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Analysis of the current status of patient safety care and factors influencing it among low-seniority nurses

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Abstract: The study investigated the current status of patient safety care among low-seniority nurses and analyzed the factors affecting it. Low-seniority nurses play a crucial role in ensuring patient safety and improving nursing care quality. To understand the factors influencing their ability to provide safe care, a cross-sectional survey was conducted in 10 tertiary general hospitals in Sichuan Province, China, involving 369 low-seniority nurses. Data were collected through an online self-assessment questionnaire and analyzed using various statistical methods, including descriptive analysis, Pearson correlation analysis, and multiple linear regression. The results showed that low-seniority nurses scored moderately high on patient safety care (174.67 ± 6.61). Patient safety care was positively correlated with systems thinking (r = 0.927) and attitude towards reporting adverse nursing events (r = 0.945). Multiple linear regression indicated that age, participation in patient safety training, systems thinking, and attitude towards reporting adverse nursing events significantly influenced patient safety care, explaining 91.1% of the total variance. In conclusion, patient safety care among low-seniority nurses is moderately high, and key factors affecting their ability to provide safe care include age, training, systems thinking, and attitude towards reporting adverse events. This highlights the importance of targeted interventions and support for low-seniority nurses to enhance patient safety.

1. Introduction

With the rapid development of medical science and technology, the complexity and diversity of patient needs and health problems have made the importance of patient safety and quality of care increasingly prominent. Over the past decade, the topic of patient safety has received particular attention in both developed and developing countries [1]. However, as unsafe care and preventable medical errors and adverse events result in disability and injury or death for millions of patients worldwide each year [2], ways to improve patient safety have become a major challenge in

healthcare worldwide [3]. Safe nursing care is the application of nurses' knowledge and skills to provide high-quality care that minimizes the risk of harm to patients in nursing practice [4]. Low seniority nurses, as an important force in clinical care, have a level of patient safety care that is critical to ensuring patient safety and improving the quality of care. Patient safety care is influenced by a variety of individual, organizational, and societal factors, among which nurses' ability to think systematically and willingness to report adverse events are considered important factors in ensuring and promoting patient safety [5,6]. Studies have shown [7,8] that nurses' systems thinking skills are crucial in avoiding adverse events and promoting adverse event reporting. Nurses with higher systems thinking skills are more motivated to engage in safety-enhancing behaviors and have lower chances of adverse nursing events, thus ensuring and promoting patient safety. It is more likely to promote patient safety and quality care. Therefore, this study aimed to provide a comprehensive understanding of the current status of patient safety care among low-seniority nurses and to analyze the influencing factors in depth to provide a basis and reference for nursing administrators to develop interventions to improve patient safety care among low-seniority nurses.

At present, more and more scholars at home and abroad have been paying attention to patient safety care. Still, no research has been found to investigate the current situation of patient safety care and the factors affecting it among low-seniority nurses. Given the lack of relevant research in this area, this project aims to understand the current situation of systems thinking, nursing adverse event reporting attitudes, and patient safety care among low seniority nurses and to analyze in depth the factors affecting patient safety care, to provide a basis for nursing administrators to further reduce the incidence of adverse events, to improve the quality of management of nursing adverse event reporting, and to improve the quality of nursing safety management continually.

2. Method

2.1 Sampling and Setting

This study used convenience sampling to select junior nurses who met the inclusion criteria from July 2023 to September 2023 in 10 tertiary general hospitals in Sichuan Province, China. Inclusion criteria: ① those who have obtained the professional qualification certificate for nurses; ② those who have been engaged in clinical nursing for 3 to 36 months [9]; ③ those who have given informed consent and voluntarily participated in the survey. Exclusion criteria: ① those who came for further training, retired or rehired; ② non-low seniority nurses in outpatient clinics or administrative departments.

According to the sample size calculation formula $n=1+m+m\psi 2(1/R2-1)$ for multifactorial analysis, the number of independent variables in this study m=19 (7 general information, one dimension of the systems thinking scale, four dimensions of the clinical adverse event reporting scale, and seven dimensions of the patient safety care evaluation scale), and $\psi=1.96$ at the standardized time of the two-sided test $\alpha=0.05$ [10]. According to the pretest linear regression analysis, we learned that R2=0.287, which was calculated as $n=1+19+19\times1.962\times(1/0.287-1)\approx113$, and the sample size was calculated to be 136 cases considering a 20% inefficiency rate, and 369 cases were finally included in this study.

2.2 Measurement

2.2.1 General Information Questionnaire

It includes seven items of basic information: age, marital status, educational level, employment status, years of experience, whether they are specialized nurses, and whether they have attended

patient safety training.

2.2.2 Systems thinking

This study used the Systems Thinking Scale (STS), which was translated and sinicized by the scholars who were translated and sinicized by Maggie Zhang et al [11] in 2021. It consists of 20 entries and is scored on a 5-point Likert scale from "never" to "most of the time," with a total score of 0 to 80, with higher scores indicating greater systems thinking ability. The Cronbach alpha coefficient of the scale in this study was 0.926.

2.2.3 Attitude toward reporting adverse nursing events

This study used the Reporting of Clinical Adverse Effects Scale (RoCAES), which was formed by Zhou Yue and other [12] scholars in 2015 by Chinese revision. It contains four dimensions and 25 entries: the purpose of reporting, the environment of reporting, the impact of reporting, and the criteria for reporting, with items 1, 2, 4, 8, 13, 15, 16, and 17 as reverse entries. A 4-point Likert scale was used, ranging from "strongly agree" to "strongly disagree" on a scale of 1 to 4, with a total score of 25 to 100, and the higher the score, the more positive the nurses' willingness to report adverse events. The Cronbach alpha coefficient of the scale in this study was 0.952, and the Cronbach alpha coefficients of the dimensions were 0.826-0.963.

2.2.4 Patient Safety Care

This study used the Patient Safety Nursing (PSN) Self-Rating Scale, which was formed by the Chinese revision of scholars such as Ma Linlin et al [13]. It consists of seven dimensions and 40 entries: the first dimension: adhering to basic principles, ensuring equipment is available, and committing to accurate and error-free nursing practice; the second dimension: ensuring that information is accurately communicated and shared; the third dimension: anticipating abnormalities or dangers that arise in the patient, detecting them early, and dealing with them promptly; the fourth dimension: working collaboratively with healthcare workers to prevent unforeseen situations from occurring; the fifth dimension: learning about ensuring safety, instructing colleagues and patients; the sixth dimension: strengthening self-management to enhance safety awareness; and the seventh dimension: assessing the patient's condition and implementing safe nursing practices. The Likert 5-point scale was used, with scores ranging from 1 to 5, from "not at all compliant" to "fully compliant," and total scores ranging from 40 to 200, with higher scores suggesting that nurses are doing a better job of ensuring the safety of patient care. The Cronbach alpha coefficient of the scale in this study was 0.893.

2.3 Data collection method

Data were collected from July to September 2023, and the survey was conducted through an online self-assessment electronic questionnaire platform. Informed consent was obtained from the relevant departments of each hospital prior to the survey. The link and QR code of the questionnaire were sent to the WeChat group of the department through the assistance of the nursing administrators of each department, and nurses in the department who met the inclusion criteria were invited to participate in the survey. The first page of the questionnaire used a unified guide, informed consent was obtained from the subjects, and a promise was made to keep the study information confidential.

2.4 Quality control

Subjects were asked to complete the questionnaire within one week, and each IP address was allowed to submit only once. All questions were set as mandatory answers, and all answers were completed before successful submission. After the questionnaires were collected, the data were screened, and invalid questionnaires were excluded. Criteria for exclusion: the answers to the selected items are regular or the same; the answers are illogical; and the completion time is less than 5 min.

2.5 Ethical principles

Ethical approval was obtained from the Ethics Committee of the unit (Ethics (Research) No. 18 of 2023) (all methods were performed in accordance with the relevant guidelines and regulations). Subjects who submitted a complete questionnaire were considered to have given informed consent (informed consent was obtained from all subjects and their legal guardians). All data were collected anonymously, and the principle of confidentiality was applied to the subjects.

2.6 Statistical methods

SPSS 26.0 statistical software was used for data analysis and processing. Descriptive statistics were used for general characteristics. Independent t-test and ANOVA were used to explore the differences in the level of patient safety care among low seniority nurses in different demographic groups; Pearson correlation analysis was used to analyze the correlation between the scales; and multivariate linear regression analysis was used to analyze the main factors affecting patient safety care among low seniority nurses. $P<0.05$ was used to indicate that the differences were statistically significant.

3. Results

3.1 Systems thinking, attitude towards reporting adverse nursing events, and patient safety care scores of low seniority nurses

The total patient safety care score of the low seniority nurses in this group was (174.67±6.61), the total systems thinking score was (60.97±3.33), and the total attitude towards reporting adverse nursing events was (72.95±2.67), and the dimensional scores shown in Table 1.

Table 1: Systems thinking, attitudes toward reporting adverse nursing events, and patient safety care scores of low seniority nurses (n=369).

Item	Entries	Scoring range	$\bar{X}\pm S$
Systems thinking	20	54~75	60.97±3.33
Attitudes toward reporting adverse nursing events	25	67~85	72.95±2.67
Patient safety care	40	160~199	174.67±6.61
The first dimension	9	37~44	39.53±1.25
The second dimension	6	24~30	25.71±1.06
The third dimension	5	20~25	22.02±0.92
The fourth dimension	5	16~25	22.16±1.01
The fifth Dimension	4	16~21	18.32±1.07
The Sixth Dimension	5	19~25	20.79±0.86
The seventh Dimension	6	24~30	26.06±0.91

3.2 Demographic characteristics and results of univariate analysis of variance

The mean age of the 369 low-seniority nurses in this group was 24.78 years (SD = 2.66), as well as the mean number of years of experience was 1.87 years (SD = 0.84). The results of the univariate analysis of demographic and work-related characteristics of the low-seniority nurses, as well as patient safety care, are shown in Table 2. It was found that age, marital status, education, years of experience, and training in patient safety were significantly associated with patient safety care (P<0.05).

Table 2: Univariate analysis of demographic characteristics of low seniority nurses and patient safety care (n =369)

Item	N(%)	Patient Safety Nursing mean (SD)	*t/F*	*P* value
Age(years)		24.78±2.66	*t*=178.623	<0.001
Marital status			*t*=7.394	<0.001
Single	210(56.91)	172.66±6.78		
Married	159(43.09)	177.33±5.36		
Educational level			*F*=57.193	<0.001
Junior college	146(39.57)	170.76±6.25		
Undergraduate	206(55.83)	177.00±5.58		
Master's degree or above	17(4.61)	180.00±3.79		
Employment status			*t*=1.836	0.067
Permanent	46(12.47)	173.00±5.76		
Contract	323(87.53)	174.91±6.70		
Years of working		1.87±0.84	*t*=42.690	<0.001
Specialized nurse			*t*=1.222	0.223
Yes	40(10.84)	175.88±6.02		
No	329(89.16)	174.52±6.68		
Training in patient safety			*t*=4.159	<0.001
Yes	280(75.88)	175.51±6.24		
No	89(24.12)	172.02±7.09		

3.3 An analysis of the correlation between patient safety care and systems thinking and attitudes toward reporting adverse nursing events among low-seniority nurses

As shown in Table 3, patient safety care was positively correlated with both systems thinking and attitude toward reporting adverse nursing events in this group of low seniority nurses (r=0.927, r=0.945, both P<0.001).

Table 3: An analysis of the correlation between patient safety care and systems thinking and attitudes toward reporting adverse nursing events among low seniority nurses (n =369)

Item	Systems thinking		Attitudes toward reporting adverse nursing events	
	r	*P*	*r*	*P*
Patient safety care	0.927	<0.001	0.945	<0.001
The first dimension	0.883	<0.001	0.922	<0.001
The second dimension	0.873	<0.001	0.886	<0.001
The third dimension	0.860	<0.001	0.862	<0.001
The fourth dimension	0.803	<0.001	0.906	<0.001
The fifth Dimension	0.894	<0.001	0.839	<0.001
The Sixth Dimension	0.814	<0.001	0.882	<0.001
The seventh Dimension	0.868	<0.001	0.437	<0.001

3.4 Multiple linear regression analysis of factors influencing patient safety care of low seniority nurses

Table 4: Independent variable assignment table

Independent variable	Assignment method
Age	Original value entry
Marital status	Single=0, Married=1
Educational level	Junior college=1, Under graduate=2, Master's degree or above=3
Years of working	Original value entry
Training in patient safety	Yes=0, No=1
Systems thinking	Original value entry
Attitudes toward reporting adverse nursing events	Original value entry

Table 5: Multiple linear regression analysis of factors influencing patient safety care among low seniority nurses (n =369)

Independent variable	*B*	*SE*	*β*	*t*	*P*	95%*CI*
Constant	11.289	4.768	—	2.368	0.018	1.912~20.666
Age	0.217	0.061	0.088	3.566	＜0.001	0.098~0.337
Training in patient safety	2.035	0.262	0.132	7.774	＜0.001	1.520~2.549
Systems thinking	0.414	0.139	0.209	2.983	＜0.001	0.098~0.337
Attitudes toward reporting adverse nursing events	1.785	0.166	0.722	10.735	＜0.001	0.458~2.112

Note: R=0.955，R2=0.912，adjusted R2=0.911，F=940.396.

Multiple linear regression analysis was performed using the total patient safety care of low seniority nurses as the dependent variable and variables that were statistically significant in the univariate and correlation analyses as the independent variables. The independent variable assignments are shown in Table 4. The results of the multiple linear regression analysis showed that age, training in patient safety in patient safety training, systems thinking, and attitude toward reporting adverse nursing events were the main influences on patient safety care among low seniority nurses (P<0.05), explaining 91.1% of the total variance. See Table 5.

4. Discussion

4.1 Patient safety care of low seniority nurses is moderately high

In this study, we found that the overall level of patient safety care among low-seniority nurses was high, which is consistent with previous studies (174.67±6.61) [13]. The reason for this may be that with the reform of the healthcare system, medical institutions have standardized nursing work processes and systems [14]. Most low-seniority nurses can consciously implement various safety care measures by nursing procedures and standards to reduce the incidence of nursing errors, which contributes to the improvement of their level of patient safety care and thus protects the quality of clinical care and patient safety.

4.2 Analysis of factors influencing patient safety care among low seniority nurses

4.2.1 Age

The results of this study showed that age was the main influencing factor for patient safety care of lower seniority nurses (B=0.217, P<0.01), i.e., the older, the lower seniority nurses, the higher the level of patient safety care. The reason may be that younger nurses have insufficient clinical experience and low professional-level competence, and they are deficient in patient risk assessment and evidence-based nursing practice [15]. Meanwhile, older age is accompanied by higher seniority, and the more experienced nurses are in their work, the more professional skills they have.

4.2.2 Patient Safety Training

The results of this study showed that whether or not they had participated in patient safety training was the main influencing factor of patient safety care for nurses with low seniority (B=2.035, P< 0.01), i.e., the level of patient safety care was higher for nurses with low seniority who had participated in patient safety training. The reason may be that by participating in patient safety-related activities or programs, such as safe medication management [16], low seniority nurses who have participated in patient safety training are able to keep abreast of the latest cutting-edge patient safety knowledge and skills, reduce the risk of adverse events, and effectively improve patient safety care.

4.2.3 Systems thinking

The results of this study showed that systems thinking was the main influencing factor on patient safety care among low seniority nurses (B=0.414, P< 0.01), and patient safety care among low seniority nurses was positively correlated with systems thinking, i.e., the greater the ability to think systematically, the higher the nurses' level of patient safety care. Studies have shown [8] that nurses can critically examine complex nursing systems through systems thinking, and the higher their systems thinking ability, the more motivated they are to identify awareness of potential patient safety risks and engage in safe behaviors in nursing care, which reduces the incidence of adverse nursing events and helps to improve the level of patient safety care.

4.2.4 Attitude of reporting nursing adverse events

The results of this study showed that the attitude of reporting adverse nursing events is the main influence factor of patient safety care of low seniority nurses (B=1.785, P<0.01), and patient safety care of low seniority nurses is positively correlated with the attitude of reporting adverse nursing events, i.e., the more positive the attitude of reporting adverse nursing events, the higher the level of patient safety care of the nurses. A study confirmed [6] that nurses in tertiary hospitals have a strong willingness to report adverse events, and when the awareness of reporting adverse events among low-seniority nurses is higher, the more positive the reporting attitude, which plays a positive role in reducing the incidence of adverse events and improving patient safety.

5. Responses

In summary, the patient safety care of low seniority nurses in this study was moderately high. It is recommended that healthcare organizations and nursing managers adopt targeted countermeasures for low seniority nurses who are younger, have not participated in patient safety-related activities or programs, and have poorer systems thinking skills and attitudes toward

reporting adverse nursing events to improve the level of patient safety care and promote the quality of clinical care and patient safety. Specific countermeasures are as follows:(1) Nursing managers can use group discussions, reflective diaries, and reading guides to educate younger low seniority nurses about patient safety and role-playing to train them in skills [17] to improve the level of patient safety care among low seniority nurses. (2) Safe nursing care can be improved through training [18]. Therefore, hospital administrators should emphasize and encourage low-seniority nurses to participate in training activities related to patient safety, and they can also apply appropriate methods to meet the training needs of low-seniority nurses by adding courses on safe nursing care to nursing training. (3) Nursing administrators should provide training based on systems thinking to achieve systems safety [3] through changes in nursing processes, organizational culture, and the environment to equip low seniority nurses with the required patient safety care and systems thinking skills to reduce the incidence of adverse nursing events to promote safe nursing practice. At the same time, low seniority nurses are encouraged to participate in systems thinking and policy development, where they can share experiences of the positive impact of systems-based approaches on patient safety care to improve low seniority nurses' systems thinking skills to provide for the promotion of safe patient care practices. (4) Healthcare organizations should emphasize the importance of nursing adverse event reporting, establish a standardized system for reporting nursing adverse events and safety hazards events [19], and cultivate the assessment of adverse events and nursing risk awareness among low seniority nurses. At the same time, the implementation of a non-punitive adverse event reporting system and the adoption of incentives to encourage low-seniority nurses to report adverse events will reduce the incidence of nursing adverse events, and the level of patient safety and care will be gradually improved.

6. Limitations of the study

Although this study collected a large sample size, there are some limitations. First, the use of self-report scales for cross-sectional surveys may lead to biased results. Second, the sample only included low-seniority nurses working in tertiary general hospitals in Sichuan Province, China. There were some limitations in selecting the geographic area and the sample, which may affect the generalizability of the findings. In the future, multi-center, large-sample surveys can be conducted in different countries or hospitals of different levels.

7. Conclusion

This study is the first pioneering study to investigate the current status and factors influencing patient safety care among low-seniority nurses. The results of this study show that the level of patient safety care among low-seniority nurses is moderate to high, and the demographic characteristics that influence the level of patient safety care among low-seniority nurses are identified. In addition, systems thinking and adverse event reporting attitudes can directly influence the level of patient safety care among low-seniority nurses. Therefore, this suggests that hospitals and nursing administrators need to tailor interventions and training programs for low-seniority nurses with different characteristics. Attention should also be given to a systems-based approach to enhance low seniority nurses' understanding of systems thinking and perception of safe nursing care and to improve their systems thinking ability and willingness to report adverse nursing events to enhance the level of patient safety care.

Author Contributions

YZ, CZ, LC and CL contributed to this study's concept and design and critically revised the

manuscript. YZ, CZ, LC, YW, MD, YZ and CL drew the figures and wrote the manuscript. YZ, CZ, LC, YW, MD, YZ and CL analyzed the data. All authors have read and agreed to the published version of the manuscript.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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