

Validation of F3ALLS Assessment in Older Adults

P.Y. Somasekhar, N. Wu, B.Y. Hung, J.E. Morley, T.K. Malmstrom

Saint Louis University School of Medicine, St. Louis, MO, USA

Corresponding Author: Theodore K. Malmstrom, PhD, 1438 South Grand Boulevard, St. Louis, MO 63104, USA, 314-977-4814 (office), theodore.malmstrom@health.slu.edu

Abstract

OBJECTIVES: The study aimed to evaluate the brief F3ALLS assessment's validity in screening fall risk.

DESIGN: This is a cross sectional and longitudinal study.

SETTING: Participants were recruited from outpatient primary care clinics.

PARTICIPANTS: Older ambulatory adults ages 65-90 volunteered for this study.

MEASUREMENTS: Falls risk was measured with TGBA and F3ALLS questionnaires. A 6-month follow-up period assessed for falls using falls diaries and chart review.

RESULTS: Participants (n=97) were older adults ages 73.91±6.4, 68% (n=66) female. 31% of participants reported at least one fall at 6-months. F3ALLS scores were higher in participants who reported 1 or more falls at 6-months follow-up (3.23±1.5). Higher F3ALLS scores were associated with 6-month fall risk (OR=1.463, 95% CI=1.098-1.949). A score > 3 stratified patients as at risk of falling (AUC=0.77, P<.001; Sensitivity=0.65, Specificity=0.71).

CONCLUSION: The F3ALLS questionnaire adequately classifies person at risk versus not at risk for falls, and higher (worse) F3ALLS scores are associated with falls over 6 months.

Key words: Falls, geriatrics, risk, survey, questionnaire.

Introduction

Falls are the leading cause of injury-related death among older adults and account for 1.1% of all deaths in older people (> 65 years) (1). According to the World Health Organization, 28-35% of older people fall each year. Falls among older adults are extremely expensive and each year \$50 billion is spent on medical costs related to non-fatal fall injuries (2). Some proven risk factors for falls in older people in the community include: gait and balance impairments, frailty, comorbid conditions such as osteoporosis, diabetes, urinary incontinence and cardiovascular disease, and polypharmacy (3).

According to a systematic literature review by Prendin et. al, over 38 fall risk assessment tools are currently available in the literature (14). However, these tools target different geriatric populations (e.g., hospitalized vs. home residents), self-reported vs. performance evaluations, and require varying levels of expertise to perform and time of administration. The reference standard, Tinetti Gait and Balance Assessment (TGBA) is one such assessment commonly used. Nevertheless, there exists

practical limitations with its use in primary care settings given the time constraints as well as specialized training for the administrator of the assessment. This led to the development of our simplified F3ALLS approach which encompasses a multidimensional approach to falls risk and can be efficiently utilized in primary care settings without specialized training.

F3ALLS is a brief questionnaire designed to be rapidly administered and easily computerizable in a primary care physician's office to identify patients at risk for falls. F3ALLS includes seven items: whether the patient had a fall within the last 6 months, fear of falling, foot pain related to diabetic neuropathy, gait and balance issues, frailty, orthostatic or postprandial hypotension, and syncope. Each item on the questionnaire has been shown to increase the risk of falling in older adults (4-8).

The purpose of this study is to evaluate the validity of the F3ALLS questionnaire compared to the reference standard TGBA. We hypothesize that the F3ALLS questionnaire would discriminate between persons at risk versus not at risk for falling.

Methods

Study Design

The F3ALLS instrument was conceptualized and developed based on the knowledge of existing falls literature and clinical experience treating older adult patients of Dr. Morley, an expert geriatrician and research scientist. This is a cross-sectional and longitudinal study. The F3ALLS questionnaire scores responses to the questions as yes, scored as one, or no, scored as zero. The highest possible score is 7 and a higher score corresponds to a higher risk of falls. Upon completion of the in-person evaluation, subjects were given a six-month follow-up calendar that contain the options Yes or No falls each day. The participants were asked to circle Yes or No at bedtime daily. Subjects who did not return their follow up calendar were followed up with chart review to assess if there were new office visit notes indicating that they have fallen, and if yes, the number of times they had fallen was noted. SLUCare Geriatricians and SLUCare General Internal Medicine providers both inquire about falls as a standard part of all visits. TGBA was performed as described previously (9). Maximum score is 28 and higher scores corresponds to healthier patients. For reference, a TGBA score between 19-24 indicates moderate-high risk for falling, scores below

Table 1. F3ALLS Questionnaire

	Item	Question	Treatment	% Respondents who answered Yes who fell during 6-month follow-up period
F	Previous Falls	Have you fallen in the last 6 months?	Assess with Toulouse – St. Louis University Mini Falls assessment Physical therapy	68%
F	Fear of Falling	Are you afraid of falling?	Exercise and balance program	56%
F	Foot (neuropathy)	Do you have foot pain?	If diabetic, assess for peripheral neuropathy	48%
A	Ataxia (balance)	Are you unsteady?	Balance exercises and medication review	58%
L	Loss of muscle (sarcopenia)	Have you lost strength?	SARC-F and, if positive, physical therapy	62%
L	Low blood pressure	Is systolic blood pressure less than 120mmHg or does blood pressure fall by >20mmHg on standing or after eating?	Evaluate for polypharmacy or anemia Evaluate for autonomic neuropathy then fludrocortisone or droxidopa	63%
S	Syncope (fainting)	Are you dizzy or do you feel faint or pass out?	Event monitor or implantable loop recorder	67%

19 indicate a high risk for falls. Hence, we grouped all scores below 24 into “any fall risk” category.

Participants, Inclusion and Exclusion Criteria

Ambulatory patients (with or without walking aid) presenting to the SLUCare Geriatrics or SLUCare General Internal Medicine clinics between the ages of 65-90 who did not have moderate or severe dementia were approached to participate in the study. The Rapid Cognitive Screen (RCS), a brief screening tool, evaluated for baseline cognition in participants (14). Patients with MCI and mild dementia were eligible for the study. All subjects completed written informed consent that was approved by the Saint Louis University School of Medicine Institutional Review Board protocol ID 29997. Consenting subjects were then evaluated using the F3ALLS questionnaire and the TGBA. First, the subjects were asked to complete a simple demographic survey. Next, they were asked the seven questions of the F3ALLS questionnaire. The balance portion of the TGBA was completed next followed by the gait portion of the TGBA.

Follow up was accomplished by two methods: 1. A falls diary with a stamped, addressed envelope to complete and return after a six-month period; 2. Chart review for all participants to capture any falls that were not self-reported. A follow-up rate of 97.9% was achieved utilizing the aforementioned methods (2 were lost to follow-up due to demise). All participants were reviewed for their falls outcome. 35 participants responded to follow-up via the falls diary. Data was analyzed using SPSS version 19.0. Descriptive statistics were reported as means \pm standard deviations or percentages. Logistic regression (odds ratios [OR], 95% Confidence Interval [CI]) was used to investigate the association of F3ALLS scores with falls (any vs. none) at 6-months adjusted for age, gender, and education. Receiver operator characteristic (ROC) curve

(area under the curve [AUC], sensitivity, specificity) was used to examine how effectively the F3ALLS assessment discriminates between fall risk (any vs. none) on the TGBA.

Tool Validation

Content and face validity were evaluated by the senior scientist on this manuscript, JE Morley. Dr. Malmstrom also evaluated face validity. Construct validation was addressed in this study by looking at the association of F3ALLS score with subsequent falls 6 months later. In the collected data, we looked to see amongst those who have fallen, does a F3ALLS score differentiate between fallers and non-fallers.

Results

A total of 97 participants were enrolled. Two participants died during the follow-up period and were excluded from the analysis. The average age of participants was 73.9 \pm 6.4 years. 68% (n=66) were female and 34% (n=33) were males. 50.5% (n=49) were African American, 46.4% (n=44) were Caucasian, and the remaining 2.1% were other races. 80% (n=78) had twelve or more years of education, with the mean highest education level as 13.76 \pm 2.9 years. When the assessment was administered, 91.8% (n=89) resided at home, 5.2% lived with caretaker, and 3.1% at an assisted living facility (Table 2). Of the seven questionnaire items, a recent history of falls was associated with the highest percentage of falls (68%) during the follow-up period (Table 1).

Of the participants who completed the 6-month follow-up, 36% (n=35) reported falling at least one time. F3ALLS scores for those who reported 1 or more falls were 3.23 \pm 1.5 (SEM: .246) compared to 2.35 \pm 1.7 (SEM: .215) for those who reported no falls (Figure 1A).

Figure 1. (A) Initial F3ALLS score for participants who reported no falls vs. 1 or more falls during the 6-month follow-up period. F3ALLS scores were 2.35±1.7 and 3.23±1.5 (P = 0.011). (B) Percentage of participants who fell during follow-up period by F3ALLS score. Higher F3ALLS score (3-7) is associated with 6-month fall risk (OR=1.463, 95% CI=1.098-1.949)

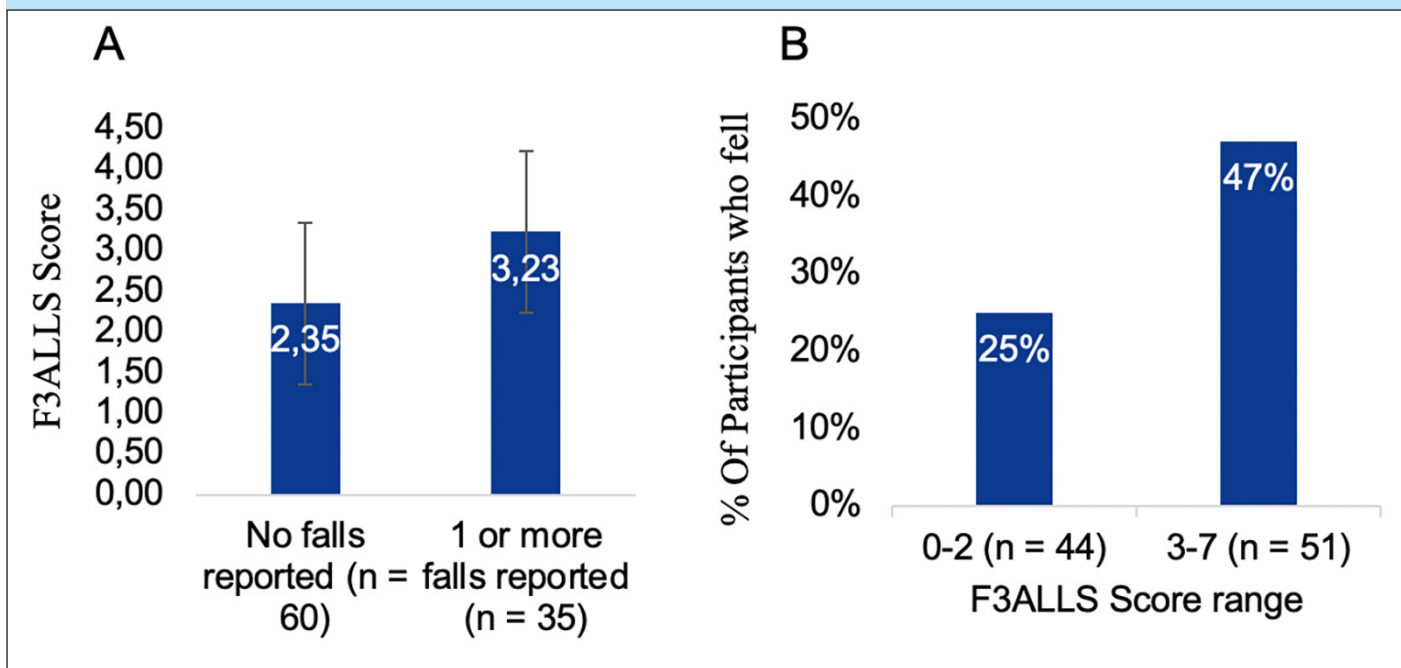
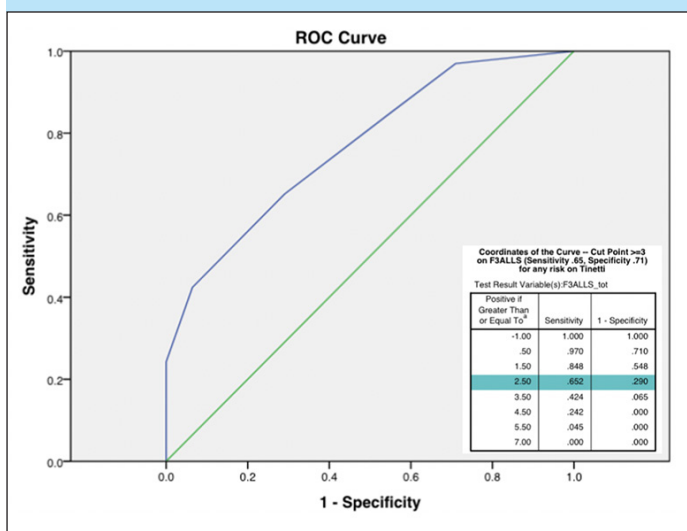


Figure 2. ROC Analysis with Area Under the Curve results with sensitivity and specificity



A higher F3ALLS score was associated with a 6-month fall risk (OR=1.463, 95% CI=1.098-1.949). 25% of participants with a F3ALLS score from 0 to 2 (n=44) reported a fall. In contrast, 47% of participants with a F3ALLS score from 3-7 (n=51) reported a fall (Figure 1B).

Based on ROC analysis, a F3ALLS score > 3 classifies a patient as any fall risk on TGBA with an optimal sensitivity (.65) and a specificity (.71). 66/97 had TGBA scores 24 or lower, while 31/97 had scores greater than 24. The discrimination value of this curve (area under the curve) was 0.769 ± .049 (P<.001) as seen in Figure 2.

Table 2. Participants’ Demographics and Faller/Non-Faller in 6-Month Follow-Up Demographics

Participant Demographics	Participants
Number of participants (n)	97
Number of participants post-follow up (n)	95
Age (Mean + SD)	73.9 + 6.4
Gender, %	
Female	68
Male	32
Race, %	
Black or African American	50.5
White	46.4
Other race	2.1
Asian	1
Hispanic/Latino	0
Highest education level, years (mean + SD)	13.76 + 2.9
Place of Residence, %	
At Home	91.8
Live with caretaker	5.2
Assisted living facility	3.1
Nursing home	0
TGBA Scores (n)	
High Risk (>24)	31
Medium Risk (19-24)	39
Low Risk (<19)	27

Table 2. (continued) Participants' Demographics and Faller/Non-Faller in 6-Month Follow-Up Demographics

Participant Demographics	Participants
Faller Demographics in 6-month follow-up	
Age (Mean + SD)	73.4 + 6
Gender (%)	
Male	31.4
Female	68.5
Average Education, years (mean + SD)	13.91 + 2.8
Race (%)	
White	42.8
Black or African American	51.4
Other race	5.7
Asian	0
Place of Residence (%)	
At Home	88
Caretaker	5.7
Assisted Living Facility	5.7
Non-Faller Demographics in 6-month follow-up	
Age (Mean + SD)	74.3 + 7
Gender (%)	
Male	33.3
Female	66.6
Average Education, years (mean + SD)	13.65 + 3.1
Race (%)	
White	50
Black or African American	48.3
Other race	0
Asian	1.6
Place of Residence (%)	
At Home	95
Caretaker	3.3
Assisted Living Facility	1.6

SD = Standard Deviation

Discussion

The present study demonstrates that the F3ALLS questionnaire adequately classifies persons at risk versus not at risk for falls compared to the reference standard TGBA. Notably, patients who fell had a statistically significant higher F3ALLS score than those who did not fall, suggesting that the F3ALLS questionnaire may be used to reliably predict the likelihood of falling. There were almost twice as many participants with a score between 3-7 who fell during the 6-month follow-up period compared to those who scored between 0-2, again supporting the idea that patients with a higher F3ALLS score have an increased risk of falling. The ROC analysis showed that a F3ALLS score cutoff of >3 is most useful to predict the likelihood of falling over a 6-month period.

The ROC curve with its sensitivity of 65%, and specificity of 71% is acceptable at best, which may be a limitation of this assessment.

The F3ALLS questionnaire is an improvement over existing fall risk assessment tools as it is an easily accessible tool that can be utilized in primary care clinic visits with substantial time pressures. Its simplicity allows it to be completed in less than five minutes and can ideally be used by auxiliary health care professionals (e.g., MA's or RN's) to screen the patients for risk of falling.

Based on these results, we recommend that the F3ALLS questionnaire be utilized in the clinical setting to assess the risk of falls in older adults. It also provides proposed interventions and evaluations in categories where deficits are identified. Patients with a F3ALLS score >3 should receive further evaluation to minimize the likelihood of a subsequent fall, including performing a thorough history and medication review and conducting the Toulouse Saint Louis University Mini Falls Assessment in older adults residing in nursing homes (10). Comorbidities that increase the risk of falls in older adults such as diabetes, cardiovascular disease, or polypharmacy should be identified and appropriately addressed (3). Non-medical interventions such as balance and exercise programs should also be considered. A recent systematic review and network meta-analysis showed that multifactorial interventions and exercise were more effective at reducing falls among older adults compared to usual care, especially medical care alone (11). A subsequent secondary analysis demonstrated that an exercise combination of anticipatory control, dynamic stability, functional stability limits, reactive control and flexibility was the most effective exercise combination to prevent falls relative to no exercise or other exercise combinations (12). Each patient may require a slightly different approach to preventing falls depending on their F3ALLS score, specific responses to the survey, and comorbidities, but using a thorough, holistic approach to preventing falls in older adults is crucial to improve outcomes.

Our study had a limited sample size due to a necessary halt in recruiting efforts caused by the COVID-19 pandemic. The F3ALLS questionnaire also does not predict falls over a more prolonged period, as participants in our study were only followed for 6 months. Another limitation is the exclusion of patients with diagnosed moderate-severe dementia as they are at risk for falls. Responses may also be hampered by recall, especially in patients with MCI (e.g., amnesic MCI) as this is not a performance evaluation, and by the smaller than anticipated falls diary response rate. A strength of this study is the utilization of chart review to broadly assess for falls in participants. Future directions include evaluating this questionnaire in different clinical populations (e.g., nursing home, inpatient settings, etc.), utilizing larger sample sizes, and assessing the efficacy of F3ALLS management recommendations. Assessing the efficacy of the F3ALLS management recommendations would be useful in developing a more targeted approach to preventing falls in older adult patients. For instance, in diabetic patients who report foot pain, it would be useful to assess the effectiveness of peripheral neuropathy screening in preventing falls.

Conclusion

We demonstrate that the F3ALLS questionnaire is a brief, comparable measure with other falls risk assessments in assessing fall risk among older adults in the outpatient clinical setting. F3ALLS simplicity allows it to be an easy-to-use clinical tool to adequately classify patients at risk versus not at risk for falls, and higher F3ALLS scores are associated with falls over 6 months. Further studies should investigate the validity and utility of the F3ALLS management recommendations to develop a more targeted approach to preventing falls in older adults.

Key Points

- F3ALLS is a brief questionnaire designed to be rapidly administered and easily computerizable in a primary care physician's office to identify patients at risk for falls.
- A F3ALLS score >3 is most useful to predict the likelihood of falling over a 6-month period.

Why does this matter?

Patients at high risk of falls can be quickly identified with the F3ALLS assessment and receive further evaluation to minimize the likelihood of a subsequent fall.

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Impact Statement: We certify that this work showing that the F3ALLS assessment tool is an efficient and valid measure to assess fall risk among older adults in the outpatient clinic is novel.

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