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Patient centered fall risk awareness perspectives: clinical correlates and fall risk

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Abstract

Background—While objective measures to assess risk of falls in older adults have been established; the value of patient self-reports in the context of falls is not known.

Objectives—To identify clinical correlates of patient centered fall risk awareness, and their validity for predicting falls.

Design—Prospective cohort study.

Setting and Participants—316 non-demented and ambulatory community-dwelling older adults (mean age 78 years, 55% women).

Measurements—Fall risk awareness was assessed with a two-item questionnaire, which asked participants about overall likelihood and personal risk of falling over the next 12 months. Incident falls were recorded over study follow-up.

Results—Fifty-three participants (16.8%) responded positively to the first fall risk awareness question about being likely to have a fall in the next 12 months, and 100 (31.6%) reported being at personal risk of falling over the next 12 months. There was only fair correlation (kappa 0.370) between responses on the two questions. Prior falls and depressive symptoms were associated with positive responses on both fall risk awareness questions. Age and other established fall risk factors were not associated with responses on both fall risk awareness questions. The fall risk awareness questionnaire did not predict incident falls or injurious falls.

Conclusion—Fall risk awareness is low in older adults. While patient centered fall risk awareness is not predictive of falls, subjective risk perceptions should be considered when designing fall preventive strategies as they may influence participation and behaviors.

Keywords

Falls; Epidemiology; Aging

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Identifying older adults at risk for falls and instituting effective preventive measures is of major public health import. Patient self-reports of physical, mental and social well-being are used in clinical and research practice to document health status and in risk prognostication for various geriatric outcomes. Subjective reports may help identify subtle early changes in everyday function that cannot be captured using objective measures.^{1, 2} Fall risk awareness can determine older adults' behaviors before or after a fall, and impact fall prevention strategies. While the role of various objective measures to assess risk of falls in older adults is established,³ the value of patient self-reports of fall risk awareness in the context of falls is not well known.⁴⁻⁶ The prevalence of fall risk awareness, associated clinical variables, and predictive validity for falls in non-demented and ambulatory community dwelling older adults participating in a prospective cohort study is reported.⁷⁻⁹

METHODS

Study population

This investigation was based in the Central Control of Mobility in Aging Study (CCMA),⁷⁻⁹ a prospective cohort study of community-dwelling adults aged 65 and older recruited from lower Westchester County, NY. The study aims and design have been previously reported.⁷⁻⁹ In brief, after completing a telephone-screening interview, eligible individuals were scheduled for in-person visits at the research center. Exclusion criteria were inability to speak English, inability to ambulate independently, presence of dementia (previous diagnosis or failing cognitive screeners) or progressive neurological diseases (such as Parkinson's disease), significant loss of vision and/or hearing, current diagnosis or history of psychiatric disorders, recent or anticipated medical procedures that may affect mobility, and patients on hemodialysis. Written informed consents were obtained at clinic visits, and the study was approved by the Einstein Institutional Review Board.

Fall risk awareness

In the preliminary item development study, when participants (not included in the main study) were asked about fall risk awareness (using the first question below) they distinguished between general and personal risk of falls. For instance, some participants said that they responded yes to the question as they realized that older adults like them were at increased risk of falls; however, they personally did not feel that they were at increased risk of falling. Hence a second question about personal risk was added.

The study clinician administered the two patient centered fall risk awareness questions in random order at the in-person visit. The first question was: "Do you think you are likely to have a fall in the next 12 months?" The second question was: "Do you think you are at personal risk of having a fall in the next 12 months?" Participants were asked reasons for negative or positive responses on both questions.

Falls

Research assistants interviewed participants at in-person visits and every 2-3 months in between visits by telephone regarding the occurrence of any new falls using a standardized

questionnaire to ensure consistency between interviewers and over the study follow-up period. Falls were defined using standard criteria as the subject unintentionally coming down on the floor or to a lower level not due to a major intrinsic or extrinsic event.¹⁰ Participants were also asked about occurrence of any falls in the previous 12 months at in-person visits at baseline and follow-up visits annually. Consistency between participants' reports of falls on the telephone and in-person collected using the same method was highly reliable in our previous study in another cohort;³ all participants who reported a fall on the telephone interview at six months recalled the fall at the subsequent in-person interview.

Other covariates

During baseline and annual follow-up visits, participants received comprehensive neuropsychological, psychological and mobility assessments by trained research assistants. Study clinicians conducted neurological examinations. For this analysis, the following covariates that were either reported to be risk factors for falls or likely to influence fall risk judgments were examined.^{3, 4, 6, 11–13} A comorbidity count (range 0–10) was obtained from dichotomous rating (presence or absence) of medical illnesses including: diabetes, arthritis, hypertension, depression, Parkinson's disease, chronic obstructive pulmonary disease, stroke, chronic heart failure, angina, and myocardial infarction. Cognition was assessed by the total score (range 40 to 160, higher better) on the Repeatable Battery for Neuropsychological Status (RBANS),¹⁴ a standardized screening tool to measure neuropsychological status. The Activity-specific Balance Confidence (ABC) scale assesses confidence in maintaining balance while performing daily activities (range 0 to 100, higher better).¹⁵ Anxiety was assessed with the Beck Anxiety Inventory score (range 0 to 63, higher worse)¹⁶ and depressive symptoms with the 30-item Geriatric depression scale.¹⁷ Gait speed (cm/sec) at normal pace was measured using GAITRite equipment as previously described.^{3, 8} Balance was measured by unipedal stance on self-selected foot (maximum 30 sec).

Analysis

All analyses were performed on SPSS version 21. Logistic regression analyses were used to determine associations of the selected fall related covariates (described above) as well as falls in the previous 12 months with the two self-reported fall risk awareness questions in separate models. The two models were adjusted for age, sex and education, and all covariates were entered together in the models to assess their independent effects (after accounting for all other variables). Results were reported as adjusted odds ratio with 95% confidence intervals (CI).

The association between the two self-reported fall risk awareness questions (individually and positive response on either question) and incident falls were analyzed using Cox regression adjusted for age and sex, and reported as Hazard Ratio (HR) with 95% CI. Additional adjustment for the other clinical variables did not materially change associations in the survival analysis, and is not reported. Incident injurious falls (associated with bruising, lacerations or fractures) were also examined. Time to event was from baseline to incident fall. Participants who did not have an incident fall were censored from the analysis at final

study contact. Proportional hazards assumptions of the models were examined analytically and graphically and were adequately met.

RESULTS

CCMA study clinicians administered the fall risk awareness questionnaire to 316 consecutive CCMA participants (mean age 78.2 ± 6.3 years, 55.1% women) between June 2012 and August 2015. Table 1 provides baseline characteristics of the cohort. The sample was relatively healthy with low comorbidity count, low levels of anxiety and depressive symptoms, and high ABC scores.

Fifty-three CCMA participants (16.8%) responded positively to the first fall risk awareness question about being likely to have a fall in the next 12 months, and 100 (31.6%) reported being at personal risk of falling over the next 12 months. There was only fair correlation ($\kappa 0.370$)¹⁸ between the two fall risk awareness questions; 73.5% of participants who responded positively to the first question reported also being at personal fall risk on the second question. Only 39.0% of participants who reported personal risk of falls on the second question reported overall fall likelihood on the first question. Top reasons provided for a positive response on the first fall risk awareness question were poor balance (30%), getting older (11%) and previous falls (9%). The main reason for a negative response on the first question was good balance (74%). Top reasons for a positive response on the second fall risk awareness question were no specific explanation (33%), poor balance (20%) and getting older (18%). Main reasons for negative response on the second fall risk awareness question were being careful while walking (47%), healthy (20%) and no falls (19%).

History of falls in the last 12 months and depressive symptoms were associated with positive responses on both fall risk awareness questions (Table 2). Unipedal stance was associated only with a positive response on the second fall risk awareness question. Age, gender and education were not associated with positive responses on both questions. When comparing the 110 participants who were age 80 and older with the 206 participants who were younger than age 80, there were no significant differences in the frequency of positive responses on the first (19.0% vs. 15.1%, $p = 0.20$) and second fall risk awareness questions (31.1% vs. 32.3%, $p = 0.47$). Excluding individuals with major depressive symptoms (GDS scores >5) did not materially change the associations of GDS scores with fall risk awareness questions.

Over a mean follow-up period of 12.1 ± 7.4 months, there were 85 incident falls (38 injurious falls). The median time to first fall was eight months (interquartile range 5 to 12 months). Neither the first (HR adjusted for age and sex 1.32, 95% CI 0.77 to 2.24, $p = 0.31$) nor second fall risk awareness question (adjusted HR 1.11, 95% CI 0.71 to 1.73, $p = 0.65$) predicted risk of incident falls. A positive response on either the first or the second fall risk awareness question was also not associated with incident falls (adjusted HR 1.12, 95% CI 0.72 to 1.74, $p = 0.60$). Neither the first (adjusted HR 0.75, 95% CI 0.34 to 1.65, $p = 0.48$) nor the second fall risk awareness question (adjusted HR 1.17, 95% CI 0.60 to 2.26, $p = 0.65$) predicted risk of incident injurious falls.

DISCUSSION

A low prevalence of fall risk awareness was seen in a community-based sample of ambulatory and non-demented older adults; positive responses were 17% and 32% on the two fall risk awareness questions, respectively. Given the common occurrence of falls in aging populations, with one in three older community-dwelling adults falling each year,^{3, 11} a higher fall risk awareness rate might have been expected. Other findings indicate that depressive symptoms and previous falls were associated with fall risk awareness. Neither of the fall risk awareness questions predicted risk of falls or injurious falls in this sample.

The study findings are in line with most but not all previous studies. A focus group of Indian seniors identified older age, uneven surfaces, physical weakness and mental health as being associated with increased fall risk estimation.¹⁹ In an Australian study, most seniors estimated their fall risk as low,¹³ which may reflect the community source of this sample (as in the CCMA cohort). Those with a low fall risk awareness in the Australian study were more likely to be men, younger, partnered, privately insured, report better health and have no history of falls.¹³ Decreased intentions to engage in behaviors to prevent falls were correlated with hospitalized patients' increased confidence in their ability to perform high-risk behaviors without help and without falling.⁵ In another community based study in Sydney, Australia, fall risk awareness in seniors was assessed using performance on the physiological profile assessment, a five domain physiological assessment.⁶ Perceived fall risk was assessed by the falls efficacy scale international that assesses participants' concern about falling across multiple activities of daily living.⁶ In contrast to our findings, both these measures predicted injurious falls over 12 months. This study did not include direct fall risk awareness questions as in our study, which may in part explain differences in fall prediction.⁶ The ABC scale, another falls efficacy scale, was not associated with fall risk awareness in the CCMA cohort.

There was poor concurrence between subjective and objective factors associated with responses to the fall risk awareness questions. Participants attributed presence of good or poor balance as the major contributor to their estimates. On the other hand, regression analysis showed that depressive symptoms and previous falls were the main objective variables associated with fall risk awareness reported on both questions. Poor balance was only associated with a positive response on the first fall risk awareness question. Depressive symptoms can influence risk judgments. For example, compared to non-depressed African American diabetic participants, African American diabetics perceived themselves to be at higher risk for multiple health problems and adhered less to diabetes self-management practices.²⁰ While being old was cited by participants as one of the reasons for positive response on both fall risk awareness questions, chronological age was not significant in the analyses.

It is interesting that a third of participants could not explain their reason for considering themselves to be at personal risk for falling. Conditions of uncertainty may favor heuristic (automatic or intuitive) reasoning, which is biased by prior evaluations of and preferences for the alternatives being considered.²¹ Objective measures have better validity than subjective assessments in predicting falls in older adults.

Both fall risk awareness questions in this study were not predictive of falls. The study findings are relevant in the context of designing fall prevention strategies as subjective assessments may influence behaviors. These findings suggest the need for educating patients in clinics or participants entering fall prevention programs about fall risk to improve their awareness. Older adults who do not perceive a high fall risk in their environment or underestimate their own personal risk for falling might not engage in fall prevention programs.¹² Patients' confidence in their ability to perform high-risk behaviors without falling was negatively correlated with extent of engagement in behaviors to prevent falls.⁵

Limitations

Single item questions were used to assess patient perceptions similar to those used to assess other subjective reports.¹ Even though both fall risk awareness questions were similarly worded and person centered, participants seem to equate the first question with general risk for their peer group and the second with their own personal risk. Some individuals may perceive a theoretical likelihood of falling but discount their own personal risk for falls. The two questions capture different facets of participants' subjective experience of risk of falls and together provide a broader patient perspective. This observation is supported by the low correlation between positive responses on the two questions, qualitative observations by participants in the preliminary item development study, and the differences in reasons provided by participants for positive and negative responses on the two questions. Nonetheless, further study and refinement of the fall risk awareness questionnaire is needed to understand whether the differential responses and associations with the two questions result from a conceptual difference in the questions or ambiguity in the wording of the questions. A scaled response or inclusion of additional questions could be considered in future studies to increase sensitivity of the fall risk awareness questionnaire; however, the associations and resulting insights obtained herein using the current fall risk awareness questions remain valid. The rationale for choosing variables included in analyses was discussed but not all possible covariates were examined. In particular, environmental and home-based assessments that may influence perceptions were not available.¹⁹ The CCMA study excluded individuals with neurodegenerative disease or mobility issues, who might have a higher awareness of fall risk. The patient centered fall risk awareness questionnaire needs to be further examined in other populations and clinical settings.

In summary, fall risk estimation provides important insights into older adults' behaviors before and following falls. While self-reports of fall risk do not provide incremental value over objective measures in predicting falls, these should be ascertained as patient perceptions can influence at-risk behaviors and participation in fall preventive interventions.

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Table 1

Baseline characteristics of study cohort.

Variables	
N	316
Age, mean (range)	78.3 (66–97)
Female, %	55.1
Education, y	14.8 ± 3.1
Comorbidity count (range 0–10)	1.5 ± 0.9
Fall in last 12 months, %	25.3
Repeatable Battery for Neuropsychological Status, total score (range 40 – 160)	93.3 ± 13.3
Geriatric depression scale (range 0–30)	4.8 ± 3.8
Beck Anxiety Inventory score (range 0–63)	3.5 ± 4.6
Activity-specific Balance Confidence scale (range 0–100)	83.8 ± 14.7
Gait velocity, cm/sec	97.2 ± 22.3
Unipedal stance time, sec (range 0–30 sec)	15.4 ± 17.9

Values are means ± SD unless otherwise noted.

Table 2

Association of fall related risk factors with self-reported fall risk awareness.

Risk factors	Fall risk awareness questionnaire aOR (95% CI)	
	Question 1	Question 2
Age, y	1.00 (0.94 – 1.07)	0.98 (0.95 – 1.04)
Female	0.63 (0.31 – 1.29)	0.98 (0.56 – 1.72)
Education, y	0.96 (0.85 – 1.08)	0.95 (0.85 – 1.04)
Comorbidity count (0–10)	1.00 (0.70 – 1.45)	0.99 (0.73 – 1.32)
Fall in last 12 months	2.48 (1.16 – 5.27)	1.98 (1.05 – 3.07)
Repeatable Battery for Neuropsychological Status (40–160)	0.98 (0.96 – 1.01)	1.00 (0.98 – 1.02)
Geriatric depression scale (0–30)	1.11 (1.01 – 1.23)	1.07 (1.00 – 3.70)
Beck Anxiety Inventory (0–63)	1.02 (0.95 – 1.10)	0.97 (0.90 – 1.03)
Activity-specific Balance Confidence (0–100)	0.98 (0.95 – 1.01)	0.98 (0.95 – 1.00)
Gait velocity, cm/sec	0.99 (0.97 – 1.01)	0.99 (0.98 – 1.01)
Unipedal stance, sec	1.01 (0.98 – 1.03)	1.02 (1.01 – 1.03)

* Associations examined using multivariable logistic regression analysis and reported as adjusted odds ratio (aOR) with 95% CI. Significant results bolded.

* Fall risk awareness was assessed with a two-item questionnaire, which asked participants about overall likelihood (question 1) and personal risk of falling (question 2) over the next 12 months.