Utilization of a Screening Tool to Identify Homebound Older Adults at Risk for Falls: Validity and Reliability

Patricia J. Flemming, PT, DSc, GCS

ABSTRACT. *Purpose.* This study examined the reliability and validity of a Falls Risk Assessment (FRA) tool developed to identify risk factors associated with falls in homebound older adults. *Design and Methods*. FRA scores of 307 Medicare-eligible adults over 65 admitted sequentially to a home health agency (HHA) were analyzed retrospectively using a case-control design. A total of 18 subjects participated prospectively in assessment of criterion-related validity and rater reliability. *Results*. Mean FRA scores of *fallers* were significantly higher than *non-fallers* (10.13, 7.2, respectively; $p < 0.05$). The FRA and Performance-Oriented Mobility Assessment (POMA) demonstrated a strong negative correlation ($r = -0.74$), utilizing a Pearson correlation. Using percent agreement, FRA scores of nine raters yielded 94.74% agreement. Kuder-Richardson (KR)-20 analysis yielded internal consistency of 0.98, 0.97, and 0.98 within subjects scored, indicating high consistency among raters. An intraclass correlation coefficient (Model 3,1) of 0.83 supports intra-rater reliability. *History of recurrent falls* was the only significant predictor in logistic regression ($p = 0.027$, odds ratio: 2.83). *Implications*. Data support use of the FRA in screening for fall-related risk factors in homebound older adults. doi:10.1300/J027v25n03_01 *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website:<http://www.HaworthPress.com>*

Patricia J. Flemming is Physical Therapy Coordinator, Pi Beta Phi Rehabilitation Institute, Vanderbilt University, Nashville, TN (E-mail: pat.flemming@vanderbilt.edu).

Home Health Care Services Quarterly, Vol. 25(3/4) 2006
Available online at http://hhc.haworthpress.com

doi:10.1300/J027v25n03_01

KEYWORDS. Falls, home health agency, falls risk

INTRODUCTION

A serious and common problem faced by older adults is falls. Falls are the leading cause of accidental death in the home (Di Fabio & Seay, 1997), and are the major factor in up to 40% of nursing home admissions (Bezon, Echevarria, & Smith, 1999). Although approximately one-third of older adults over 65 report one or more fall each year (Tinetti, Speechley, & Ginter, 1988), many others go unreported (Trueblood, Hodson-Chennault, McCubbin, & Youngclarke, 2001). Reported falls increase to 40% annually for persons over 75 and to 50% for those 80 and older (Tinetti & Williams, 1997). Researchers (Tinetti, Doucette, Claus, & Matrottoli, 1995) have suggested that fall-related deaths are often underestimated since death in older individuals is usually attributed to a complication, rather than the fall itself (Trueblood, Hodson-Chennault, McCubbin, & Youngclark, 2001).

Health care professionals who provide services to older adults in their home are challenged to identify individuals who are falling or are at increased risk for falls. Fall-risk is often not recognized because a specific assessment related to falls is not included in routine physical examinations (Beers & Berkow, 2000). Other falls go undetected simply because many older adults are hesitant to admit they have fallen, because they may be isolated and have little contact with others, and because health care workers or family members do not ask if they have fallen. A failure of the faller to report falls is thought to be linked to fear of institutionalization and loss of independence (Kressig et al., 2001).

Clinical instruments that measure aspects of balance or mobility have been studied extensively, however, no individual clinical balance test has been determined to be the best predictor of falls in older adults (Brauer, Burns, & Galley, 2000). Some clinical instruments studied to date include the Berg Balance Scale (Berg, 1989), The Timed Up and Go (Podsaidlo & Richardson, 1991), The Functional Reach (Duncan, Studenski, Chandler, & Prescott, 1992), the Performance-Oriented Mobility Assessment (POMA) (Tinetti, 1986), the Barthel Index (Mahoney & Barthel, 1965), the Gait Abnormality Rating Scale (Mahoney & Barthel, 1965), the Dynamic Gait Index (Shumway-Cook & Woollacott, 1995), and the Clinical Test of Sensory Interaction on Balance (Anacker & Di Fabio, 1992). Di Fabio and Seay (1997) have demonstrated that tests of physical performance, balance, and mobility can be predictive of fall risk. Yet, Di

Fabio suggests that the "narrow focus of these tests limits the assessment of fall risk to unidimensional entities" (Di Fabio & Seay, 1997, p. 906). Additionally, many existing scales require lengthy training for proficient usage, and have been developed specifically for use by either therapists or nurses. The discipline-specific focus of existing tools limit their usage by multi-disciplinary teams (Perell, 2001).

Mary Tinetti has reported that the majority of falls in older adults appear to be multifactorial in etiology, "resulting from a combination of activity-related, extrinsic, and intrinsic factors" (Tinetti et al., 1993, p. 315). She has also reported in both institutional and community-based studies that the risk for falling appears to increase with the number of risk factors present (Nevitt, Cummings, Kidd, & Black, 1989; Tinetti et al., 1988). Tinetti et al. also reported that a " multiple-risk factor intervention strategy resulted in a significant reduction in risk of falling among elderly persons in the community" (Tinetti et al., 1994, p. 821).

Without specific screening procedures in place, patient needs and risk factors related to falls may not be clearly identified by home health agency (HHA) personnel on the opening assessment, and all appropriate referrals may not be occurring (Di Fabio & Seay, 1997). A valid and reliable assessment method is needed to identify older homebound adults at risk for falls, one that can be completed by all nurses and therapists who perform opening assessments. With use of such a tool, appropriate referral into a fall prevention program may occur (Shumway-Cook, Baldwin, Polissar, & Gruber, 1997).

Utilizing available Medicare risk-adjusted data, home health agencies are now able to benchmark their patient outcomes against outcomes of other home health agencies across the country. The home health agency (HHA) involved in this study experienced an above average incidence of Medicare client hospital admissions secondary to falls or accidents in the home when compared with national adverse event data from September 1999 through June of 2001. A valid and reliable clinical assessment method to identify risk for falls in the homebound population was not available. HHA staff discovered that while the literature had extensively addressed falls and risk factors in the community dwelling, non-homebound older adult, research-based findings related to falls in the homebound older adult were limited to invalidated screening tools.

In response to the adverse event outcomes related to falls, an agency-wide one-time screening of all active home health cases (N = 264) was performed in June of 2001. Active patient charts were reviewed to identify falls-related risk factors. A history of falls within the last six months was identified as the most significant risk factor for falling during the

episodes of care provided through the HHA. A review of the medical literature relating to falls risk factors was performed by members of the HHA Continuous Quality Improvement Committee. The literature review and the one-time screening supported the need for a multidisciplinary approach to risk factor identification and intervention (Gillespie, Gillespie, Cumming, Lamb, & Rowe, 2001).

The staff sought a tool that could utilize elements from the extensive OASIS (Medicare's Outcome and Assessment Information Set) performed at the start of care, since OASIS usage had been a requirement for Medicare reimbursement since October 1, 2000. A 16-item Falls Risk Assessment (FRA) tool (see Appendix A.) was developed by a multi disciplinary group comprising of physical, speech, and occupational therapists, nurses, and administrative staff, using a consensus method as described by Koch et al., (Koch, Gottshalk, Baker, Palumbo, & Tinetti, 1994; Tinetti et al., 1993). The FRA tool underwent multiple revisions and was reviewed by a team of experienced clinicians with neurological and geriatric specialties prior to piloting. The risk factors and assessment measures included in the FRA were selected based on a comprehensive literature review (Brauer et al., 2000; "Clinical Practice Guidelines: The prevention of falls in older persons," 2001; Cwikel, Fried, Biderman, & Galinsky, 1998; Koch et al., 1994; Kressig et al., 2001; Lange, 1996; Tinetti et al., 1993; van Haastregt et al., 2000) and data collected with OASIS start of care assessments. A fall was defined as "any event that led to an unplanned, unexpected contact with a supporting surface" (Shumway-Cook et al., 1997, p. 814). This definition of a fall had been utilized in previous falls-related research and supported the content validity of the FRA.

The FRA was piloted on Medicare admissions by multidisciplinary staff members in the Fall of 2001, and recommendations for additional revisions were made. Following staff training, the FRA was implemented as a part of agency standard of care for all Medicare admissions, effective January 2002. A baseline level of falls risk patient education was implemented in conjunction with the administration of the FRA. The purpose of the current study was to test the validity and reliability of the 16-item newly developed screening tool developed.

This study is clinically significant because the potential consequences of not identifying and treating individuals at risk for falls are great (Perell, 2001; Shumway-Cook et al., 1997). Although less than 10% of falls in older adults result in a fracture, approximately 20% require medical attention (Gillespie, Gillespie, Cumming, Lamb, & Rowe, 2001). Even non-injurious falls can result in a fear of falling, which may lead to

self-imposed restriction in activity and decline in function (Kressig et al., 2001). This study is also significant from an administrative standpoint, since HHAs are called upon by accrediting agencies to address conditions associated with a high rate of adverse events, such as hospitalization related to falls or accidents in the home. Most importantly, identification of fall risk is important because appropriate identification and intervention in the homebound population may improve the quality of life for older adults, and may assist many in achieving their goal of remaining in their home.

Based on the review of the literature, the following assumptions can be made:

- Nurses and therapists in the home health setting are frequently basing estimates regarding fall risk on experience and training instead of utilization of multidimensional and standardized assessment measures (Riddle & Startford, 1999).
- Development of comprehensive interventions to address fall prevention is more difficult without first a broad assessment of falls-related risk factors (Di Fabio & Seay, 1997).
- A valid and reliable clinical assessment tool or method that identifies relative risk for falls can identify clients who can be appropriately referred into a preventative program (Shumway-Cook et al., 1997).
- Measures that quantify falls risk can potentially be utilized in evaluating outcome following intervention (Shumway-Cook et al., 1997).

A primary purpose of this study was to evaluate the psychometric properties of the FRA, including criterion-related and predictive validity, reliability, sensitivity, and specificity. A secondary purpose was to determine if the FRA would be able to distinguish homebound older adults who fall from those who do not fall.

DESIGN AND METHODS

Subjects

FRA scores of 307 HHA Medicare sequential admissions from January 21, 2002 to May 15, 2002, age 65 and older (age range 65-102), were utilized for retrospective analysis. An additional 81 clients were

screened with the FRA, but did not meet the criteria for inclusion in the study. Prospectively, 15 active HHA subjects consented to participate in administration of Tinetti's Performance Oriented Mobility Assessment (POMA) during the initial visit when the FRA was administered, to evaluate criterion-related validity. Also prospectively, three active HHA clients participated in videotaping of the administration of the FRA for assessment of inter-rater and intra-rater reliability. The study was approved by the Institutional Review Board (IRB) of the affiliated university medical center. Subjects recruited prospectively provided written informed consent.

Inclusion and Exclusion Criteria

FRA scores of patients meeting the following criteria were utilized in data analysis: (1) 65 years of age or older, (2) resided at home, a family member's residence, a boarding home, or assisted living center, and (3) followed for HHA services up to 120 days. Exclusion criteria included (1) enrollment in a hospice program and (2) confined to bed or transferred out of bed only via mechanical lift.

Inclusion criteria for the 15 HHA Medicare clients asked to participate in administration of the POMA at the time of agency admission included (1) age of 65 or older, (2) transferred or ambulated with or without an assistive device, (3) cognitive status as identified by OASIS screening of "alert/ oriented, able to focus and shift attention, comprehends and recalls task directions independently" or "requires prompting (cueing, repetition, reminders) only under stressful or unfamiliar conditions," and (4) English was the primary language. The utilization of OASIS classification of cognitive status was selected, since cognitive status is assessed with the initial assessment of each Medicare client, and OASIS assessments have been tested for reliability during tool development (Shaughnessy, Crisler, & Schlenker, 1997). Exclusion criteria included (1) admission to hospice, and (2) confinement to bed.

Three active Medicare HHA clients over 65 consented to be videotaped during the administration of the FRA within 7 days of agency admission, for assessment of the tool's reliability. One client with a primary orthopedic diagnosis, one with a primary neurological diagnosis, and one with a primary general medical diagnosis were asked to provide consent to participate, to reflect the case mix within the HHA. All risk factors present on the FRA were present in at least one of the three clients selected, so that the potential identification of all 16 risk factors by raters was possible.

Instruments

Three instruments were utilized in conducting this study: the newly created falls risk screening tool (FRA), the Medicare OASIS, and the POMA.

The Falls Risk Assessment (FRA) identifies the presence or absence of 16 falls risk factors and is integrated to form a tool that can be administered in conjunction with the OASIS opening assessment. Several of the risk factors included in the FRA (use of sedatives, impairments in gait, balance, and strength) have been identified as falls risk factors by Tinetti (Tinetti et al., 1994). Other research involving Tinetti has targeted additional risk factors included in the development of the FRA (four or more medications, lower extremity range of motion impairments, and transfer dysfunction) (Tinetti et al., 1993).

The Outcomes and Assessment Information Set (OASIS) was implemented in October of 2000 for all Medicare certified home health agencies, following the entry of home health care into the Medicare prospective payment system (PPS). The OASIS provides standardized and risk-adjusted data which agencies can use to improve outcomes (Krulish, 2002). Since January, 2001, OASIS items have provided data to produce Adverse Event Outcome Reports which compare incidence rates for 13 undesirable outcomes with other HHAs nationally (Krulish, 2002). Eight of the 16 risk factors on the FRA utilized OASIS data collected during the initial assessment.

The Performance-Oriented Mobility Assessment (POMA) was developed as a practical assessment of personal mobility and performance of activities of daily living (Arnadottir & Mercer, 1999), was originally tested in residents of intermediate care facilities (Tinetti, Williams, & Mayewski, 1986), and incorporates both balance and gait components. This assessment is simple to use, portable, and can be accomplished in approximately 10-15 minutes (Arnadottir & Mercer, 1999). The gait portion of the POMA can be performed with or without an assistive device, an advantage over other balance assessments, that is, the Berg Balance Scale (Berg et al., 1995), which do not allow use of an assistive device. The POMA has been shown to exhibit good intrarater reliability using the Spearman Rank-order coefficient ($rs = 0.92$) (Tinetti, 1986), good inter-rater reliability ($r = 0.76$-0.90) (Keith, 1984), rater agreement of 85-90% (Tinetti, 1986), and good test-retest reliability for the balance sub scale (ICC = 0.93) (Rothstein et al., 1991). A total score of 19 or less is associated with high risk for falls (Trueblood et al., 2001).

Procedures

Retrospective Data Collection

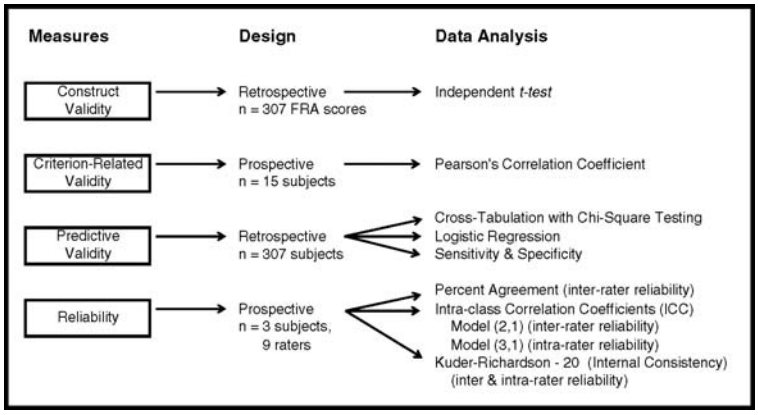
An overview of the study design implemented for retrospective data collection is presented in Figure 1.

Since January 21, 2002, the FRA has been administered at the time of initial assessment for all Medicare clients admitted to the HHA. All staff eligible to complete the OASIS on agency opening (nurses (RN) and physical (PT), occupational (OT), and speech therapists (ST)) were trained in use of the FRA via a mandatory agency in-service; written instructions were also provided (see Appendix B). Completed FRAs were copied and the originals were filed in the patient's medical record. Upon IRB approval of the research proposal, the FRA copies were coded, identifiers removed, and prepared for data entry. The FRA copies were destroyed upon completion of data entry into a statistical software program.

Prospective Assessment of Criterion-Related Validity

One HHA physical therapist (the primary researcher) administered the POMA on 15 opening admissions for patients who met the study's inclusion criteria. The primary researcher utilized verbal instructions and demonstration in administration of the POMA per guidelines provided by the tool's author (Tinetti, 1986) to ensure consistency in scoring. The POMA forms were coded and collected for analysis of data; identifiers were removed.

FIGURE 1. Overview of Study Design



Prospective Assessment of Rater Reliability

All rehabilitation staff and nurses at the HHA were invited to view videotapings of FRA administration to three HHA active clients during a monthly unit board meeting, and were asked to complete the FRA for the patients viewed. Videos of three patients were prepared because they represented the three major types of clients served in the HHA (neurological, orthopedic, and general medical/generalized weakness) (Di Fabio & Seay, 1997), and because the time to provide training, view the three videos, and score the FRAs was feasible within the work setting.

In addition to the videotape, HHA staff were given essential medical record information and segments of the completed OASIS, with all patient identifiers removed, to facilitate accurate identification of falls risk factors present. From staff in attendance, FRA scores of four RNs, four PTs, two OTs, and one ST who had expressed willingness to participate in the study were randomly selected for assessment of reliability.

The eleven HHA staff members who were utilized in the initial assessment of inter-rater reliability were asked to view the videotapes again, in varied order, following a three to four week time lapse, for assessment of intra-rater reliability. Nine of the staff members were able to participate in the second viewing; one RN and one PT randomly selected were unable to participate. Personnel who scored the FRA assessments after viewing the videotapes were identified only by their discipline, number of years of full-time experience in their respective discipline, and number of years in home health care.

Data Analysis

Descriptive characteristics of FRA subjects were calculated with data from the FRA and OASIS, as well as gender, age, and living status. Frequency distributions of each risk factor were calculated in *faller* and *non-faller* groups within the study sample. FRA scores were calculated by summing all the risk factors that were present; therefore, higher scores reflect a greater risk for falling.

Construct validity was assessed with the use of an independent *t*-test to determine whether a difference existed between mean *faller* and *non-faller* scores on the FRA. Since the intent of the FRA and POMA scales was to provide interval measurement, and both tools use equal interval scores for successive response categories, (Wang, Yu, Wang, & Huang, 1999) the independent *t*-test was deemed appropriate.

Criterion-related validity was assessed utilizing a Pearson product moment correlation coefficient (Portney & Watkins, 2000) to correlate FRA scores with POMA scores (Wang et al., 1999). A Pearsons's *r* was selected since many researchers and statisticians feel comfortable using parametric statistics with ordinal data if there are a number of ordered values, and conceptually, the underlying dimension is really interval (Wang et al., 1999). A one-tailed test [r (alpha = 0.05)] was utilized since the correlation was expected to be both negative and unidirectional. Lower scores on the POMA indicate increased risk for falls while higher scores on the FRA (greater number of risk factors) would be expected to show an increased risk for falls.

Predictive validity was assessed by identifying variables (falls risk factors) that differed between *fallers* and *non-fallers*, using cross tabulation with Chi-square testing (alpha = 0.05) (Shumway-Cook et al., 1997). Significant risk factors identified with Chi square testing were utilized by performing logistic regression analysis, using Minitab Release 13 for Windows, to identify a combination of variables that would most effectively predict fall status (Shumway-Cook et al., 1997). The logistic regression model was selected since the study variables are dichotomous (risk factor present/ not present, *faller/ non-faller*). Sensitivity and specificity were calculated for specific FRA cut-off points in *fallers* and *non-fallers* using a 2×2 arrangement described by Portney and Watkins (Portney & Watkins, 2000).

Three methods were used to establish the FRA's reliability. First, inter-rater reliability was assessed by comparing FRA scores of nine multidisciplinary raters with FRA scores produced by an experienced multidisciplinary HHA team utilizing percentage agreement (Portney & Watkins, 2000). Since the assessment of risk factors with use of the FRA is dichotomous (present or not present), it was felt that clinicians with expertise in the field of home health care and geriatrics should be able to accurately identify risk factors present in selected homebound older adults at the time of opening assessment. A team of one RN, one PT, and one OT was selected as the *gold standard* team, based on clinical expertise, years of professional experience, years in home health care, and experience in utilizing the OASIS, to score the FRA on the three active HHA clients videotaped. Utilizing a consensus method, the *gold standard* HHA team scored the three clients. The scores produced with the consensus method were utilized for "scoring" the other multidisciplinary raters in assessment of inter-rater reliability. Comparing rater scores with the scores of the *gold standard* team yielded information related to not only the degree of accuracy in scoring the tool as a whole, but information re-

lated to the degree of accuracy in rater identification of individual risk factors present in the three subjects.

Second, inter-rater and intra-rater reliability with FRA scores among the nine raters was assessed utilizing intraclass correlation coefficients (ICC), since the ICC "reflects degree of correspondence and agreement among raters" (Portney & Watkins, 2000, p. 560).

Third, since result of the ICC coefficient calculated for inter-rater reliability was not strong, an additional measure of the tool's reliability was needed. Measures of internal consistency, such as Cronbach's alpha, are typically used to examine summed scales. Since the FRA is a summed scale, a measure was selected to determine the inter-rater reliability among the nine raters who scored the three patient videos on two different occasions. A Kuder-Richardson (KR-20) analysis, which reflects internal consistency of binary data, was performed to assess information regarding the internal consistency of the FRA. Values of the KR-20 reliability coefficient estimate the extent to which individuals scoring the test or tool will receive similar scores. Reliability coefficients were calculated to assess the consistency between the nine raters. The presence or absence of the 16 fall-risk factors was identified in the two viewings of the video by each rater.

RESULTS

Descriptive Characteristics

Forty of the sample of 307 subjects (13%) sustained falls between admission to and discharge from the home health agency. This compares with 14% of active home health patients who reported having fallen in the one-time HHA screening prior to the initiation of this study. The average age of the *fallers* in the current study was 78.67 years ($SD = 7.19$, range of 65-96); the average of the *non-fallers* was 78.57 years ($SD = 7.68$, range of 67-102).

Construct Validity

A two-sample *t*-test revealed a significant difference between mean *faller* scores (10.14, $SD = 2.86$) and *non-faller* scores (7.20, $SD = 3.61$), $p < 0.001$. *Faller* FRA scores ranged from 6 to 16; *non-faller* FRA scores ranged from 0 to 16 (see Table 1).

TABLE 1. Demographic Information for Fallers and Non-Fallers

Risk Factor	Non-Fallers (n = 267)	Fallers (n = 40)	P (test)
Age (y)			
X	78.67	78.57	0.852 (t test)
SD	7.187	7.68	
Range	65-96	67-102	
Gender (%)			
Female	87.75	85.29	0.549 (χ^2)
Male	12.25	14.71	
Screen Score			
X	7.202	10.125	<0.0001 (t test)
SD	3.608	2.857	
Range	0-16	6-16	

Criterion-Related Validity

With a sample of 15 subjects, $r = -0.74$ ($p = 0.002$) (R squared = 0.55) when correlating both the balance and gait sub-scales (total score) of the POMA with the FRA; $r = -0.65$ ($p = 0.009$) when correlating only the POMA balance sub-scale with the POMA.

Predictive Validity

Using cross-tabulation with Chi-square testing (alpha = 0.05), 10 of the 16 risk factors in the FRA were found to differ between *fallers* and *non-fallers* (see Table 2). Gender, living status (lives alone/ does not live alone), age greater than 80, use of four of more medications (or two specific medications), environmental hazards, mental status changes, decreased lower extremity strength, decreased vision, and incontinence were not found to vary significantly between the two groups.

Performing logistic regression with *faller status* as the response variable and the 10 significant risk factors identified with Chi square testing yielded only one risk factor with a p value of < 0.05. The risk factor of *history of recurrent falls* was found to have a p value of 0.027 (an odds ratio of 2.83, and a 95% confidence interval of 1.13-7.10). Measures of association between the response variable and predicted probabilities in the logistic regression model correctly classified 75.5% of fallers within this study. As an additional assessment of predictive validity, forward

TABLE 2. Fall Risk Factor Frequencies

FRA Risk Factors (%)	Percentage Identified in Non-Fallers (n = 267)	Percentage Identified in Fallers (n = 40)	*P* (χ^2)
History of 1 fall	43.07	67.5	0.004 (χ^2)
History of 2 or more falls	20.22	50	$<$ 0.0001 (χ^2)
History of fall with injury	9.55	21.84	0.004 (χ^2)
Fear of falling	38.2	60	0.009 (χ^2)
Environmental hazards	18.73	27.5	0.195 (χ^2)
Mental status changes	26.59	32.5	0.434 (χ^2)
Decreased independence in ADL	71.91	92.5	0.005 (χ^2)
Decreased independence in transfers	50.94	72.5	0.011 (χ^2)
Decreased independence in ambulation	72.66	95	0.002 (χ^2)
Decreased lower extremity strength	73.41	85	0.115 (χ^2)
Decreased balance	42.32	72.5	$<$ 0.0001 (χ^2)
Use of assistive device	71.16	92.5	0.004 (χ^2)
Decreased lower extremity range of motion	45.32	62.5	0.042 (χ^2)
Decreased vision	21.35	30	0.222 (χ^2)
Incontinence	26.97	40	0.089 (χ^2)
Four or more medications	73.41	85	0.115 (χ^2)
Additional Risk Factors (%)			
Age $>$ 80	46.44	45	0.865 (χ^2)
Living status	27.34	25	0.756 (χ^2)

stepwise logistic regression, utilizing *faller status* as the response variable and all 16 risk factors as the predictor variables (with alpha to enter: 0.25), was performed, yielding only *history of recurrent falls* as statistically significant ($p = 0.003$).

Sensitivity and specificity for various cut-off scores on the FRA were calculated, comparing positive and negative predictive values. The maximum sensitivity and specificity for the various cut-off scores on the FRA was identified with a score of eight: sensitivity of 75%; specificity of 82% (see Table 3).

Reliability

Using percentage agreement, 8 of 16 risk factors (fall history, history of recurrent falls, fear of falling, presence of environmental hazards,

TABLE 3. Sensitivity and Specificity for Selected FRA Cut-Off Points

FRA Score	Sensitivity (%)	Specificity (%)
6	100	33
7	95	41.2
8	75	82
9	62.5	64
10	57.5	73.4
11	40	79.8
12	32.5	87.6

< lower extremity strength, use of an assistive device, incontinence, and medications) yielded 100% agreement across the nine raters (54/54 responses). Percentage of rater agreement within the other eight risk factors varied between 77.78% and 99.1% agreement (see Table 4). Overall agreement, averaging the percent agreement of the 16 risk factors yielded 94.74% agreement among the nine raters.

Intraclass correlation coefficients (ICCs) for the data yielded an intra-rater reliability with multiple scores from the same rater of 0.83, and an inter-rater reliability assessing *n* subjects measured by *k* raters, with rater as the independent variable of 0.43.

Alpha coefficients calculated using the KR-20 as a measure of internal consistency were: within Patient One: alpha = 0.98, within Patient Two: alpha = 0.97, and within Patient Three: alpha = 0.98. Internal consistency focuses on the degree to which individual items are correlated with each other. Values close to 1.0 indicate a high degree of reliability (Portney & Watkins, 2000).

DISCUSSION

The use of valid and reliable screening tools to identify persons at high risk for falls and to trigger appropriate interventions and assessments is needed in all clinical settings (Perell, 2001). It is known that effective screening tools can be critical in implementation of effective fall prevention programs (Perell, 2001) and that tools which have been shown to be reliable, sensitive, and specific to the patient population are the most appropriate to utilize. Screening tools selected should have clear written procedures, established thresholds to trigger interventions,

TABLE 4. Percentage of Rater Agreement with Scoring FRA Risk Factors

FRA Risk Factors (%)	Agreement (%)	Number of Correct Responses
History of 1 fall	100	54/54
History of 2 or more falls	100	54/54
History of fall with injury	87.04	47/54
Fear of falling	100	54/54
Environmental Hazards	100	54/54
Mental status changes	99.1	53/54
Decreased independence in ADL	96.3	52/54
Decreased independence in transfers	77.78	42/54
Decreased independence in ambulation	96.3	52/54
Decreased lower extremity strength	100	54/54
Decreased balance	79.63	43/54
Use of assistive device	100	54/54
Decreased lower extremity range of motion	88.89	48/54
Decreased vision	90.74	49/54
Incontinence	100	54/54
Four or more medications	100	54/54

and be administered within a reasonable length of time (Perell, 2001). The characteristics of the FRA and the related findings of this study support its use as an effective screening tool in the homebound population.

The FRA was able to distinguish older homebound adults who fell from those who did not fall, with $p < 0.0001$. Of interest is the fact that the range of *faller* scores ranged from 6 to 16 while *non-faller* scores ranged from 0 to 16. It is known that many homebound individuals with multiple falls risk factors have increased supervision in their living environment or may self-restrict their activities. This increased supervision may offer an explanation as to why certain individuals with as many as 16 identified risk factors did not fall during the course of the study.

Both the correlation between the total score on the POMA and the FRA and the score on the POMA balance subscale and the FRA would be considered moderate to good, according to Portney and Watkins (Portney & Watkins, 2000). The correlations found ($r = -0.74$ and $r = -0.65$, respectively) indicate strength of association between the two instruments. It is of interest to note that the correlation of the FRA with the total POMA score was stronger than the correlation of the FRA with the balance portion of the POMA alone, since the FRA assesses

subject mobility (i.e., transfers, ambulation). The strong correlation between the FRA and total POMA scores were noted to have greater than a 50% overlap in variance with an R squared of 0.55.

The POMA (Tinetti, 1986) was selected as the measure for comparison (Portney & Watkins, 2000) for correlation with the FRA in this study. Since 71.2% of *non-fallers* and 92.5% of *fallers* in the study used an assistive device in this homebound population, a tool was selected in which an assistive gait device could be utilized. The POMA was also selected because it assesses both static and dynamic components of balance, can be conducted in a short period of time, and has been shown to have good reliability. The POMA was not used alone as a measure of fall-risk in this study because it is assesses only balance and gait, and is primarily administered by physical therapists, rather than nurses or other allied health personnel who perform Medicare initial assessments.

The overall agreement of 94.74% among the nine raters provided evidence of strong agreement with the FRA tool as a whole. Only two FRA risk factors, *decreased independence in transfers* and *decreased balance*, yielded less than 80% agreement (77.78% and 79.63%, respectively). Communication with raters at the study's conclusion revealed rater confusion in the OASIS definition for independence in transfers and inconsistent screening methods utilized for assessing decreased balance. Since the completion of the study, the OASIS intent for *decreased independence in transfers* has been more clearly defined on the FRA and the process of screening for *decreased balance* has been converted to a self-rated, dichotomous report of history of balance deficit (Shumway-Cook et al., 1997) to facilitate increased reliability among HHA staff who conduct the FRA. Clinicians who perform opening assessments have participated in mandatory educational sessions regarding changes made in the FRA tool.

A possible rationale for the low inter-rater reliability coefficient (0.43) using the ICC is that the three home health clients videotaped for FRA assessment were too homogeneous. Despite selecting clients with various primary diagnoses (neurological, orthopedic, and general medical), the clients scored 11, 12, and 13 risk factors, or basically similar scores, when rated by the *gold standard* HHA team. It is known that when between-subjects variance is not significant, "the actual limits of the ICC do not match the theoretical limits of 0.00 to 1.00" (Portney & Watkins, 2000, p. 566).

The ICC Model (3,1) of 0.83 demonstrated good intra-rater reliability, testing multiple scores from the same rater. The findings with data analysis using the KR-20 indicated high internal consistency of the

FRA. The internal consistency demonstrated is a reflection of the degree of correlation among the nine raters and the correlation of each individual item with the total score.

A cut-off score of eight on the FRA yielded a sensitivity of 75% and a specificity of 82%. This cut-off score represents the maximum sensitivity and specificity, yet 25% of the fallers are not captured with this cut-off score. A cut-off score of six on the FRA yielded a sensitivity of 100%, but a specificity of only 33%. Using six as a cut-off score would capture all those, who fell in this sample, but might not capture all future fallers in the homebound population of older adults. HHA staff should be aware that while a cut-off score of eight is the most sensitive and specific, individuals with fewer identified risk factors may and do fall. Since the potential for not treating individuals at risk for falls is great, Perell et al. (2001) have suggested that in settings where the majority of patients are at high risk for falls, some measure of falls precautions and implementation of a fall prevention program may be appropriate.

Perell also reported that in an analysis of 15 fall-risk assessment tools, sensitivity reported ranged from 43% to 100% and specificity reported ranged from 38% to 96% for the nursing and functional assessment tools (Perell, 2001). The Berg Balance Test (Berg, 1989) exhibited a sensitivity of 77% and specificity of 86% with testing, while the POMA has been shown to have a sensitivity of 80% and specificity of 74%, respectively (Tinetti et al., 1986). The sensitivity and specificity of the FRA fall within the ranges of these widely accepted tools.

Chi-square testing did not show that gender, living status (living alone), age > 80, use of four more medications (or two or more specific medications), environmental hazards, mental status changes, decreased lower extremity strength, reduced vision, and incontinence varied significantly between *faller* and *non-fallers*. Thus the results of this study were not completely consistent with the findings of other researchers who have examined fall-risk in the over 65 population ("Clinical Practice Guidelines: The prevention of falls in older persons," 2001). In the current homebound population studied, the majority of both groups (*fallers/non-fallers*) had multiple medications and exhibited decreased lower extremity strength. Similar percentages within *faller* and *non-faller* homebound groups were also noted for the presence of mental status changes, decreased vision, environmental hazards, living status, and age > 80. It was difficult to accurately assess the impact of living status in this study, since many subjects who were identified as living alone had regular help, while some individuals living within assisted living centers were left alone for periods of time during the day.

Although 10/16 risk factors were found to differ statistically between the two groups compared (fallers/ non-fallers), only *history of recurrent falls* (two or more in the past year) was found to be statistically significant with regression analysis. Individuals with this risk factor were shown to be 2.83 times more likely to fall than individuals not possessing this risk factor. While HHA staff may routinely administer the extensive OASIS assessment with all new agency admissions, it is of interest to note that the OASIS does not ask the patient or caregiver about fall history. As a result of this study's findings, HHA staff should be aware of the significance of identifying a history of recurrent falls in clients screened on opening assessment. Fletcher and Hirdes concluded in their research on Canadian homebound subjects that "it is the recurrent faller who would benefit to the greatest extent from fall prevention efforts and from the negative outcomes associated with multiple falls (i.e., mortality)" (Fletcher, 2002, p. M504).

Recommendations

It is recommended that a more varied group of subjects with a greater range in number of identified risk factors be utilized for similar studies of inter-rater reliability in the future. A greater number of subjects utilized for videotaping would also strengthen the assessment of the tool's reliability. Another possible limitation of this study's design is that not all falls may be captured using agency reports and existing data, since previous research suggests that falls in the home may be under-reported by older adults, and agency staff may not complete the necessary paperwork to report all falls. The use of a calendar or falls diary in the home may be helpful in future studies to more accurately capture a higher percentage of actual falls in the home. Instructions to the patient and caregiver could be provided on the initial visit in the home.

CONCLUSION

The proportion of *fallers* and *non-fallers* in this study may not be representative of the proportion of cases in the general population; however, this study's findings can provide evidence that supports a causal relationship between specific falls-related risk factors and falls occurrences in homebound older adults (Portney & Watkins, 2000). Data analysis supports the validity and reliability of the FRA and its use in the home health setting in screening for fall risk in older adults. The FRA can be adminis-

tered quickly and efficiently in conjunction with performance of Medicare OASIS assessment and can reliably be administered by HHA staff members, including both nurses and therapists. The additional questions asked on the FRA supplements functional and medical information derived from the OASIS to provide the HHA with a comprehensive multidimensional fall-risk assessment for the homebound client.

Since the conclusion of this study, research specifically targeting fall-risk of the homebound population has been published (Trader, Newton, & Cromwell, 2003; Lewis, Moutoux, Slaughter, & Bailey, 2004). The work of Lewis et al. supports the findings of the current study in their report that falls prior to admission to a HHA appear to be an "important indicator for falls during the provision of home health care services" (Lewis, Moutoux, Slaughter, & Bailey, 2003, p. 31). Recently published systematic reviews and meta-analyses also support the findings of the current study; they have reported that multifactorial falls risk assessment and program management have been shown to be effective in preventing falls in older adults (Gillespie, Gillespie, Robertson, Lamb, Cumming, & Rowe, 2003; Chang, Morton, Rubenstein, Mojica, Maglione, Suttorp et al., 2004).

The results of this study can now be utilized to implement agency strategies for further assessment and both discipline-specific and multidisciplinary interventions directed toward prevention of falls. It is recommended that existing baseline falls prevention education continue with all agency admissions, but that the presence of either a FRA score of eight or more and/or presence of *history of recurring falls* would trigger further assessment and interventions, such as referral to other disciplines, administration of functional balance assessments, and implementation of a risk factor-specific falls prevention program. This study has clinical relevance because reducing falls can result in decreased health care costs, decreased morbidity and mortality, as well as increased independence and quality of life for patients and caregivers.

REFERENCES

Anacker, S. L., & Di Fabio, R. P. (1992). Influence of sensory inputs on standing balance in community-dwelling elders with a recent history of falling. *Phys Ther, 72*, 575-581.

Arnadottir, S., & Mercer, V. S. (1999). Functional assessment in geriatric physical therapy. *Issues on Aging, 23*, 3-12.

Beers, M., & Berkow, R. (2000). *The Merck manual of geriatrics*. White House Station (NJ): Merck Research Laboratories.

Berg, K. (1989). Balance and its measure in the elderly. *Physiother Can., 41*, 240-246.

Bezon, J., Echevarria, K. H., & Smith, G. B. (1999). Nursing outcome indicator: Preventing falls for elderly people. *Outcomes Manag Nurs Pract, 3*, 112-116.

Brauer, S. G., Burns, Y. R., & Galley, P. (2000). A prospective study of laboratory and clinical measures of postural stability to predict community-dwelling fallers. *J Gerontol A Biol Sci Med Sci, 55*, M469-M476.

Center for Health Services Research, UCHSC, Denver, CO; OASIS-B1 SOC. (2002), (12), 8-9.

Chang, J., Morton, S., Rubenstein, L., Mojica, W., Maglione, M., Suttorp, M., Roth, E., & Shekelle, P. (2004). Interventions for the prevention of falls in older adults: Systematic review and meta-analysis of randomized clinical trials. *BMJ*, 328 (7441):680.

Clinical Practice Guidelines: The prevention of falls in older persons. (2001). *J Am Geriatr Soc, 49*, 664-672.

Cwikel, J. G., Fried, A. V., Biderman, A., & Galinsky, D. (1998). Validation of a fall-risk screening test, the Elderly Fall Screening Test (EFST), for community-dwelling elderly. *Disabil Rehabil, 20*(5), 161-167.

Di Fabio, R. P., & Seay, R. (1997). Use of the "Fast Evaluation of Mobility, Balance, and Fear" in elderly community dwellers: Validity and reliability. *Phys Ther, 77*, 904-917.

Duncan, P. W., Studenski, S., Chandler, J., & Prescott, B. (1992). Functional reach: Predictive validity in a sample of elderly male veterans. *J Gerontol, 47*, M93-M98.

Fletcher, P. C., & Hirdes, J.P. (2002). Risk factors for falling among community-based seniors using home care services. *J Gerontol, 57A*(8), M504-M510.

Fried, A. V., Tangen, C. M., Walston, J., Newman, A. B., Calvin, H., Gottdeiner, J. et al. (2001). Frailty in older adults: Evidence for a phenotype. *J Gerontol, 56A*(3), M146-M156.

Gillespie, L.D., Gillespie, W.J., Cumming, R., Lamb, S.E., & Rose, B.H. (2001). Interventions for preventing falls in elderly people. *Cochrane Database Systematic Review,* (3): CD000340.

Gillespie, L. D., Gillespie, W. J., Cumming, R., Lamb, S. E., & Rowe, B. H. (2003). Interventions for preventing falls in elderly people. *Cochrane Database Systematic Review*, (4):CD000340.

Keith, R. (1984). Functional assessment measures in medical rehabilitation: Current status. *Arch Phys Med Rehabil, 65*, 74-78.

Koch, M., Gottshalk, M., Baker, D. I., Palumbo, S., & Tinetti, M. E. (1994). An impairment and disability assessment and treatment protocol for community-living elderly persons. *Phys Ther, 74*(4), 286-294.

Kressig, R. W., Wolf, S. L., Sattin, R. W., O'Grady, M., Greenspan, A., Curns, A., & Kutner, M. (2001). Associations of demographic, functional, and behavioral characteristics with activity-related fear of falling among older adults transitioning to frailty. *J Am Geriatr Soc, 49*(11), 1456-1462.

Krulish, L. (2000). HCFA update instructions for OASIS data collection. *APTA Home Health Section Quarterly Report, 35*(4), 1.

Lange, M. (1996). The challenge of fall prevention in home care: A review of the literature. *Home Healthc Nurse, 14*(3), 198-206.

Lewis, C., Moutoux, M., Slaughter, M., & Bailey, S. (2004). Characteristics of individuals who fell while receiving home health services. *Phys Ther, 84* (1), 23-32.

Mahoney, F. I., & Barthel, D. W. (1965). Functional evaluation: The Barthel index. *Md Med J., 14*, 61-65.

Nevitt, M. C., Cummings, S. R., Kidd, S., & Black, D. (1989). Risk factors for recurrent nonsyncopal falls. *JAMA, 261*, 2663-2668.

Perell, K. L., Nelson, A., Goldman, R.L., Luther S.L., Prieto-Lewis, N., & Rubenstein, L.Z. (2001). Fall risk assessment measures: An analytic review. *J Gerontol, 56A* (No. 12), M761-M766.

Podsaidlo, D., & Richardson, S. (1991). The "timed up and go": A test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc, 39*, 142-148.

Portney, L. G., & Watkins, M. P. (2000). *Foundations of Clinical Research: Applications to Practice* (2nd ed.). Upper Saddle River, NJ: Prentice Hall Health.

Riddle, D. L., & Startford, P. W. (1999). Interpreting validity indexes for diagnostic tests: An illustration using the Berg Balance Test. *Phys Ther, 79*, 939-948.

Rothstein, J., Campbell, S., Echternach, J., Jette, A., Knecht, H., & Rose, S. (1991). Standards for tests and measurements in physical therapy practice. *Phys Ther, 71*, 589-622.

Shaughnessy, P. W. Crisler, K. S. & Schlenker, R. E. (1997). *Medicare's OASIS: Standardized Outcome and Assessment Information Set for Home Care*: National Association for Home Care.

Shumway-Cook, A., Baldwin, M., Polissar, N. L., & Gruber, W. (1997). Predicting the probability for falls in community-dwelling older adults. *Phys Ther, 77*, 812-819.

Shumway-Cook, A., & Woollacott, M. (1995). *Motor Control Theory and Applications*. Baltimore: Williams and Wilkins.

Tinetti, M. E. (1986). Performance-oriented assessment of mobility problems in elderly patients. *J Am Geriatr Soc, 34*, 119-126.

Tinetti, M. E., Baker, D. I., Garrett, P. A., Gottshalk, M., Koch, M. L., & Horwitz, R. I. (1993). Yale FICSIT: Risk factor abatement strategy for fall prevention. *J Am Geriatr Soc, 41*, 315-320.

Tinetti, M. E., Baker, D. I., McAvay, G., Claus, E. B., Garrett, P., Gottshalk, M. et al. (1994). A multifactorial intervention to reduce the risk of falling among elderly people living in the community. *N Eng J Med, 331*, 821-827.

Tinetti, M. E., Doucette, J., Claus, E., & Matrottoli, R. (1995). Risk factors for serious injury during falls by older persons in the community. *J Am Geriatr Soc, 43*, 1214-1221.

Tinetti, M. E., Speechley, M., & Ginter, S. F. (1988). Risk factors for falls among elderly persons living in the community. *N Eng J Med, 319*, 1701-1707.

Tinetti, M. E., & Williams, C. (1997). Falls, injuries due to falls, and the risk of admission to a nursing home. *N Eng J Med,* 337, 1279-1284.

Tinetti, M. E., Williams, T. F., & Mayewski, R. (1986). Fall risk index for elderly patients based on number of chronic disabilities. *Am J Med, 80*, 429-434.

Trader, S., Newton, R., & Cromwell, R. (2003). Balance abilities of homebound older adults classified as fallers and nonfallers. *Journal of Geriatric Physical Therapy*, *26*(3), 3-8.

Trueblood, P. R., Hodson-Chennault, N., McCubbin, A., & Youngclarke, D. (2001). Performance and impairment-based assessments among community-dwelling elderly: Sensitivity and specificity. *Issues on Aging, 24*, 2-6.

van Haastregt, J. C. M., van Rossum, E., Diederiks, J. P. M., Voorhoeve, P., de Witte, L. P., & Crebolder, F. J. M. (2000). Preventing falls and mobility problems in community-dwelling elders. *Geriatric Nursing, 21*(6), 309-314.

Wang, S., Yu, M., Wang, C., & Huang, C. (1999). Bridging the Gap Between the Pros and Cons in Treating Ordinal Scales as Interval Scales from an Analysis Point of View. *Nursing Research, 48*(4), 226-229.

Received: 05/17/04
Revised: 09/04/05
Accepted: 11/17/05

doi:10.1300/J027v25n03_01

APPENDIX A

FALLS RISK ASSESSMENT

Vanderbilt University Medical Center

VANDERBILT HOME CARE SERVICES

Patient: _____ **Age:** _____ **Date:** _____

Mark all that apply	**Risk Factors**
_____	**1. History of Falls:** patient has fallen once in the last year. **A fall is defined as any event that led to an unplanned, unexpected contact with a supporting surface**.
_____	**2. History of Recurrent Falls:** patient has fallen 2 or more times in the last year
_____	**3. History of Injury Related to Falls:** a fall within the last year has resulted in injury. **Injury is defined as any fracture or soft tissue injury requiring medical attention or resulting in activity restriction > 48 hours.**
_____	**4. Fear of falling:** Does patient have a fear of falling? When/where: ☐ at all times ☐ outside or on uneven surfaces ☐ at night only ☐ other:
_____	**5. Environmental hazards:** Risks identified by OASIS assessment and/or additional observations during visit (MO310; MO320; MO330, i.e., structural barriers, safety hazards, clutter)
_____	**6. Mental status changes/behavioral issues:** Risks identified by OASIS assessment and/or additional observations during visit (MO560 MO570 MO580; MO610; MO620, i.e., ↓ cognitive function; impaired decision-making; confusion; physical aggression)
_____	**7. ↓ Independence in ADL's:** Risks identified by OASIS assessment and/or additional observations during visit (MO650; MO660; MO670; MO680; MO690; MO710; MO720–requires assist with activities)
_____	**8. ↓ Independence in transfers:** Risks identified by OASIS assessment and/or additional observations during visit (MO690–requires assist with activities)
_____	**9. ↓ Independence in ambulation/ locomotion:** Risks identified by OASIS assessment and/or additional observations during visit (MO700–scores 1-4)
_____	**10. ↓ LE Strength:** Include risks identified when completing OASIS assessment MO690 & MO700; patient is unable to come to standing without use of arms or has history of LE weakness, i.e., CVA, paralysis
_____	**11. Balance:** Patient is unable to maintain static standing balance for 30 seconds without support or indicates a history of "dizziness," sensation of spinning, frequent loss of balance
_____	**12. Use of Assistive Device:** Patient requires assistive device for mobility including wheelchair, walker, cane, AFO, or prosthesis *(circle)* MO700
_____	**13. Limitations In LE ROM:** Patient indicates stiffness or problems with joints, i.e., hips, knees, ankles or has history of arthritis. Ask, "Do you have restrictions in fully moving your ankles, hips, or knees?"
_____	**14. ↓Vision:** Severely impaired per OASIS assessment, MO390–score of 2
_____	**15. Incontinence:** Per OASIS assessment MO520 and MO530
_____	**16. Medications:** Per medication sheet: currently taking ≥ 4 medications OR taking 2 or more of the following: ▪ sedatives/hypnotics (class 29) ▪ antihypertensives (class 23) ▪ diuretics (class 62) ▪ narcotics (class 28) ▪ antidepressants (class 31) ▪ antipsychotics (class 33) ▪ nonsteroidal anti-inflammatories (class 27); ▪ electrolyte/hormonal replacement for osteoarthritis or osteoporisis (classes 61 & 63)
_____	**Total number of risk factors**

Patient: _____

Patient Status:

_____ Lives alone: ☐ home or apartment ☐ assisted living ☐ other: _____

_____ Transfers with mechanical lift only

_____ Totally bedfast

Interventions:

_____ Education provided including written guidelines, "Preventing a Fall at Home"
☐ Patient/caregiver verbalized understanding of education

_____ PT

_____ OT

_____ Nursing ☐ Behavioral Health

_____ ST

_____ MSW

_____ Home health aide

_____ Environmental adaptation

_____ Contact MD: ☐ for add-on referral for ☐ Nursing ☐ PT ☐ OT ☐ ST ☐ MSW ☐ Aide
☐ Other reason: _____

_____ Other: _____

Staff: _____ Date: _____

APPENDIX B

FALLS RISK ASSESSMENT INSTRUCTIONS

Vanderbilt University Medical Center **VANDERBILT HOME CARE SERVICES**

In the United States, one of every three adults 65 years old or older falls each year.[1,2] Falls are the leading cause of injury deaths among people 65 years and older.[3] In order to minimize falls among home care patients, VHCS staff will conduct a falls risk assessment and provide education and/or interventions.

Instructions:

- This is to be completed by the staff member doing the **initial opening** when a patient is admitted to the agency
- Complete patient's name, age and date assessment
- Mark all risk factors (these are based on literature review and factors that VHCS has identified)
- Many of the risk factors are tied to questions and observations during the OASIS assessment, so complete it first, keeping in mind the factors listed below.
    - Risk Factors 1-3 require asking the patient about falling in the past year and # 4 identifies patient's perceived risks
        1. History of Falls: patient has fallen once in the last year. A fall is defined as any event that led to an unplanned, unexpected contact with a supporting surface.
        2. History of Recurrent Falls: patient has fallen 2 or more times in the last year
        3. History of Injury Related to Falls: a fall within the last year has resulted in injury. Injury is defined as any fracture or soft tissue injury requiring medical attention or resulting in activity restriction > 48 hours.
        4. Fear of falling: Does patient have a fear of falling? When/where: ☐ at all times ☐ outside or on uneven surfaces ☐ at night only ☐ other CHECK BOX FIELD CODES SHOULD:
    - Risk Factors 5-10, 12, 14, 15 are covered during the OASIS assessment and are aggregated here to help identify risk factors
        5. Environmental hazards: Risks identified by OASIS assessment and/or additional observations during visit (MO310; MO320; MO330, i.e., structural barriers, safety hazards, clutter)
        6. Mental status changes/behavioral issues: Risks identified by OASIS assessment and/or additional observations during visit (MO560 MO570 MO580; MO610; MO620, i.e., ↓ cognitive function; impaired decision-making; confusion; physical aggression)
        7. ↓ Independence in ADL's: Risks identified by OASIS assessment and/or additional observations during visit (MO650; MO660; MO670; MO680; MO690; MO710; MO720–requires assist with activities)
        8. ↓ Independence in transfers: Risks identified by OASIS assessment and/or additional observations during visit (MO690–requires assist with activities)
        9. ↓ Independence in ambulation/ locomotion: Risks identified by OASIS assessment and/or additional observations during visit (MO700–Score 1-4)
        10. ↓ LE Strength: Include risks identified when completing OASIS assessment MO690 & MO700; patient is unable to come to standing without use of arms or has history of LE weakness, i.e., CVA, paralysis

12. Use of Assistive Device: Patient requires assistive device for mobility including wheelchair, walker, cane, or prosthesis *(circle)* MO700
14. ↓Vision: Severely impaired per OASIS assessment, MO390–score of 2
15. Incontinence: Per OASIS assessment MO520 and MO530

- Risk Factors 11 and 13 cover two other areas that identify increased risk of falling.
  11. Balance: Patient is unable to maintain static standing balance for 30 seconds without support or indicates a history of "dizziness," sensation of spinning, frequent loss of balance
  13. Limitations In LE ROM: Patient indicates stiffness or problems with joints, i.e., hips, knees, ankles or has history of arthritis ascertained by asking, "Do you have restrictions in fully moving your ankles, hips, or knees?"

- Risk Factors 16
  16. Medications: Per medication sheet: currently taking ≥ 4 medications OR taking 2 or more of the following:
      - sedatives/hypnotics (class 29)
      - antihypertensives (class 23)
      - diuretics (class 62)
      - narcotics (class 28)
      - electrolyte/hormonal replacement for osteoarthritis or osteoporisis (class 61 & 63)
      - antipsychotics (class 33)
      - antidepressants (class 31)
      - nonsteroidal anti-inflammatories (class 27)

- Add the number of risk factors mark to get the total number of risk factors

- Patient Status–mark all that apply:

  _____ Lives alone: ☐ home or apartment ☐ assisted living ☐ other:
  _____ Transfers with mechanical lift only
  _____ Totally bedfast

- Interventions–mark all that apply. Written guidelines, "Preventing a Fall at Home," will be in opening packets and is to be reviewed as appropriate. Mark all disciplines that are ordered or which an add-on referral will be obtained. If patient is at risk of falls, appropriate disciplines will address more specific interventions in their care plans.

  _____ Education provided including written guidelines, "Preventing a Fall at Home"
  ☐ Patient/caregiver verbalized understanding of education
  _____ PT
  _____ OT
  _____ Nursing ☐ Behavioral Health
  _____ ST
  _____ MSW
  _____ Home health aide
  _____ Environmental adaptation
  _____ Contact MD: ☐ for add-on referral for ☐ Nursing ☐ PT ☐ OT ☐ ST ☐ MSW ☐ Aide
  ☐ Other:
  _____ Other: _____

- Sign and date the assessment form

- The form is filed in the medical record with assessments

[1] Tinetti ME, Speechley M, Ginter SF. Risk factors for falls among elderly persons living in the community. New England Journal of Medicine 1988; 319(26):1701-7.

[2] Sattin RW. Falls among older persons: A public health perspective. Annual Review of Public Health 1992;13:489-508.

[3] Hoyert DL, Kochanek KD, Murphy SL. Deaths: Final Data for 1997. National vital statistics reports; vol. 47 no. 19. Hyattsville, Maryland: National Center for Health Statistics, 1999.