.8 (1653)
Males	28.3 (651)
Marital status	
Never married	6.0 (138)
Married	33.2 (762)
Widowed	55.6 (1276)
Other	5.1 (118)
Education	
Elementary/no schooling	33.8 (773)
Secondary/some secondary	43.4 (992)
Technical/trade or some post second	16.6 (379)
Diploma/university/graduate degree	6.2 (141)
Living arrangements (at referral)	
Lived alone	47.7 (1048)
Lived with spouse only	28.8 (634)
Other	23.5 (517)
Amount of time alone during day	
Never or hardly ever	33.3 (766)
About 1 hour	11.3 (261)
Long periods of time (i.e., all morning)	30.6 (703)
All of the time	24.8 (571)

Table 2. Presence of illness, medication use and other indicators of frailty, by percentage (frequency), (n = 2304)

Variables	Percentage (frequency)
Diagnoses	
Stroke	15.1 (347)
Heart disease	17.7 (406)
Hypertension	37.1 (852)
Parkinson's disease	4.4 (101)
Alzheimer's disease	6.1 (141)
Arthritis	47.5 (1091)
Osteoporosis	11.6 (267)
Hip fracture	4.3 (987)
Glaucoma or cataracts	22.0 (506)
Vision	
Impaired moderately	24.4 (562)
Severely impaired	3.7 (86)
Perceived good health	69.2 (1594)
Impaired gait	53.5 (1232)
Environmental hazards	
1 environmental hazard	7.69 (177)
2 or more environmental hazards	3.47 (80)
Medications	
Use of antipsychotic/neuroleptic	5.0 (114)
Use of anxiolytics	16.9 (388)
Use of antidepressants	18.2 (418)
Use of hypnotics	4.0 (92)
Fall history[a]	
0 falls	73.0 (1679)
1 fall	16.7 (384)
2+ falls	10.3 (237)

[a]Fall history refers to the number of times the client fell in the last 90 days.

Table 3. Percentage (frequency) distribution of restriction of activity resulting from fear of falling utilising the MDS-HC (n = 2304)

Variables	Percentage (frequency)
Fear of falling	
No fear of falling	58.9 (1356)
Fear of falling	41.2 (948)

fear of falling (Table 3). (Bivariate results are available upon request of authors.)

Multivariate results

The independent variables that remained significant in the final logistic regression model have been summarised in Table 4. No interaction terms were significant within the final model.

Discussion

This study provides information about community-based seniors receiving home care services, a group that has been relatively neglected in the fall prevention literature, in addition to adding to the lack of research specifically examining activity restriction resulting from fear of falling. The MDS-HC gives assessors the opportunity to measure and respond to fear of falling and its associated risk factors for individual clients. This information can be useful in a number of ways. First, it provides case managers with a mechanism to raise the question of whether fear of falls is affecting the client's quality of life. Second, it allows for detection of factors, some of which may be modifiable, that are contributing to the increased fear. Third, it provides standardised clinical protocols in the form of CAPs that might be used in support of client-specific care plan development to alleviate both the fear of falls and the underlying conditions causing the fear. Ultimately, this may assist in reducing deterioration in health and institutionalisation [34].

In this sample of community living seniors receiving home care services, 41% of clients limited going outdoors because they feared they may experience a fall. Other studies of community-based seniors reporting fear of falling or activity restriction resulting from falling in studies have typically reported lower prevalence rates than the present study [22, 23, 35]. This may reflect, at least in part, the use of a more frail, home care population in the present analysis. At a minimum, this raises the point that we might expect differential rates of fear of falling among the community-based elderly, and it may be a particularly important problem for home care clients.

Several factors were predictive of limiting activity because clients were afraid they would fall in a manner consistent with previous research. For example, females were more likely than men to restrict their activity out of fear. Results from Arfken *et al.* [17], Howland *et al.* [20] and Vellas *et al.* [16] provide similar evidence concerning older females. However, in another study of actual falls using the same MDS-HC data, Fletcher and Hirdes [24] found that men were at greater risk of falling than women. Women may tend to over-estimate their risk or men may underestimate the risk of falling. On the other hand, women in this study may be less likely to fall precisely as a consequence of limiting their activity because they were fearful of falling. Clearly, longitudinal analysis would be necessary to establish a temporal order between fear of falling, restriction of activity and falling. It is likely that these two factors have a reciprocal relationship with each other.

Greater amounts of informal support (amount of time individuals received assistance for instrumental and personal activities of daily living over the last 7 days from family, friends and neighbours) and being alone for long periods of time during the day were also significant predictors for restriction of activity as a result of fear of falling. With respect to time alone during the day, it would seem logical that individuals may be hesitant to complete activities or go out of the house without some form of assistance. Individuals with increased informal support may be receiving the support because of their frail state which would also contribute to fear of falling, and thus activity restriction. The results of Howland *et al.* [16] differ in that they found that individuals that had support were least likely to report curtailment of activities; the authors suggested that these seniors continued to be active because they could rely on friends and family to talk about their fears [16]. It is important to note that Howland *et al.* [16] defined social support as frequency of contact with friends/relatives, whereas social support in this study refers more directly to assistance

Table 4. Multiple logistic regression for restricting outdoor activity due to fear of falling utilising the MDS-HC

Independent variables	Parameter estimate	Standard error	Odds ratio (95% CI)
Gender			
Male	0.00		1.00
Female***	0.47	0.12	1.60 (1.26, 2.02)
Vision			
Adequate vision	0.00		1.00
Impaired moderately**	0.34	0.12	1.41 (1.10, 1.78)
Severely impaired***	1.09	0.28	2.99 (1.73, 5.20)
Alone during day			
Never/hardly ever	0.00		1.00
About 1 hour**	0.37	0.18	1.45 (1.02, 2.06)
Long periods of time**	0.33	0.14	1.38 (1.06, 1.83)
All of the time	0.32	0.17	1.38 (0.98, 1.92)
Informal support*	0.19	0.09	1.21 (1.01, 1.44)
Diagnoses			
Heart disease*	0.31	0.14	1.36 (1.04, 1.79)
Alzheimer's disease***	–0.85	0.26	0.43 (0.26, 0.71)
Arthritis***	0.37	0.11	1.45 (1.17, 1.80)
Osteoporosis**	0.44	0.16	1.55 (1.13, 2.12)
Cataracts/glaucoma*	0.26	0.13	1.30 (1.01, 1.67)
Gait			
Not impaired	0.00		1.00
Impaired***	1.77	0.11	5.90 (4.73, 7.28)
Perceived health status			
Perceived good health	0.00		1.00
Perceived poor health***	0.60	0.11	1.82 (1.47, 2.26)
Antipsychotics			
Non-use	0.00		1.00
Use**	–0.80	0.27	0.45 (0.26, 0.76)
IADL summary***	0.06	0.01	1.07 (1.04, 1.08)
Fall status			
0 falls	0.00		1.00
1 fall	0.17	0.14	1.89 (0.90, 1.56)
2+ falls***	0.70	0.17	2.02 (1.44, 2.81)

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

with activities of daily living. Other research has either not examined support or has found insignificant results [17, 19]. Given the inconsistencies in these findings future work should ascertain the precise relationship between support, or more specifically different types of support, and restriction of activity resulting from fear of falling. It is probably useful to employ stratified longitudinal analyses to determine whether informal support is protective against fear of falling and actual falls (as one would hope) in subsets of the elderly with similar levels of predisposition to falls and fear of falling.

Having impaired gait was also an important correlate in this study. The research of Arfken *et al.* [17] is consistent with the current findings, and Vellas *et al.* [16] report that having one or more abnormalities in gait at baseline was the strongest factor predicting of fear of falling. Compromised scores on instrumental activities of daily living measures [16, 17], having a history of multiple falls [17, 20], and perceived poor health [16], have been found to be predictors of fear of falling in other research studies. All of these risk factors are indicative of varying degrees of frailty and reduced health status and thus are representative of factors that have the potential to decrease one's confidence in avoiding falling.

The presence of moderately or severely impaired vision, heart disease, arthritis, osteoporosis and cataracts/glaucoma were also revealed to be significant risk factors for activity restriction due to fear of falling; however, other studies that examined predictors for fear of falling at the multivariate level either failed to find significance with similar variables or did not assess the measures in question [16, 17, 19, 20]. Nevertheless these factors also are indicative of varying degrees of frailty, and as such warrant further investigation in the future as to their contribution of activity restriction resulting from fear of falling.

Individuals with Alzheimer's disease and individuals that use antipsychotics were less likely to report activity restrictions resulting from fear of falling. As cognitive function would be compromised with either the presence of some form of dementia or use of antipsychotics, it is conceivable that individuals possessing these traits may have unrealistic appraisals of their potential risk of falling and they may not understand that restricting their activity may decrease their risk of falling.

This study adds to present research on fear of falling in two ways: (1) it examines risk factors for restriction of activity resulting from fear of falling utilising a comprehensive, multidisciplinary assessment tool that is rapidly becoming part of normal clinical practice in home care in several regions of Canada and the US; and (2) it uses a sample not

previously studied in the area of fear of falling, namely, community-based seniors receiving home care services, a group that appears to be at greater risk of fear of falling than community samples assessed in previous research.

There are a few limitations that may have affected the present results. Restriction of activity resulting from fear of falling may be underestimated. Seniors may not want to admit they have experienced a fall or are fearful of falling for feelings that disclosing this information would lead to their caregiver restricting their activity or to the decision that institutionalisation would be most appropriate. Maki *et al.* [11] suggest that seniors may not acknowledge their fear in order to avoid stigmatisation. Additionally, the cross-sectional nature of this research does not allow researchers to determine causality or to establish a temporal order for factors associated with the outcome variable, namely restriction of activity resulting from fear of falling. Longitudinal analyses would offer more insight in ascertaining the order of events that surround the development of fear of falling and restriction of activity. Further, it was not possible with the MDS-HC to identify individuals that were fearful, but did not limit their activity. Although Lachman *et al.* [36] and Tennstedt *et al.* [37] provide some insight into the differences between fear of falling that leads to activity restriction from fear of falling that accompanies activities performed, more research in this area is warranted. With respect to the generalisability of the sample to the home care population, it should be noted that the pilot implementation of the RAI-HC in Ontario was mainly focused on longer stay clients and elderly post-acute clients. The sample tended to be under-represented with respect to post-acute home care clients not requiring comprehensive assessment, palliative care clients, and clients with serious mental illness.

An assessment instrument, like the MDS-HC, provides comprehensive, psychometrically sound health information about clients, and indicates those that may benefit from more extensive evaluation and/or care planning, which would be instrumental in comparison between different research studies. For further discussion of the importance of comprehensive assessment instruments refer to Stuck *et al.* [38] and Challis *et al.* [39]. The inclusion of items on falls, fear of falling, and risk factors for both adverse outcomes means that home care professionals using this instrument will have a unique opportunity to identify and respond to problems that have an important impact on the client's quality of life.

Presentations

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