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Impact of Patient-Centred Care and Work Environment on Adverse Patient Events in Intensive Care Units among Nurses: A Cross-Sectional Correlational Design

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ABSTRACT

Background: In healthcare, ensuring patient safety and providing high-quality care is crucial, particularly in the intensive care units. Adverse patient events include a broad range of patient harm and can affect patient safety and overall healthcare outcomes. **Objective:** To explore the impact of patient-centered care and work environment on adverse patient events among nurses in intensive care units. **Methods:** Using a cross-sectional correlational design, nurses from various healthcare organizations were studied. A simple random sampling technique was employed to collect data from 152 nurses working in the intensive care units. Data collection was achieved using the patient-centered care competency scale, the Healthy Work Environment assessment tool of the American Association of Critical Care Nurses, and the adverse patient events scale. **Results:** The mean score was high for patient-centered care (M=4.52, SD=0.13) and work environment (M=4.53, SD=0.28). A weak negative correlation was found between respecting patients' perspectives and nosocomial infections and medication errors. No correlation was found between the work environment and adverse patient events. There were significant correlations between patient-centred care and work environment subscales. Some nurses' demographic characteristics were significantly different among study outcomes. **Conclusion:** Patient safety is critical to healthcare, ensuring patients are protected from harm and receive quality care. The study offers valuable guidance for nurses to enhance patient care delivery and ensure patient safety in the ICU environments.

Keywords: Adverse Patient Events; Impact of Patient-Centred Care; Work Environment

INTRODUCTION

The main objectives of healthcare, specifically in Intensive Care Units (ICUs), are patient safety and high-quality care (Ambulkar *et al.*, 2023). Adverse Patient Events (APE) cover a wide range of patient harms that have the potential to impact patient safety and overall healthcare outcomes significantly (Gabiatti *et al.*, 2023). Understanding the factors contributing to APE is crucial as healthcare systems strive to improve patient care. Patient-Centred Care (PCC) is a crucial factor among these factors (Kwame & Petrucka, 2021). Patient-centred care, characterized by an approach that focuses on meeting patients' unique needs, preferences, and values, has emerged as a critical component of healthcare delivery (Al Khaibari *et al.*, 2023). Participating in care and having their concerns addressed by patients leads to enhanced patient outcomes, satisfaction, and safety (Gupta, Pandey & Naagar, 2023). As frontline caregivers, nurses play a vital role in delivering PCC in the ICU and their ability to establish effective communication, engage patients in decision-making, and provide compassionate care that can contribute to positive patient experiences and ultimately reduce APE (Franck *et al*., 2023). Nurses operate in a Work Environment (WE) that substantially influences patient care outcomes. So, the ability of nurses to provide safe and effective care can be enhanced by a supportive work environment that includes communication, collaboration, effective decision-making, appropriate staffing, meaningful recognition, and authentic leadership.

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Unfavourable work environments, with high workloads, inadequate resources, and poor communication, can lead to errors, APE, and compromise patient safety (Hegazy *et al.*, 2021). As per the research, the workload of nurses is affected by external influences such as tasks, work organisation, and the work environment (Richa, Argaheni & Mufidah, 2024).

Despite exploring the relationship between PCC, nurse WE, and APE, a complete understanding of how these factors interact still needs to be completed, particularly in the ICU context. Improving patient safety strategies can be achieved by examining the complex connections between PCC, the nurse work environment, and APE (Kwame & Petrucka, 2021). Although more exploring work remains to be completed in understanding the relationship between PCC, nurse WE, and APE. This primarily involves the ICU context since patient safety improvement strategies might be better obtained through an examination of complex interplay between PCC, the nurse work environment, and APE. Prevention of APE and patient safety in the ICU is essential (Kotfis *et al*., 2022). The importance of PCC in improving patient safety outcomes has been highlighted by significant research on the connection between PCC, the nurse work environment, and APE (Gartner *et al*., 2022; Rumintang & Widianto, 2024).

PCC requires patients to participate in their care, respect their values and preferences, to promote effective communication between patients and healthcare providers (Grover *et al.*, 2022). In 2020, Dykes *et al*., conducted a study to examine the effectiveness of a nurse-led fall prevention toolkit in a nonrandomized controlled trial that included patients and families throughout their hospitalization. A decrease in APE rates was observed. Patients who were actively involved in their care and had their concerns addressed were more likely to have positive results and less harm. The nurse's role is a crucial factor in influencing patient safety. Al Sabei *et al*.(2021) focused on the impact of WE characteristics, interprofessional teams, and staffing levels on adverse patient events (APE) in healthcare settings in Oman. According to the findings, there is a significant and positive link between the quality of the WE and nurses' experiences. Nurses in supportive environments that encourage teamwork reported fewer adverse incidents, such as patient and family complaints, verbal abuse, patient falls, hospital-acquired infections, and medication errors.

Bachnick *et al*. (2018) examined the relationship between PCC and nurses' WE subscales in Swiss acute care hospitals. A study was conducted on 2073 patients and 1810 registered nurses who provide direct patient care across 123 units in 23 acute care hospitals. The study found that patients who reported high levels of PCC, including staffing, resource adequacy, and leadership ratings, were likelier to have higher levels of PCC. Another study, including a sample of 432 nurses from a large U.S. Hospital, revealed a significant association between nurse-reported bullying and the incidence of central-line-associated bloodstream infections, even after controlling nurse staffing and qualifications (Arnetz *et al*., 2020). A sample of 603 nurses from 11 public hospitals in Iraq reported that the challenges faced by nursing staff were a shortage of nurses, inadequate experience and fear of reporting ADE, lack of training, and limited monitoring equipment (Al-Jumaili *et al*., 2021). Another study, which included 246 nurses from two private hospitals in Northern Cyprus, investigated the relationship between workload, APE, and experience with patient safety attitudes. The findings indicated statistically significant differences between experiences, workloads, and APE (Al-Mugheed *et al*., 2022; Labrague, 2024).

PCC promotes active patient engagement, effective communication, individualized care and reducing APE. A cheerful nurse WE with adequate staffing, supportive leadership, and strong teamwork facilitates a safe and effective care delivery, that ultimately reducing APE. However, more research is needed to fully understand the complex dynamics between these factors and develop targeted interventions for improving patient safety in the ICU (Mohamed, Mohammed & Ahmed, 2018). The current study aimed to explore the impact of PCC and work environment on adverse patient events among nurses in intensive care units.

Theoretical Framework

The theoretical framework for exploring the relationship between PCC, the nurse work environment, and APE in the ICU is guided by Donabedian's Quality of Care Framework (Evans *et al.*, 2023); this framework focuses on three critical subscales of quality in healthcare: structure, process, and outcomes. In the context of this study, the framework can be applied as follows:

Structure: This dimension refers to the organisational and environmental factors influencing PCC and the nurse work environment. The ICU focuses on nurses' demographics, communication, collaboration, decision-making, staffing, meaningful recognition, and authentic leadership.

Process: This dimension encompasses the interactions and activities between healthcare providers and patients within the ICU. It includes PCC practices such as respecting patients' perspectives, promoting patient involvement in care processes, providing comfort, and advocating for patients.

Outcomes: This dimension evaluates the impact of PCC zand the nurse WE on APE and patient safety outcomes. APE, such as medication errors, falls, healthcare-associated infections, and patient harm, can be assessed as outcome measures.

The Donabedian framework permits researchers to investigate the impact of PCC and nurse workforce on specific APEs in the ICU, which ultimately influences patient safety outcomes.

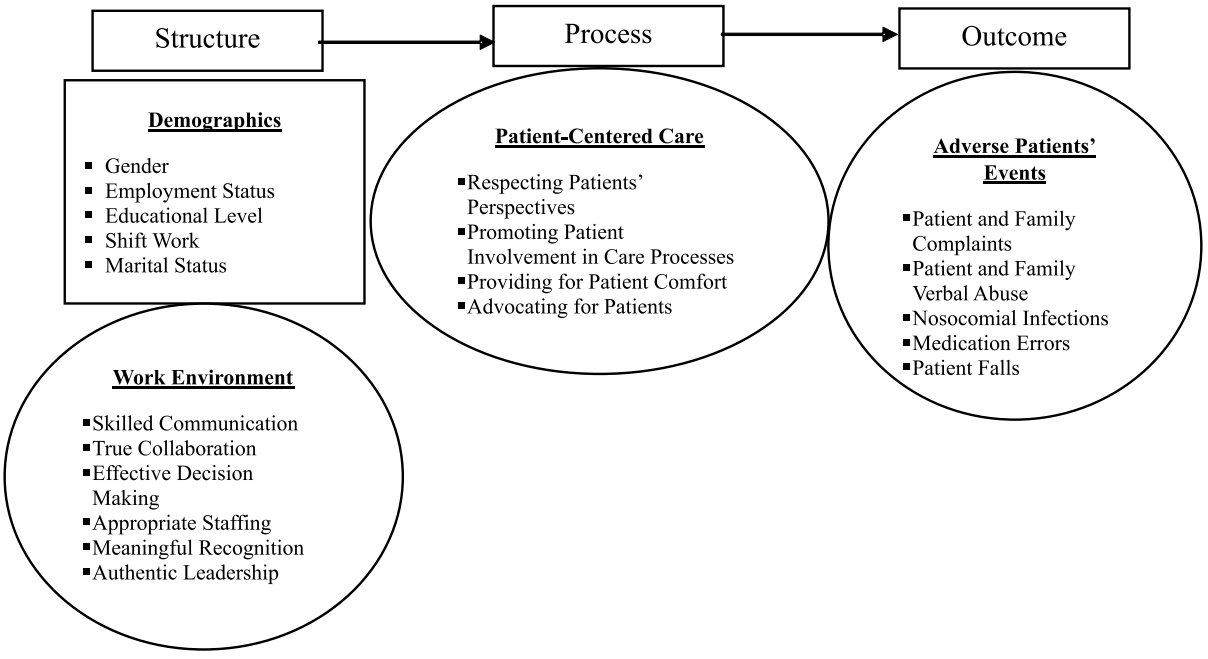

Figure 1: Study Theoretical Framework

The Significance of the Study

This study is significant as it investigates the complex interplay between PCC, the nurse work environment, and APE in the intensive care unit (ICU). The primary objectives are to advance patient safety by identifying the contributory factors to APE, enhance PCC by scrutinising its association with APE, optimise the nurse WE to foster improved patient outcomes, provide guidance for healthcare policy and practice, and contribute to the advancement of knowledge and research in the realm of patient safety and quality improvement. The outcomes of this study will inform evidence-based interventions, policies, and training programs to cultivate a culture of safety, enhance patient outcomes, and foster a supportive WE for ICU nurses (Dagne & Beshah, 2021).

METHODOLOGY

Aim

To explore the impact of patient-centred care and work environment on APE in intensive care units among nurses.

Research Questions

1. What is the relationship between PCC and APE in the ICU?
2. What is the relationship between the nurse WE and the occurrence of APE in the ICU?
3. What is the relationship between PCC and nurse WE in the ICU?
4. What are the relationships between nurses' gender, employment status, educational level, work shift, marital status, and the study variables (PCC, WE, and the occurrence of APE in the ICU)?

Research Design

A cross-sectional correlational design examined the relationship between the WE and APE of ICU nurses. By focusing on nurses' experiences and perceptions, the study provides insights into how aspects of the WE contribute to patient safety outcomes. The quantitative analysis of the survey data and adverse event records allows for statistical exploration. It provides quantitative evidence regarding the impact of the nurse's WE on APE in the ICU (Nwabuko, 2024).

Sampling and Setting

A simple random sampling technique was used to select a representative sample of nurses working in the ICUs of various private general healthcare organisations in Cairo, Egypt with a capacity of about 200 beds. Factors such as age, gender, years of experience in ICUs, education level, employment status, shifts, marital status, and type of ICU (e.g., medical, surgical, mixed) ensured the diversity and generalisability of the findings. The inclusion criteria required nurses currently working in ICUs with a diversity of personal and work factors. Exclusion criteria include nurses working in the ICU for less than 6 months. Using power analysis statistical packages G*Power for sample size calculation for multiple regression, considering medium effect size and a significance level (p-value) $p<0.05$, with a power of 80%, the estimated sample size was 121 nurses.

Measures

Nurses' Demographic Data: This data was collected to describe the characteristics of the nurse sample and identify any potential associations between these variables and the study outcomes. It included age, gender, years of experience in ICU, educational level, employment status (full-time, part-time), shift work (rotating shifts (day, evening, night shifts) or fixed shifts), and marital status (single, married, divorced, or widowed).

The PCC Competency Scale for hospital nurses was developed by Hwang (2015). It consists of 17 items grouped into four subscales: respecting patients' perspectives (6 items), promoting patient involvement in care processes (5 items), providing for patient comfort (3 items), and advocating for patients (3 items). The instrument uses a five-point Likert scale (1 minimal, two below average, three average, four good, five excellent), which the respondents used to rate their competencies. The overall scale demonstrates high internal consistency with Cronbach's alpha coefficient of 0.92, and the subscales exhibit good reliability ranging from 0.80 to 0.85. Multi-trait scaling analysis confirms the convergent and discriminant validity of the subscales.

American Association of Critical-Care Nurses Healthy WE Assessment Tool (AACN HWEAT) (Connor *et al*., 2018). It is a generalisable survey designed to identify areas for improvement in the work environment rather than diagnose specific challenges. It assesses the 6 Healthy WE (HWE) standards, with 3 for each unique item (skilled communication, true collaboration, effective decision-making, appropriate staffing, meaningful recognition, and authentic leadership). It consists of 18 questions, with three items dedicated to each of the 6 HWE standards. The standards include statements related to the work environment, and respondents are asked to indicate their level of agreement or disagreement using a 5-point Likert (1 = "strongly disagree"; 5 = "strongly agree"). Scoring system: Mean scores are calculated for the six standards and the overall survey. The overall score interpretation is as follows: 4.00 to 5.00 is considered "excellent," 3.00 to 3.99 is "good," and 1.00 to 2.99 "needs improvement." Test-retest reliability was demonstrated through Spearman correlation coefficients ranging from 0.50 to 0.68. Internal consistency was supported by a Cronbach α of 0.77 overall (range for standards, 0.77-0.81). Convergent validity between AACN HWEAT standards and the Agency for Healthcare Research and Quality Hospital Survey on Patient Safety Culture items indicated correlation coefficients of 0.30 to 0.52 (Connor *et al.*, 2018).

The Adverse Patient Events (APE) Scale uses a nurse-reported scale that includes (a) complaints from patients and families, (b) verbal abuse, (c) falls, (d) nosocomial infections, and (e) medication errors (Laschinger & Leiter, 2006). Nurses rate each item according to the frequency of occurrence among patients during their shifts over the past year. A seven-point Likert scale is used (0 = never, 1 = a few times a year, 2 = at least once a month, 3 = several times a month, 4 = at least once a week, 5 = several times a week, and 6 = daily). A previous study by Labrague *et al*. (2020) indicated that the internal consistency of this tool has a Cronbach alpha value of 0.91.

Data Collection

The data collection involved distributing written surveys to nurses working in the ICUs. This approach was followed to accommodate the preferences and ease of participants, ensuring a higher response rate and an adequate representation of the nursing population. Paper surveys were administered to the nurses directly in the ICU for 20–25 minutes during designated times (staff meetings or shift handovers). Clear instructions were provided on completing the surveys, and participants could complete and submit the form within a specific timeframe. The approval of hospital directors, and informed consent from nurses, to ensure confidentiality and anonymity and the possibility of withdrawal at any time.

Data Analysis

A descriptive analysis was used to measure means, frequencies, and percentages. Correlations were used to determine the strength and direction of the relation between the nurse WE, PCC, and the occurrence of APE. T-tests and ANOVA tests were used to test the relationships between nurses' gender, employment status, educational level, marital status, and the study variables (PCC, WE, and the occurrence of APE in the ICU).

Ethical Consideration

Ethical approval was obtained from the Internal Review Board Badr University in Cairo, Egypt with reference number BUC-IACUC-231217-51on 17th December 2023. The approval of hospital directors was obtained, along with informed consent from nurses, to ensure confidentiality and anonymity while informing them of their right to withdraw at any time.

RESULTS

About sixty-two percent were males, and almost equal percentages (50.7% and 49.3%) were diploma and associate degree, or BSN graduates. Most were employed full-time (87.5%), on rotating shifts (54.6%), and 59.2% were married. The mean age was 30.64 (SD=7.02), with a mean of 8.33 (SD=6.55) years of experience (Table 1).

Table 1: Descriptive Statistics for Demographic Data (n=152)

Variable		***N***	***%***	
Gender	Male	95	62.5	
	Female	57	37.5	
Educational Level	Diploma	17	11.2	
	Associate degree	60	39.5	
	Baccalaureate	75	49.3	
Employment Status	Full Time	133	87.5	
	Part Time	19	12.5	
Shift Work	Rotating Shifts	83	54.6	
	Fixed Shift	69	45.4	
Marital Status	Single	54	35.5	
	Married	90	59.2	
	Divorced	4	2.6	
	Widowed	4	2.6	
Variable			**Mean**	**SD**
Age			30.64	7.02
Years of experience working in the ICU			8.33	6.55

In Table 2, Nurses across all subscales reported a positive perception. The PCC subscales and WE variables scored high, with a mean score of 4.56 (SD=0.51) for providing patient comfort (PCC) and a mean of 4.58 (SD=0.43) for 'Skilled Communication' (WE). The APE mean score for 'Patient and Family Complaints' was 3.91 (SD=2.06).

Table 2: Descriptive Statistics for the Main Variables (n=152)

Variable		Mean	SD
Patient-Centered Care Total	1. Respecting Patients' Perspectives	4.52	0.13
		4.54	0.39
	2. Promoting patient involvement in care processes	4.50	0.38
	3. Providing for patient comfort	4.56	0.51
	4. Advocating for patients	4.52	0.53
Work Environment Total	1. Skilled Communication	4.53	0.28
		4.58	0.43
	2. True Collaboration	4.52	0.44
	3. Effective Decision Making	4.54	0.46
	4. Appropriate Staffing	4.55	0.49
	5. Meaningful Recognition	4.55	0.45
	6. Authentic Leadership	4.51	0.48
Adverse Patients Events Total		2.97	1.58
	1. Patient and family complaints	3.91	2.06
	2. Patient and family verbal abuse	3.60	2.11
	3. Nosocomial infections	3.09	1.65
	4. Medication errors	2.43	1.68
	5. Patient falls	1.81	1.73

Table 3: Correlations among the Study Variables (n=152)

Variable		Age	Years of experience working in the ICU	Patient-Centred Care			
				Respecting patients' perspectives	Promoting patient involvement in care processes	Providing patient comfort	Advocating for patients
Patient-centred Care	Respecting patients' perspectives	-0.17*	-0.24**				
	Promoting patient involvement in care processes		-0.19*				
	Providing for patient comfort	-0.23**	-0.27**				
	Advocating for patients		-0.20*				
Work Environment	True Collaboration			0.30*		0.18*	0.33**
	Effective Decision Making			0.36*	0.27**	0.38**	0.41**
	Appropriate Staffing		-0.16*	0.33**	0.24**	0.31**	0.23**
	Meaningful Recognition			0.23**			0.22**
	Authentic Leadership			0.42**	0.19*	0.28**	0.19*
Adverse patients' events	Nosocomial infections			-0.20*			
	Medication errors			-0.17*			

*$P \leq 0.05$, **$P \leq 0.01$

In Table 3, specific aspects of PCC, such as respecting patients' perspectives and providing patient comfort, were shown to have negative correlations with age. Years of experience in the ICU showed a negative correlation with all PCC subscales. Within the WE domain, years of experience in the ICU were weakly and negatively correlated with appropriate staffing.

The only PCC subscale that showed a weak negative correlation with nosocomial infections and medication errors among the APEs was "respecting patients' perspectives." In addition, the study found no association between nurse WE and APE. PCC subscales are positively correlated with various WE subscales, with some exceptions. Respecting patients' perspectives was correlated positively with all WE subscales

except skilled communication. Promoting patient involvement was linked positively to effective decision-making, appropriate staffing, and authentic leadership. Providing for patient comfort was positively correlated with proper collaboration, effective decision-making, appropriate staffing, and authentic leadership. They advocated for patients positively correlated with all WE subscales except skilled communication.

Table 4: t-tests between Gender and Study Variables

	Variable	Gender	Mean	SD	*t*-test	*p*-value
Patient-Centered Care	Respecting Patients' Perspectives	Male	4.54	0.36	-0.18	0.86
		Female	4.55	0.44		
	Promoting patient involvement in care processes	Male	4.44	0.41	-2.87	0.01
		Female	4.61	0.29		
	Providing for patient comfort	Male	4.57	0.53	0.26	0.80
		Female	4.55	0.47		
	Advocating for patients	Male	4.53	0.55	0.26	0.79
		Female	4.50	0.50		
Work Environment	Skilled Communication	Male	4.61	0.42	1.12	0.26
		Female	4.53	0.44		
	True Collaboration	Male	4.55	0.43	1.16	0.25
		Female	4.46	0.44		
	Effective Decision Making	Male	4.57	0.44	1.06	0.29
		Female	4.49	0.48		
	Appropriate Staffing	Male	4.55	0.49	0.20	0.84
		Female	4.54	0.49		
	Meaningful Recognition	Male	4.56	0.45	0.54	0.59
		Female	4.52	0.45		
	Authentic Leadership	Male	4.51	0.46	0.19	0.85
		Female	4.50	0.51		
Adverse Patients' Events		Male	2.91	1.69	-0.63	0.53
		Female	3.07	1.40		

There was a gender-based distinction observed in promoting patient involvement in care processes, with females scoring higher (M= 4.61, SD=0.29) than males (M= 4.44, SD=0.41) (t = -2.87, p=0.01). No significant differences were found between genders for other PCC subscales, WE subscales, or APEs (Table 4).

Table 5: t-tests between Shift Work and Study Variables

	Variable	Shift Work	Mean	SD	*t*-test	*p*-value
Patient-Cantered Care	Respecting Patients' Perspectives	Rotating Shifts	4.55	0.40	0.37	0.71
		Fixed Shift	4.53	0.37		
	Promoting patient involvement in care processes	Rotating Shifts	4.52	0.36	0.42	0.67
		Fixed Shift	4.49	0.40		
	Providing for patient comfort	Rotating Shifts	4.61	0.46	1.25	0.22
		Fixed Shift	4.51	0.56		
	Advocating for patients	Rotating Shifts	4.54	0.53	0.53	0.60
		Fixed Shift	4.49	0.53		
Work Environment	Skilled Communication	Rotating Shifts	4.54	0.44	-1.09	0.28
		Fixed Shift	4.62	0.41		
	True Collaboration	Rotating Shifts	4.53	0.40	0.33	0.74
		Fixed Shift	4.50	0.48		
	Effective Decision Making	Rotating Shifts	4.53	0.47	-0.46	0.65
		Fixed Shift	4.56	0.44		
	Appropriate Staffing	Rotating Shifts	4.60	0.45	1.40	0.16
		Fixed Shift	4.49	0.52		
	Meaningful Recognition	Rotating Shifts	4.56	0.43	0.37	0.72
		Fixed Shift	4.53	0.48		
	Authentic Leadership	Rotating Shifts	4.49	0.51	-0.36	0.72
		Fixed Shift	4.52	0.44		
Adverse Patients' Events		Rotating Shifts	2.99	1.56	0.17	0.87
		Fixed Shift	2.94	1.62		

Table 5 presents that for PCC dimensions, WE domains, and APE, there are no significant differences between rotating shifts and fixed shifts.

Table 6: t-tests between Employment and Study Variables

	Variable	Employment	Mean	SD	*t*-test	*p*-value
Patient-Centred Care	Respecting Patients' Perspectives	Full Time	4.54	0.40	0.05	0.96
		Part Time	4.54	0.33		
	Promoting patient involvement in care processes	Full Time	4.51	0.36	0.51	0.61
		Part Time	4.46	0.49		
	Providing for patient comfort	Full Time	4.56	0.49	-0.14	0.89
		Part Time	4.58	0.64		
	Advocating for patients	Full Time	4.51	0.53	-0.54	0.59
		Part Time	4.58	0.54		
Work Environment	Skilled Communication	Full Time	4.56	0.44	-0.98	0.33
		Part Time	4.67	0.31		
	True Collaboration	Full Time	4.52	0.42	0.26	0.80
		Part Time	4.49	0.56		
	Effective Decision Making	Full Time	4.55	0.46	0.34	0.74
		Part Time	4.51	0.42		
	Appropriate Staffing	Full Time	4.55	0.48	-0.13	0.90
		Part Time	4.56	0.51		
	Meaningful Recognition	Full Time	4.56	0.45	1.12	0.27
		Part Time	4.44	0.42		
	Authentic Leadership	Full Time	4.54	0.46	2.05	0.04
		Part Time	4.30	0.53		
Adverse Patients' Events		Full Time	2.95	1.58	-0.34	0.73
		Part Time	3.08	1.60		

Regarding employment status, *t*-tests revealed a significant difference in authentic leadership with part-time employees (M=4.30, SD=0.53) scoring lower than full-time employees (M = 4.54, SD=0.46), (*t*=2.02, *p*=0.04). However, no statistically significant differences were found between full-time and part-time employees for other PCCs, WEs, or APEs (Table 6).

Table 7: ANOVA between Educational Level and Study Variables

	Variable	Education	Mean	SD	F	*p*-value
Patient-Centred Care	Respecting Patients' Perspectives	Diploma	4.38	0.59	2.43	0.09
		Associate	4.51	0.34		
		Baccalaureate	4.60	0.36		
	Promoting patient involvement in care processes	Diploma	4.35	0.44	2.99	0.05
		Associate	4.46	0.36		
		Baccalaureate	4.57	0.36		
	Providing for patient comfort	Diploma	4.29	0.72	2.76	0.07
		Associate	4.61	0.46		
		Baccalaureate	4.59	0.48		
	Advocating for patients	Diploma	4.45	0.66	0.19	0.83
		Associate	4.51	0.53		
		Baccalaureate	4.54	0.50		
Work Environment	Skilled Communication	Diploma	4.57	0.39	3.38	0.04
		Associate	4.47	0.46		
		Baccalaureate	4.66	0.39		
	True Collaboration	Diploma	4.51	0.43	0.15	0.86
		Associate	4.54	0.43		
		Baccalaureate	4.50	0.45		
	Effective Decision Making	Diploma	4.57	0.51	0.07	0.93
		Associate	4.55	0.38		
		Baccalaureate	4.53	0.51		
	Appropriate Staffing	Diploma	4.57	0.48	0.03	0.97
		Associate	4.54	0.48		
		Baccalaureate	4.55	0.50		
	Meaningful Recognition	Diploma	4.73	0.36	1.99	0.14
		Associate	4.48	0.46		
		Baccalaureate	4.56	0.45		
	Authentic Leadership	Diploma	4.53	0.46	0.85	0.43
		Associate	4.44	0.54		
		Baccalaureate	4.55	0.42		
Adverse Patients' Events		Diploma	3.28	1.73	0.39	0.68
		Associate	2.90	1.73		
		Baccalaureate	2.95	1.43		

Regarding the nurses' educational levels, the ANOVA test revealed significant differences in PCC, notably in promoting patient involvement (M=4.57, SD=0.36, F=2.99, *P*=0.05), and in WE, particularly in skilled communication (M=4.66, SD=0.39, F=3.38, *P*=0.04). Nurses with baccalaureate degrees showed higher means in these areas (Table 7).

Table 8: ANOVA between Marital Status and Study Variables

	Variable	Marital Status	Mean	SD	F	*p*-value
Patient-Centred Care	Respecting Patients' Perspectives	Single	4.61	0.38	1.76	0.16
		Married	4.51	0.39		
		Divorced	4.54	0.21		
		Widowed	4.21	0.48		
	Promoting patient involvement in care processes	Single	4.54	0.39	1.85	0.14
		Married	4.50	0.34		
		Divorced	4.40	0.46		
		Widowed	4.10	0.62		
	Providing for patient comfort	Single	4.67	0.45	5.63	0.00
		Married	4.53	0.51		
		Divorced	4.75	0.17		
		Widowed	3.67	0.72		
	Advocating for patients	Single	4.60	0.50	2.88	0.04
		Married	4.50	0.52		
		Divorced	4.50	0.58		
		Widowed	3.83	0.64		
Work Environment	Skilled Communication	Single	4.62	0.45	0.78	0.51
		Married	4.57	0.42		
		Divorced	4.42	0.50		
		Widowed	4.33	0.38		
	True Collaboration	Single	4.52	0.46	1.48	0.22
		Married	4.52	0.42		
		Divorced	4.67	0.67		
		Widowed	4.08	0.17		
	Effective Decision Making	Single	4.55	0.48	1.93	0.13
		Married	4.54	0.44		
		Divorced	4.83	0.19		
		Widowed	4.08	0.57		
	Appropriate Staffing	Single	4.62	0.49	2.26	0.08
		Married	4.53	0.48		
		Divorced	4.67	0.38		
		Widowed	4.00	0.38		
	Meaningful Recognition	Single	4.61	0.48	0.80	0.49
		Married	4.52	0.43		
		Divorced	4.50	0.43		
		Widowed	4.33	0.47		
	Authentic Leadership	Single	4.53	0.46	0.28	0.84
		Married	4.49	0.50		
		Divorced	4.67	0.47		
		Widowed	4.42	0.32		
Adverse Patients' Events		Single	2.98	1.64	0.77	0.51
		Married	2.89	1.60		
		Divorced	3.70	0.77		
		Widowed	3.85	0.50		

ANOVA tests indicated significant differences in PCC subscales based on nurses' marital status. Divorced nurses reported a higher mean for providing patient comfort (M=4.75, SD=0.17, F=5.63, *P*=0.00) than others. Regarding advocating for patients, single nurses had a higher mean (M=4.60, SD=0.50, F=2.88, *P*=0.04) than others. The WE subscales and APE occurrence were not significantly influenced by marital status (Table 8).

DISCUSSION

Cooperation between patients and nurses and a supportive work environment with effective teamwork and leadership can improve patient outcomes and reduce APE. Nurses are essential in promoting patient safety by communicating effectively with the healthcare team and identifying areas for improvement in care processes (Lucas *et al.*, 2023). Patient-centred care is one of the approaches used to assure the primacy of the individual's health and life goals in their care management. In recent years, the concept of having the person be the driving force in their healthcare decisions has evolved and gained momentum, and it is now largely considered the gold standard for healthcare worldwide (Elkefi & Asan, 2024).

Nurses reported that the most frequent adverse event in the ICU was patient and family complaints, followed by patient and family verbal abuse. Meanwhile, a study by Tlili *et al*. (2024) reported that healthcare-associated infection was the most frequently reported adverse event. However, the results of this study revealed that out of all aspects of PCC, respecting patients' perspectives had a weak correlation with APEs. Patients' perspectives might indirectly affect adverse outcomes through improved patient-provider communication or shared decision-making.

In the current study, the only PCC subscale that showed a weak negative correlation with nosocomial infections and medication errors among the APEs was "respecting patients' perspectives." When patients' viewpoints are inadequately acknowledged, a communication breakdown or mistrust between the healthcare provider and the patient could happen. This breakdown could cause misunderstandings, dissatisfaction, or non-compliance with treatment plans, thereby elevating the likelihood of adverse events. Although PCC subscales and APE have become more widespread, there still needs to be more evidence regarding their usage and effectiveness. Understanding how these subscales were applied and their influence on APE, especially in promoting effective patient and nurse respect relationships, remains limited (Newman *et al*., 2021).

The study revealed no association between nurses' WE and APE. However, El-Gazar *et al*. (2024) found a significant negative correlation between the nursing practice environment and APE. While the current study nurses rated their work environment positively, those in private hospitals may hesitate to report APE due to fears of blame or punishment. Nurses rated in the current study high mean scores for all PCC subscales and WE subscales. This indicated their perception of the high importance of all aspects. Nurses in acute care general hospitals in Korea rated their perception of PCC as high but lower than the current study results for all PCC subscales (Hwang, Kim & Chin, 2019). However, this disparity in PCC scoring may result from cultural and organisational differences. Alkhaibari *et al*. (2023) reviewed 50 articles of studies done in the Middle East and North Africa, indicating that the concept of PCC is adapted to the healthcare setting. However, the application still needs to be improved.

The present study indicated significant correlations between PCC and other WE subscales, except for skilled communication. In the ICU setting, where patient conditions are critical and fast decision-making is essential, other factors like staffing, leadership, and teamwork may take precedence over skilled communication in directly influencing patient-centred care (PCC). Effective communication might already be embedded in routine practice in high-pressure environments, supported by standardised protocols. With patients in life-threatening situations, the availability of adequate staff and cohesive teamwork becomes more crucial in ensuring timely interventions, making communication less noticeable as an independent factor. Additionally, strong leadership in ICUs can guide care processes and foster an organised work environment, reducing the immediate impact of communication skills on patient outcomes in these critical situations. Furthermore, the subscales promoting patient involvement in care processes and providing for patient comfort showed no significant correlation with meaningful recognition within the WE subscales. Consistent with these findings, Bachnick *et al*. (2018) and Rose-Facey (2020) reported that adequate staffing and resources were linked to higher levels of PCC in acute care hospitals and medical-surgical units. Baek *et al*. (2023) also identified a significant positive relationship between nursing teamwork and PCC. Moreover, Kang and Lim (2019) observed a positive correlation between the leadership of head nurses and person-centred critical care nursing. Similarly, a literature review in Ghana highlighted leadership, patient and family involvement, communication, and the work environment (WE) as facilitators of PCC in hospitals (Nkrumah & Abekah-Nkrumah, 2019).

Contrary to the current study results, Abekah-Nkrumah and Nkrumah (2021) and Rose-Facey (2020) investigated the effect of perceived WE on patient-centred behaviour and found that communication as a factor of WE had a significant effect on patient-centred behaviour in ICU and medical-surgical units. The current study's absence of a correlation between PCC and communication may stem from nurses needing to pay more attention to the significance of communication within the PCC context. Proficient communication is essential in nurse-patient interactions, constituting a fundamental element of nursing care. Communication in some literature reviews (Moser *et al*., 2022; Todd *et al*., 2024) was mentioned as a component of PCC. Patient-centred communication fosters trust and mutual respect and encourages care practices considering patients' and caregivers' needs, concerns, and preferences.

The study results also indicated the relationships between nurses' demographic variables and PCC, the nurse WE, and the occurrence of APE in the ICU. Age exhibited negative correlations with specific subscales of PCC, namely, respecting patients' perspectives and providing patient comfort. Contrary to the current study's findings, Alhalal, Alrashidi, and Alanazi (2020) found that older nurses connect with PCC by demonstrating enhanced capabilities in empathy, effective communication, responsiveness to patients' perspectives and concerns, and active engagement in shared decision-making. Years of experience in the ICU showed a negative correlation with all PCC subscales. These results might be because the experienced nurses could grow accustomed to ICU protocols, potentially reducing their focus on patient-centred care. As they gain experience, they prioritise efficiency and task completion, decreasing perceived patient-centredness.

A significant difference was observed in promoting patient involvement in care processes within the PCC, where females scored significantly higher than males. One possible explanation was that female nurses typically show higher empathy and communication skills, leading to greater patient involvement. Additionally, societal expectations that emphasise nurturing and empathy in nurses' roles further strengthen this pattern, influencing differences in patient engagement. Female nurses have historically been predominant, although a recent increase in male participation in nursing has occurred. No significant differences between rotating shifts and fixed shifts for all the study outcomes (PCC, WE, and APE). This result may be explained by the same settings that both shift types offer, which enables nurses to maintain consistent care quality and patient outcomes.

A significant difference was observed in authentic leadership within WE, with full-time nurses scoring significantly higher scores than part-time nurses. Part-time nurses, with their limited hours and potentially less engagement in organisational activities, might encounter fewer instances to observe and encounter authentic leadership behaviours in comparison to full-time nurses. Moreover, their limited presence might lead to a diminished connection with the organisation and its leadership, resulting in lower perceptions of authentic leadership. In contrast to the current study, previous research found no significant differences between authentic leadership and full-time and part-time nurses (Al-Hassan *et al*., 2023).

Nurses with baccalaureate degrees scored higher than those with other educational backgrounds in the PCC dimension of "promoting patient involvement in care processes" and the WE factor of "skilled communication." A logical explanation of these results was that nurses with baccalaureate degrees typically undergo more extensive training in communication skills and patient-centred care during their education compared to those with lower educational backgrounds. The curriculum of baccalaureate programs often emphasises critical thinking, effective communication, and patient engagement strategies, which could explain their higher mean scores in promoting patient involvement and skilled communication. Additionally, nurses with higher educational qualifications might feel more confident and competent in engaging patients and communicating effectively, leading to higher perceived proficiency in these areas.

Divorced nurses reported a higher mean score in the PCC dimension of "providing patient comfort" than other nurses. In comparison, single nurses exhibited a higher mean score in the "advocating for patients" dimension than other nurses in the current study. These results explain that divorced nurses, having gone through significant life changes, developed a heightened sensitivity to providing comfort to patients, stemming from their own experiences of needing support during challenging times. On the other hand, single nurses, who might not have immediate family responsibilities, might channel their focus towards advocating for patients, as they might have more time and emotional energy to dedicate to patient care and advocacy. Personal life

circumstances and coping mechanisms can influence the approach to patient-centred care, leading to variations in mean scores across different PCC dimensions.

Limitation

One of the study's challenging limitations was the considerable heterogeneity of the PCC conceptualisation, definition, and measurements, leading to divergent findings in the existing literature. This study's results cannot be generalised to all nurses and only represent tertiary hospitals. Further studies should aim to standardize PCC conceptualization, definitions, and measurements while expanding research to include nurses from diverse healthcare settings beyond tertiary hospitals.

CONCLUSION

The study yielded significant findings regarding PCC, nurse WE, and APEs in ICU settings. It discovered a weak negative correlation between "respecting patients' perspectives" in PCC and nosocomial infections and medication errors, highlighting its potential role in patient safety. While no direct link was found between nurses' WE and APEs, notable correlations were found between various PCC and WE factor. Furthermore, nurses' demographic characteristics, such as age and ICU experience, showed negative correlations with specific PCC measures. Gender differences were evident, with females scoring higher in promoting patient involvement and full-time nurses rating higher in authentic leadership. Divorced nurses scored higher in providing patient comfort, while single nurses scored higher in advocating for patients.

The future scope of the current study includes implementing an intervention study about PCC among healthcare providers. It is recommended to ensure the correct conceptualisation and implementation of PCC and its effect on patient outcomes. Considering the low rating of communication as a dimension of WE, holding an in-service program to highlight the relationship between communication and PCC is recommended. They are conducting a mixed-methods study incorporating surveys and interviews to assess patient-centred care interventions from the nurse and patient viewpoints. Future studies are needed with a larger sample of hospitals.

Conflict of Interest

The authors declare that they have no competing interests.

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REFERENCES

Abekah-Nkrumah, G., & Nkrumah, J. (2021). Perceived work environment and patient-centered behavior: A study of selected district hospitals in the central region of Ghana. *PloS One, 16*(1). https://doi.org/10.1371/journal.pone.0244726

Al Sabei, S. D., AbuAlRub, R., Labrague, L. J., Ali Burney, I., & Al-Rawajfah, O. (2021). The impact of perceived nurses' work environment, teams, and staffing levels on nurse-reported adverse patient events in Oman. *Nursing Forum, 56*(4), 897-904. https://doi.org/10.1111/nuf.12639.

Al-Hassan, N. S., Rayan, A. H., Baqeas, M. H., Hamaideh, S. H., & Khrais, H. (2023). Authentic leadership and its role in registered nurses' mental health and experiences of workplace bullying. *SAGE Open Nursing, 9*. https://doi.org/10.1177/23779608231185919

Al-Jumaili, A. A., Abbood, S. K., Abbas, A. N., Rafaeel, H. M., Mohammed, F. R., & Ali, A. Z. (2021). Organizational factors influencing nurses' ability to prevent and detect adverse drug events in public hospitals using a patient safety model. *Saudi Pharmaceutical Journal, 29*(10), 1216–1222. https://doi.org/10.1016/j.jsps.2021.09.003

Al-Mugheed, K., Bayraktar, N., Al-Bsheish, M., AlSyouf, A., Jarrar, M., AlBaker, W., & Aldhmadi, B. K. (2022). Patient safety attitudes among doctors and nurses: Associations with workload, adverse events, experience. *Healthcare, 10*(4). https://doi.org/10.3390/healthcare10040631

Alhalal, E., Alrashidi, L. M., & Alanazi, A. N. (2020). Predictors of patient-centered care provision among nurses in acute care setting. *Journal of Nursing Management, 28*(6), 1400-1409. https://doi.org/10.1111/jonm.13100.

Alkhaibari, R. A., Smith-Merry, J., Forsyth, R., & Raymundo, G. M. (2023). Patient-centered care in the Middle East and North African region: A systematic literature review. *BMC Health Services Research, 23*(1). https://doi.org/10.1186/s12913-023-09132-0.

Arnetz, J. E., Neufcourt, L., Sudan, S., Arnetz, B. B., Maiti, T., & Viens, F. (2020). Nurse-Reported Bullying and Documented Adverse Patient Events: An Exploratory Study in a U.S. Hospital. *Journal of Nursing Care Quality, 35*(3), 206-212. https://doi.org/10.1097/ncq.0000000000000442.

Bachnick, S., Ausserhofer, D., Baernholdt, M., & Simon, M. (2018). Patient-centered care, nurse work environment and implicit rationing of nursing care in Swiss acute care hospitals: A cross-sectional multicenter study. *International Journal of Nursing Studies, 81*, 98-106. https://doi.org/10.1016/j.ijnurstu.2017.11.007

Baek, H., Han, K., Cho, H., & Ju, J. (2023). Nursing teamwork is essential in promoting patient-centered care: A cross-sectional study. *BMC Nursing, 22*(1). https://doi.org/10.1186/s12912-023-01592-3

Connor, J. A., Ziniel, S. I., Porter, C., Doherty, D., Moonan, M., Dwyer, P., . . . & Hickey, P. A. (2018). Interprofessional use and validation of the AACN healthy work environment assessment tool. *American Journal of Critical Care, 27*(5), 363-371. https://doi.org//10.4037/ajcc2018179

Dagne, A. H., & Beshah, M. H. (2021). Implementation of evidence-based practice: The experience of nurses and midwives. *PloS One, 16*(8). https://doi.org/10.1371/journal.pone.0256600

Dykes, P. C., Burns, Z., Adelman, J., Benneyan, J., Bogaisky, M., Carter, E., . . . Bates, D. W. (2020). Evaluation of a patient-centered fall-prevention tool kit to reduce falls and injuries: A nonrandomized controlled trial. *JAMA Network Open, 3*(11). https://doi.org/10.1001/jamanetworkopen.2020.25889

El-Gazar, H. E., Abousoliman, A. D., Shawer, M., Coelho, P., & Zoromba, M. A. (2024). How nursing practice environments limit implicit rationing of care and nurse-assessed adverse events: the role of flow at work. *BMC Nursing, 23*(1). https://doi.org/10.1186/s12912-023-01644-8

Elkefi, S., & Asan, O., (2024). Validating the effectiveness of the patient-centered cancer care framework by assessing the impact of work system factors on patient-centered care and quality of care: Interview study with newly diagnosed cancer patients. *JMIR Human Factors, 11*. https://doi.org/10.2196/53053

Evans, K. K., Bekeny, J. C., Zolper, E. G., Steinberg, J. S., Atves, J. N., Benedict, C. D., . . . & Attinger, C. E. (2023). Ensuring quality care in the covid-19 era: Applying the donabedian model to tertiary wound care center practices. *Journal of the American Podiatric Medical Association, 113*(2). https://doi.org/10.7547/20-080

Franck, L. S., Axelin, A., Van Veenendaal, N. R., & Bacchini, F. (2023). Improving neonatal intensive care unit quality and safety with family-centered care. *Clinics in Perinatology, 50*(2), 449-472. https://doi.org/10.1016/j.clp.2023.01.007

Gabiatti, D., Vieira, L. G., Margatho, A. S., Dos Santos, B. N., Clark, A. M., Vasques, C. I., & Silveira, R. C. D. C. P. (2023). Prevalence of adverse events in pronated intubated adult COVID-19 patients: A systematic review with meta-analysis. *Journal of Clinical Nursing, 33*(1), 58-75. https://doi.org/10.1111/jocn.16741

Gartner, J.-B., Abasse, K. S., Bergeron, F., Landa, P., Lemaire, C., & Côté, A. (2022). Definition and conceptualization of the patient-centered care pathway, a proposed integrative framework for consensus: A concept analysis and systematic review. *BMC Health Services Research, 22*(1). https://doi.org/10.1186/s12913-022-07960-0

Grover, S., Fitzpatrick, A., Azim, F. T., Ariza-Vega, P., Bellwood, P., Burns, J., . . . & Hoppmann, C. A. (2022). Defining and implementing patient-centered care: An umbrella review. *Patient Education and Counseling, 105*(7), 1679–1688. https://doi.org/10.1016/j.pec.2021.11.004

Gupta, M., Pandey, D., & Naagar, S. (2023). Quality management and patient safety in healthcare domain. In *A guide to hospital administration and planning* (pp. 67–78). Springer Nature, Singapore.

Hegazy, A. M., Ibrahim, M. M., Shokry, W. A., & El Shrief, H. A. (2021). Work environment factors in nursing practice. *Menoufia Nursing Journal, 6*(2), 65–73. https://doi.org/10.21608/menj.2021.206247

Hwang, J. I. (2015). Development and testing of a patient-centered care competency scale for hospital nurses. *International Journal of Nursing Practice, 21*(1), 43–51. https://doi.org/10.1111/ijn.12220

Hwang, J. I., Kim, S. W., & Chin, H. J. (2019). Patient participation in patient safety and its relationships with nurses' patient-centered care competency, teamwork, and safety climate. *Asian Nursing Research, 13*(2), https://doi.org/10.1016/j.anr.2019.03.001

Kang, J., & Lim, Y. M. (2019). The relationship between the work environment and person-centered critical care nursing for intensive care nurses. *Journal of Korean Critical Care Nursing, 12*(2), 73-84. https://doi.org/10.34250/jkccn.2019.12.2.7

Kotfis, K., van Diem-Zaal, I., Williams Roberson, S., Sietnicki, M., van den Boogaard, M., Shehabi, Y., & Ely, E. (2022). The future of intensive care: Delirium should no longer be an issue. *Critical Care, 26*(1). https://doi.org/10.1186/s13054-022-04077-y

Kwame, A., & Petrucka, P. M. (2021). A literature-based study of patient-centered care and communication in nurse-patient interactions: barriers, facilitators, and the way forward. *BMC Nursing, 20*(1). https://doi.org/10.1186/s12912-021-00684-2

Labrague, L. J., De Los Santos, J. A. A., Tsaras, K., Galabay, J. R., Falguera, C. C., Rosales, R. A., & Firmo, C. N. (2020). The association of nurse caring behaviors on missed nursing care, adverse patient events and perceived quality of care: A cross-sectional study. *Journal of Nursing Management, 28*(8), 2257-2265. https://doi.org/10.1111/jonm.12894

Labrague, L., (2024). Emergency room nurses' caring ability and its relationship with patient safety outcomes: A cross-sectional study. *International Emergency Nursing, 72*. https://doi.org/10.1016/j.ienj.2023.101389

Laschinger, H. K. S., & Leiter, M. P. (2006). The impact of nursing work environments on patient safety outcomes: The mediating role of burnout engagement. *JONA: The Journal of Nursing Administration, 36*(5), 259-267. https://doi.org/10.1097/00005110-200605000-00019

Lucas, P., Jesus, É., Almeida, S., & Araújo, B. (2023). Relationship of the nursing practice environment with the quality of care and patients' safety in primary health care. *BMC Nursing, 22*(1), 413. https://doi.org/10.1186/s12912-023-01571-8

Mohamed, A. A., Mohammed, A. M., & Ahmed, H. (2018). Relation between locus of control and academic achievement of nursing students at Damanhour University. *IOSR Journal of Nursing and Health Science, 7*(5), 1–13. https://doi.org/10.9790/1959-07051196108

Moser, R. P., Trivedi, N., Murray, A., Jensen, R. E., Willis, G., & Blake, K. D. (2022). Patient-Centered Communication (PCC) scale: Psychometric analysis and validation of a health survey measure. *PloS One, 17*(12). https://doi.org/10.1371/journal.pone.0279725

Newman, B., Joseph, K., Chauhan, A., Seale, H., Li, J., Manias, E., . . . & Harrison, R. (2021). Do patient engagement interventions work for all patients? A systematic review and realist synthesis of interventions to enhance patient safety. *Health Expectations, 24*(6), 1905-1923. https://doi.org/10.1111/hex.13343

Nkrumah, J., & Abekah-Nkrumah, G. (2019). Facilitators and barriers of patient-centered care at the organizational level: a study of three district hospitals in the central region of Ghana. *BMC Health Services Research, 19*, 1-111. https://doi.org/10.1186/s12913-019-4748-z

Nwabuko, O. (2024). An overview of research study designs in quantitative research methodology: Research article. *American Journal of Medical and Clinical Research & Reviews, 3*(5), 1–6. https://doi.org/10.58372/2835-6276.1169

Rose-Facey, W. (2020). Professional quality of life and perceived patient-centered care within the context of patient-centered care competency and the nurse practice environment among medical/surgical nurses. Adelphi University. Retrieved from: https://media.proquest.com/media/hms/PFT/2/VuLyK?_s=P%2BMyZSX5O96h48pHod2Gk6kw3aY%3D. Accessed on 23rd October, 2023.

Richa, F. T., Argaheni, N. B., & Mufidah, A. (2024). Workload of midwives: A bibliometric analysis. *Malaysian Journal of Medical Research (MJMR), 8*(2), 30-41. https://doi.org/10.31674/mjmr.2024.v08i02.005

Rumintang Marito, D., & Widianto, S., (2024). Link of infection prevention climate to patientcentered care: Role of workplace safety and risk mitigation. *Risk Management and Healthcare Policy*, *17*, 329–340. https://doi.org/10.2147/RMHP.S439907

Tlili, M. A., Aouicha, W., Gambashidze, N., Ben Cheikh, A., Sahli, J., Weigl, M., . . . & Mallouli, M. (2024). A retrospective analysis of adverse events reported by Tunisian intensive care units' professionals. *BMC Health Services Research, 24*(1), 77. https://doi.org/10.1186/s12913-024-10544-9

Todd, J. A., Shanahan, B., Del Fabbro, L., Armit, L., & Grealish, L. (2024). Translating person-centered care policy into practice: A pre-post study of a work-based learning intervention for nurses. *The Journal of Continuing Education in Nursing, 55*(6), 303-308. https://doi.org/10.3928/00220124-20240301-02