



VOLUNTARY MEDICATION ERROR REPORTING BY ED NURSES: EXAMINING THE ASSOCIATION WITH WORK ENVIRONMENT AND SOCIAL CAPITAL

Authors: Amany Farag, PhD, RN, Mary Blegen, PhD, RN, FAAN, Amalia Gedney-Lose, BSN, RN, Daniel Lose, BSN, RN, and Yelena Perkhounkova, PhD, Iowa City, IA, San Francisco, CA

Introduction: Medication errors are one of the most frequently occurring errors in health care settings. The complexity of the ED work environment places patients at risk for medication errors. Most hospitals rely on nurses' voluntary medication error reporting, but these errors are under-reported. The purpose of this study was to examine the relationship among work environment (nurse manager leadership style and safety climate), social capital (warmth and belonging relationships and organizational trust), and nurses' willingness to report medication errors.

Methods: A cross-sectional descriptive design using a questionnaire with a convenience sample of emergency nurses was used. Data were analyzed using descriptive, correlation, Mann-Whitney U, and Kruskal-Wallis statistics.

Results: A total of 71 emergency nurses were included in the study. Emergency nurses' willingness to report errors decreased as the nurses' years of experience increased ($r = -0.25$, $P = .03$). Their willingness to report errors increased when they received more feedback about errors ($r = 0.25$, $P = .03$) and when their managers used a transactional leadership style ($r = 0.28$, $P = .01$).

Discussion: ED nurse managers can modify their leadership style to encourage error reporting. Timely feedback after an error report is particularly important. Engaging experienced nurses to understand error root causes could increase voluntary error reporting.

Key words: Leadership style; Safety climate; Organizational trust; Medication error reporting; Emergency department

Medical errors climbed from the eighth to the third leading cause of death in the United States.¹ Medication errors are one of the most frequently occurring errors in health care settings.² The ED work flow,

characterized by fragmented information, diverse patient acuity levels, frequent interruption, time pressure, and a crowded environment, is believed to increase the likelihood of medication errors.³⁻⁵ In addition, more than 210 million medications are administered in the emergency department annually, placing the emergency department as one of the highest risk areas for the occurrence of medication errors.⁶ Medication errors occur in approximately 1 of every 4 medication administrations, and 60% of ED patients experience medication errors.³ Fortunately, not all ED medication errors are harmful, and some are caught before medications are administered to patients.^{3,5,7} A small percentage of errors (0.6%) result in severe patient harm and death.^{3,5,7}

Emergency nurses are in a crucial position for intercepting and reporting errors. Most hospitals rely on nurses' voluntary error reporting to capture errors and to assess both human and system failures contributing to errors. Medication error reporting is a voluntary activity that could help hospitals' safety and quality officers to understand root causes and recommend measures for preventing similar errors from happening in the future.^{2,5,8} Unfortunately, although serious medication errors are usually reported, minor errors and near-misses often are not reported.⁸ Failure to report minor errors and

Amany Farag is Assistant Professor, College of Nursing, The University of Iowa, Iowa City, IA.

Mary Blegen is Professor Emerita, School of Nursing, University of California-San Francisco, San Francisco, CA.

Amalia Gedney-Lose is Registered Nurse-ER, University of Iowa Hospitals and Clinics, Iowa City, IA.

Daniel Lose is Nurse Manager, General Neurology & Epilepsy Monitoring Unit, University of Iowa Hospitals and Clinics, Iowa City, IA.

Yelena Perkhounkova is Statistician, College of Nursing, The University of Iowa, Iowa City, IA.

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For correspondence, write: Amany Farag, PhD, RN, College of Nursing, The University of Iowa, Rm 486, CNB, 50 Newton Rd, Iowa City, IA 52242; E-mail: amany-farag@uiowa.edu.

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TABLE 1

Definitions of the study concepts and variables and examples for the survey items

Variable	Definition	Sample items
Leadership styles		
Transformational	Is a leadership style in which the leader aims at achieving long term organizational and individual change Transformation leader is people oriented and motivates and inspires staff to exceed their abilities ²⁷	“Instills pride in me for being associated with him/her” “Seeks differing perspectives when solving problems”
Transactional	Is a leadership style in which the manager clarifies the goals, the desired outcomes, the requirements to reach the goals, and the conditions for receiving a reward ²⁷	“Discusses in specific terms who is responsible for achieving performance targets” “Makes clear what one can expect to receive when performance goals are achieved”
Safety culture	Shared values, beliefs, and attitudes about safety among staff ¹²	N/A
Safety climate		
Managers actions supporting safety	Staff perception about policies, procedures, and safety priorities within an organization/unit; it represents a more concrete layer of safety culture ^{12,13} The extent to which a manager considers staff suggestions to improve safety and reward staff safety actions ³⁰	“My unit manager says a good word when he/she sees a job done according to established patient safety procedures”
Team work	The extent to which staff supports each other and work together as a team ³⁰	“When a lot of work needs to be done quickly, we work together as a team to get the work done”
Communication openness	The extent to which the staff can speak freely and question authority if they encountered something that could harm patients ³⁰	“Staff will freely speak up if they see something that may negatively affect the patient care”
Error feedback and communication about errors	The extent to which staff receives feedback about errors and discuss actions to prevent further errors ³⁰	“We are given feedback about changes put into place based on event reports”
Organizational learning	The extent to which errors are used to initiate positive changes ³⁰	“After we make changes to improve patient safety, we evaluate their effectiveness”
Nonpunitive response to errors	The extent to which staff feel that errors will not be used against them ³⁰	“Staff feel like their mistakes are held against them”
Social capital		
Warmth and belonging	Social capital as a construct could be loosely defined as a set of structured interactions and trusting relationships among staff members that could influence organizational social and economic outcomes ^{17,18} ; for the purpose of our study, it was captured through the 2 concepts of warmth and belonging and organizational trust; Warmth and belonging is the degree of cohesion, pride, and harmony among staff members ¹⁹	“A friendly atmosphere prevails among the people in this unit” “As far as I can see, there is much personal loyalty to this unit”
Organizational trust	Is the individual's willingness to put himself/herself in a vulnerable position in front of another person (in our study, managers and peers) with a confidence that the other person will act in a positive way	Trust in peers: “If I got into difficulties on my work, I know my peers/colleagues would try to help me out” Trust in managers: “My nurse manager is sincere in his/her attempts to meet our point of view”

near-misses can harm organizations because “weak signals” for early detection of system and human failures are missed.⁹

Reasons for under-reporting medication errors include lack of error feedback, fear of blame, punishment, humiliation, and retaliation from managers and peers.^{8,10,11} Nurses’ willingness to report medication errors could increase in a work environment where safety culture is a priority and errors are used as learning opportunities for staff and system improvements. *Safety culture* represents the core values, beliefs, and attitudes among organizational members about safety.¹² *Safety climate* represents a more concrete layer of safety culture. Specifically, safety climate represents the policies, procedures, and practices supportive of safety in an organization or unit.^{12,13} Many hospitals use climate surveys to assess safety levels. Studies conducted in inpatient units supported the significant relationship between safety climate and outcomes such as readmission rates,¹⁴ readiness to report errors,¹⁵ and patient safety indicators.¹⁶ In the emergency department, safety climate was significantly associated with more intercepted near-misses.¹⁷

Leadership style is important to creating a robust safety climate.^{12,13,18} Although many taxonomies of leadership styles exist, 2 broad types of leadership styles are *transformational* and *transactional*. A transformational leader is charismatic and people-oriented and stimulates and challenges staff to reach and exceed their full potential.¹⁹ On the other hand, a transactional leader is goal-oriented, defines expectations, rewards employees for attaining expectations, alerts employees if they fail to meet standards, and provides praise in exchange for success.¹⁹ Studies in inpatient units supported the significant relationship between nurse manager leadership style and outcomes such as satisfaction,²⁰ empowerment,²⁰ and safety climate.¹³ In the emergency department, units with managers who displayed behaviors associated with transformational leadership style had fewer nurse turnover rates than did units with a nontransformational style.²¹ It is reasonable to conclude that there will be similar relationships among safety climate, nurse managers’ leadership style, and ED nurses’ willingness to report medication errors.

In addition to the work environment variables of safety climate and leadership style, the construct of social capital could logically play a role in medication error reporting. Social capital relates to the quality of the relationships and networks within organizations.^{22,23} Social capital provides a comprehensive picture about a hospital as a complex system.²⁴ The quality of the relationship among staff members includes warmth and belonging and trust.^{23,24} The first social capital component of warmth and belonging

reflects the degree of cohesion, pride, and harmony among nurses in a particular unit²⁵; it was significantly related to nurses’ turnover intention.²⁵

Organizational trust, the second social capital component, is defined as the individual’s willingness to put himself/herself in a vulnerable position in front of another person with confidence that the other person will not cause harm and will act in a positive way.^{26,27} Error reporting is a time of vulnerability; nurses who trust that their nurse manager and peers will not act in a negative or retaliatory manner will be more willing to report medication errors. Organizational trust was significantly related to some nurses’ behaviors such as citizenship²⁸ and willingness to voice their concerns and make suggestions about improving their workplace and patient care.²⁰

Studies in acute care settings supported the significant relationships among work environment, social capital variables, and safety outcomes.^{14–16} There is limited empirical evidence about these relationships in the emergency department. The purpose of this study was to examine if work environment (leadership style and unit safety climate) and social capital (warmth and belonging and organizational trust) are correlated with ED nurses’ willingness to report medication errors.

Method

DESIGN

In this study we used a cross-sectional descriptive correlational design and collected data through use of a questionnaire.

SETTING AND SAMPLE

The study sample consisted of nurses working full time, part time, or as needed in emergency departments of 5 hospitals (3 community and 2 critical access hospitals) affiliated with one Midwestern health care system.

VARIABLES AND INSTRUMENTS

Definition for all the measured variables and sample questions can be found in Table 1.

Nurses’ willingness to report medication errors was measured using 3 items from the outcome subscale of Nieva and Sorra Safety Climate Survey.²⁹ Nurses used a 4-point Likert scale ranging from 0 (not likely) to 3 (very likely). A high score indicates more willingness to report medication errors.

A nurse manager’s leadership style was measured using the Multifactorial Leadership Questionnaire (MLQ-5X

TABLE 2

Descriptive statistics for the study measures

Continuous variables and study measures	Mean $\pm$ SD	Minimum-Maximum	Cronbach's α	Categorical variables	N	%
Age, y	36.8 $\pm$ 10.1	22-59				
Years of nursing experience	8.3 $\pm$ 8.3	0.08-38				
Years of experience in the unit	4.7 $\pm$ 3.9	0.08-18				
Years of experience with the manager	2.2 $\pm$ 3.2	0.08-19				
Working hours/week	33.4 $\pm$ 7.7	3-42				
Willingness to report medication error	2.2 $\pm$ 0.65	0-3	0.73			
Leadership style						
Transformational total	2.8 $\pm$ 0.8	0-4	0.97			
Transactional total	2.6 $\pm$ 0.8	0-4	0.87			
Safety climate						
Manager's actions	2.9 $\pm$ 0.7	1-4	0.66			
Organizational learning	3.0 $\pm$ 0.8	0-4	0.88			
Team work	2.9 $\pm$ 0.8	0-4	0.91			
Communication openness	2.6 $\pm$ 0.8	0-4	0.81			
Error feedback	2.8 $\pm$ 0.8	0-4	0.86			
Nonpunitive environment	2.1 $\pm$ 0.9	0-4	0.86			
Social capital						
Warmth and belonging relationships	2.0 $\pm$ 0.5	0-3	0.92			
Organizational trust						
Trust in managers total	2.2 $\pm$ 0.6	0-3	0.89			
Trust in peers total	2.2 $\pm$ 0.5	1-3	0.90			
				Educational level		
				Diploma/associate	39	55
				BSN or higher	32	45
				No. hours/week worked		
				≥ 35 h	56	79
				35 h	15	21
				Shift work		
				Day/morning	21	30
				Evening/night	25	35
				Rotating/other	25	35
				Hospital size		
				Critical access (≤ 25 beds)	13	18
				26-199 beds	16	23
				≥ 200 beds	42	59

SD, Standard deviation.

rater form).¹⁹ According to Avolio and Bass,¹⁹ leadership behaviors are not mutually exclusive to one style or another (ie, transformational or transactional). Instead, managers can display behaviors pertinent to more than one style. Nurses indicated the extent to which their nurse managers

used transformational and transactional behaviors using 28 items covering manager behaviors associated with the 2 styles. Nurses completed this questionnaire using a 5-point Likert scale ranging from 0 (not at all) to 4 (frequently if not always).¹⁹ A high score indicates the nurse manager's

TABLE 3

Summary of relationship and differences in willingness to report medication errors by nurse and hospital characteristics

Nurse and hospital characteristics	Willingness to report medication errors	
	<i>R</i> or mean $\pm$ SD	<i>P</i> value
Age	−0.13	.29
Years of nursing experience	−0.25	.03 *
Years of experience in the unit	−0.20	.08
Years of experience with the manager	−0.08	.48
Working hours/week	0.08	.50
Educational level		.44 ^a
Diploma/associate	2.18 $\pm$ 0.6	
BSN or higher	2.28 $\pm$ 0.6	
No. hours worked per week		.23 ^a
≥ 35 h	2.27 $\pm$ 0.6	
35 h	2.04 $\pm$ 0.6	
Shift work		.30 ^b
Day/morning	2.03 $\pm$ 0.7	
Evening/night	2.21 $\pm$ 0.6	
Rotating/other	2.40 $\pm$ 0.5	
Hospital size		.69 ^b
Critical access (≤ 25 beds)	2.21 $\pm$ 0.6	
26-199 beds	2.12 $\pm$ 0.6	
≥ 200 beds	2.26 $\pm$ 0.6	

SD, Standard deviation.

* Significant at $P < .05$.

^a *P* value for Mann-Whitney test.

^b *P* value for Kruskal-Wallis test.

tendency toward displaying behaviors associated with a particular leadership style.

Safety climate was measured using Nieva and Sorra safety climate survey.²⁹ For this study, 20 items covering 6 unit safety climate dimensions (manager's actions promoting safety, organizational learning, unit team work, communication openness, errors feedback, and nonpunitive response to error) were used. Nurses completed this instrument using a 5-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree).²⁹ A high score highlights favorable safety climate dimension.

Warmth and belonging was measured using one dimension of the modified Litwin and Stringer Organizational Climate Survey.²⁵ The 11 items were measured on a 4-point Likert scale ranging from (0) strongly disagree to 3 strongly agree. A high score indicates greater sense of warmth and belonging among the nursing personnel.

Organizational trust was measured using Cook and Wall Organizational Trust Survey.²⁶ It consists of 12 items

covering 4 domains of trust in peer, faith in peers, trust in managers, and faith in managers. Scores for the 4 domains were aggregated into 2 categories of trust in managers and trust in peers.²⁶ Nurses completed each item using a 4-point Likert scale, ranging from (0) strongly disagree to 3 strongly agree (3).²⁶ A high score indicates a more trusting relationship.

In addition to the previous measures, demographic characteristics (eg, age, years of experience, employment stats, and shift work) were also collected. Hospital characteristics were available directly from the hospitals (hospital bed size and critical access status).

PROCEDURE

This study was approved by the Institutional Review Board of the study health care system. Waiver of the signed consent was obtained. The study cover letter covered the elements of the informed consent. After obtaining the

required Institutional Review Board approval, the study was introduced to emergency nurses at their monthly meeting. A package containing the following materials was distributed to the nurses' workplace mailbox: the study cover letter, the study survey, and a prestamped and addressed return envelope. Reminder flyers were placed in the nurses' mail boxes weekly over a 3-week period. Each nurse received a \$10 compensation check after mailing the completed survey. The data collection started in November of 2013 and lasted for a 6-month period.

DATA ANALYSIS

Initial analysis included data screening, cleaning, and reliability analysis. After conducting descriptive analysis, correlations between nurses' willingness to report medication errors and study variables were examined. Pearson correlation coefficients were used to describe the relationships between nurses' willingness to report medication errors and continuous variables (measures of leadership style, safety climate, warmth and belonging, organizational trust, age, and experience as a registered nurse [RN]). Because of the small sample size ($n = 71$), multiple regression analysis using 11 predictors and 5 covariates was not conducted because of the possibility of having predictive results with small statistical power. Inability to perform regression analysis was acknowledged as a limitation of the study. Differences in willingness to report across categories were tested with Mann-Whitney U and Kruskal-Wallis statistics (education: BSN or higher vs diploma/associate; work shift: day/morning, evening/night, and rotating/other; work hours: ≥ 35 hours vs < 35 hours; hospital size: critical access ≤ 25 beds, 26-199 beds, and ≥ 200 beds).

Results

Out of the 158 surveys distributed, 71 complete and usable surveys were mailed back (resulting in a 45% response rate). Nurses in this study had a mean age of 36.8 years, ranging from 22 to 59 years (Table 2). Experience as an RN averaged 8.3 years, ranging from a 1 to 38 years. Fifty-five percent of the participants had diploma or associate degrees, whereas 45% had a BSN or higher degree. The majority of participants worked more than 35 hours a week (79%), in hospitals with at least 200 beds (59%).

Nurses in this study were willing to report medication errors at an average score of 2.2 on the 3-point scale. To understand the relationship between error severity and nurses' willingness to report medication errors, the 2 items

TABLE 4

Pearson correlation for the relationship between willingness to report medication errors work environment (leadership and safety climate) and social capital (warmth climate and organizational trust)

Work environment and social capital variables	Willingness to report medication errors	
	<i>r</i>	<i>P</i>
Leadership style		
Transformational	0.09	.41
Transactional	0.28	.01 ^a
Safety climate		
Managers' actions	0.15	.19
Organizational learning	0.21	.07
Teamwork	0.12	.32
Communication openness	0.16	.16
Error feedback	0.25	.03 ^a
Nonpunitive response to errors	0.22	.06
Social capital		
Unit warmth and belonging	0.11	.36
Organizational trust		
Trust in managers	0.14	.25
Trust in peers	0.22	.06

^a Correlation is significant at $P < .05$.

of willingness to report medication error were individually analyzed. Whereas 71.8% of responding nurses were very likely to report errors with high potential for patient harm, 54.9% of nurses were very likely to report errors that reached the patients but had *no potential harm*, and only 25.4% of nurses were very likely to report errors that were caught and corrected before reaching the patient (ie, near-miss).

The study participants indicated that their managers displayed transformational leadership behaviors ($M = 2.8$) slightly more than transactional behaviors ($M = 2.6$), and indicated that their emergency departments had a moderate *safety climate* with scores ranging between 2.1 and 3 on the 4-point scale. Nonpunitive response to errors received the lowest score ($M = 2.1$), indicating that nurses feel that errors might be held against them. For social capital variables, wherein the possible range was 0 to 3, a higher score indicated a higher perception of the variable. Participants' scores averaged 2.0 for warmth and belonging among members, 2.0 for trust in managers, and 2.2 for trust in peers.

Differences in willingness to report errors by the categorical demographic variables are shown in Table 3.

Differences in willingness to report medication errors were not statistically significant across education levels, nurses' age, hours worked per week, shift, or hospital size. Willingness to report medication errors was weakly negatively associated with the RNs' years of experience ($r = -0.25$, $P = .03$) but not nurses' age. Thus nurses with more experience were less willing to report errors. Longevity in the emergency department was negatively but not significantly associated with willingness to report medication errors ($r = -0.20$, $P = .08$; Table 3).

Willingness to report errors was weakly positively associated with transactional nurse management leadership style ($r = 0.28$, $P = .01$) but was not associated with transformational leadership style ($r = 0.09$, $P = .42$). Neither warmth and belonging relationships nor trust in managers was related to willingness to report at a statistically significant level. Trust in peers approached significance to willingness to report ($r = 0.22$, $P = .06$; Table 4).

Regarding safety climate dimensions of error feedback, organizational learning, and nonpunitive environment, only error feedback dimension was correlated with willingness to report errors ($r = 0.25$, $P = .03$). Managers' actions, teamwork, and communication openness were not related to willingness to report errors (Table 4).

Discussion

The purpose of our study was to examine if leadership style, safety climate, and social capital was correlated with emergency nurses' willingness to report medication errors. With 71 emergency nurse participants, the work environment variables of transactional leadership style and error feedback (1 of 6 safety climate dimensions) were associated with higher willingness to report medication errors. Nurses with more experience were less willing to report medication errors. The results did not show the expected relationship between the social capital variables of warmth and belonging relationships and trust in managers with nurses' willingness to report medication errors.

Although nurses in this study perceived that their nurse managers almost equally displayed behaviors related to transformational and transactional leadership styles, only transactional leadership style was significantly associated with nurses' willingness to report medication errors. This result contradicts previous study results, which showed that ED nurses perceived their managers displaying behaviors pertinent to transformational leadership style more frequently than nontransformational styles.²¹ Transactional leaders are goal-oriented and communicate and define expectations.¹⁹ Error reporting is an expectation that is

repeatedly emphasized in most hospitals. Having error reporting as a frequently enforced expectation at both the hospital and unit level may increase ED nurses' willingness to report errors.

Transformational style was strongly related to all the other variables but not to willingness to report medication errors. Based on this result, we could suggest that transformational leadership style could be indirectly related to nurses' willingness to report medication errors through other variables, such as safety climate, organizational trust, and warmth and belonging. Given our small sample size, we were not able to examine the indirect relationships.

Nurses in the present study were generally willing to report errors and could be more willing to do so with error feedback. This result is aligned with findings of prior studies in which nurses expressed their frustration when their managers failed to provide them with feedback about corrective actions that will be taken as a result of their error report.^{10,11} The importance of error feedback was also emphasized by leaders in the ENA, who added that establishing a mechanism such as "good catch" could result in improving rates of near-miss reports.³⁰ Nurses who report errors are motivated to do so to prevent subsequent errors and hope that reporting errors would result in preventing further errors from happening. Therefore, having feedback about possible process improvement to prevent future error could facilitate nurses' decisions to report medication errors.

Nurses with more years of experience were less willing to report medication errors. Nurses who were educated before the Quality and Safety Education for Nurses initiative developed the Knowledge, Skills, and Attitudes competencies in 2005³¹ may not have learned the importance of reporting errors. Numerous educational institutions across the US now use Quality and Safety Education for Nurses quality and safety competencies, and newly educated nurses, regardless of their age, have been introduced to safety concepts including organizational learning, just culture, and the importance of error reports. Therefore, it could be inferred that new nurses, regardless their age, are more willing to report medication errors. On the other hand, nurses with more years of experience might have been exposed to some negative experiences regarding response to errors such as retaliation and delayed feedback. Having a negative experience could be a major factor that deters seasoned nurses from reporting medication errors. Another possibility is that seasoned nurses are competent enough to contain and manage errors while keeping their patients safe, so they perceive that reporting the error will not result in increased patient safety.

The relationship between nurses' willingness to report medication errors, organizational learning from errors, nonpunitive response to errors, trust in peers, and years of experience in the emergency department were not correlated. This outcome may be due to the sample size, and further study is indicated.

Limitations

The results of this study must be interpreted with consideration for some limitations. The response rate of 45% was low. Data were collected from 5 emergency departments affiliated with one Midwestern health care system, and results may not be generalizable to other settings. Results of this study provide initial insights about factors related to nurses' willingness to report medication errors. Replicating the study in different sites is warranted. The study data were collected using self-report and may have been biased by social desirability, yet self-report was justified to capture the perception of a large number of nurses within a reasonable time frame. Finally, data were analyzed using correlation; future study using multivariable regression will add to our understanding to the proposed relationships.

Implications for Emergency Nurses

ED managers assume main responsibility in setting the context for error reporting. A task-oriented leader who sets clear expectations, monitors nurses' practice, and provides timely feedback with a nonpunitive approach is likely to be effective in error reporting. ED managers must communicate that error reports make a difference to the system and future practices in medication administration. In addition, ED managers should involve experienced nurses in analyzing root causes, responding to medication errors, and participating in quality and safety committees.

Conclusion

ED nurses are willing to report medication errors. Error reporting is correlated with having a manager who clearly communicates this expectation and provides timely feedback about corrective measures to prevent similar errors. Leadership could directly and indirectly influence nurses' voluntary medication error reporting. Investing in leadership training would be a reasonable starting point to enhance the development of safety climate, strengthen the quality of interpersonal relationships, and improve nurses' willingness to report medication errors.

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