

Pediatric Nurses' Perception Regarding the Relation between Patient Safety Culture and Work Environment

Shimmaa Mansour Moustafa Mohamed

Assistant professor of Pediatric Nursing, Faculty of Nursing, Zagazig University, Egypt.

* E-mail of the corresponding author: dr.shimamansour2020@gmail.com

Abstract:

Background: While many studies have been conducted on the relationship between work environment and patient safety in healthcare organizations, very few have focused specifically on pediatric care providers. **Aim:** to assess the pediatric nurses' perception regarding the relation between patient safety culture and work environment. **Design:** A descriptive study was utilized. **Sample:** A sixty-five pediatric nurses working in pediatric units at Zagazig University hospitals were included in the study. **Tool:** A structured questionnaire that included demographic data and the Safety Attitudes Questionnaire (SAQ) 2014 - 2017. **Results:** Revealed a significant correlation between emotional exhaustion and all safety dimensions, while perceptions of management were found to be correlated with working conditions, job satisfaction, safety climate, and teamwork climate. **Conclusion:** Work environment variables such as teamwork climate, job satisfaction, stress recognition, perceptions of management, working conditions, and emotional exhaustion affecting patient safety culture in pediatric units and require prioritizing interventions and hospital management procedures. **Recommendation:** Extending the study to other hospitals and different geographic locations could enhance the generalizability of the study results.

Keywords: Patient safety, Work environment, Pediatric nurses' perception.

Introduction:

Patient safety refers to the prevention of unintended harm resulting from work-related errors (**Institute of Medicine, 2004**). The work environment defined as encompasses the unique characteristics of an organization that distinguishes it from others, and which have lasting effects on the behavior of its members (**Forehand and Gilmer, 1964**). The design of the work environment has a significant impact on patient safety outcomes, including adverse effects associated with healthcare professionals working in the organization (**Laschinger and Leiter, 2006**). Care providers play a crucial role in ensuring patient safety, as most medical errors, diagnostic errors, nosocomial infections, and teamwork errors are directly or indirectly linked to them (**Pham et al., 2012**).

Research has shown that nurses working in hospitals with favorable work environments are more likely to utilize their skills and have a

higher awareness of near-miss incidents. Consequently, it is crucial for healthcare organizations to comprehend nurses' perceptions of the work environment to improve patient safety (**Flynn et al., 2012**).

In order to enhance the care process and promote patient safety, it is crucial to understand the perceptions and needs of nurses as care providers (**Allen, 2018**). These needs encompass various aspects, such as familiarity with new technologies like bar-code identification (**Guffey and Hyman, 2017**), improvements in physical space (**Farokhzadian et al., 2015**), and adequate funding, equipment, and facilities that impact working conditions (**Li et al., 2018**). Additionally, interventions by management in the organization of the care process are also influential (**Saltzman et al., 2017**).

Conversely, nurses working in inadequate work environments, such as those

with improper working hours, are more susceptible to medical errors and near-miss incidents (Wu et al., 2013).

Significance of the study

Numerous studies have examined the relationship between patient safety and work environment factors in healthcare professionals. These factors include staff retention levels, teamwork climate, emotional stress, working conditions, stress recognition, and job satisfaction, and have been found to impact patient safety outcomes such as mortality rates, healthcare-associated infections, medical errors, and adverse events (Nantsupawat et al., 2017).

However, research on the impact of work environments on patient safety in pediatric units from the perspective of care providers is limited. Children are more vulnerable to physical issues in a compromised environment, making the care process and behavior of frontline providers critical for patient safety in pediatric units. Additionally, nurses in pediatric units are often subject to occupational stress, as they not only have to deal with the issues of their young patients but also the concerns of their parents.

Aim of the study:

The study aimed to assess the pediatric nurses' perception regarding the relation between patient safety culture and work environment through:

- Evaluate the demographic characteristics of pediatric nurses and their scores on various patient safety dimensions.
- Identify the critical dimensions that impact safety climate from the perspective of pediatric nurses.

Research question:

What are work environment variables from the pediatric nurses' perception that relate to patient safety culture in pediatric units?

Subjects and methods:

Research design: The study design was descriptive design is most appropriate for this

study, can be used as a reference to assess nurses' perception regarding the relation between patient safety culture and work environment.

Study setting: The study was conducted in the medical and surgical wards of a pediatric hospital at Zagazig University Hospitals. The hospital consists of nine divisions, with a total of 260 registered nurses, 300 hospital beds, and clinical education and training for health professionals.

Sample: The study used convenient sample included 65 pediatric nurses who agreed to participate in the study.

The sample size was calculated based on a power analysis of $0.95(\beta=1-0.95=0.5)$ at alpha .05 (one-sided) with a large effect size (0.5) was used as the significance, and 0.001 was used as the high significance.

Tools: The data collection tools included a questionnaire developed by the researcher, which consisted of two parts:

A) Demographic data (age, position, education, and working experience).

B) The Safety Attitude Questionnaire (SAQ) in Chinese version from 2014-2017, which was used to assess hospital staff attitudes towards patient safety culture. The SAQ questionnaire contained 46 questions that were grouped into eight dimensions: teamwork climate (questions 1 to 6), safety climate (questions 7 to 13), job satisfaction (questions 14 to 18), stress recognition (measured through reverse-scored questions 19, 21, 25, and 26), perceptions of management (questions 27 to 30), working conditions (questions 31 to 34), emotional exhaustion (measured through reverse-scored questions 20, 22, 23, 24, 35, 36, 37, 38, and 39), and work-life balance (questions 40 to 46).

Scoring system: Each question in each dimension was assessed using a five-point Likert scale (1 = Strongly Disagree, 2= Disagree, 3= Neither agree nor disagree, 4= Agree and 5 = Strongly Agree). These scores were summed up and converted into a

percentage score with mean and standard deviation.

Field work: The data collection for the study was carried out for a period of one month, starting from January to February 2021. The researchers arranged to meet the eligible participants at their convenience to explain the study purpose and obtain consent from those who agree to participate. The questionnaire tool required 15 minutes for each participant to complete.

Validation of tool: Before data collection, the research tool was validated by five nursing faculty professors who reviewed it for clarity, comprehensiveness, applicability, and ease of implementation. Based on their feedback, some minor modifications were made to the tool.

Reliability of the tool: The internal consistency of the Chinese version of the SAQ has been confirmed by the results of (Wu, Wu et al., 2019) to be reliable. The Cronbach's alphas for the dimensions of the SAQ ranged around 0.760 to 0.941.

Methods:

Administrative and ethical considerations: The study obtained ethical approval and permission from the relevant authorities, and the pediatric registered nurses were informed about the study's purpose and requested to sign a consent form. The administrative office and the director of nursing in the pediatric medical and surgical wards at Pediatric hospital, Zagazig university hospitals granted permission for the study.

Pilot study: A pilot study was conducted involving ten pediatric registered nurses to assess the feasibility and applicability of the tool, and no modifications were required. The sample was added to the total study sample.

Statistical analysis:

The data collected from the study were analyzed using the Statistical Package for the Social Sciences (SPSS version 22.0). Descriptive statistics such as frequency, percentage, mean, and standard deviation were

used to summarize and describe the data. Inferential tests were also conducted, including Pearson's correlation coefficient, to measure the strength of the linear relationship between two continuous variables related to patient safety dimensions. To identify the critical dimensions that affect safety climate from the pediatric nurses' viewpoint and to determine the variable that has a more significant direct impact on the dependent variable, logistic regression was applied after validating the strength of patient safety dimensions.

Results:

Table (1) illustrates that all participants in the study were female, with the majority falling in the age range of 21 to 30 years. Regarding job position, 96.9% of the nurses were staff nurses. In terms of education level, 90.8% held a bachelor's degree, while only 6.1% had a master's degree. Approximately one third of the nurses had 3-4 years of work experience.

In terms of reporting adverse events, more than half of the nurses reported experiencing adverse events 1 to 5 times within the past 12 months, while only 7.7% reported experiencing 6 to 10 adverse events.

Table (2) displays the results of the statistical analysis of the patient safety dimensions from the perspective of pediatric nurses. The analysis revealed that work-life balance had the highest average value of 4.14, while stress recognition had the lowest average value of 2.73. The Cronbach values for all dimensions indicated acceptable internal consistency. The dimension with the lowest mean percentage was emotional exhaustion, with a value of 58%. Notably, the standard deviation for emotional exhaustion was higher than the other patient safety dimensions, with a value of $SD=1.29$.

Table (3) displays the correlation between patient safety dimensions. The Pearson's correlation coefficients revealed that the perceptions of management were strongly and significantly correlated ($p=0.000$) with working conditions, job satisfaction, safety climate, and teamwork climate. Safety climate

was also found to be significantly correlated with teamwork climate, job satisfaction, perception of management, and working conditions ($p=0.000$). Working conditions were significantly correlated with teamwork climate, safety climate, job satisfaction, perception of management, and emotional exhaustion ($p=0.000$). Moreover, emotional exhaustion was found to be significantly correlated with all dimensions of patient safety.

Table (4) shows a significant correlation between the age groups of 21-30 and 31-40 years and emotional exhaustion ($p=0.022$). Additionally, work-life balance was significantly correlated with the age of the studied group ($p=0.005$).

Regarding the correlation between the working experience of the studied group and various patient safety dimensions, Figure (1) illustrates a significant correlation between working experience and safety climate

($p=0.006$), job satisfaction ($p=0.036$), perception of management ($p=0.007$), working conditions ($p=0.035$), and emotional exhaustion ($p=0.014$).

Regarding the correlation between the educational level of the studied group and different patient safety dimensions, Figure (2) indicated that there was a significant correlation between the educational level and the perception of management dimension ($p=0.08$).

Table (5) presented the level of satisfaction among the studied group, and it was found that 81.5% of them were satisfied with their patient safety attitudes.

The results of the regression analysis in Table (6) demonstrated that emotional exhaustion was the most significant factor affecting satisfaction, with a positive effect on safety climate ($p=0.000$), followed by teamwork climate ($p=0.056$).

Table (1): Sociodemographic characteristics of the studied group.

Variable	Characteristics	Frequency	Percentage %
Gender	Male	0	0
	Female	65	100
Age group	21:30 Y	51	78.5
	31: 40 Y	14	21.5
Position	Head Nurse	2	3.1
	Staff Nurse	63	96.9
Education	Nursing Diploma	2	3.1
	Bachelor	59	90.8
	Master	4	6.1
Respondent reporting adverse events in the past 12 months	Not Know	5	7.7
	1:5 times	41	63.1
	6:10 times	5	7.7
	others	14	21.5
Working Experience	< 1 Y	17	26.2
	1:2 Y	14	21.5
	3: 4 Y	20	30.8
	5:10 Y	11	16.9
	11:20 Y	3	4.6

Table 2: Characteristics of patient safety dimensions

Domain	Mean (% score)	SD
Teamwork Climate	3.35 (68.9 %)	0.75
Safety Climate	3.42 (70.58%)	0.67
Job Satisfaction	3.1 (60%)	0.97
Stress Recognition	2.73 (64%)	0.77
Perceptions of Management	3.37 (61.7%)	0.91
Working Conditions	2.85 (60%)	1.09
Emotional Exhaustion	2.9 (58%)	1.29

Work-life Balance	4.14 (82.8%)	0.76
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Table 3: Correlation between patient safety dimensions.

Dimensions		(TC)	(SC)	(JS)	(SR)	(PM)	(WC)	(EE)	(WB)
Teamwork Climate (TC)	r	1	.763**	.641**	-.036	.692**	.719**	.400**	-.299*
	P		.000	.000	.774	.000	.000	.001	.016
Safety Climate (SC)	r	.763**	1	.714**	-.170	.681**	.759**	.404**	-.324**
	P	.000		.000	.175	.000	.000	.001	.009
Job Satisfaction (JS)	r	.641**	.714**	1	.131	.784**	.827**	.643**	-.639**
	P	.000	.000		.298	.000	.000	.000	.000
Stress Recognition (SR)	r	-.036	-.170	.131	1	-.143	-.085	.483**	-.369**
	P	.774	.175	.298		.255	.502	.000	.002
Perceptions of Management (PM)	r	.692**	.681**	.784**	-.143	1	.902**	.389**	-.326**
	P	.000	.000	.000	.255		.000	.001	.008
Working Conditions (WC)	r	.719**	.759**	.827**	-.085	.902**	1	.500**	-.392**
	P	.000	.000	.000	.502	.000		.000	.001
Emotional Exhaustion (EE)	r	.400**	.404**	.643**	.483**	.389**	.500**	1	-.776**
	P	.001	.001	.000	.000	.001	.000		.000
Work-life Balance (WB)	r	-.299*	-.324**	-.639**	-.369**	-.326**	-.392**	-.776**	1
	P	.016	.009	.000	.002	.008	.001	.000	

Test used is Pearson correlation P is significant if ≤ 0.05 .000 means highly significant

Table 4: Comparing various dimensions regarding age of studied group

	AGE	N	Mean	Std. Deviation	T	P
Teamwork Climate	21:30 Y	51	3.3889	.82305	.765	.447
	31:40 Y	14	3.2143	.40525		
Safety Climate	21:30 Y	51	3.4650	.73615	.774	.442
	31:40 Y	14	3.3061	.39960		
Job Satisfaction	21:30 Y	51	3.0667	1.43201	.449	.655
	31:40 Y	14	3.2429	.54450		
Stress Recognition	21:30 Y	51	2.7304	.74974	.159	.875
	31:40 Y	14	2.7679	.90120		
Perceptions of Management	21:30 Y	51	2.8922	1.07268	.243	.808
	31:40 Y	14	2.9643	.49862		
Working Conditions	21:30 Y	51	2.8578	1.22296	.002	.998
	31:40 Y	14	2.8571	.36314		
Emotional Exhaustion	21:30 Y	51	2.2418	.96063	2.341	.022*
	31:40 Y	14	2.8651	.47176		
Work-life Balance	21:30 Y	51	4.2801	.76290	2.929	.005*
	31:40 Y	14	3.6429	.53084		

Test used is independent sample t-test

P is significant if ≤ 0.05

Fig.1: Comparing various dimensions regarding working experience of studied group

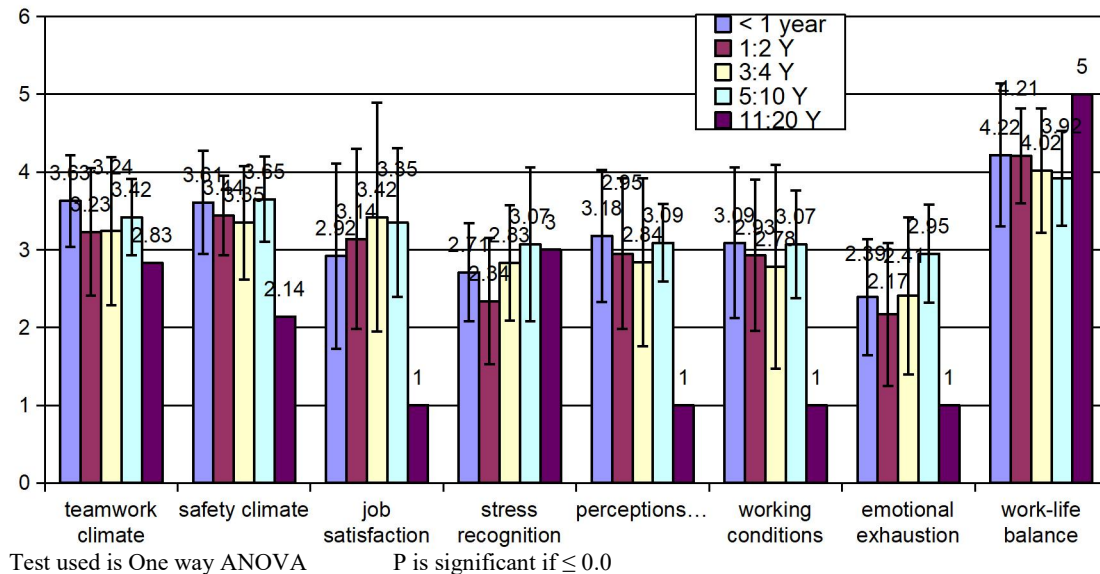


Fig.2: Comparing various dimensions regarding educational level of studied group

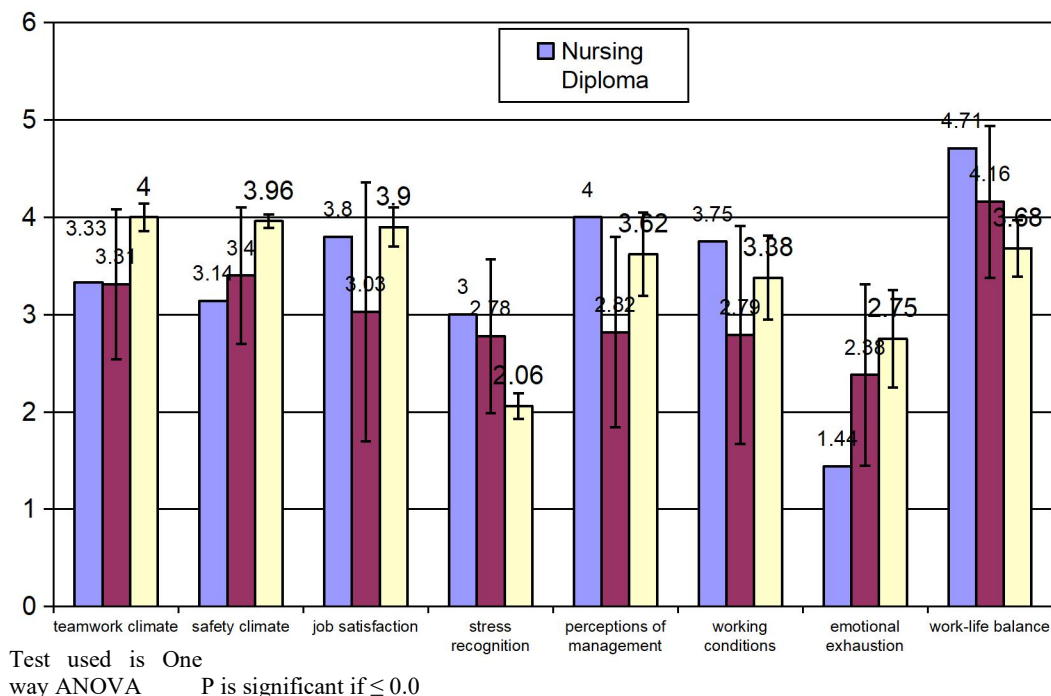


Table 5: Total Satisfaction among studied group

SATISFACTION	Number	Percentage
Satisfied	53	81.5%
Not Satisfied	12	18.5%
Total	65	100.0%

Table 6: Binary logistic regression using the significant factors of satisfaction.

Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations		
						Lower Bound	Upper Bound	Zero-order	Partial Part	
1 (Constant)	2.772	.403		6.871	.000	1.964	3.580			
teamwork climate	-.117	.062	-.226	-1.880	.056	-.242	.008	-.674	-.244	-.133
safety climate	-.026	.079	-.044	-.324	.747	-.183	.132	-.624	-.043	-.023
job satisfaction	.062	.053	.205	1.164	.249	-.045	.169	-.664	.154	.082
stress recognition perceptions of management	.008	.048	.017	.175	.862	-.088	.105	-.109	.023	.012
working conditions	-.110	.072	-.275	-1.540	.129	-.254	.033	-.692	-.202	-.109
emotional exhaustion	-.083	.072	-.232	-1.147	.256	-.228	.062	-.742	-.152	-.081
work-life balance	-.234	.059	-.545	-3.977	.000	-.351	-.116	-.660	-.469	-.281
	-.051	.065	-.099	-.782	.437	-.181	.079	.449	-.104	-.055

a. Dependent Variable: Total-Satisfaction

Discussion:

The findings of the study revealed that emotional exhaustion is significantly correlated with all safety dimensions, including job satisfaction, stress recognition, teamwork climate, safety climate, perceptions of management, working conditions, and work-life balance. This result could be due to high levels of nurses' experience of emotional exhaustion, tend them to be less satisfied with their teamwork climate, perceptions of management, working conditions, work-life balance, and job satisfaction. While higher levels of nurses' satisfaction with working conditions are associated with their better perceived safety climate.

These results are consistent with research conducted by Profit et al. (2014) and dos Santos Alves et al. (2016) in pediatric care units, which also reported high levels of emotional exhaustion among nurses. Emotional exhaustion is often caused by a heavy workload and a nurse-patient ratio that exceeds the international standard of 1:6 (Ministry of Health and Welfare, 2019), leading to adverse consequences that compromise patient safety, such as medical errors, high personnel turnover, absenteeism, staff shortages, and failure to meet patient needs (Huang et al., 2018).

The study results revealed a correlation between management perceptions, working condition, job satisfaction, safety climate and teamwork climate. From the researcher's point of view, hospital management should prioritize promoting cooperation between nurses and physicians and regularly emphasizing the importance of patient safety. Additionally, open communication about safety issues should be encouraged. So, nurses feel more supported by management, and tend to have higher perceptions of working conditions and job satisfaction.

As mentioned in a study carried by Huang et al., 2018 to emphasize the burnout risks among nurses which leads to adverse consequences regarding patient safety, that to mitigate the negative outcomes that threaten patient safety, hospitals can implement Employee Assistance Programs (EAPs) to regularly monitor factors that may affect nurses' productivity, such as work pressure, interpersonal relationships, and work arrangements. Additionally, stable recruitment programs and standard handoff systems should be put in place to reduce the high nurse-patient ratio and minimize medical errors and mistakes during shifts.

The study also found a correlation between working conditions, safety climate, and teamwork climate, which is consistent with

previous studies by **Abu-El-Noor and Hamdan (2017)** and **Gabrani (2015)**. The researcher's point of view in this regard represents that the perception of patient safety among pediatric nurses is greatly influenced by their working conditions. Effective teamwork and communication between nurses and physicians contribute to a safer environment for patients.

The study also highlights the influence of working conditions on nurses' perceptions of patient safety, which is consistent with **Huang, Wu, & Lee's (2018)** findings. High workloads, time pressure, and staffing shortages can all contribute to nurse burnout, decreased perceived quality of care, and negative patient outcomes. Providing resources such as training programs can help improve working conditions and avoid burnout. Respecting nurses' health and well-being is essential to improving working conditions.

The study found a correlation between age and emotional exhaustion, which may be caused by varying degree of emotional exhaustion according to age. The same result was also observed in a study by **Chih-Hsuan Huang (2020)**. In addition, the results showed that job satisfaction had a positive impact on safety climate, this is suggested by researcher that nurses with more job satisfaction were more aware of patient safety.

The study results showed a significant correlation between working experience and safety climate, job satisfaction, perception of management, working conditions, and emotional exhaustion. These results cohort with a study by **Roney and Aciri, 2018**, they detected that safety climate is positively impacted by nurses' work experience, the more the nurses' work experience the higher the consciousness about patient safety needs.

Moreover, **Wagner et al., 2018**, suggested that implementing appropriate performance appraisal mechanisms effectively strengthened the job satisfaction, and the sense of belonging to the units. Therefore, the administrators' leadership style play an important role in determining nurses' satisfaction on the pediatric care units. A study

conducted by **Boamah et al., 2018** on the effect of transformational leadership on job satisfaction and patient safety outcomes, revealed that the empowerment of nurses increases their job satisfaction and the quality of patient safety perception in hospital work environment.

Conclusion:

In conclusion, work environment variables such as teamwork climate, job satisfaction, stress recognition, perceptions of management, working conditions, and emotional exhaustion are affecting patient safety culture in pediatric units and require prioritizing interventions and hospital management procedures.

Recommendation

The findings of this study suggest several recommendations for future research on patient safety in pediatric units:

- Extending the study to other hospitals and different geographic locations could enhance the generalizability of the study results.
- Future studies on patient safety should consider incorporating the perspectives of other staff types, such as technicians, pharmacists, and other healthcare professionals to provide a more comprehensive understanding of patient safety culture in pediatric units.
- Conducting longitudinal studies to assess the impact of interventions aimed at improving patient safety culture over time to identify strategies for sustained improvements in patient safety outcomes.

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