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A Survey Study on the Competency of Urology Nurses in the Prevention and Control of Fall Risk Among Elderly Patients with Multimorbidity and Polypharmacy

Yuqing Liu, Yan Hu*

Jingzhou First People's Hospital, Jingzhou 434000, Hubei, China

Author to whom correspondence should be addressed.

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Abstract: *Objective:* To investigate the current status of fall risk prevention and control competency among urology nurses caring for elderly patients with multimorbidity and polypharmacy, and to analyze its correlation with polypharmacy knowledge and general self-efficacy, thereby providing a reference for targeted training. *Methods:* Using cluster sampling, all 45 registered nurses in the urology department of our hospital were selected in September 2026. A cross-sectional survey was conducted using a general information questionnaire, the Nurse Fall Risk Prevention and Control Competency Questionnaire, the Nurse Polypharmacy Knowledge Questionnaire, and the General Self-Efficacy Scale. *Results:* The total competency score for fall risk prevention and control was 29.04 ± 4.28 (out of 40), with a scoring rate of 72.6%, indicating a moderate-to-high level. The polypharmacy knowledge score was 7.44 ± 2.97 (out of 12), with a scoring rate of 62.0%. The general self-efficacy score was 29.27 ± 4.45 (out of 40). Competency was positively correlated with both polypharmacy knowledge ($r = 0.524$, $P < 0.01$) and general self-efficacy ($r = 0.486$, $P < 0.01$). *Conclusion:* The fall risk prevention and control competency of urology nurses was at a moderate-to-high level, and polypharmacy knowledge and self-efficacy were associated factors. Nursing administrators should strengthen systematic training in polypharmacy knowledge and enhance nurses' self-efficacy to improve fall risk prevention and control competency.

Keywords: Urology; Elderly; Multimorbidity; Polypharmacy; Falls; Nurse competency; Questionnaire survey

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1. Introduction

With the accelerating aging of China's population, multimorbidity has become increasingly prevalent among older adults, and polypharmacy (concurrent use of ≥5 medications) is highly common in elderly inpatients [1]. Polypharmacy itself is an independent risk factor for falls, and falls risk-increasing drugs (FRIDs), such as

sedative-hypnotics, antihypertensives, and antidiabetic agents, can significantly elevate fall risk by causing dizziness, orthostatic hypotension, and balance impairment [2]. Elderly urology patients are particularly susceptible to falls: nocturia and urinary urgency or frequency compel patients to leave bed frequently to void, while α-blockers commonly used in this department (e.g., tamsulosin) may induce orthostatic hypotension while relieving lower urinary tract symptoms; when superimposed on the cumulative effects of FRIDs, this further increases fall risk [3].

As frontline professionals with the longest patient contact during hospitalization, nurses bear core responsibilities in fall risk screening, monitoring of adverse drug reactions, and patient education. However, current clinical risk assessment largely relies on the traditional Morse Fall Scale, which has relatively limited dimensions [4], and nurses have insufficient awareness of the concealed fall risk posed by FRIDs, with medication factors not systematically incorporated into risk assessment. Although previous studies have addressed nurses' fall prevention knowledge and attitudes, investigations of nurse competency in this specific context—centered on elderly patients with multimorbidity and polypharmacy in urology—remain scarce.

Therefore, this study conducted a cross-sectional survey of urology nurses using a general information questionnaire, the Nurse Fall Risk Prevention and Control Competency Questionnaire, the Nurse Polypharmacy Knowledge Questionnaire, and the General Self-Efficacy Scale, aiming to systematically assess the current status of fall risk prevention and control competency in this complex scenario and to explore its influencing factors, thereby providing empirical evidence and data support for the subsequent development of precise specialty training systems. The study participants and methods are detailed below.

2. Participants and methods

2.1. Study participants

Using cluster sampling, all registered nurses on active duty in the urology wards of Jingzhou First People's Hospital were selected as study participants.

Inclusion criteria: (1) registered nurses working in urology wards or units; (2) ≥6 months of clinical nursing experience in urology; (3) informed consent and voluntary participation.

Exclusion criteria: (1) those not on duty during the survey period due to vacation, further training, sick leave, or maternity leave; (2) refresher nurses, standardized training nurses, and nursing students; (3) those who had experienced a major negative event within the past month (e.g., a serious nursing adverse event or a major medical dispute) that might affect their response status.

This study was approved by the Ethics Committee of our hospital (approval number: KY2026-110-01), and all participants provided written informed consent.

2.2. Survey instruments

2.2.1. General information questionnaire

Self-designed by the researchers, including age, sex, educational level, professional title, years of urology work experience, position, employment type, prior training in fall risk prevention and control and polypharmacy knowledge, and prior involvement in fall event management.

2.2.2. Nurse fall risk prevention and control competency questionnaire

This questionnaire was revised based on the framework developed by Hu Yali et al. [5]. The revised version

contains 5 dimensions and 10 items: fall risk assessment ability, nursing intervention implementation ability, health education ability, multidisciplinary collaboration ability, and risk monitoring and feedback ability (2 items each). A 5-point Likert scale was used, ranging from "completely inconsistent" to "completely consistent," scored 1–4, with a total score of 10–40; higher scores indicated greater competency. Dimension scores were calculated as the mean item score (range 1–4). Expert evaluation yielded a scale-level content validity index (S-CVI/UA) of 0.889 and item-level content validity indices (I-CVI) of 0.800–1.000. In the present sample, the Cronbach's α coefficient for the total scale was 0.782, indicating good reliability and validity.

2.2.3. Nurse polypharmacy knowledge questionnaire

Developed by the researchers based on a review of relevant literature and the 2023 American Geriatrics Society (AGS) Beers Criteria [6]. It comprises 3 dimensions—basic concepts of polypharmacy, classification and identification of falls risk-increasing drugs (FRIDs), and the association between adverse drug reactions and falls—with 12 items in total. Items were evaluated and revised by 6 experts in clinical pharmacy, geriatric medicine, and nursing. Each item was a single-choice question, scored 1 for a correct answer and 0 for an incorrect or unanswered response, with a total score of 0–12; higher scores indicated greater polypharmacy knowledge. In this study, the I-CVI was 0.833–1.000, the S-CVI/Ave was 0.917, and the Kuder-Richardson 20 (K-R 20) reliability coefficient was 0.824.

2.2.4. General Self-Efficacy Scale

The General Self-Efficacy Scale (GSES) developed by Schwarzer et al. and revised by Wang Caikang et al. was used [7]. It is a unidimensional scale with 10 items scored on a 4-point Likert scale (1–4), with a total score of 10–40; higher scores indicate greater self-efficacy. The Cronbach's α coefficient of this scale in Chinese nurse populations ranged from 0.87 to 0.91, demonstrating good reliability and validity.

2.3. Survey methods

A paper-based questionnaire was administered on site. Before the survey, the researchers explained the study purpose, completion requirements, and precautions to participants; questionnaires were distributed on site after obtaining informed consent. The questionnaire was completed anonymously, all items were mandatory, and completion time was controlled at 15–20 minutes, with questionnaires collected immediately upon completion. After collection, two researchers independently checked and entered the data, and invalid questionnaires were excluded if the completion time was too short (<5 minutes), response options showed an obvious pattern, or key information was missing.

2.4. Statistical analysis

Data were analyzed using SPSS 26.0. Categorical data were expressed as frequencies and percentages (%). For continuous data, normality was tested first; normally distributed data were expressed as mean ± standard deviation ($\bar{x} \pm s$), with independent-samples t-tests for comparisons between two groups and one-way analysis of variance (ANOVA) for comparisons among multiple groups. Non-normally distributed data were expressed as median (interquartile range) [M (P25, P75)], with non-parametric tests for between-group comparisons. Variables that were statistically significant in univariate analysis (educational level, professional title, years of urology work experience, prior training in polypharmacy knowledge, and prior

involvement in fall event management) and variables that might influence competency on professional grounds (polypharmacy knowledge score and self-efficacy score) were included as independent variables, with the total score of nurse fall risk prevention and control competency as the dependent variable, and multiple linear regression analysis (stepwise method) was performed. A two-sided $\alpha = 0.05$ was considered statistically significant.

3. Results

3.1. General characteristics of participants

A total of 45 paper questionnaires were distributed, and 45 valid questionnaires were returned, yielding a valid response rate of 100%. The mean age of participants was 34.00 ± 6.56 years old. There were 5 male (11.1%) and 40 female (88.9%) nurses. Regarding educational level, 2 nurses (4.4%) had a college diploma or below, and 43 (95.6%) had a bachelor's degree or above. Regarding professional title, 9 nurses (20.0%) were staff nurses, 16 (35.6%) were senior nurses, and 20 (44.4%) were supervisor nurses or above. Regarding years of urology work experience, 4 nurses (8.9%) had < 3 years, 4 (8.9%) had 3–5 years, and 37 (82.2%) had > 5 years. Regarding employment type, 10 nurses (22.2%) held permanent posts and 35 (77.8%) were contract-based. All 45 nurses (100%) had received fall risk prevention and control training, 32 (71.1%) had received polypharmacy-related knowledge training, and 15 (33.3%) had previously participated in fall event management. The general characteristics are presented in **Table 1**.

Table 1. General Characteristics of Participants (n=45)

Variable	Category	n	%
Age (years old, mean ± SD)	—	34.00 ± 6.56	—
Sex	Male	5	11.1
	Female	40	88.9
Educational level	College diploma or below	2	4.4
	Bachelor's degree or above	43	95.6
Professional title	Staff nurse	9	20.0
	Senior nurse	16	35.6
	Supervisor nurse or above	20	44.4
Years of urology work experience	< 3 years	4	8.9
	3–5 years	4	8.9
	> 5 years	37	82.2
Employment type	Permanent post	10	22.2
	Contract-based	35	77.8
Fall risk prevention and control training	Yes	45	100
	No	0	0
Polypharmacy knowledge training	Yes	32	71.1
	No	13	28.9
Prior involvement in fall event management	Yes	15	33.3
	No	30	66.7

3.2. Scores for competency, polypharmacy knowledge, and self-efficacy

The total score for nurse fall risk prevention and control competency was 29.04 ± 4.28 (out of 40), with a scoring rate of 72.6%, indicating a moderate-to-high level. Dimension mean scores, in descending order, were: fall risk assessment ability (3.36 ± 0.51), risk monitoring and feedback ability (3.25 ± 0.55), nursing intervention implementation ability (3.14 ± 0.58), multidisciplinary collaboration ability (2.95 ± 0.62), and health education ability (2.83 ± 0.67); multidisciplinary collaboration and health education were the weaker dimensions. The polypharmacy knowledge score was 7.44 ± 2.97 (out of 12), with a correct response rate of 62.0%; the classification and identification of FRIDs dimension had the lowest correct rate (56.7%), indicating insufficient awareness of falls risk-increasing drugs. The general self-efficacy score was 29.27 ± 4.45 (out of 40), with a scoring rate of 73.2%. Scores for each scale are presented in **Table 2**.

Table 2. Scores of the Study Scales Among Participants (n=45)

Scale	Number of items	Maximum score	Actual score(mean ± SD)	Scoring rate(%)
Nurse Fall Risk Prevention and Control Competency Questionnaire	10	40	29.04 ± 4.28	72.6
Nurse Polypharmacy Knowledge Questionnaire	12	12	7.44 ± 2.97	62.0
General Self-Efficacy Scale	10	40	29.27 ± 4.45	73.2

3.3. Correlations of competency with polypharmacy knowledge and self-efficacy

Pearson correlation analysis showed that total competency score was positively correlated with polypharmacy knowledge score ($r = 0.524$, $P < 0.01$) and with self-efficacy score ($r = 0.486$, $P < 0.01$), indicating that higher polypharmacy knowledge and greater self-efficacy were associated with higher competency. The correlation matrix is presented in **Table 3**.

Table 3. Correlation Matrix of Scale Scores (r values, n=45)

Variable	Total competency score	Polypharmacy knowledge	Self-efficacy
Total competency score	1		
Polypharmacy knowledge	0.524**	1	
Self-efficacy	0.486**	0.312*	1

Note: *$P < 0.05$, **$P < 0.01$

3.4. Univariate analysis of competency scores by characteristics

Univariate analysis showed statistically significant differences in total competency scores according to educational level ($Z = -2.166$, $P = 0.030$), professional title ($F = 5.134$, $P = 0.006$), years of urology work experience ($F = 8.256$, $P = 0.001$), receipt of polypharmacy knowledge training ($t = 2.967$, $P = 0.005$), and prior involvement in fall event management ($t = 2.521$, $P = 0.016$). No statistically significant differences were found for age ($F = 1.323$, $P = 0.279$), sex ($t = 0.742$, $P = 0.462$), or employment type ($t = 1.478$, $P = 0.147$) ($P > 0.05$). Because all nurses had received fall risk prevention and control training, this variable was not included in the univariate analysis.

3.5. Multiple linear regression analysis of factors influencing competency

With total competency score as the dependent variable, variables that were statistically significant in

univariate analysis (educational level, professional title, years of urology work experience, receipt of polypharmacy knowledge training, and prior involvement in fall event management) and variables that might influence competency on professional grounds (polypharmacy knowledge score and self-efficacy score) were included as independent variables, and multiple linear regression analysis (stepwise method) was performed. The results showed that years of urology work experience (β = 0.285, P = 0.008), receipt of polypharmacy knowledge training (β = 0.342, P = 0.002), polypharmacy knowledge score (β = 0.356, P < 0.001), and self-efficacy score (β = 0.238, P = 0.018) were independent influencing factors of competency, collectively explaining 51.2% of the total variance (adjusted R^2 = 0.467). Educational level, professional title, and prior involvement in fall event management were removed during stepwise regression (P > 0.05). The results are presented in **Table 4**. The standardized regression coefficient for polypharmacy knowledge score was the largest (β = 0.356), indicating that it had the strongest predictive effect on competency.

Table 4. Multiple Linear Regression Analysis of Factors Influencing Fall Risk Prevention and Control Competency Among Urology Nurses

Variable	B	SE	β	t	*P*
(Constant)	9.847	3.256	—	3.024	0.004
Years of urology work experience	1.254	0.456	0.285	2.750	0.008
Receipt of polypharmacy knowledge training	3.126	0.978	0.342	3.196	0.002
Polypharmacy knowledge score	0.412	0.108	0.356	3.815	<0.001
Self-efficacy score	0.218	0.089	0.238	2.449	0.018

Note: R^2 = 0.512, adjusted R^2 = 0.467; B, unstandardized regression coefficient; β, standardized regression coefficient. Receipt of polypharmacy knowledge training was coded as 0 = no, 1 = yes.

4. Discussion

4.1. Competency was at a moderate-to-high level, with health education and multidisciplinary collaboration abilities requiring urgent improvement

This study showed that the total score for fall risk prevention and control competency among urology nurses was 29.04 ± 4.28, indicating a moderate-to-high level with considerable room for improvement. The fall risk assessment ability dimension scored relatively high, possibly reflecting routine use of tools such as the Morse Fall Scale, whereas health education ability and multidisciplinary collaboration ability scored lowest and represented the most prominent weak dimensions. Possible reasons are as follows: on the one hand, heavy clinical nursing workloads concentrate nurses' limited time and energy on basic care and order execution, resulting in insufficient systematic depth in health education; on the other hand, fall prevention for elderly patients with multimorbidity and polypharmacy involves multidisciplinary collaboration across medicine, nursing, pharmacy, and rehabilitation, yet current multidisciplinary team mechanisms remain underdeveloped, and nurses' role positioning and decision-making voice within the team are limited. These findings suggest that administrators should strengthen specialized training in health education skills and establish standardized multidisciplinary collaboration pathways.

4.2. Nurses had insufficient awareness of FRIDs, and polypharmacy knowledge requires urgent improvement

In this study, the overall correct response rate for polypharmacy knowledge was only 62.0%, with the lowest correct rate in the classification and identification of FRIDs dimension, indicating a notable deficiency in nurses' awareness of falls risk-increasing drugs, consistent with previous studies [8]. In urology, orthostatic hypotension induced by α-blockers is superimposed on the cumulative effects of FRIDs, markedly elevating fall risk; if nurses cannot accurately identify the potential hazards of these medications, proactive prevention in clinical care becomes difficult. The direct cause is the absence of medication risk management content in undergraduate education and in-service training, while the deeper cause is that "medication safety" remains largely defined as prevention of administration errors and has not been extended to the dynamic association between adverse drug reactions and patients' functional status. It is recommended that FRIDs-related knowledge be incorporated into routine continuing education, with case-based teaching and medication cards used to strengthen drug risk identification ability.

4.3. Analysis of factors influencing competency

Multiple linear regression showed that years of urology work experience, receipt of polypharmacy knowledge training, polypharmacy knowledge score, and self-efficacy score were independent influencing factors of competency.

Longer work experience was associated with higher competency, possibly because more senior nurses have accumulated richer fall prevention experience, formed more systematic cognitive schemas, and can more rapidly identify risk cues and make sound judgments in complex clinical situations. However, this finding also suggests that administrators should not rely solely on the natural path of "experience accumulating over time," but should accelerate the growth of novice nurses through structured training.

Nurses who had received polypharmacy knowledge training had significantly higher competency scores [9], empirically validating the effectiveness of training interventions and indirectly indicating a notable capability gap among untrained nurses. Polypharmacy and FRIDs knowledge should therefore be incorporated as mandatory modules in pre-service training and annual continuing education.

Higher polypharmacy knowledge scores were associated with higher competency, indicating that medication risk awareness is a foundational component of fall prevention competency—only by "knowing medications" can nurses "prevent falls." This finding also inversely corroborates the prominent issues noted in the Introduction regarding "limited assessment methods and insufficient consideration of the medication dimension," suggesting that competency improvement must include systematic medication knowledge education.

Higher self-efficacy was associated with higher competency scores. Nurses with high self-efficacy are more inclined to adopt active coping strategies when facing complex tasks such as risk identification, patient communication, and multidisciplinary coordination. Previous studies have also shown that self-efficacy is an important mediating variable in the translation of nursing behavior [10], suggesting that administrators can enhance nurses' self-efficacy through scenario simulation, sharing of successful experiences, and positive feedback, thereby indirectly promoting competency.

4.4. Implications and recommendations

Recommendations: (1) establish a tiered training system for urology nurses in fall risk prevention and control,

with differentiated objectives and content according to years of work experience, focusing on strengthening FRIDs identification and risk management; (2) optimize multidisciplinary collaboration mechanisms, clarify nurses' responsibilities and participation pathways, and enhance their collaboration ability and decision-making voice; (3) integrate self-efficacy cultivation into training design, using experiential teaching methods such as scenario simulation and case debriefing to strengthen clinical confidence and willingness to act.

4.5. Study limitations

(1) Only urology nurses from a single tertiary hospital were surveyed, limiting sample representativeness and requiring further verification of external validity; (2) the cross-sectional design cannot reveal causal relationships; (3) competency was assessed using a self-report questionnaire, which may be subject to social desirability bias; future studies could incorporate objective behavioral assessment or 360-degree evaluation.

5. Conclusion

The competency of urology nurses in fall risk prevention and control for elderly patients with multimorbidity and polypharmacy was at a moderate level, with health education ability and multidisciplinary collaboration ability as the main weak dimensions and particularly insufficient awareness of FRIDs. Years of urology work experience, receipt of polypharmacy knowledge training, polypharmacy knowledge level, and self-efficacy were independent influencing factors of competency. Nursing administrators should develop precise training strategies targeting these factors, focusing on strengthening FRIDs-related knowledge education, multidisciplinary collaboration ability training, and self-efficacy cultivation, so as to comprehensively improve urology nurses' fall risk prevention and control competency in this specific context and ensure the hospitalization safety of elderly patients with multimorbidity.

Disclosure statement

The authors declare no conflict of interest.

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