


CLINICAL SCHOLARSHIP

Congruency and its related factors between patients' fall risk perception and nurses' fall risk assessment in acute care hospitals

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Abstract

Introduction: Inpatients need to recognize their fall risk accurately and objectively. Nurses need to assess how patients perceive their fall risk and identify the factors that influence patients' fall risk perception.

Purpose: This study aims to explore the congruency between nurses' fall risk assessment and patients' perception of fall risk and identify factors related to the non-congruency of fall risk.

Designs: A descriptive and cross-sectional design was used. The study enrolled 386 patients who were admitted to an acute care hospital. Six nurses assessed the participants' fall risk. Congruency was classified using the Morse Fall Scale for nurses and the Fall Risk Perception Questionnaire for patients.

Findings: The nurses' fall risk assessments and patients' fall risk perceptions were congruent in 57% of the participants. Underestimation of the patient's risk of falling was associated with gender (women), long hospitalization period, department (orthopedics), low fall efficacy, and history of falls before hospitalization. Overestimation of fall risk was associated with age group, gender (men), department, and a high health literacy score. In the multiple logistic regression, the factors related to the underestimation of fall risk were hospitalization period and department, and the factors related to the overestimation of fall risk were health literacy and department.

Conclusions: Nurses should consider the patient's perception of fall risk and incorporate it into fall prevention interventions.

Clinical Relevance: Nurses need to evaluate whether patients perceive the risk of falling consistently. For patients who underestimate or overestimate their fall risk, it may be helpful to consider clinical and fall-related characteristics together when evaluating their perception of fall risk.

KEYWORDS

acute care hospitals, congruency, fall, fall risk, inpatients, perception

INTRODUCTION

Falls are one of the safety accidents that can cause critical consequences in medical institutions and continue to occur despite the efforts of many healthcare professionals (LeLaurin & Shorr, 2019). Various factors related to falls in medical institutions have been identified, and interventions for fall prevention that reflect these factors have been implemented (Najafpour et al., 2019; Schoberer et al., 2022). Although a systematic review and meta-analysis of interventions in hospitals reported that patient education can reduce hospital falls, there is marked heterogeneity in intervention methods and study designs (Morris et al., 2022). A single-effective intervention to prevent falls has not been reported since fall risk factors and fall risk levels of each individual are different (Dabkowski et al., 2023). Therefore, individualized fall interventions that reflect the characteristics of each patient have been emphasized (Spano-Szekely et al., 2019).

Patient perception of fall risk has emerged as an important indicator of fall risk in recent fall assessment and intervention studies (Dabkowski et al., 2023; Solares et al., 2023). The World Guidelines for Fall Prevention and Management strongly recommend evaluating patient concerns regarding falling as part of a multifactorial assessment (Montero-Odasso et al., 2022).

However, the relationship between patient perceptions of fall risk and falls has been inconsistent. One previous study reported an association between patient perception of fall risk and fall occurrence (Moreira et al., 2018), whereas another study reported no such association (Verghese, 2016). In addition, the relationship between patients' perceptions of fall risk and fall risk assessments by healthcare professionals is inconsistent. A scoping review reported a disparity between patients' perceived fall risk and the actual risk of falling; approximately one-third of the participants accurately identified their fall risk (Dabkowski et al., 2022). A recent study showed that approximately 62% of patients' fall assessments were consistent with the nurses' fall risk assessment regarding their fall risk, 27.5% of patients' fall assessments underestimated their fall risk, and 10.6% of patients' fall assessments overestimated their fall risk (Bao et al., 2022). Therefore, it is necessary to identify factors associated with the congruency between a patient's perception of fall risk and the fall risk assessed by healthcare professionals to ensure that patients have an accurate perception of fall risk. Although a previous study reported that demographic and clinical characteristics influenced the overestimation and underestimation of fall risk (Bao et al., 2022), fall efficacy, and health literacy, which were recently reported as characteristics related to falls, were excluded. Recent studies have reported that fall efficacy is significantly associated with the number of falls (Kamide et al., 2019) and that health literacy is related to fall occurrence (Barker et al., 2019; Chesser et al., 2018; Lantos & Simon, 2018).

Because fall interventions require the active participation of patients, it is necessary to achieve congruency between the patient's

fall risk perception and the fall risk judged by healthcare professionals (Barmenloo et al., 2020; Reuben et al., 2017; Tzeng & Yin, 2015). Therefore, it is important for patients who overestimate or underestimate their fall risk to perceive their fall risk objectively, and for nurses to identify factors related to the non-congruency of fall risk. In particular, patients admitted to tertiary hospitals for acute care are at an increased risk of falls owing to rapidly changing physical and mental conditions, medication and treatment modalities to treat the diseases, and unfamiliar hospital environments. Therefore, inpatients need to accurately and objectively recognize their fall risk. Nurses need to assess how inpatients perceive fall risk and identify the factors that influence their fall risk perception. This study aimed to identify the congruency between nurses' fall risk assessment and patients' perception of fall risk and to identify factors related to the congruency of fall risk assessment, including demographic, clinical, and fall-related characteristics such as fall efficacy and health literacy.

METHODS

Study design

A descriptive and cross-sectional design was used.

Study participants

Using convenience sampling, the study enrolled 386 patients hospitalized for acute care at five wards of a tertiary medical center in Seoul, Republic of Korea. The subjects of this study were (1) those aged 18 years or older with no communication problems, (2) those who were hospitalized in a general ward, and (3) those who were hospitalized for more than 3 days. Patients hospitalized for less than 3 days were excluded because they were hospitalized for diagnostic testing or examination and simple treatment or surgery, and their clinical condition or disease severity may be different from that of other patients. Patients diagnosed with cognitive impairment were excluded from the evaluation of fall risk perception accuracy. A total of 400 questionnaires were distributed, and 386 were completed.

Six nurses who were members of the research team evaluated the fall risks of the study participants. For consistency in the fall risk assessment, one nurse per ward (the ward where the nurse worked) assessed the participants' fall risk, with the exception of one ward where two nurses assessed the risk of falling.

This study was conducted after IRB approval of the tertiary medical center for acute care. After explaining the purpose and process of this study, the researchers obtained written consent from the participants who agreed to participate in the study. The participants were informed that they could stop participating in the study at any time without any special disadvantage.

Measurement

Fall risk assessment of nurse-Morse Fall Scale

In this study, the nurses' assessment of patient fall risk was assessed using the Morse Fall Scale (MFS) (Morse et al., 1989). The MFS is a scale commonly used for assessing fall risk in hospitalized patients. The scale comprises six items with a total score of 0–125. The area under the curve (AUC) for criterion validity of MFS was 0.77 (Mousavipour et al., 2022). The inter-rater reliability with an intraclass correlation coefficient of the MFS was 0.83, sensitivity was 0.67, and specificity was 0.82 among inpatients (Mousavipour et al., 2022). In the Korean population, interrater reliability had a kappa of 0.82 (Kim et al., 2013), and sensitivity of 0.58, a specificity of 0.95 based on 45 points, and sensitivity of 0.72, and a specificity of 0.91 based on 51 points (Baek et al., 2014). The optimal cutoff value of the MFS for predicting falls is 45 (Bagui et al., 2019). This study classified a group with a score of 45 or more as high risk and a group with a score of less than 45 as non-high risk.

Fall risk perception of patient-fall Risk Perception Questionnaire

The patient's perception of their fall risk was measured using the Fall Risk Perception Questionnaire (FRPQ) (Choi et al., 2021). This scale comprises 27 items, and each question is rated on a 4-point Likert scale. The total score ranged from 0 to 81, with a higher score indicating a higher fall risk perception. In the original study, the reliability, convergent, and known-group validity of the FRPQ were established (Choi et al., 2021). The FRPQ had a statistically significant positive correlation with the Korean Falls Efficacy Scale International (FESI) and the MFS in convergent validity, and the risk for falls group (MFS score \geq 45) had a significantly higher perceived fall risk than the no-risk for falls group (MFS score $<$ 45) in known-group validity (Choi et al., 2021). In a previous study, the cutoff score for fall risk was reported to be 28.5 points (Bao et al., 2022). In this study, we classified a score of 28.5 or more as a high-risk perception group and a score of less than 28.5. Cronbach's α was 0.95 in the original study (Choi et al., 2021) and 0.95 in this study.

Fall-related characteristics

Fall-related characteristics included fall efficacy, health literacy, fear of falling, and fall history before admission. For fall efficacy, the Korean version of the FESI was used (Park et al., 2010; Yardley et al., 2005), and this scale measures the level of concern about falling. It comprises 16 items, each measured on a 4-point Likert scale. The higher the score, the more concern the respondent has about falling. In a previous study (Park et al., 2010), the test-retest reliability was 0.96, and the FESI scores of individuals with no fall experience

were significantly lower than those of individuals with 1 or 2 falls for known-group validity. Cronbach's α was 0.97 in the Korean version study (Park et al., 2010) and 0.96 in this study. Health literacy was measured using the Short Form of the Korean Functional Health Literacy Test (S-KHLT) (Kim, 2017). This scale comprises eight questions on the numeracy and understanding of health information, and each question is scored 1 point if correct and 0 points if incorrect (Kim, 2017). In an original study (Kim, 2017), the S-KHLT score was correlated with the Korean Health Literacy Assessment Tool score for convergent validity, and the scores of the S-KHLT were significantly higher among nursing students than older adults for known group validity. A cut-off value of \leq 6 appeared to provide the best trade-off with a sensitivity of 0.79 and specificity of 0.65 to predict low health literacy, and the AUC for criterion validity was 0.78. The total score ranges from 0 to 8, with a score of 7 or more indicating high health literacy and a score of 6 or less indicating low health literacy. Cronbach's α was 0.79 in the original study (Kim, 2017) and 0.73 in this study. Fear of falling used a single item about whether or not there was a fear. This scale is a widely used method (Tinetti et al., 1990), and the test-retest reliability has been reported to be 0.90 (Zhang et al., 2021). In addition, the study also investigated the occurrence of falls during hospitalization.

Demographic and clinical characteristics

Demographic characteristics included age, gender, and level of education, and clinical characteristics included hospitalization period, department, surgery, comorbidity, number of medications, types of medication related to falls (antihypertensives, hypoglycemic agents, antipsychotics, and analgesics), sleep disturbance, and urinary disturbance.

Data collection

Data were collected from February 14, 2022 to March 18, 2023. Data were collected from six nurses from five wards. These nurses have more than 5 years of clinical experience and use the MFS every day in patient care. For FRPQ, fall efficacy, health literacy, and fear of falling, a self-administered questionnaire was administered. The MFS was measured by six nurses in charge of data collection, and MFS was measured when the patient completed a questionnaire on the FRPQ. The fall risk in 55–82 subjects per nurse was assessed. The lowest MFS score was 0–15 points and the highest score was 60–85 points evaluated by each nurse. The presence of a fall history before admission, movement for diagnostic testing, sleep disturbance, urinary disturbance, and mobility problems were recorded after the nurse checked the medical records and interviewed the patient.

Considering that the nurse's knowledge of the patient's fall risk perception may affect the study results, we ensured that the patient's fall risk perception and the nurse's fall risk judgment were

made independently. The questionnaires completed by the patient and the nurse were produced separately. After the data investigation was completed, they were grouped into one pair, and the data were stored.

Data analysis

Data were analyzed using SPSS 27.0. The participants' demographic, clinical, and fall-related characteristics (including fall efficacy, health literacy, and fear of falling), MFS, FRPQ, and occurrence of falls were analyzed using descriptive statistics. The congruence between patients' fall risk perception and nurses' fall risk assessment was analyzed using descriptive statistics. This study considered the group with MFS 45 or higher (high risk according to nurse assessment) and FRPQ 28.5 or higher (high risk according to patient perception) and the group with MFS 45 or lower and FRPQ 28.4 or lower as a congruent group. In addition, it considered the group with MFS 45 or higher and FRPQ 28.4 or lower as not congruent group-underestimated fall risk, and the group with MFS 45 or lower and FRPQ 28.5 or higher as not congruent group-overestimated fall risk. Differences in demographic, clinical, and fall-related characteristics between the congruent, overestimated, and underestimated groups were analyzed using analysis of variance and chi-square tests. Multiple logistic regression analysis was used to identify factors related to the underestimation and overestimation of fall risk. Statistical significance was set at $p < 0.05$.

RESULTS

Demographic and clinical characteristics of the participants

The demographic and clinical characteristics of the 386 participants are presented in Table 1. Their mean age was 60.14 ± 13.40 years, and 66.1% were men. The median hospitalization period was 6.0 days (IQR, 5.0–8.0), and 72% underwent surgery during the hospitalization period. The mean number of medications taken was 3.84 ± 3.73 . A total of 44.8% were taking antihypertensive drugs, and 19.2% were taking oral hypoglycemic agents. Approximately 29% had orthopedic problems, and 11.7% had urinary disturbances.

Occurrence of falls, the score of MFS and FRPQ, and fall-related characteristics

Falls occurred in three of the 386 participants (0.8%). Among the participants, 38.6% were assessed by nurses as being at high risk of falls, with an MFS score of 45 or higher. Twenty-two percent of patients with an FRPQ score of 28.5 or higher were perceived to be at high risk for falls. The average score for fall efficacy was 25.31 ± 9.97 , and the average score for health literacy was 6.31 ± 2.00 . Approximately

TABLE 1 Demographic and clinical characteristics of subjects (N = 386).

Variables	Category	n (%) or mean \pm SD or median (IQR)
Demographic characteristics		
Age (year) (n = 383)	18–60	144 (37.3)
	61–70	165 (42.7)
	≥ 71	77 (20.0)
	Gender (n = 384)	Men
	Women	130 (33.9)
Level of education (n = 382)	\leq Elementary school	31 (8.1)
	Middle school	46 (12.0)
	High school	142 (37.2)
	\geq College	163 (42.7)
Clinical characteristics		
Hospitalization period (day-)		6.0 (5.0–8.0)
Department	Urology	160 (41.5)
	Orthopedics	113 (29.3)
	Liver, biliary, and pancreas	109 (28.2)
	Others	4 (1.0)
Surgery during hospitalization (n = 373)	Yes	278 (72.0)
	No	95 (28.0)
Cancer	Yes	162 (42.0)
	No	224 (58.0)
Comorbidity ^a	Hypertension	160 (41.5)
	Diabetes mellitus	85 (22.0)
	Cardiovascular disease	42 (10.9)
	Pulmonary disease	13 (3.4)
	Chronic kidney disease	11 (3.4)
	Neurologic disease	11 (2.9)
	Eye problem	12 (3.1)
Number of medication		3.84 ± 3.73
Medication ^a	Antihypertensive	173 (44.8)
	Hypoglycemic agents	74 (19.2)
	Antipsychotics	21 (5.4)
	Analgesics	50 (13.0)
Sleep disturbance	Yes	14 (3.6)
	No	372 (96.4)
Urinary disturbance	Yes	45 (11.7)
	No	341 (88.3)

Abbreviation: IQR, interquartile range.

^aMultiple response.

46% had a fear of falling, and 7 participants had a history of falling before hospitalization (Table 2).

Congruency between patients' fall risk perception and nurses' fall risk assessment

The congruence between patients' fall risk perceptions and nurses' fall risk assessments is shown in Table 3. About 38.6% of all subjects were rated high risk by nurses; 8.8% rated themselves high risk (congruent); and 29.8% rated themselves low risk (underestimated). About 61.4% of all subjects were rated as not high risk by nurses; 48.2% rated themselves as not high risk (congruent); and 13.2% rated themselves as high risk (overestimated). Therefore, nurses' fall risk assessments and patients' fall risk perceptions were congruent in 57% of the participants.

Comparison of demographic, clinical, and fall-related characteristics among the congruent, underestimated, and overestimated groups

The study compared the congruent group with the underestimated group and the congruent group with the overestimated group to identify the demographic, clinical, and fall-related characteristics associated with non-congruency in the fall risk evaluation (Table 4). When comparing the congruent and underestimated groups, gender (women) ($\chi^2=20.44$, $p<0.001$), long hospitalization period ($Z=-2.15$, $p=0.031$), department (orthopedics)

($\chi^2=14.70$, $p<0.001$), high fall efficacy score (low level of fall efficacy) ($t=-2.96$, $p=0.003$), and history of falls before hospitalization ($\chi^2=4.39$, $p=0.049$) were associated with underestimate of fall risk. When comparing the congruent and overestimated groups, age group ($\chi^2=25.47$, $p<0.001$), gender (men) ($\chi^2=4.63$, $p=0.033$), department ($\chi^2=4.27$, $p=0.029$), and high health literacy score ($t=-3.45$, $p=0.001$) were associated with an overestimate of fall risk.

Multiple logistic regression for factors related to the underestimation and overestimation of fall risk

Multiple logistic regression analyses for the factors related to the underestimation and overestimation of fall risk are shown in Table 5. Multiple logistic regression was performed, including the statistically significant variables in Table 4, and the p -value was set at 0.1.

In multiple logistic regression, the factors related to the underestimation of fall risk were the hospitalization period (odds ratio [OR]=1.131, 95% confidence interval [CI]=1.067–1.199, $p<0.001$) and department (orthopedics) (OR=2.466, 95% CI=1.279–4.753, $p=0.007$). In addition, the factor related to the overestimation of fall risk was health literacy (OR=1.410, 95% CI=1.071–1.855, $p=0.014$) and department (orthopedics) (OR=0.252, 95% CI=0.065–0.982, $p=0.047$). This model showed that the Cox and Snell (R^2) coefficient had an explanatory power of 24.5%, and the coefficient of Nagelkerke (R^2) had an explanatory power of 29.0%.

DISCUSSION

In this study, 43% of patients' fall assessments were inconsistent with the nurses' fall risk assessment for their fall risk. In particular, 29.8% of participants who underestimated their fall risk, and this finding was similar to about 27.5% of patients underestimated the fall risk in hospitalized patients (Bao et al., 2022). Therefore, nurses should not only systematically evaluate the fall risk of hospitalized patients but also be interested in the patient's self-assessed fall risk perception and whether the patient's fall risk perception is consistent with the nurse's assessment. In addition, nurses should provide interventions, including conversations with patients about their understanding of fall risk, when providing education on risk factors and fall prevention (Knox, 2018). Particularly, patients who are at a high risk of falling but do not have a high fall risk awareness themselves are required to have fall risk awareness appropriate to their condition because adequate awareness of fall risk by inpatients is associated with participation in fall prevention activities (Twibell et al., 2015).

In the present study, hospitalization period and department (orthopedics) were independent factors influencing the underestimation of fall risk in inpatients. This study's finding that length of stay is related to underestimation of fall risk is consistent in that the longer length of stay was reported as an associating factor for

TABLE 2 Occurrence of fall, the score of MFS and FRPQ, and fall-related characteristics (N=386).

Variables	Category	n (%) or mean \pm SD
Occurrence of fall		3 (0.8)
Morse Fall Scale	High risk (45 \geq)	149 (38.6)
	No high risk (45<)	237 (61.4)
Fall risk perception		10.62 \pm 11.73
	High risk (28.5 \geq)	85 (22.0)
	No high risk (28.5<)	301 (78.0)
Fall-related characteristics		
Fall efficacy		25.31 \pm 9.97
Health literacy		6.31 \pm 2.00
	High	228 (59.1)
	Low	158 (40.9)
Fear of fall	Yes	179 (46.4)
	No	207 (53.6)
Fall history before admission	Yes	7 (1.8)
	No	379 (98.2)

Abbreviations: FRPQ, Fall Risk Perception Questionnaire; MFS, Morse Fall Scale.

TABLE 3 Congruency between patients' fall risk perception and nurses' fall risk assessment (N = 386).

Patient perception	Nurse assessment	
	High risk (n = 149) (MFS ≥ 45) n (%)	No high risk (n = 237) (MFS < 45) n (%)
High risk (FRPQ ≥ 28.5)	34 (8.8) (Congruent)	51 (13.2) (Not congruent—overestimate)
No high risk (FRPQ < 28.5)	115 (29.8) (Not congruent—underestimate)	186 (48.2) (Congruent)

Abbreviations: FRPQ, Fall Risk Perception Questionnaire, MFS, Morse Fall Scale.

falling accidents among inpatients (Heikkilä et al., 2023; Najafpour et al., 2019). This result may be due to the possibility that, as the length of stay increased, patients adapted to the hospital environment and perceived their risk of falling as low compared with the actual risk. Hospitalized patients with long lengths of stay gradually perceive their risk of falling as low and practice fewer fall prevention behaviors, resulting in frequent falls as the length of stay increases. Therefore, patients with longer hospital stays require education to accurately recognize the risk of falling in acute care hospitals.

This study showed that patients with orthopedic problems frequently underestimated the risk of falls. The high incidence of falls in orthopedic patients continues to be studied. Patients hospitalized for orthopedic surgery have significantly higher fall rates than all other patients (Kobayashi et al., 2018), and orthopedic patients may overestimate their abilities, underestimate fall risk, and avoid asking for assistance (Ben Natan et al., 2021). In particular, falls in patients with orthopedic diseases were reported to be related to being younger, having fewer comorbidities, taking fewer medications, and having a shorter hospital stay, unlike the characteristics of other patients reported in a previous study (Ben Natan et al., 2021). Therefore, orthopedic patients require education from the beginning of hospitalization to help them objectively recognize their walking ability and accurately recognize their risk of falling.

In this study, health literacy was a significant factor influencing the overestimation of fall risk. This finding was consistent with that of a previous study in which participants with high self-perception were likely to engage in fall prevention and less high-risk performance (Twibell et al., 2015). It is possible that subjects with a high level of health literacy were more sensitive to the risk of falling than subjects with low health literacy through the various information provided. In the recent literature, low health literacy has been reported as a risk factor for falls (Chesser et al., 2018; Kaps et al., 2021), and interventions considering health literacy have been reported to be effective (Barker et al., 2019). Therefore, nurses should assess the level of health literacy when assessing fall risk and provide interventions to prevent falls. In addition, it is necessary to provide fall interventions tailored to the subject's health literacy level.

Univariate analysis demonstrated that underestimation of the patient's risk of falling was associated with gender (women), low level of fall efficacy, and a history of falls before hospitalization. In previous studies, lower fall efficacy was found to be significantly associated with a higher number of falls (Kamide et al., 2019), and falls before hospitalization were risk factors for falls in acute care

hospitals (Najafpour et al., 2019). Therefore, nurses should pay attention to assessing whether subjects with low fall efficacy and a history of falls have an accurate perception of fall risk and should ensure that they can objectively recognize fall risk.

The overestimation of fall risk in the participants was associated with age group and gender (men) in univariate analysis. Age has been reported to be related to the underestimation of fall risk in previous studies (Bao et al., 2022), and healthy older adults are unaware of age-related physical decline and are likely to overestimate their step-over ability (Sakurai et al., 2013). In this study, there was no relationship between age and underestimation of fall risk, and there was a lower rate of overestimation of fall risk in the group aged 71 years or older. However, there were differences between the departments of the patients included in previous studies (Bao et al., 2022; Sakurai et al., 2013) and in this study. Therefore, future research is required to determine the relationship between age and fall risk perception among patients with various diseases. This study found that women underestimated the risk of falling, and men overestimated it. This may be due to the relationship between gender and fall-related factors rather than the relationship between gender and fall risk perception. A previous longitudinal study reported that gender-specific risk factors included incontinence and frailty in women and older age, high levels of depressive symptoms, and an inability to perform a standing balance test in men. Therefore, it is necessary to consider this along with other gender-related fall risk factors when nurses evaluate fall risk perception according to gender.

This study had several limitations. First, the proportion of men was high, approximately two-thirds. Second, this study used a cross-sectional design, and the congruency between fall risk assessment by nurses and the fall risk perception of participants was measured only once. Third, six nurses participated in data collection in this study. However, inter-rater reliability for MFS was not calculated, although nurses were trained on the use of the MFS prior to data collection to ensure consistent evaluation. In addition, the mean MFS score in the ward where subjects with orthopedic diseases were admitted was higher than that in other wards in an additional analysis. This difference may be due to orthopedic diseases or because the nurse who assessed the fall risk in the ward may have overestimated the fall risk. Fourth, the expectations of the nurses who participated as researchers may have influenced the results, even though we prepared separate questionnaires to prevent this possibility. Finally, this study focused on patients with hepatobiliary, pancreatic, urological, and orthopedic diseases. Therefore, there may be limitations in generalizing the results of this study.

TABLE 4 Comparison of demographic, clinical, and fall-related characteristics among congruent, underestimate, and overestimate groups (N = 386).

Variables	Category	Congruent (n = 220) mean ± SD or n (%)	Underestimate (n = 115) mean ± SD or n (%)	Overestimate (n = 51) mean ± SD or n (%)	t or Z or χ^2 (p) ^a	t or Z or χ^2 (p) ^b
Demographic characteristics						
Age (year)	18–60	60.70 ± 12.79	59.26 ± 14.10	59.26 ± 14.10	0.74 (0.463)	0.75 (0.454)
	61–70	80 (36.4)	43 (37.4)	21 (41.2)	0.36 (0.837)	25.47 (<0.001)
	≥71	93 (42.3)	45 (39.1)	27 (52.9)		
Gender (n = 219/114/51)	Men	47 (21.3)	27 (23.5)	3 (5.9)		
	Women	157 (71.7)	53 (46.5)	44 (86.3)	20.44 (<0.001)	4.63 (0.033)
Level of education (n = 219/112/51)	≤Elementary school	62 (28.3)	61 (53.5)	7 (13.7)		
	Middle school	18 (8.2)	12 (10.7)	1 (2.0)		
	High school	25 (11.4)	17 (15.2)	4 (7.8)		
	≥College	76 (34.7)	47 (42.0)	19 (37.3)	5.68 (0.128)	3.34 (0.343)
Clinical characteristics						
Hospitalization period	Orthopedics	6.0 (4.0–8.0)	6.0 (5.0–10.0)	6.0 (4.0–8.0)	-2.15 (0.031) ^c	-0.83 (0.407) ^c
	Others	55 (25.2)	52 (46.0)	6 (11.8)	14.70 (<0.001)	4.27 (0.029)
Surgery (n = 214/108/51)	Yes	163 (74.8)	61 (54.0)	45 (88.2)		
	No	166 (77.6)	76 (70.4)	36 (70.6)	1.99 (0.158)	1.11 (0.293)
Number of comorbidity	Yes	48 (22.4)	32 (29.6)	15 (29.4)		
	No	1.45 ± 1.31	1.43 ± 1.30	1.59 ± 1.13	0.19 (0.850)	-0.67 (0.502)
Medication						
Antihypertensive	Yes	97 (44.1)	54 (47.0)	22 (43.1)	0.25 (0.617)	0.02 (0.902)
	No	123 (55.9)	61 (53.0)	29 (56.9)		
Hypoglycemic agents	Yes	43 (19.5)	24 (20.9)	7 (13.7)	0.08 (0.774)	0.93 (0.334)
	No	177 (80.5)	91 (79.1)	44 (86.3)		
Antipsychotics	Yes	13 (5.9)	7 (6.1)	1 (2.0)	0.01 (>0.999)	1.32 (0.222)
	No	207 (94.1)	108 (93.9)	50 (98.0)		
Analgesics	Yes	30 (13.6)	15 (13.0)	5 (9.8)	0.02 (>0.999)	0.54 (0.643)
	No	190 (86.4)	100 (87.0)	46 (90.2)		
Number of medication	Yes	3.73 ± 3.55	4.31 ± 4.02	3.29 ± 3.83	-1.34 (0.181)	0.81 (0.435)
	No	6 (2.7)	7 (6.1)	1 (2.0)	2.31 (0.144)	0.99 (>0.999)
Sleep disturbance (n = 219/114/51)	Yes	213 (97.3)	107 (93.9)	50 (98.0)		
	No					

(Continues)

TABLE 4 (Continued)

Variables	Category	Congruent (n = 220) mean ± SD or n (%)	Underestimate (n = 115) mean ± SD or n (%)	t or Z or χ^2 (p) ^a	Overestimate (n = 51) mean ± SD or n (%)	t or Z or χ^2 (p) ^b
Urinary disturbance (n = 220/114/51)	Yes	26 (11.8)	15 (13.2)	0.13 (0.728)	4 (7.8)	0.67 (0.415)
	No	194 (88.2)	99 (86.8)		47 (92.2)	
Fall-related characteristics						
Fall efficacy		24.65 ± 9.91	28.02 ± 9.88	-2.96 (0.003)	22.08 ± 9.08	1.69 (0.091)
Health literacy		6.32 ± 1.95	5.97 ± 2.30	1.38 (0.169)	7.06 ± 1.19	-3.45 (0.001)
Fear of fall (n = 220/115/51)	Yes	93 (42.3)	71 (61.7)	0.02 (0.905)	15 (29.4)	2.86 (0.091)
	No	127 (57.7)	44 (38.3)		36 (70.6)	
Fall history before admission (n = 219/114/50)	Yes	2 (0.9)	5 (4.4)	4.39 (0.049) ^d	0 (0.0)	0.46 (>0.999)
	No	217 (99.1)	109 (95.6)		50 (100.0)	

^aComparison of congruent group and underestimate group.^bComparison of congruent group and overestimate group.^cMann-Whitney U test.^dFisher's exact test.

TABLE 5 Multiple logistic regression for factors related to underestimate and overestimate for fall risk.

Variables	Underestimate for fall risk ^a			Overestimate for fall risk ^a		
	B	Odds ratio	95% CI	B	Odds ratio	95% CI
Gender (men)	-0.566	0.568	0.301-1.072	0.217	1.242	0.431-3.580
Age, 18-60 (reference)						
61-70	-0.311	0.733	0.399-1.346	0.633	1.884	0.880-4.036
71 ≥	-0.099	0.906	0.427-1.921	-0.706	0.494	0.128-1.898
Hospitalization periods	0.123	1.131	1.067-1.199	-0.032	0.969	0.881-1.064
Department (orthopedics)	0.902	2.466	1.279-4.753	-1.378	0.252	0.065-0.982
Fall efficacy	0.005	1.005	0.978-1.033	-0.037	0.964	0.906-1.026
Health literacy	-0.118	0.889	0.781-0.012	0.343	1.410	1.071-1.855
Fear of fall (yes)	-0.552	0.576	0.318-1.045	0.376	1.456	1.071-1.855
Fall history before admission (yes)	-1.623	0.197	0.035-1.127			0.630

Note: Cox & Snell R² coefficient = 0.245, Nagelkerke R² coefficient = 0.290.

Abbreviation: CI, confidence interval.

^aReference = Congruent group.

CONCLUSION

Approximately 43% of patients' fall assessments were inconsistent with the nurse's fall assessment, and non-congruency was related to clinical and fall-related characteristics among inpatients in acute care hospitals. Therefore, nurses should consider patients' perception of fall risk, evaluate whether patients perceive the risk of falling consistently, and incorporate it into fall prevention interventions to accurately and objectively perceive the risk of falling for inpatients in acute care hospitals. For patients who underestimate or overestimate their fall risk, it may be helpful to consider these factors together to evaluate their fall risk perception and establish a fall prevention strategy based on these findings. Nurses asking patients to evaluate their risk of falling and knowing how to use the results to improve their own assessment of fall risk is important and contributes to the science of fall prevention.

Clinical resources

- Patient Safety Movement Foundation. Available at: https://psmf.org/aebp-publications/falls-and-fall-prevention-in-adults/?gclid=EAlalQobChMI6evEw7_EgQMVENQWBR12QAtJEAAYASAAEglTmvD_BwE
- Fall Prevention Foundation. Available at: https://fallpreventionfoundation.org/?gclid=EAlalQobChMI6evEw7_EgQMVENQWBR12QAtJEAAYAAEgLPKvD_BwE
- Agency for Healthcare Research and Quality. Available at: <https://www.ahrq.gov/patient-safety/settings/hospital/fall-prevention/toolkit/index.html>

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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