

Determinants of Patient Safety Practice Behavior Among Nurses at Dr. Moewardi Hospital, Surakarta, Central Java, Indonesia

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Received: November 17, 2025; Accepted: December 19, 2025; Available online: January 16, 2026

ABSTRACT

Background: Patient safety is an event where the hospital builds patient care to be safer, including risk assessment, identifying, and managing matters related to patient risk, reporting and analyzing incidents, learning from incidents and their follow-up, as well as providing solutions to reduce the occurrence of risks and to avoid injuries caused by mistakes that occur due to doing an action or taking an action that should not have been taken. The purpose of this study is to identify the behavioral determinants of patient safety practices among nurses at Dr. Moewardi Hospital, Indonesia.

Subjects and Method: This study was a cross-sectional study conducted at Dr. Moewardi Hospital in January 2025. The sample consisted of 200 inpatient nurses selected by a simple random sampling method. The independent variables in this study were work attitude, work stress, communication, teamwork, and work environment. The dependent variable was the patient safety practice behavior. Data collection was conducted using a questionnaire. Data analysis was conducted using path analysis.

Results: The behavior of patient safety practice in inpatient nurses was directly influenced by positive work attitudes ($b=0.22$; 95% CI= 0.08 to 0.36; $p= 0.002$), low work stress ($b= 0.16$; 95% CI= 0.02 to 0.30; $p= 0.022$), and effective communication ($b= 0.24$; 95% CI= 0.11 to 0.36; $p<0.001$). The patient safety practice behavior among nurses through work attitudes was indirectly influenced by work stress and teamwork. The patient safety practice behavior among nurses through work stress is indirectly influenced by teamwork and the work environment. The patient safety practice behavior among nurses through communication was indirectly influenced by teamwork.

Conclusion: The patient safety practice behavior among inpatient nurses is directly influenced by positive work attitudes, low work stress, and effective communication. The patient safety practice behavior among nurses through work attitudes is indirectly influenced by work stress and teamwork.

Keywords: patient safety practice, nurses, path analysis

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Cite this as:

Nurhayati FD, Sulaeman ES, Murti B, Sumardiyono, Novika RGH (2026). Factors Influencing the Health Workers Performance in Community Health Center in Metro, Lampung. Health Policy Manage, 11(01): 21-31. <https://doi.org/10.26911/thejhpm.2026.11.01.03>.



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BACKGROUND

Patient safety is an event in which the hospital builds patient care to be safer, including risk assessment, identifying and managing matters related to patient risk, reporting and analyzing incidents, learning from incidents and following up as well as providing solutions to reduce the occurrence of risks and to avoid injuries caused by mistakes that occur due to doing an action or taking actions that should not have been taken (Sa'diyah, 2024). The main goal of patient safety is to reduce the occurrence of Patient Safety Incidents (PSI) in health services, especially in hospitals that cover all Adverse Events (AE), Near Misses (NM), Potential Injury Events (PIE), and Non-Injury Events (NIE).

According to World Health Organization (WHO) data in 2022, 4 out of 10 patients are harmed in primary healthcare and outpatient services, and 1 out of 10 patients are injured while receiving hospital treatment in developed countries. Meanwhile, in developing countries, there are 134 adverse events every year. This event is triggered by treatments that do not implement patient safety, which includes medication errors, surgical errors, and sharp object injuries (Jerng *et al.*, 2017). The patient safety practice is influenced by various factors, namely organization and management, work environment, and individual factors of the officers (physical and psychological) (Ismail and Khalid, 2022).

According to the annual report of Dr. Moewardi Hospital, data on the number of inpatient visits in 2023 is 51,571 patients, an increase of 36.22% compared to 37,860 patients in 2022. Out of the 6 quality indicators of patient safety target areas, only 3 indicators (50%) have met the target at this hospital. This needs to be addressed and improved in the implementation of patient safety targets in order to minimize the incidence of patient safety incidents.

SUBJECTS AND METHOD

1. Study Design

The study was a quantitative study with an analytical observational method using a cross-sectional study design. This study was conducted at Dr. Moewardi Hospital Surakarta. This study was conducted in January 2025.

2. Population and Sample

The population in this study was inpatient nurses at Dr. Moewardi Hospital. The number of inpatient nurses was 451. The researchers used 200 study subjects. The study used simple random sampling.

3. Study Variables

The independent variables in this study were work attitude, work stress, communication, teamwork, and work environment. The dependent variable was patient safety implementation behaviors.

4. Operational Definition of Variables

Patient Safety Practice Behavior: Nurses' ability to implement patient safety in hospitals.

Attitude: The tendency of a nurse to act in patient safety practice.

Work Stress: The feeling of pressure or feeling depressed that the nurse experiences in dealing with her job.

Communication: The process of exchanging information and being understood by two or more people.

Teamwork: Ability to work collaboratively in groups to achieve common goals in the context of healthcare.

Work Environment: Everything around that can affect the execution of tasks.

5. Study Instrument

The study instrument used for data collection was a questionnaire using a likert scale.

6. Data Analysis

Univariate analysis was carried out with the aim of determining the frequency distribution and percentage of each variable studied, namely patient safety practice behavior, work

attitude, work stress, communication, teamwork, and work environment. The next analysis was bivariate, which was conducted on each exogenous variable, namely the patient safety practice behavior, toward endogenous variables, namely work attitude, work stress, communication, teamwork, work environment. The multivariate analysis was conducted using a path analysis model.

7. Research Ethics

Research ethics, including informed consent, anonymity, and confidentiality, were handled carefully throughout the study process. Ethical clearance was obtained from the Research Ethics Committee at Dr. Moewardi Hospital on December 27, 2024 number 2.898/XXI/HREC/2024.

RESULTS

1. Univariate Analysis

The characteristics of the study sample included several demographic and professional variables, namely gender, age, last education level, length of employment, and experience in occupational safety and health (OSH) training or patient safety training. These variables were analyzed to describe the profile of the respondents and to provide an overview of the background factors that may be related to nurses’ patient safety practice behavior in the healthcare setting.

Table 1. Sample Characteristics

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	54	27
	Female	146	73
Age (year)	<37	119	60
	≥37	81	40
Latest Education	Associate’s Degree	88	44
	Nurse Professional Program	112	56
Working Period (years)	<12	124	62
	≥12	76	38
Training of OSH/Patient Safety	Never	52	26
	Ever	148	74

Table 1 shows that of the 200 respondents who were studied by gender, most of the study subjects were female as many as 146 (73%) respondents while male as many as 54 (27%) respondents. Meanwhile, the study subjects who were <37 years old were 119 (60%) nurses and as many as 81 (40%) nurses were ≥37 years old. Furthermore, based on the latest education, it shows that the last education of most nurses was Nuresse Professional Program as many as 112 (56%) while the last education of 88 (44%) nurses were Associate’s Degree in Nursing.

Working period of 124 (62%) nurses was <12 years and working period of 76 (38%) nurses was ≥12 years. In OSH training or patient safety training, most nurses had participated in training with a total of 148 (74%) nurses, while 52 (26%) had not participated in OSH training or patient safety.

2. Univariate Analysis

The univariate analysis explains the overview of each study variable, including patient safety practice behavior, work attitude, work stress, communication, teamwork, and work environment.

Table 2. Univariate Analysis of Variables Related to Patient Safety Practice Behavior Among Nurses

Variable	Mean	SD	Minimum	Maximum
Patient safety practice behavior	64.14	7.21	42	72
Work attitude	26.71	3.24	19	32
Work Stress	15.01	1.72	11	20
Teamwork	19.82	2.40	15	24
Communication	16.04	2.12	7	20
Work environment	15.97	2.23	10	20

Table 2 shows the results of univariate data of 200 study subjects, it was discovered that the average score of the nurses who implemented patient safety practice behavior was 64.14, with a minimum score of 42 and a maximum score of 72. In the work attitude variable, the average score was 26.71 with a minimum score of 19 and a maximum score of 32. Furthermore, the work stress variable had an average score of 15.01 with a minimum score of 11 and a maximum score of 20. The teamwork variable had an average score of 19.82 with a minimum score of 15 and a maximum of 24. In the communication

variable, the average score obtained was 16.04 with a minimum score of 7 and a maximum score of 20. Furthermore, the work environment variable had an average score of 16.97, a minimum score of 10 and a maximum of 20.

3. Bivariate Analysis

The bivariate analysis test in this study was carried out to discover whether there was an effect of work attitude, work stress, teamwork, communication, and environment on the patient safety practice behavior among nurses. The relationship was considered significant if the value of $p < 0.05$.

Table 3. Bivariate Analysis of Variables Related to Patient Safety Practice Behavior Among Nurses

Independent Variable	b	95% CI		p
		Lower limit	Upper limit	
Work attitude	0.75	0.46	1.05	< 0.001
Work stress	1.19	0.63	1.75	< 0.001
Teamwork	0.65	0.24	1.06	0.002
Communication	1.04	0.58	1.49	< 0.001
Work environment	0.73	0.29	1.17	0.001

In table 3, a bivariate analysis of work attitude and patient safety practice behavior among nurses was obtained ($b = 0.75$; 95% CI = 0.46-1.05; $p < 0.001$). These results show that work attitudes improved patient safety practice behavior among nurses by 0.75 units higher than nurses with negative work attitudes; this relationship was statistically significant.

Furthermore, the relationship of the variable of work stress and patient safety practice behavior among nurses was obtained

($b = 1.19$; CI 95% = 0.63-1.75; $p < 0.001$). These results showed that nurses with sufficient work stress had patient safety practice behaviors 1.19 units higher than nurses with less work stress; this relationship was statistically significant.

The relationship between variables of teamwork and patient safety practice behavior among nurses was obtained ($b = 0.65$; 95% CI = 0.24-1.06; $p = 0.002$). This showed that nurses with teamwork improved patient safety practice behavior among nurses by 0.65

units higher than those without teamwork; this relationship was statistically significant.

In the relationship between communication variable and patient safety practice behavior in nurses, a score was obtained ($b=1.04$; $CI\ 95\%=0.58-1.49$; $p<0.001$). These results showed that nurses with effective communication increased by 1.04 units higher than nurses without effective communication, this relationship was statistically significant.

The relationship between variables of the work environment and patient safety practice behavior in nurses was obtained ($b=0.73$; $95\% CI=0.29-1.17$; $p=0.001$). This showed that nurses with a good work environment increase by 0.73 units higher than those without a good work environment,

and the relationship was statistically significant.

4. Multivariate Analysis

Multivariate analysis in this study was conducted using a path analysis model. Path analysis was applied to examine both the direct and indirect relationships among the study variables. Specifically, this analysis aimed to analyze the influence of work attitude, work stress, teamwork, communication, and work environment on patient safety practice among nurses. Through this model, the study sought to identify the pathways through which these organizational and individual factors contribute to nurses' behavior in implementing patient safety practices within healthcare settings.

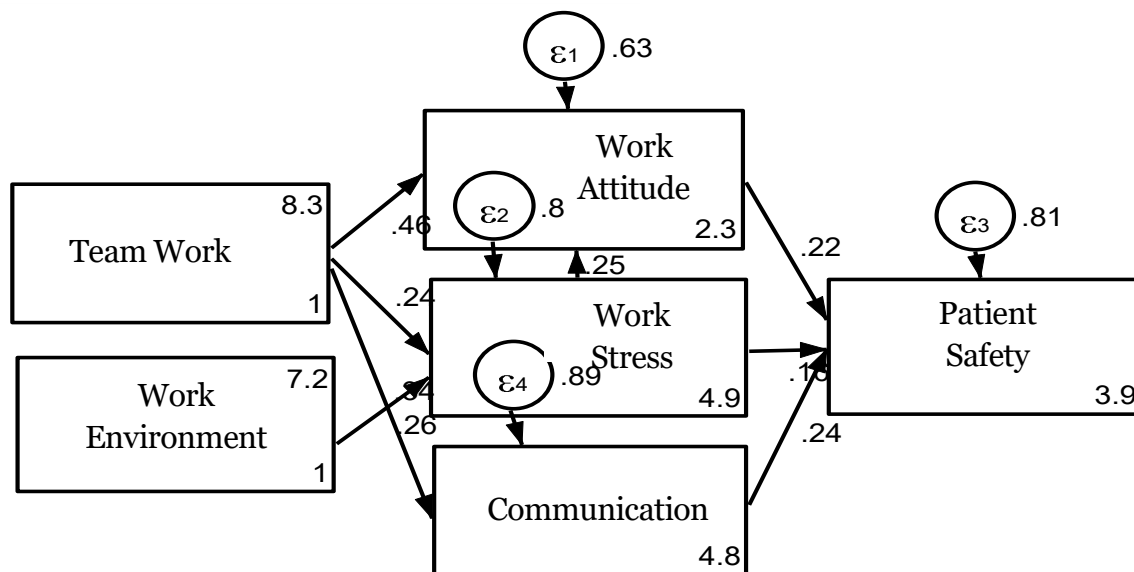


Figure 1. Path analysis of the determinants of the patient safety practice behavior among nurses

Figure 1 shows the model designed by the researcher, based on the theory after testing with STATA 13 shows that the model is suitable. This SEM model shows a good model fit with the following parameters: Value $p=0.13$ (Good if $p>0.05$). $RMSEA=0.04$ (Good if <0.05). $SRMR=0.04$ (Good if <0.05).

1. Work attitude toward patient safety practice behavior

Table 4 shows that there was a direct effect of work attitude on patient safety practice behavior among nurses, and it was statistically significant. Nurses with a positive work attitude had a patient safety practice behavior 0.22 units higher to experience an increase of

1 unit of positive work attitude (b= 0.22; 95%CI= 0.08 to 0.36; p= 0.002).

2. Work stress toward patient safety practice behavior

Table 4 shows that there was a direct effect of work stress on patient safety practice behavior among nurses, and it was statistically significant. Nurses with sufficient work stress had patient safety practice behaviors 0.16 units higher to experience an increase of 1 unit of sufficient work stress (b=0.16; 95%CI= 0.02 to 0.30; p=0.022).

3. Communication toward patient safety practice behavior

Table 4 shows that there was a direct effect of communication on patient safety practice behavior among nurses, and it was statistically significant. Nurses with effective communication had patient safety practice behavior 0.24 units higher to experience an increase of 1 unit of effective communication (b= 0.24; 95%CI= 0.11 to 0.36; p <0.001).

4. Work stress toward work attitude

Table 4 shows that there was a positive effect between sufficient work stress and a positive work attitude, and it was statistically significant. Nurses with sufficient work stress had positive work attitude 0.25 units higher to experience an increase of 1 unit of sufficient work stress (b= 0.25; 95%CI= 0.13 to 0.36; p < 0.001).

5. Teamwork toward work attitude

Table 4 shows that there was an effect of teamwork on work attitude and it was

statistically significant. Nurses with good teamwork had positive work attitude 0.47 units higher to experience an increase of 1 unit of good teamwork (b= 0.47; 95%CI= 0.36 to 0.57; p< 0.001).

6. Teamwork toward work stress

Table 4 shows that there was an effect of teamwork on work stress, and it was statistically significant. Nurses with good teamwork at work sufficient work stress had 0.24 units higher to experience an increase of 1 unit of good teamwork (b=0.24; 95%CI= 0.09 to 0.39; p= 0.001).

7. Work environment toward work stress

Table 4 shows that there was an effect of a good work environment on sufficient work stress, and it was statistically significant. Nurses with a good work environment had sufficient stress 0.26 units higher to experience an increase of 1 unit of a good work environment (b= 0.26; 95%CI= 0.11 to 0.41; p= 0.001).

8. Teamwork on communication

Table 4 shows that there was an effect of teamwork on communication, and it was statistically significant. Nurses with good teamwork had effective communication 0.34 units higher to experience an increase of 1 unit of good teamwork (b= 0.34; 95%CI= 0.22 to 0.46; p< 0.001).

Table 4. Results of the path analysis of the determinants that affect patient safety practice behavior among nurses

Dependent Variable	Independent Variable	b	95% CI		P
			Lower limit	Upper limit	
Direct Effect					
Patient Safety Practice	← Work attitude	0.22	0.08	0.36	0.002
	← Work stress	0.16	0.02	0.30	0.022
	← Communication	0.24	0.11	0.36	< 0.001
Indirect Effect					
Work attitude	← Work stress	0.25	0.13	0.36	< 0.001
	← Teamwork	0.47	0.36	0.57	< 0.001

Dependent Variable	Independent Variable	b	95% CI		p
			Lower limit	Upper limit	
Work stress	← Teamwork	0.24	0.09	0.39	0.001
	← Work environment	0.26	0.11	0.41	0.001
Communication	← Teamwork	0.34	0.22	0.46	< 0.001
N Observation: 200					
Likelihood ratio:	-2783.28				
Prob > chi2	0.81				
RMSEA	0.00				
SRMR	0.01				
CFI	1.00				
TLI	1.04				

DISCUSSION

1. Work attitude on patient safety practice behavior

There was a direct effect of work attitude on patient safety practice behavior among nurses and it was statistically significant. This is in line with a study conducted by Wake *et al.* (2021) at Asella Hospital Ethiopia that nurses who have a positive attitude are a factor that significantly affects the patient safety practice in hospitals. Another study conducted by Galleryzki *et al.* (2021) also states that nurses' attitudes in general have a significant effect on the patient safety practice, the better the nurses' attitude, the better the patient safety practice.

Attitudes include positive or negative feelings that an individual feels so that they can have a special effect on the individual's response to objects (Soola *et al.*, 2022), circumstances and other people and can affect an individual's behavior in the decision-making process (Ayyad *et al.*, 2024). Patient safety practice behavior refers to the positive attitudes, skills, and knowledge that healthcare workers must possess to protect patients from risks and hazards (Abraham *et al.*, 2022). Implementing patient safety in the hospital cannot be separated from the attitude of nurses because they are responsible for patients for 24 hours.

2. Work stress on patient safety practice behavior

The results of this study show that there was a direct effect of work stress on the patient safety practice behavior among nurses and it was statistically significant. These results are in line with a study by Sani *et al.* (2024) that most nurses at the Federal Medical Center Hospital Birnin-Kebbi experience work stress at a moderate level (45.0%), with the majority of nurses (69.9%) implementing a patient safety culture, and there is a statistically significant correlation between patient safety culture practices and work stress at the Federal Medical Center Hospital Birnin-Kebbi. This study is also supported by the results of a study conducted by Hutahaean and Mutiara (2022) which states that there is a significant effect between work stress and the patient safety practice among nurses. However, the results of this study were not supported by a study of Nengsih and Pranatha (2019) which stated that there was no significant relationship between work stress and the patient safety practice.

Sufficient work stress can be a driver to improve the quality of care because nurses feel motivated to work more effectively. Nurses who are challenged but not overburdened tend to have higher patient application behaviors. Low levels of stress and workload can result in a lack of nursing care provided to patients and an increase in the number of violations related to patient safety (Chen *et al.*, 2019).

3. Communication on patient safety practice behavior

There was a direct effect of communication on patient safety practice behavior in nurses and it was statistically significant. This study is in line with the results of a study conducted by Fanny and Arini (2024), which states that there is a positive effect of communication on the patient safety practice at Jati Husada Karanganyar Hospital. Noviyanti et al. (2021) also mention that the higher the level of nurse communication satisfaction, the more significant the quality of patient safety applied.

Based on the results of this study, the healthcare at Dr. Moewardi Surakarta Hospital have been able to carry out good communication with patients, in this case nurse-patient interpersonal communication. Effective communication between nurses and patients from disease diagnosis, medical intervention, as well as proper transfer of patient information at every patient switching point, is critical for patient safety and quality of care. A study by Fanny and Arini (2024) at Jati Husada Hospital Karanganyar stated that nurses who have carried out interpersonal communication well can help patients heal. The implementation of effective communication correlates with patient safety, which has an impact on patient safety outcomes in the form of frequency of incidents, perception, and patient safety awareness.

4. Work stress on work attitude

There was a positive association between sufficient work stress and a positive work attitude, and it was statistically significant. The results of a systematic review written by Zabin et al. (2023), states that work stress affects the professional attitude of nurses in the patient safety practice.

When nurses deal with high levels of stress, whether due to heavy workloads, long working hours, or other job demands, this can have an impact on the quality of their attitudes and behaviors in carrying out their daily tasks.

Patient safety practice behaviors among nurses may decrease as work-related stress increases. The professional attitude of nurses is also affected by moderate to high stress. Work-related stress makes nurses more susceptible to poor professional communication, leading to a decline in the quality of nursing care. Therefore, work-related stress affects professional attitudes, which in turn impact individual nurses and organizational performance, thereby interfering with the achievement of patient safety goals.

5. Teamwork on work attitude

There was an effect of teamwork on work attitudes, and it was statistically significant. A study by Moussa et al. (2022) states that good teamwork has a great effect on nurses' work attitudes in patient safety practice. Sogut and Ozsaker (2023) explain that nurses who work in good teams tend to have a higher awareness of the importance of patient safety, and their attitude in adhering to safety protocols will be stronger.

Patient safety is a shared responsibility in teamwork. Team members remind each other and ensure that any procedures or actions taken follow safety standards. Nurses who work in good teams tend to have a higher awareness of the importance of patient safety, and their attitude in adhering to safety protocols will be stronger. In a hospital or other health facility, nurses work together with various other medical personnel. The success of these teams depends heavily on how they communicate, share information, and support each other (Wahyuni et al., 2025).

6. Teamwork on work stress

There was an effect of teamwork on work stress and it was statistically significant. Nurses with good teamwork at work had a sufficient work stress of 0.24 units higher to experience an increase of 1 unit of good teamwork ($b=0.24$; 95%CI= 0.09 to 0.39; $p=0.001$). This is in line with a study conducted

by Nguyen et al. (2024) states that good teamwork greatly affects the level of work stress of nurses. Through effective communication, responsibility distribution, emotional support, shared decision-making, and increased job satisfaction, teamwork can reduce the pressure and stress that nurses often face (Huang et al., 2022).

Teamwork plays a very important role in reducing nurses' work stress, especially in the context of implementing patient safety. Work stress in nurses can be caused by a variety of factors, including high workloads, lack of resources, poor communication, and concerns related to patient safety. According to Huang et al. (2022), the effective patient safety practice requires solid cooperation between members of the medical team, including nurses, doctors, and other health-care workers. When communication between team members runs smoothly, nurses feel more confident in carrying out their duties, thus reducing anxiety and stress related to patient safety.

7. Work environment on work stress

There was an effect of work environment on work stress, and it was statistically significant. Similar study by Wang *et al.* (2024) conducted in tertiary hospitals in China, discovers that a conducive and supportive work environment is very influential in reducing nurses' work stress, especially in the context of implementing patient safety.

The work environment has a significant effect on the work stress level of nurses, particularly in patient safety practice behavior. Work stress experienced by nurses can affect the quality of health services provided, including in the patient safety practice behavior (Akgul *et al.*, 2021). Things related to the work environment, namely the physical condition of the room at work, organizational culture, and support from superiors, all contribute to the services that nurses will provide.

8. Teamwork on communication

There was an effect of teamwork on communication, and it was statistically significant. Nurses with good teamwork had 0.34 units higher effective communication to experience an increase of 1 unit of good teamwork ($b=0.34$; 95%CI= 0.22 to 0.46; $p<0.001$). Chen and Gong (2021) in their study state that good teamwork among nurses in the workplace has an effect on communication.

Through clear communication and good coordination, nurses can ensure that safety procedures are properly executed and that every step taken follows applicable standards. Good teamwork can create smooth lines of communication, strengthen coordination between medical team members, and minimize the risk of errors that can harm patients so that effective communication is one of the keys to ensuring patient safety in the hospital.

AUTHOR CONTRIBUTION

All authors have made meaningful and significant contributions to data analysis and the preparation of the final manuscript.

CONFLICT OF INTEREST

There was no conflict of interest in the study.

FUNDING AND SPONSORSHIP

The study was self-funded by the first researcher.

ACKNOWLEDGEMENT

The researchers would like to express their deep gratitude to the study subjects for their willingness to make time to participate in the study and to all parties who played a role in the preparation of this article.

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