LS_GT SEPTEMBER 04 FALLS RISK ASSESSMENT 2880 WORDS 5 TABLES

# Measurement Properties of a New Falls Risk Self-Assessment Questionnaire for Seniors

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## Abstract

### Background
The Elliott Falls Risk Tool is a 20-item falls risk assessment questionnaire. The study was designed to determine the test-retest reliability of the questionnaire and to compare self-assessment with objective measures of falls risk.

### Methods
Fifty-two cognitively well community-dwelling seniors attending a geriatric day program were enrolled in the study. They completed a self-assessment questionnaire on two occasions, two to 14 days apart and gave a self-reported history of falls. A day hospital chart review was also undertaken.

### Results
Individual item Kappas ranged from 0.36 to 0.96. The Pearson correlation coefficient was 0.91 for retest reliability of the total score. Subjects reporting falls in the previous six months tended to have higher total scores than those not reporting falls, with highest scores for subjects reporting multiple falls. Self-report of total medications correlated with the actual number of medications, but self-reported difficulty with balance, gait or memory did not correlate with lower Berg Balance scores, gait speed or a formal mental status examination.

### Conclusions
The Elliott Falls Risk Tool demonstrated high test-retest reliability in this population and showed a trend towards correlation with self-reported history of falls. After data analysis, two questions were reworded for improved clarity.

### Key words
Falls
Questionnaire
Reproducibility of Results
Aged

Conflict of Interest: None declared

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## Introduction
Fall prevention in older people receives well deserved attention. Risk factors associated with falls in community-dwelling older people are numerous and have been well documented in

epidemiologic studies.[1-9] Most falls in this population are multi-factorial and result from a complex interplay between predisposing and precipitating factors.[2,6,8,10,11] Studies also show that individualized, multi-component interventions are effective in reducing falls and fall-related injuries.[12-15] A simple, effective method to identify individuals at risk for falls, and the factors which increase risk may improve case findings and promote individualized fall prevention strategies at an earlier stage.

Self-assessment of falls risk may be a more accessible and cost-effective screening tool than assessment by health professionals. In addition, self-report of subjective experiences can be used to augment clinical assessment. Self-appraisal may serve a health education function, both for general knowledge and to aid insight into personal risks, which in turn may improve adherence with suggested interventions. Finally, the very act of self-assessment involves the individual in their own care, which potentially benefits self-esteem and quality of life.

While many falls risk assessment measures have been described, no self-assessment measures could be found in a literature review. This paper describes the development of a falls risk self-assessment questionnaire for seniors and its test-retest reliability. Concurrent validity with self-reported history of falls as well as objective measures of mobility and cognition are reported.

## Methods

### *Questionnaire design*

As part of a health education program at a geriatric day program, a list of questions was developed to guide group discussion about risk factors for falls. The questions were intended to encompass a range of issues that could be addressed by an interdisciplinary team. As interest grew, funding was secured from the Royal Canadian Legion to develop and validate a self-assessment tool based on the original list of questions. A review of the literature using certain keywords—falls, accidental falls, risk factors, risk assessment, self-assessment, questionnaire and aged—was undertaken using the OVID search engine to search MEDLINE (1966-2001), EMBASE (1980-2001) and CiNAHL (1982-2001). This review and an OVID search of "Health and Psychosocial Instruments" (1985-2001) with keyword "falls" failed to turn up any existing self-assessment measure.

A revised questionnaire was developed by an interdisciplinary steering group of professionals from the geriatric day program (nursing, physiotherapy, occupational therapy, nutrition and medicine). There was considerable debate about the relationship of alcohol consumption to falls as well as the accuracy of self-reported alcohol consumption.

### *Item selection*

A review of the literature revealed numerous factors associated with falls in community-dwelling older people. Forty-two risk factors were identified which were felt to be intrinsic to the individual and amenable to change. These risk factors were grouped by consensus into clusters which could be addressed by a single question (see Figure 1). The intent was to find every potentially modifiable risk factor, and hence the questions were to be as inclusive as possible. Each question was worded from the client's perspective by focusing on perceptions, symptoms and feelings. Diagnoses and healthcare jargon were avoided. Non-modifiable risk factors such as gender, age and history of previous falls were omitted from the final questionnaire. Environmental risks were also disregarded, as several assessment tools for these already exist.

For content validation, a draft of the questionnaire was sent to experts identified by members of the interdisciplinary team.

*Scoring method*
Questions were worded to give a simple yes/no answer, with "yes" always indicating risk and "no" indicating absence of risk. The total score directly reflects the number of affirmative responses.

**Test-retest reliability**
*Participants*
Individuals attending either of two geriatric day programs in Vancouver were invited to participate if they scored ≥25/30 on the Mini Mental State Examination (MMSE). Recruitment began April 2002 with consecutive eligible admissions until December 2002. The consent process was used to determine ability to read, understand and communicate in English.
The questionnaire was completed on two occasions, two to 14 days apart. Following the second administration, participants were asked if they had fallen in the previous six months, "By falls I mean any slips, trips, stumbles or falls, indoors or outdoors, even if you did not hurt yourself." Falls were excluded if the investigator (JAE) concluded they were due to excessive external force that would result in a fall in a healthy, younger individual.
Objective measures of risk were obtained by chart review: MMSE, Berg Balance Scale (BBS),[16-17] Timed-Up-And-Go (TUG)[18-19] and current medications. Ethics approval was granted by the University of British Columbia Clinical Ethics Review Board and the Providence Health Care Ethics Review Board.

*Statistical analysis*
A sample size of 50 to 60 was determined based on an anticipated reliability of 0.9 with margin of error of ±0.10 ($\alpha$=0.05). Data was analyzed using SPSS Version 10. Individual item reliability was determined using the Kappa coefficient ($K=P_o-P_e/1-P_e$) and overall correlation was determined using Pearson r. Self-reported items were compared with objective measures using the Student-t test for difference of means. Medians and the Mann-Whitney U test were used where the parameter exhibited a non-normal distribution. Overall scores were compared for subgroups based on history of falls using one-way analysis of variance (ANOVA).

**Results**
Fifty-nine clients were referred to the study. Two were subsequently found to be ineligible and five were unable to complete both questionnaires during the study period, leaving 52 clients completing the protocol. A summary of participant characteristics is presented in Table 1. Age ranged from 68 to 93 years (mean 81±5 years). Almost 80 per cent (41/52) were female. Twenty-four of 52 (46 per cent) reported falling in the previous six months and of these, 11 reported falling more than once. MMSE scores ranged from 25 to 30, with one-third (17/52) falling below 28. BBS scores were recorded for 39 participants. Only two obtained the maximum score of 56, while less than half scored over 45. TUG scores were available for 37 participants and ranged from seven to 76 seconds. The distribution of TUG scores was skewed to the left.
All participants took at least one medication. Number of prescription medications ranged from one to 13 (15 including over-the-counter and herbal remedies). Ten participants were taking benzodiazepines and 26 were taking other psychotropic medications.

*Test-retest reliability*
The duration between the first and second administration of the questionnaire ranged between two and 14 days (mean 5.6 days). Over 90 per cent (49/52) were re-tested within three to 10 days.

Individual item Kappas and percentage agreement are presented in Table 2. Kappas ranged from 0.36 to 0.91 (mean 0.70). Question 20 showed the poorest correlation between test-retest responses. The reliability of this question increased from 0.36 to 0.48 for the 35 subjects with MMSE scores ≥ 28 in a post-hoc analysis; percentage agreement also increased from 69 per cent to 75 per cent. Total scores ranged from 0 to 18. Test and retest scores were highly correlated (r=0.91).

*Validity*

Subjects reporting falls in the previous six months (N=24) tended to have higher total scores than those not reporting falls (Figure 2). Scores were highest for subjects reporting multiple falls (N=11). The mean total score was lowest for those who did not report any falls in the previous six months, 9.5 (95 per cent CI 8.3-10.8); intermediate for those reporting a single fall, 10.3 (95 per cent CI 8.3-12.3); and highest in those reporting two or more falls, 11.6 (95 per cent CI 8.5-14.4). These differences show a trend to positive correlation but fail to reach statistical significance (p=0.316).

It was possible to compare self-report with objective measures for four questions. The total number of prescription medications was significantly higher for those who reported taking "more than three medications" (N=37) in Question #8 (6.8 vs. 4.3, p=0.009). Those who reported difficulty with walking in Question #19 (N=26) had longer TUG scores (p=0.050). Participants who reported memory problems in Question #16 (N=32) did not score differently on the MMSE compared to those who did not report memory difficulties (28.0 vs. 28.2, p=0.649). Similarly, participants who reported balance problems in Question #1 did not have significantly different BBS scores (p=0.453).

**Discussion**

The initial set of questions was used to focus client-centred discussion about falls and falls risk in a geriatric day program. The original intention was to educate clients about falls, to help clients identify their risks related to falls and to involve clients in their own health care. We believe that the Elliott Falls Risk Tool developed from the initial questionnaire preserves this original intention. It is not intended to stand alone in the identification of those at risk for falls.

To simplify scoring of the tool, responses were standardized with "yes" always indicating risk. This resulted in some awkward questions, especially question #20. Each question was given equal weight. Likert scales, which could have enhanced predictive validity, were avoided to keep scoring simple. This was also deliberate in order to focus fall prevention strategies around every possible modifiable risk factor, consistent with the original intent in developing the tool. The accuracy of predicting future falls using the tool was felt to be of lesser importance.

The Elliott Falls Risk Tool demonstrated high test-retest reliability for most questions despite their subjective nature. A less subjective question (Question #6 "Do you walk with an aid, such as a cane or walker?") showed the highest reliability (?=0.96). The poorest test-retest reliability was seen for Question # 20 ("Do you get out for activities, errands or social events fewer than three times a week?") with ?=0.36. We have attempted to improve the clarity of this question for future use by modifying it to read, "Do you stay at home most days?"

It is more difficult to explain why Question #3 ("Are your arms or legs weak?") had lower reliability (?=0.42). The implication that one should know, rather than simply feel, whether their limbs are weak may have fostered an uncertainty in response. We have changed this question to read, "Do your arms or legs feel weak?" which would make it consistent with other questions of this type.

Total scores were highly correlated. There was a trend towards higher scores for those with a history of multiple falls, however, a larger sample size and an accurate falls history in a prospective study would be required to examine the predictive validity of the Elliott Falls Risk Tool. Retrospective recall of falls, while potentially unreliable, was used as there was no consistently reported history of falls available for each participant.
Self-report did not correlate well with objective measures in this study. Poorer results were seen in measures of balance and gait in those who reported difficulty with these, but the clinical significance of these differences is uncertain. We were not able to compare self-reports of low mood with an objective measure of depression as only one site routinely performed the Geriatric Depression Scale.
These two geriatric day programs admit frail seniors from the community. All clients require interdisciplinary investigation and short-term intervention for a variety of medical, functional and psychosocial issues. The study population was less medically stable, more cognitively and functionally compromised, and at a greater risk for falls than the general population of community-dwelling older people. One unit in particular was weighted towards psychogeriatrics, accounting for the large number of participants taking psychoactive medications. We expect the reliability of the Elliott Falls Risk Tool would be upheld in a cognitively intact population over 65 in the community as an improvement was seen in individual item Kappa when the MMSE cut-off score was raised to 28 in a post-hoc analysis.

**Conclusion**

The Elliott Falls Risk Tool demonstrates good test-retest reliability in this selected group of frail seniors. Overall scores correlated with a self-reported history of falls but did not reach statistical significance. The tool may be used as part of an educational intervention. Further research in this setting should focus on the use of the Falls Risk Tool to increase risk factor awareness and adherence to risk reduction interventions.
The demonstrated test-retest reliability and the association of total test score with a self-reported history of falls suggest this tool may be a useful adjunct for fall risk appraisal by health professionals. Prior to clinical application, it should undergo predictive validity testing in conjunction with documentation of established non-modifiable risk factors such as age, sex and history of previous falls. Clarity and reliability may be further improved by re-wording two questions (Appendix 1).

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