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The Effects of Professional Autonomy, Job Satisfaction, and Perceived Patient-Safety Culture on Nurses' Patient-Safety Management Activities: A Cross-Sectional Study

Koak, Bokja¹ · Seo, Junglim¹ · Song, Eunji¹ · Shin, Haneul¹ · Jeon, Jaehee²¹Graduate student, Department of Nursing, Gangneung-Wonju National University, Wonju, Korea²Associate Professor, Department of Nursing, Gangneung-Wonju National University, Wonju, Korea

Purpose: This study aims to confirm the relationship between nurses' professional autonomy, job satisfaction, perceived patient-safety culture, and patient-safety management activities; it also identifies factors that influence their patient-safety management activities. **Methods:** A cross-sectional study design was adopted. The participants were 164 nurses from five hospitals in two G provinces, Korea, who participated in the study voluntarily. Data were collected between November and December 2022 via a 120-question structured questionnaire and analyzed using SPSS/WINDOWS software version 25.0. The data were measured by frequency, percentage, and mean and standard deviation, using an independent t-test, one-way ANOVA, Pearson's correlation coefficients, and multiple regression analysis. **Results:** The average age of the participants was 35.54±8.42 years; 143 (87.2%) were women. The following factors influenced their patient-safety management activities: level of education ($\beta=.16, p=.018$), experience of patient-safety education ($\beta=.15, p=.014$), and perceived patient-safety culture ($\beta=.56, p<.001$). The explanatory power of the nurses' patient-safety management activities was 44.0%. **Conclusion:** Hospital managers should enable nurses to carry out patient-safety procedures competently by providing continuous patient-safety education; they should also revise regulations and systems to promote good patient-safety management practices and create an environment that supports patient safety. In addition, a program should be designed and implemented to improve nurses' perceived patient-safety culture.

Key Words: Nurses; Job satisfaction; Patient safety; Professional autonomy

INTRODUCTION

A 1999 report on patient safety and ways to improve it, issued by the U.S. National Institute of Medicine, raised the issue of medical errors leading to an increased death rate. As a consequence, interest in this problem increased and patient safety became an important healthcare issue [1]. Subsequently, similar studies were conducted in many countries around the world, turning patient safety into a global issue [2]. In 2002, the 55th general meeting of the World Health Organization (WHO) emphasized the importance of patient safety and urged national leaders to establish patient-safety systems and required procedures [3]. In the case of South Korea, the Patient Safety Act was

announced in 2012 and enacted in 2015; nationwide patient-safety management procedures were implemented in July 2016 [4]. However, according to the 2020 Ministry of Health and Welfare patient-safety statistics yearbook, medical accidents increased by approximately 1.3 times between 2019 and 2020, with the 5-year trend showing an annual increase from 2016 [5]. Specifically, 45.4% of patient-safety incidents occurred in hospital rooms and more than 83% of all cases involved adults aged 20 or older in situations that often involved falls, medications, examinations, treatments, or surgeries [5].

Patient-safety management activities include all practices and procedures capable of preventing errors, mistakes, or accidents from occurring during the delivery of

Corresponding author: Jeon, Jaehee <https://orcid.org/0000-0003-3570-043X>

Department of Nursing, Gangneung-Wonju National University, 150 Namwon-ro, Heungeop-myeon, Wonju 26403, Korea.

Tel: +82-33-760-8648, Fax: +82-33-760-8641, E-mail: jhjeon@gwnu.ac.kr

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medical services, regardless of the actual harm done to patients [6]. In addition, it includes all procedures implemented by healthcare professionals, patients, patient caregivers, relevant institutions, corporations, and organizations to prevent the occurrence or recurrence of patient-safety incidents [4]. In-hospital safety breaches can threaten the lives of patients and gravely affect hospital finances [2]; thus, patient safety is an important factor, which can serve as an index for determining the quality of medical care. Although overall responsibility for patient-safety management activities lies with various organizations, the majority of staff at medical institutions are nurses; at least 50% of documented safety incidents have been linked to inappropriate nursing [7]. In other words, nurses hold the key role in patient-safety management activities at medical institutions, [8] acting as medical deliverers who can check and correct treatment errors [9]. Accordingly, various studies of patient-safety procedures have targeted nurses. The following factors have been found to influence nurses' patient-safety management activities: job satisfaction and organizational commitment [10], perceived patient-safety culture and self-efficacy [11], professional autonomy [12], and awareness of the importance of patient-safety management activities [13].

Professional autonomy refers to "a nurse's independent and creative decision-making, practice, and responsibility for nursing behavior in accordance with conscience and ethics, law and responsibility, and work performance standards." [14] Research has shown that professional autonomy can contribute to good patient-safety nursing practices. Some previous studies verified that the professional autonomy of nurses in small and medium-sized hospitals had an influence on patient-safety management activities [12]. However, another study found that the professional autonomy of hospital nurses had no influence on patient-safety nursing practices [15]. Professional autonomy is the ability and confidence to provide nursing care, based on professional knowledge and skills. It is considered an important variable in efforts to secure the independence of professional nurses and guarantee nursing quality [16]. As conflicting research results have been reported, further verification is needed.

Job satisfaction is a significant factor, supporting the growth and development of individual nurses. It has a positive impact on organizational development and goal achievement, fostering the provision of better-quality services [17]. Since high-quality nursing is strongly associated with patient satisfaction and patient safety, efforts to enhance the job satisfaction of hospital staff and the organizational culture around nursing constitute the most

effective way to enhance hospital competitiveness [10]. In previous studies, nurses' job satisfaction was found to be positively correlated with patient-safety results [10]. However, some studies have found no relationship between the job satisfaction of nurses in integrated wards and the number of patient-safety incidents [18]. One factor that impacts job satisfaction is the number of patients each nurse is responsible for. As the number of patients assigned to a nurse decreases, the time s/he spends on direct nursing increases, and his/her work efficiency improves, thus enhancing job satisfaction [12]. From this point of view, nurses' job satisfaction is expected to have an influence on patient-safety management activities, although few studies have investigated this topic to date.

Similarly, nurses' perceived patient-safety culture can have an important impact on their patient-safety management activities. A culture of patient safety incorporates leadership, teamwork, policies and procedures, efficient staff management, and a willingness to identify and report potential patient-safety risks in order to prevent incidents [19]. It is extremely important to create a patient-safety culture that can anticipate nurses' patient-safety management activities [19].

Among nurses, higher levels of perceived patient-safety culture are associated with better patient-safety management outcomes [11]. Alongside the need to highlight the importance of patient-safety management activities [20] (a social phenomenon), stakeholders must constantly identify factors that impact nurses' patient-safety management activities and perceived patient-safety culture in order to improve medical and nursing services.

This study explores the relationships among nurses' professional autonomy, job satisfaction, perceived patient-safety culture, and patient-safety management activities and procedures in order to identify factors that affect nurses' patient-safety management activities. The results will serve as fundamental data to improve the patient-safety management activities of clinical nurses.

The aim of this study is to identify the relationships among professional autonomy, job satisfaction, perceived patient-safety culture, and patient-safety management activities in nursing practice and thus to identify the factors that affect patient-safety management activities.

METHODS

1. Study Design

This descriptive research study aims to identify the factors that affect nurses' patient-safety management activities.

2. Study Subjects

As a minimum of three months' work experience is needed to foster professional autonomy [16], the study participants included nurses at five general hospitals in G province in the central region of Korea, all of whom had least three months of work experience. All participants understood the research objective and provided their voluntary consent. Our calculations showed that at least 157 participants were required, based on an effect size of 0.15, a significance level (α) of .05, power ($1-\beta$) of .90, and 12 predictive variables (nine general characteristics, three independent variables) in a regression analysis using G*Power 3.1.9.7. Overall, 173 participants were recruited (to accommodate an estimated 10% dropout rate) and 165 participants completed the questionnaire during the online survey period. Of these, only one participant provided inappropriate responses and was excluded, leaving 164 participants who completed the questionnaire in full and whose data were included in the analysis.

3. Ethical Considerations

The protocol and questionnaire for this study were reviewed and approved by the institutional review board of G University (GWNUIRB-2022-29) before any data were collected. The tools used in the study were approved by the original authors via email. Subjects who wished to participate in the study voluntarily accessed the survey link and read an explanation of the study purpose, the voluntary nature of participation, and the measures in place to protect participants before providing their consent online. In return for their participation, they received a gift certificate. The collected data will be stored for three years in a password-protected folder on the investigator's personal computer before being destroyed through permanent deletion.

4. Study Tools

1) General and work-related characteristics

Work-related characteristics were drawn from a previous study [7,8,10-12]. General characteristics were addressed in four questions about the participants' gender, age, levels of education, and marital status. Work-related characteristics were addressed in five questions about each participant's job position, total clinical career, hospital size, unit, and experience of patient-safety education. There were nine questions in total.

2) Professional autonomy

To assess professional autonomy, the 30-question Professional Autonomy Scale initially developed by Schuttenhofer [21] for adult women was revised, supplemented by Kim, [22] and adapted for Korean nurses as an 11-item questionnaire. Each question was rated using a 5-point Likert scale, with responses ranging from (1) "not at all" to (5) "strongly agree". Higher scores indicated higher levels of professional autonomy. The reliability was Cronbach's $\alpha = .80$ for Kim [22] and .82 for the present study.

3) Job satisfaction

The job-satisfaction tool developed for nurses by Song [23] was applied. This tool consists of 25 questions in five sub-domains, including six questions on the work itself, six questions on the work environment and welfare, four questions on colleague relationships, four questions on relationships with superiors, and five questions on human resources. Each question was rated using a 5-point Likert scale, with responses ranging from (1) "not at all" to (5) "strongly agree". Higher scores indicated higher levels of job satisfaction. At the time of development, the reliability of the tool was Cronbach's $\alpha = .84$ [23] and .94 for this study.

4) Perceived patient-safety culture

A Korean-style perceived patient-safety culture measurement tool developed for nurses by Lee [24] was used to measure perceived patient-safety culture. The tool is divided into three dimensions: organizational, departmental, and individual. It consists of 35 questions, including nine questions on leadership, four questions on patient-safety policies and procedures, four questions on patient-safety improvement systems as organization-level sub-factors, six questions on team work, four questions on non-punitive environments as department-level sub-factors, five questions on patient-safety knowledge and attitudes, and three questions on patient-safety priorities as individual-level sub-factors. Each question was rated using a 5-point Likert scale, with responses ranging from (1) "not at all" to (5) "strongly agree". Higher scores indicated more perceived patient-safety culture. At the time of development, the reliability of the tool was Cronbach's $\alpha = .93$ [24] and .93 for this study.

5) Patient-safety management activities

Patient-safety management activities were measured using a tool revised and supplemented by Lee [25]; it consisted of 46 questions based on the literature review in Lee [6] and designed to measure nurses' patient-safety prac-

tices. The tool provided 40 questions under eight sub-domains, including seven questions on patient identification, three questions on oral prescriptions, seven questions on medication, four questions on surgeries and procedures, three questions on safe environments, three questions on infections, three questions on falls, three questions on bed sores, and seven questions on emergency situations. Each question was rated using a 5-point Likert scale, with responses ranging from (1) "not at all" to (5) "strongly agree." Higher scores indicated better patient-safety management activities among nurses. At the time of development, the reliability of the tool was Cronbach's $\alpha = .95$ [6]; it was Cronbach's $\alpha = .92$ for the study by Lee [25] and .96 for the present study.

5. Data Collection

Data were collected between November 24 and December 15, 2022. After undergoing an IRB review, five general hospitals located in two G provinces posted details of the study in an online community of nurses, after obtaining permission from the head of the hospital. Participating nurses began the survey after accessing the online survey link. Once the data were submitted, no more entries were allowed to prevent duplicate surveys. The total time required to complete the survey was about 15 minutes.

6. Data Analysis

A statistical analysis was performed on the collected data using the SPSS/WIN 22.0 program. The subjects' general characteristics and variable degrees were analyzed by frequency, percentage, mean, and standard deviation. Differences in patient-safety management activities, based on participants' general characteristics, were analyzed using an independent t-test, a one-way ANOVA, and a Scheffé test post-hoc analysis. The correlation between each participant's professional autonomy, job satisfaction, perceived patient-safety safety, and patient-safety management activities was analyzed using Pearson's correlation coefficients. Factors that affected each participant's patient-safety management activities were analyzed via a multiple regression analysis.

RESULTS

1. Subjects' General and Work-related Characteristics

A total of 164 participants participated, of whom 143 were women (87.2%). The mean age was 35.54 ± 8.42 years,

with most participants in their 30s and 40s (68 participants, 41.5%). The typical level of education was graduation from bachelor's degree (108 participants, 65.9%) and most participants were married (87 participants, 53.0%). Work-related characteristics included hospital size 200~<300 beds for 65 participants (39.6%), 100~<200 beds for 62 participants (37.8%), 300~<500 beds for 22 participants (13.4%), and 500 beds or more for 15 participants (9.2%). Positions included staff nurse (124 participants, 75.6%), followed by charge nurse (21 participants, 12.8%), and head nurse (19 participants, 11.6%). Total clinical career was 10.12 ± 7.31 years on average, with the majority of participants (48 participants, 29.3%) having 5-10 years' experience. For 76 participants (46.4%), the unit was a hospital ward. In relation to patient-safety management activities, 152 participants (92.7%) had received training (Table 1).

2. Level of Professional Autonomy, Job Satisfaction, Perceived Patient-Safety Culture, and Patient-Safety Management Activities

The participants' mean professional autonomy score was 3.34 ± 0.58 points out of 5. The mean score for job satisfaction was 3.27 ± 0.58 out of 5. The mean score for perceived patient-safety culture was 3.56 ± 0.48 out of 5. The mean score for patient-safety management activities was 4.13 ± 0.52 out of 5 (Table 2).

3. Differences in Patient-Safety Management Activities, Based on Participant Characteristics

Level of education was the general characteristic with the most statistically significant impact on patient-safety management activities ($F=4.90, p=.009$). The post-test found that levels of patient-safety management were higher among nurses who had graduated from bachelor's degree, as opposed to three-year colleges (Table 1).

4. Correlation between Professional Autonomy, Job Satisfaction, Perceived Patient-Safety Culture, and Patient-Safety Management Activities

Patient-safety management activities had a positive correlation with professional autonomy ($r=.40, p<.001$), job satisfaction ($r=.44, p<.001$), and perceived patient-safety culture ($r=.62, p<.001$). Professional autonomy had a significant, positive correlation with job satisfaction ($r=.51, p<.001$) and perceived patient-safety culture ($r=.50, p<.001$). In addition, job satisfaction had a significant, posi-

Table 1. General Variable Characteristics and Differences based on Subject Characteristics

(N=164)

Characteristic	Categories	n (%) or M±SD	Patient safety-management practices	
			M±SD	t or F (p) Scheffé
Gender	Men	21 (12.8)	4.22±0.42	0.84
	Women	143 (87.2)	4.12±0.54	(.405)
Age (year)	< 30	48 (29.3)	4.09±0.51	0.68
	30~< 40	68 (41.5)	4.20±0.52	(.567)
	40~< 50	33 (20.1)	4.07±0.51	
	≥ 50	15 (9.1)	4.11±0.65	
		35.54±8.42		
Education level	College ^a	42 (25.6)	3.93±0.62	4.90
	Bachelor's degree ^b	108 (65.9)	4.19±0.46	(.009)
	≥ Master's degree ^c	14 (8.5)	4.31±0.54	a < b, c
Marital status	Married	87 (53.0)	4.19±0.50	1.41
	Unmarried	77 (47.0)	4.07±0.55	(.160)
Hospital size	100~< 200	62 (37.8)	4.03±0.54	1.57
	200~< 300	65 (39.6)	4.18±0.53	(.199)
	300~< 500	22 (13.4)	4.28±0.41	
	≥ 500	15 (9.2)	4.17±0.54	
Job position	Staff nurse	124 (75.6)	4.13±0.50	0.06
	Charge nurse	21 (12.8)	4.11±0.61	(.942)
	Head nurse	19 (11.6)	4.17±0.60	
Total clinical career (year)	< 5	45 (27.4)	4.17±0.45	0.79
	5~< 10	48 (29.3)	4.13±0.57	(.502)
	10~< 15	28 (17.1)	4.00±0.59	
	≥ 15	43 (26.2)	4.18±0.49	
		10.12±7.31		
Unit	Ward (general, comprehensive nursing service)	76 (46.4)	4.16±0.50	0.33
	Special ward (ICU, OR, ER)	23 (14.0)	4.17±0.47	(.717)
	Other (outpatient, angiography room, endoscopy room)	65 (39.6)	4.09±0.57	
Experience of patient- safety education	Yes	152 (92.7)	4.18±0.49	3.75
	No	12 (7.3)	3.61±0.65	(< .001)

ER=emergency room; ICU=intensive care unit; M=mean; OR=operation room; SD=standard deviation.

tive correlation with perceived patient-safety culture ($r=.68, p<.001$) (Table 3).

5. Factors Affecting Patient-Safety Management Activities

A multiple regression analysis was carried out to confirm the factors that affected participants' patient-safety management activities. The assumptions for the regression analysis were tested before the analysis. The Durbin-Watson index was 2.02 and the dependent variable was independent without autocorrelation. The Variance Inflation Factor (VIF) was 1.07~2.05, less than the standard value of 10, with no multicollinearity between independent variables. To confirm the suitability of the regression model

estimated via the regression analysis, the basic assumptions of normality and equal variance were confirmed. As the Kolmogorov-Smirnov test was confirmed, the normality of residuals was satisfied. The normal P-P plot of the regression standardized residuals was visually confirmed and their equal variance was satisfied. In a univariate analysis of the characteristics of participants with differing patient-safety management activities, the level of education and experience of patient-safety management training were treated as dummy variables before the regression analysis and inputted as independent variables.

The multiple regression analysis showed that the regression model was significant ($F=21.92, p<.001$); the factors that influenced participant patient-safety manage-

Table 2. Variable Scores

(N=164)

Variables	Categories	n	M±SD	Min~Max	Range
Professional autonomy	Total score	11	3.34±0.58	16~55	1~5
Job satisfaction	Work-related factors	6	3.51±0.67	6~30	1~5
	Factors related to the working environment/Employee benefits	6	2.84±0.72	7~30	
	Factors related to the personnel management system	5	2.91±0.76	5~25	
	Peer-related factors	4	3.76±0.65	8~20	
	Supervisor-related factors	4	3.51±0.89	4~20	
	Total score	25	3.27±0.58	37~119	
Perceived patient-safety culture	Leadership	9	3.58±0.68	9~45	1~5
	Teamwork	6	3.78±0.60	12~30	
	Patient-safety knowledge and attitude	5	4.01±0.54	13~25	
	Patient-safety policy and procedure	4	3.46±0.71	4~20	
	Non-punitive environment	4	3.27±0.88	4~20	
	Patient-safety improvement system	4	3.35±0.66	4~20	
	Patient-safety priority	3	3.00±0.73	3~15	
	Total score	35	3.56±0.48	53~164	
Patient-safety management activities	Patient confirmation	7	4.19±0.51	12~35	1~5
	Oral prescription	3	4.21±0.69	5~15	
	Medication surveillance	7	4.08±0.60	14~35	
	Surgical procedures	4	3.17±0.52	6~15	
	Secure environment	3	3.75±0.78	5~15	
	Infection prevention	3	4.35±0.62	7~15	
	Fall prevention	3	4.30±0.70	3~15	
	Bedsore prevention	3	4.19±0.75	3~15	
	Emergency	7	4.01±0.65	11~35	
	Total score	40	4.13±0.52	90~200	

Min=minimal; Max=maximal; M=mean; SD=standard deviation.

Table 3. Correlation between Professional Autonomy, Job Satisfaction, Perceived Patient-Safety Culture and Patient-Safety Management Activities

(N=164)

Variables	Professional autonomy	Job satisfaction	Perceived patient-safety culture	Patient-safety management activities
	r (p)	r (p)	r (p)	r (p)
Professional autonomy	1			
Job satisfaction	.51 (<.001)	1		
Perceived patient-safety culture	.50 (<.001)	.68 (<.001)	1	
Patient-safety management activities	.40 (<.001)	.44 (<.001)	.62 (<.001)	1

ment activities were as follows: at least four years of education ($\beta=.16$, $p=.018$), graduate school ($\beta=.16$, $p=.015$), having received patient-safety training ($\beta=.15$, $p=.014$), and perceived patient-safety culture ($\beta=.56$, $p<.001$). Of these, perceived patient-safety culture was the most influential factor. The explanatory power of the regression model (e.g., the influence of these variables on patient-safety management activities) was 44.0%. In other words, participants had better patient-safety management activ-

ities if they had a four-year bachelor's or graduate degree rather than a three-year professional BA, had received patient-safety management training, and was highly aware of patient-safety culture (Table 4).

DISCUSSION

This study set out to identify nurses' levels of professional autonomy, job satisfaction, perceived patient-safety

Table 4. Factors that Influence Patient-Safety Management Activities

(N=164)

Variables		B	S.E	β	t	p	95% CI
(Constant)		1.66	.25		6.66	< .001	1.17~2.16
Education level [†]	College (ref.)						
	Bachelor	0.17	.07	.16	2.39	.018	0.03~0.32
	≥ Master's degree	0.30	.12	.16	2.46	.015	0.06~0.54
Experience of patient-safety education [†]	Yes	-0.30	.12	.15	-2.48	.014	-0.54~-0.06
	No (ref.)						
Professional autonomy		0.10	.06	.11	1.51	.134	-0.03~0.22
Job satisfaction		-0.04	.08	-.05	-0.55	.586	-0.19~0.11
Perceived patient-safety culture		0.61	.09	.56	6.75	< .001	0.43~0.79

 $R^2=.46$, Adjusted $R^2=.44$, $F=21.92$, $p<.001$, Durbin-Watson=2.02CI=confidence interval; ref.=reference; S.E=standard error; [†] Dummy variables.

culture and patient-safety management activities; it has also confirmed the impact of these factors on patient-safety management activities. Based on the key findings of this study, the following issues are worth discussing.

The study participants averaged 4.13 out of 5 points for perceived patient-safety management activities; this result was similar to an average of 3.99 points in a study that used the same tool to analyze general-hospital nurses [26]. However, it was lower than the 4.32 point average [27] found in a study of shift-duty general-hospital nurses, and higher than the 3.51-point average [12] found in a study of nurses at small and medium-sized hospitals. Most studies in which the participants had lower patient-safety management activities scores were conducted in 2017 or 2018; since that time, nurses' patient-safety management activities scores appear to have increased. This may reflect a new emphasis on the importance of patient-safety management activities [28] since the Coronavirus Disease 2019 (COVID-19) pandemic highlighted the risk of infectious disease, based on specific, systematic safety management measures, guidelines, and medical-institution certification assessments introduced by hospitals to comply with the Patient Safety Act [4]. Among the sub-domains of patient-safety management activities, preventing infection scored the highest, in contrast to previous studies, in which the top-scoring item was preventing falls [11,12]. This too seems to reflect increased interest in infection prevention due to the pandemic. Ultimately, the factors that affected nurses' patient-safety management activities were as follows: level of education, patient-safety training experience, and perceived patient-safety culture; the total explanatory power of patient-safety management activities was 44.0%. In other

words, nurses received higher scores for patient-safety management activities if they had higher levels of education, experience of patient-safety training, and more perceived patient-safety culture.

First, the presence of level of education among these key general characteristics is consistent with a study by Kim [29] involving nurses at medium-sized hospitals. In other words, this prior study confirms that nurses with higher levels of education tend to have better patient-safety performance. In addition, nurses who received patient-safety training generally implemented more patient-safety management activities, according to a structural-model study of factors that influence nurses' patient-safety management activities. The fact that safety-related knowledge was a factor in that study [30] supports the present findings. Another study, which developed a structural model of patient-safety management activities, found that organizational factors influenced individual participative norms and that individual participative norms influenced patient-safety management activities through behavioral intentions [31]. In the present study, patient-safety education is seen as an organizational stimulant, which ultimately influences patient-safety management activities through participative norms and nurses' behavioral intentions. To improve nurses' patient-safety management activities, organizations will need to strengthen patient safety-related education, making sure that individuals focus on and complete relevant education to improve their understanding of patient safety.

In the present study, the factor that had the most impact on nurses' patient-safety management activities was perceived patient-safety culture. The score for perceived patient-safety culture was 3.56 out of 5 points, very close to

the 3.55 points [32] reported in a study that used the same tool to investigate intensive-care nurses working in tertiary general-hospital units; the score was lower than the 3.82 points [27] reported in a study of medical workers, conducted when the tool was developed. A further study, which used a meta-analytic path analysis to verify a virtual model of the patient-safety management activities of Korean nurses, found that patient-safety culture indirectly affected patient-safety management activities [9], thus partially supporting the results of the present study. A systematic literature review, carried out to confirm the influence of patient-safety culture as a safety strategy, showed that improving the perceived patient-safety culture could potentially reduce the damage caused by patient-safety incidents [33]. Improving nurses' perceived patient-safety culture may foster good patient-safety management activities. According to a study that compared perceived patient-safety culture at university hospitals and small and medium-sized hospitals, nurses at small and medium-sized hospitals had significantly higher levels of cultural awareness than those at university hospitals. In particular, university-hospital nurses said there was too much work to do and insufficient staff in the patient-safety culture recognition area. The dominant staff culture involved fear of being punished for safety incidents [34]. The university-hospital nurses engaged in more patient-safety practices to support surgery/procedures and to relieve pressure ulcers from falls than nurses at small and medium-sized hospitals [34]; this finding partially supports the results of the present study. To improve nurses' perceived patient-safety culture, it is important for organizations, departments, and individuals to work well and harmoniously together [27]. In other words, efforts to improve nurses' patient-safety culture require individual knowledge, awareness, and attitudes, along with systematic efforts to secure appropriate staff, establish an efficient communication culture within the hospital, and identify and improve the patient-safety cultural environment.

Although the nurses' professional autonomy and job satisfaction were correlated with patient-safety management activities in the present study, ultimately they were not influencing factors. Previous research on the relationship between professional autonomy and patient-safety management activities is limited, and the results contradict the research finding [12] that nurses' professional autonomy in small and medium-sized hospitals affects patient-safety management activities. According to a study of the properties of professional autonomy, the factors that explain nurses' professional autonomy are decision-making independence and the ability to use their own abilities

[16]. Related characteristics such as shared leadership, professional skills, inter- and intra-professional collaboration, and a healthy work environment are also involved [16]. As professional autonomy includes multidimensional attributes, there may be limitations involved in considering a direct relationship with nurses' patient-safety management activities. In fact, in a study in which nurses' professional autonomy was found to influence their patient-safety management activities, the average age of participants was 29, with 7% in managerial or higher positions [12]. By contrast, in a study in which professional autonomy was not shown to be an influencing factor, the average age of participants was 31.9, with 12% in managerial or higher positions [15]. The latter resemble participants in the present study, who had a mean age of 35.54 years, with 11.6% in managerial or higher positions. Among the attributes of professional autonomy, communication skills, such as leadership, professional skills, and collaboration can be elevated in nurses with relatively high levels of experience who hold higher than managerial roles [16]. It is conceivable that different results may be obtained, depending on the subject characteristics used as a tool to measure patient-safety management activities (based on actual work). However, as it is necessary to pay continuous attention to the relationship between professional autonomy and patient-safety management activities, additional verification will be needed in various clinical settings in future, based on participant characteristics.

A study of nurses in an integrated nursing-care service ward found low levels of job satisfaction but also a very low level of patient-safety incidents [18], supporting the results of the present study. In other words, even nurses with low levels of job satisfaction appear to feel a strong sense of responsibility for patient safety, due in part to a cultural fear of being punished for safety incidents [34]. Alternatively, these results have also been linked to independence and the ethical aspects of nursing work [12]. A study of doctors and nurses in small and medium-sized hospitals in Spain found that higher job satisfaction had a positive effect on patient-safety culture [35], contradicting another study, which suggested the need to repeatedly confirm the relationship between nurses' job satisfaction and patient-safety management activities.

As the present study collected data from nurses who deliver direct patient care at a medical institution in one region, there are limitations in generalizing the results. Nevertheless, the study makes a meaningful contribution to the field by confirming that nurses' perceived patient-safety culture has an influence on patient-safety management activities in environments with a high risk of infection

(e.g., during the COVID-19 pandemic). To improve nurses' patient-safety management activities, it will be necessary to prepare a patient-safety management education program and increase nurses' perceived patient-safety culture at the hospital, department, and individual level, alongside continuous education related to patient-safety management.

CONCLUSION

This study aims to confirm the relationship between nurses' professional autonomy, job satisfaction, perceived patient-safety culture, and patient-safety management activities. In addition, it identifies various factors that affect nurses' patient-safety management activities: having a four-year bachelor's degree or higher, having received patient-safety education, and a perceived patient-safety culture. Hospitals should therefore develop and provide regular programs to educate nurses about patient safety, while nurses, for their part, should actively participate in education. It is also important to create and promote a patient-safety culture to improve the perceived patient-safety culture within organizations. To this end, a system must be established to prevent avoidable safety breaches by analyzing their causes, rather than punishing staff when incidents occur. To achieve this, policies and procedures, effective leadership, and good staff management will be needed. Such changes will ultimately improve nurses' patient-safety management activities and help to reduce the number of safety breaches involving adult patients.

Based on the results of this study, we would like to propose the following initiatives. First, we recommend developing a program to strengthen nurses' perceived patient-safety culture and improve their patient-safety practices. Further research is needed to confirm this effect. Second, it is important to regularly confirm the relationship between nurses' professional autonomy, job satisfaction, and patient-safety management activities in various medical environments.

CONFLICTS OF INTEREST

Jaehee Jeon has been the Associate Editor of the Korean Journal of Adult Nursing since 2022. She was not involved in the review process. Otherwise, no potential conflict of interest relevant to this article was reported.

AUTHORSHIP

Study conception and design acquisition - KB, SJ, SE and JJ; Data collection - KB, SE and SH; Analysis and interpretation of the data - KB, SJ, SE and JJ; Drafting and critical revision of the manuscript - KB, SJ, SE, SH and JJ.

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