



## Original Article

**Safety climate, nursing organizational culture and the intention to report medication errors: A cross-sectional study of hospital nurses**Hyun Young Lee<sup>1</sup>, Eun-Kyung Lee<sup>2\*</sup><sup>1</sup>Daegu Catholic University Medical Center, Daegu, Republic of Korea<sup>2</sup>Research Institute of Nursing Science, College of Nursing, Daegu Catholic University, Daegu, Republic of Korea

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## ABSTRACT

**Background & Aim:** Medication errors are the second most common accident after the fall accident in hospitals. Medication errors are a threat to patient safety. It is important to find the cause of such errors so that we can reduce them. However, the rate of medication error reporting is low. This study aimed to explore the factors associated with the intention to report medication errors among general hospital nurses.**Methods & Materials:** A cross-sectional study design was used. The participants were 171 registered nurses working in 4 general hospitals in South Korea. Convenient random sampling was used to select participants. Data were collected using mobile self-report structured questionnaires that covered general characteristics, medication errors and the intention to report them, the safety climate, and the nursing organizational culture. The data collection period was from March 14 to April 6, 2018. The data were analyzed by descriptive statistics, the Pearson correlation coefficients, and multiple regression analysis.**Results:** The mean scores of the intention to report medication errors and safety climate were  $5.20 \pm 1.40$  and  $3.04 \pm 0.47$ , respectively. Each mean score of nursing organizational culture types was hierarch-oriented culture  $3.63 \pm 0.51$ , relation-oriented culture  $3.13 \pm 0.69$ , task-oriented-culture  $2.99 \pm 0.56$ , and innovation-oriented culture  $2.85 \pm 0.67$ . Significant factors associated with the intention to report medication errors were the safety climate ( $\beta = .26$ ,  $p = .001$ ), a task-oriented culture ( $\beta = .16$ ,  $p = .023$ ), educational level ( $\beta = -.19$ ,  $p = .006$ ), the experience of medication errors ( $\beta = .19$ ,  $p = .006$ ), and male ( $\beta = .18$ ,  $p = .011$ ). They accounted for 25% of the intention to report medication errors.**Conclusion:** This study found that the safety climate of the hospital, task-oriented culture of the nursing organization, education level, experience of medication errors, and gender associated with the intention to report medication errors. It is necessary to find ways to improve the safety climate of the hospital and the task-oriented culture of the nursing organization and establish a strategy for improving the intention to report medication errors for male nurses and nurses with medication errors.**Introduction**

An ongoing concern for healthcare organizations, medication errors are accidents that can harm. Approaches to reducing medication errors concern nurses as nearly 80% of medication errors occur during the prescription and administration phases (1). According to self-reports to the Korea Patient Safety Reporting & Learning System in 2018, more than 9,000 cases (28% of the total) were medication errors (2). Various types of medication errors occur, including wrong dosages, drugs, and patients (3,4).

Many studies pointed out that determining the status and causes of medication errors based solely on reports is very dangerous due to the number of unreported cases (5-7). For example, according to a study conducted with nurses at 25 hospitals in the US, only about 47% of medication errors were reported (8). Nevertheless, medication errors reports are important because they enable the evaluation of a real error that can be used to prevent future errors (5).

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The theory of planned behavior (TPB) was developed by Ajzen (9). TPB has been widely applied to describe and predict human behaviors in various fields (10). According to TPB, intention is an influencing factor of behavior (11), and studies of the relationship between intention and actual behavior also showed that intention is an influential factor in behaviors (12-13). TPB has also been used in a number of studies involving medication errors and patient safety (13-15).

Safety climate is a variable that should be noted as a factor related to intention to report medication errors. Safety climate refers to shared perceptions of workgroup members regarding workplace safety (16). According to a study that analyzed the effectiveness of a program on patient safety, safety climate decreased patient harm and serious safety events (17). The importance of safety climate is emphasized for promoting reporting of medication errors, since the fear of unfavorable administrative decisions due to medication errors or the errors becoming known to colleagues or patients make nurses hesitate to report them, despite them believing that reporting medication errors can prevent them and help create a safety climate (6,7,18). Research on hospital nurses showed that the better the safety climate, the better the willingness to reporting medication errors (19, 20).

Organizational culture refers to the organization's own beliefs, values, norms, and patterns of behavior shared by the members of the organization and that affect the behavior of the members (21). Nursing organizations have unique cultural and nursing organizational cultures, made up of nurses' values, beliefs, and modes of behavior. These influence the behaviors and attitudes of the members (22). Especially in Korea, when nurses make medication errors, they report them to the department leader, so the dynamics of the ward need to be free from existing points of view on medication errors such as stigma, shame, and criticism (23). In addition, finding the cause of errors is difficult in a culture that attempts to conceal errors when they occur (24). Since

open discussions on errors are effective in preventing errors (25) and the necessity of creating an organizational culture that promotes error reporting is emphasized (1), the types of nursing organizational culture are expected to be related to the intention to report medication errors.

This study aimed to identify the factors related to the nurse intention to report medication errors (IRME) in Korean nurses.

## Methods

This was a cross-sectional study with a survey design conducted in Korea.

### Sample

The Participants included registered nurses working in four general hospitals in Daegu, Korea. A convenient sampling technique was used to recruit the number of nurses needed to complete the study. The inclusion criteria for the participants were (a) working in inpatient departments, (b) working eight-hour/night shifts, (c) providing direct patient care, and (d) full-time registered nurses. The power analysis identified 171 were required for the study (basis of a 3.1.9.2 program for multiple regression analysis with an alpha level of 0.05, a power of 0.90, and a medium effect size of 0.15) (26).

### Measurements

The IRME was measured using the scale used by Kim (19). It is consisted of three-items. Items include 'In your current situation, would you report a medication error if you had caused it that did not harm the patient at all?,' 'In your current situation, would you report a medication error if your coworker had caused it that did not harm the patient at all?,' 'Will you exchange information about the medication error with other healthcare members in the future?'. All items were supposed to be measured on a 100-point visual analogue scale. However, it was difficult to display it on the mobile screen, so the researchers modified it to an eight-point Likert scale based on the advice of three nursing professors. The IRME was

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calculated as the mean value. The range of the IRME score was from 1 to 8. The higher the score, the higher the IRME quality. The original study reported a Cronbach's alpha coefficient of 0.86 (19).

The safety climate was measured using the scale by Blegen et al. (8), translated into Korean (20). It consisted of 33 items addressing 7 dimensions, including unit manager (5 items), safety emphasis (4 items), use of data for improvement (4 items), pharmacists (3 items), blame system (5 items), worker safety (5 items), and socialization/training (6 items). All items were measured with a five-point Likert scale. The safety climate was calculated as the mean score. The range of the safety climate score was from 1 to 5. Higher scores indicated a stronger safety climate. The Cronbach's alpha coefficient for the scale reported in the Korean version (20) was 0.85.

The nursing organizational culture was measured using the scale by Kim et al. (22). Based on the competitive value model, Kim et al. classified nursing organizational culture into four types and developed measurement items for each type (22). This scale has consisted of 20 items addressing 4 types: relation-oriented culture (5 items), innovation-oriented culture (6 items), hierarch-oriented culture (5 items), and task-oriented culture (4 items). All items were measured using five-point Likert scales. The nursing organizational culture was calculated as the mean score. The higher the score, the stronger each type of nursing organizational culture is. The original study reported Cronbach's alpha for relation-oriented, innovation-oriented, hierarch-oriented, and task-oriented cultures of 0.88, 0.75, 0.66, and .62, respectively.

### *Data collection*

Data were collected using an online survey administered from March 14 to April 6, 2018, after obtaining approval from the institutional review board of Daegu Catholic University (IRB no. CUIRB-2017-0093). The participants were informed of the

purpose and method of the study through an online guide. They voluntarily accessed the website to respond to the online questionnaire, and they were told that by responding to the online questionnaire, they agreed to participate in the study. They were also informed that the collected data would only be used for statistical purposes. A total of 201 people replied to the online survey.

### *Data analysis*

Data analysis was performed using SPSS/WIN 25.0. The statistical significance level was  $p < .05$ . Descriptive statistics were used to describe the participants' demographic characteristics. Normality was checked using skewness and kurtosis. We checked independent variables for multicollinearity. The tolerance was 0.84-0.95, over 0.1, and the variance inflation factor (VIF) was 1.06-1.02, under 10, confirming that there was no problem in multicollinearity between independent variables. Pearson's correlation coefficient analysis was used to assess the correlations among variables. Stepwise multiple linear regression was used to identify the factors associated with the intention to report medication errors.

### **Results**

After completing the questionnaire, 30 respondents were excluded due to incomplete data. The study included 171 participants, with 93.6% female. The mean participant age was  $30.91 \pm 6.12$  years (47.4% between 26 and 30), with most having a bachelor's degree (67.8%). The mean nurse work experience was  $8.44 \pm 6.15$  years, with half the participants reporting more than 7 years. The mean work years in the present ward was  $4.24 \pm 3.22$  years, with less than half having more than three years. In total, 21.6% of the participants were involved in a medication error while almost double the participants detected a medication error in the past month. Only 11.1% had experienced reporting a medication error, and 88.9% had not had such an experience in the past month (Table 1).

Table 1. General characteristics (N=171)

Characteristics	N (%) or M±SD
<b>Gender</b>	
Female	160(93.6)
Male	11(6.4)
<b>Age (years)</b>	30.91±6.12
≤25	25(14.6)
26~30	81(47.4)
31~35	27(15.8)
≥ 36	38(22.2)
<b>Educational level</b>	
3-year college	38(22.2)
Bachelor	116(67.8)
Master	17(10.0)
<b>Total clinical career (years)</b>	8.44±6.15
≤3	37(21.6)
4~6	48(28.1)
≥ 7	86(50.3)
<b>Career in present ward (years)</b>	4.24±3.22
≤3	91(53.2)
4~6	49(28.7)
≥ 7	31(18.1)
<b>Medication errors in the past month</b>	
Yes	37(21.6)
No	134(78.4)
<b>Detection of medication errors in the past month</b>	
Yes	76(44.4)
No	95(55.6)
<b>Reporting medication errors in the past month</b>	
0	152(88.9)
1≥	19(11.1)

The mean scores of the intention to report medication errors and safety climate were  $5.20 \pm 1.40$  and  $3.04 \pm 0.47$ , respectively. The mean scores of hierarchy-oriented culture, relation-oriented culture, task-oriented culture, and innovation-oriented culture were  $3.63 \pm 0.51$ ,  $3.13 \pm 0.69$ ,  $2.99 \pm 0.56$ , and  $2.85 \pm 0.67$ , respectively (Table 2). Internal reliability of the variables of the questionnaire ranged between 0.61 and 0.92.

Intention to report medication errors was found to be positively correlated with safety climate ( $r=.35$ ,  $p<.001$ ), innovation-oriented culture ( $r=.34$ ,  $p<.001$ ), relation-oriented culture ( $r=.27$ ,  $p<.001$ ), and task-oriented culture ( $r=.19$ ,  $p=.016$ ), the exception was hierarchy-oriented culture ( $r=-.07$ ,  $p=.396$ ) (Table 3). Multiple linear regression was conducted to examine the factors associated

with reporting medication errors. 25.0% of the variance in the intention to report was explained by safety climate, task-oriented culture, education level, medication errors in the past month, and gender ( $F=11.07$ ,  $p<.001$ ). Significant factors associated with the intention to report medication errors were the safety climate ( $\beta=.26$ ,  $p=.001$ ), a task-oriented culture ( $\beta=.16$ ,  $p=.023$ ), educational level ( $\beta=-.19$ ,  $p=.006$ ), the experience of medication errors ( $\beta=.19$ ,  $p=.006$ ), and gender ( $\beta=-.18$ ,  $p=.011$ ). Higher degrees of safety climate, task-oriented culture, and medication errors in the past month were identified as predictors of increased intention to report, and holding a master's degree and being male were identified as predictors of decreased intention to report (Table 4).

Table 2. Degree of variables (N=171)

Variables	M±SD	Min.	Max.	Possible range
<b>Intention to report medication errors</b>	5.20±1.40	1.00	8.00	1~8
<b>Safety Climate</b>	3.04±0.47	2.03	4.21	1~5
Unit manager	2.93±0.65	1.00	4.60	1~5
Safety emphasis	3.41±0.59	1.80	5.00	1~5
Use data for improvement	3.25±0.58	1.75	4.75	1~5
Pharmacists	2.60±0.64	1.00	4.00	1~5
Blame system	2.84±0.57	1.20	4.80	1~5
Worker safety	3.04±0.60	1.80	4.40	1~5
Socialization/training	3.09±0.56	1.33	4.83	1~5
<b>Nursing organizational culture</b>	3.15±0.39	2.14	4.15	1~5
Relation-oriented culture	3.13±0.69	1.00	5.00	1~5
Innovation-oriented culture	2.85±0.67	1.00	5.00	1~5
Hierarchy-oriented culture	3.63±0.51	2.20	4.80	1~5
Task-oriented culture	2.99±0.56	1.25	4.25	1~5

Table 3. Correlations among variables (N=171)

Variables	1	2	3	4	5	6
	r (p)					
<b>Safety climate</b>	1					
<b>Relation-oriented culture</b>	.68 (<.001)	1				
<b>Innovation-oriented culture</b>	.71 (<.001)	.68 (<.001)	1			
<b>Hierarchy-oriented culture</b>	-.09 (.223)	-.10 (.217)	-.23 (.002)	1		
<b>Task-oriented culture</b>	.27 (<.001)	.17 (.029)	.34 (<.001)	.28 [<.001]	1	
<b>Intention to report medication errors</b>	.35 (<.001)	.27 (<.001)	.34 (<.001)	-.07 (.396)	.19 (.016)	1

Table 4. Factors associated with intention to report medication errors (N=171)

Variables	B	SE	β	t	p
(Constant)	1.31	.75		1.75	.082
<b>Safety climate</b>	0.76	.22	.26	3.50	.001
<b>Nursing organizational culture</b>					
Task-oriented culture	0.41	.18	.16	2.30	.023
<b>Educational level d2<sup>†</sup></b>	-0.90	.32	-.19	-2.80	.006
<b>Medication errors in the past month<sup>†</sup></b>	0.66	.24	.19	2.79	.006
<b>Gender<sup>†</sup></b>	-1.03	.40	-.18	-2.56	.011

R<sup>2</sup>=.25, Adjusted R<sup>2</sup>=.23, F=11.07, p<.001

<sup>†</sup>Dummy variables: Education level (College=0, Bachelor=d1, Master=d2), Medication errors in last month (Yes=0), Gender (Female=0)

## Discussion

In the present study, 21.6% of the subjects had experienced medication errors during the past month, and only 11.1% of the participants who had experienced medication errors reported the errors. This rate was lower than the 58.9% reported (20) and higher than the 47% reported by one overseas study (8). These differences in the reporting rate of medication errors can be interpreted from two different perspectives. First, institutions do not have clear criteria for reporting medication errors, resulting in lower reporting than researchers in South Korea (23). Second, reporting medication errors requires time in addition to personal liabilities such as damage to self-image, fear of blame, and potential for punishment (5).

The safety climate was found to be related to IRME in the present study. It would be expected that the safety climate will improve the intention to report medication errors because previous studies also reported that a safety climate perceived by nurses promoted the reporting of disruptive behavior (7) and improved nurses' intention to report medical incidents (27). According to overseas researches, prescription errors constituted about half of all drug-related errors, and administration errors were mostly caused by a lack of knowledge and information on drugs (28,29). Therefore, efforts at the hospital level to periodically provide new drug information to nurses, share drug-related errors among hospital medical personnel. Previous studies reported that nurses who made medication errors were afraid of criticism and punishment from fellow nurses, doctors, and the head nurse once their errors became known (6,30). The low level of IRME when they were experienced in the present study also appeared to be related to previous negative experiences. Although medication errors are made by nurses when administering medications, there are other possible factors outside nurse control, such as the medication environment, a lack of drug information, and incomplete or unclear prescriptions (3,4). Consequently,

the organizational climate not supporting nurse medication error reporting is unable to realize hidden problems with processes and weakness in the system. Through leaders focused on advancing a just culture, where errors are viewed as the organization's responsibility versus the poor-quality work of one person, the nurse will be more comfortable and confident in report medication errors.

A task-oriented culture among the nursing organizational culture was found to be related to IRME in the present study. This finding is supported by a domestic study using the same scale (31). A task-oriented culture is a culture that emphasizes organizational stability, achievement, and productivity (22). So, the higher the task-oriented culture, the more likely it is to seek safety by reporting medication errors, which seems to have resulted.

IRME was low in nurses with a master's degree or higher than nurses with an associate's degree. According to a domestic study, nurses who concurrently attend graduate schools are sorry for asking for their shift schedules. At the same time, they are burdened with high expectations for themselves (32). Accordingly, their concern that their medication errors would be considered evidence that they were neglecting their hospital work appeared to make them hesitate to report errors.

Gender was related to IRME in this study. However, the generalization of the present findings is difficult because of the low ratio of male nurses (6.4%). In this study, the ratio of male nurses was lower than the ratio of all-male nurses because operating rooms, in which the number of male nurses is relatively high in Korea, were excluded. But, the findings of this study cannot be overlooked in the current situation in which the number of male nurses is increasing in Korea. Therefore, it appears to be necessary to determine if different strategies to improve the intention to report medication errors should be established for each gender through a future study

investigating differences in the reporting rate of medication errors and barriers to reporting according to the gender ratio of South Korean nurses.

### **Limitations**

The present study has several limitations. First, the use of convenience sampling limited its generalizability. This study focused on four general hospitals in Korea, and the results may not be applicable to other regions. Second, a cross-sectional study was used. There are limitations in determining the causality of variables. Third, the IRME scale was modified, and the instruments were not reviewed for face validity or tested for construct validity. Fourth, the study did not investigate the characteristics of the nursing organization, which can influence the intention to report medication errors. Nonetheless, the significance of the present study for nursing science lies in its identification of factors related to the intention to report medication errors in the organizational dimension rather than the personal dimension, in which medication errors are frequent. Going beyond the safety climate of the hospital and nursing organizational culture, whose relationships with the intention to report medication errors were determined in the present study, efforts should be made to understand the relationship between the intention to report and the nursing work environment, professionalism, the reporting system, and the leadership of the head nurse, which were identified in previous studies.

### **Conclusion**

We found that the safety climate perceived by general hospital nurses, a task-oriented culture among the types of nursing organizational culture, education level, experiences of medication errors, and gender are related to the intention to report medication errors. Accordingly, efforts to create a supportive atmosphere throughout the whole hospital should be supported at the hospital organizational level to improve

the safety climate so that departments related to drugs will collaborate and medication errors will not be criticized. In addition, nursing organizations should search for ways to create a ward culture that emphasizes patient safety and the department's productivity.

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### **Conflict of interest**

There is no conflict of interest in this study.

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