

Original Article

The Relationship Between Nurse-Nurse Collaboration and Patient Safety Attitudes: A Cross-Sectional Study

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Abstract

Introduction: Patient safety is a global priority, and nurses play a key role in ensuring patient safety. Examining the relationship between nurse-to-nurse collaboration and nurses' attitudes toward patient safety can provide valuable insights into improving the safety culture in healthcare settings.

Aims: This study was conducted to examine the relationship between nurse-nurse collaboration and patient safety attitudes in inpatient care.

Design: This was a cross-sectional study. The results of the present study were reported in accordance with the STROBE guidelines.

Methodology: The study population consisted of nurses working in inpatient clinics of a public hospital in Antalya, Türkiye. The sample was determined using Yamane's formula for known population sizes. A total of 160 nurses who met the inclusion criteria and agreed to participate were included in this study. Instruments for data collection: The data were collected using the "Nurse-Nurse Collaboration (NNC) Scale" and "Patient Safety Attitude Questionnaire (PSAQ)". The NNC Scale was developed by Dougherty and Larson (2010) to assess collaboration among nurses. Its Turkish adaptation and validation were conducted by Temucin et al. (2019), who reported a Cronbach's alpha value of 0.90. In the current study, the scale showed good internal consistency (0.815). The PSAQ, originally developed by Sexton et al. (2006), was used to assess nurses' attitudes toward patient safety. The Turkish version, validated by Baykal et al. (2010), has demonstrated acceptable psychometric properties. In this study, Cronbach's alpha was 0.791. Data were collected between January and March 2020 using printed questionnaires distributed to nurses during their shifts. Participation was voluntary and anonymous.

Ethical Issues: Ethics committee approval of the research was obtained from the Akdeniz University Faculty of Medicine Clinical Research Ethics Committee (Approval No: 1189; Date: 11.12.2019). Institutional approval was received from the Public Hospital where the data were collected. The principles of the Declaration of Helsinki were followed in the study. The purpose of the research was explained to all participants, and their written informed consent was obtained.

Statistical analysis: Descriptive statistics, t-test, ANOVA, correlation, and linear regression analysis were used to analyze the data.

Results: It was revealed that the nurses' higher level of collaboration with increasing work experience. Patient safety attitudes, job satisfaction, safety climate and perceptions of management of the manager nurses were higher than those of clinical nurses. Nurse-nurse collaboration has a statistically significant effect on patient safety attitude of nurses. The results show that 24% of the change in patient safety attitude in nurses could be explained by nurse-nurse collaboration. The results of this study show that collaboration between nurses has a significant effect on patient safety attitudes.

Conclusion: The findings indicate a significant relationship between nurse-to-nurse collaboration and nurses' attitudes toward patient safety. As collaboration increases, attitudes toward patient safety become more positive. Enhancing nurse collaboration may be an effective strategy to promote patient safety, and implementing interventions to support this is recommended.

Keywords: Collaboration, hospital, patient safety, nurses

Introduction

Recognised as a global health priority, patient safety is fundamental to delivering high-quality healthcare (WHA, 2019). Essentially, patient safety involves avoiding preventable harm to patients during healthcare delivery and minimising the risk of harm to an acceptable level (IOM, 2011). Recent statistics indicate that patient harm ranks as the 14th leading cause of morbidity and mortality worldwide. Evidence from developed countries reveals that one in ten hospitalised patients suffers harm due to unsafe care, with about 50% of this harm being preventable (WHO, 2019). However, there is insufficient evidence regarding this issue in developing countries. The Patient Safety 2030 report highlights that developing countries (Nations, 2021) will play a significant role in enhancing patient safety over the next 15 years (Yu et al., 2016). Given that nurses constitute 59% of the global and 18.75% of the national healthcare workforce; they are pivotal in advancing patient safety (ICN, 2019). Sermeus et al. found that a 10% increase in the number of nurses with undergraduate education correlates with a 7% reduction in inpatient mortality risk (Sermeus et al., 2016). Nonetheless, a study¹⁰ revealed that 66% of nurses felt that they were practising unsafely when working with a colleague (Blair et al., 2021). Furthermore, ineffective collaboration with colleagues is linked to unsafe practices.

WHO's 'Global Strategic Directions for Strengthening Nursing and Midwifery 2016–2020' highlighted the significance of both intra-professional and inter-professional collaboration to fully harness the capabilities and potential of nurses. Patient safety, a global healthcare priority, sees nurses playing a crucial role at every stage (ICN, 2019; WHA, 2019). With globalization, the standards of nursing care and patient safety are evolving worldwide. In this

transformative period, collaboration is underscored as a vital strategy for maintaining patient safety (IOM, 2011; Ma et al., 2018). Furthermore, collaboration is recognized as a fundamental element of the patient safety culture (Reis et al., 2018). A systematic review by Vaismoradi et al. (2020) on nurses' adherence to patient safety principles identified collaboration as one of the factors influencing patient safety (Vaismoradi et al., 2020). Nurses, who form the largest workforce in healthcare, play a significant role in collaborative care practices (ICN, 2019). Numerous studies in both international studies (Ma et al., 2018; Zhu et al., 2020) and national literature (Erarslan & Gülhan, 2020; Turac, 2020) have explored nurses' interdisciplinary collaborative efforts. Most of these studies aimed to assess attitudes towards collaboration between nurses and physicians, consistently finding that both groups exhibited positive attitudes towards working together.

Studies have linked improved collaboration between nurses and doctors to a reduction in hospital stays (Ma et al., 2018), a decrease in surgical site infections (Fan et al., 2016), lower rates of hospital-acquired pressure ulcers and falls (Ma et al., 2018), and enhanced patient outcomes and care quality (Gasparino et al., 2021). Nurses are tasked with enhancing patient safety by identifying potential harm and risks through collaboration with fellow nurses and other healthcare professionals (Sermeus et al., 2016). Despite this, the emphasis in healthcare service delivery and patient safety has predominantly been on doctor-nurse collaboration, often overlooking the impact and outcomes of nurse-to-nurse collaboration (Ma et al., 2018; Prentice et al., 2020). Consequently, it is crucial to highlight the importance of nurse-to-nurse collaboration and attitudes towards patient safety to develop practice guidelines based on nurse collaboration and strengthen

the evidence supporting patient safety attitudes.

This study introduces new insights into the literature by presenting evidence of the connection between nurse-to-nurse collaboration and patient safety attitudes in inpatient care. Additionally, it highlights how nurse collaboration contributes to patient-safety practices in this setting. This study was designed to assess the extent of nurse-to-nurse collaboration and patient safety attitudes in inpatient care, as well as their interrelationships. This study addresses the following research questions: (1) What is the extent of nurse collaboration and patient safety attitudes in inpatient care? (2) How do nurses' sociodemographic characteristics relate to their level of collaboration and patient safety attitudes in inpatient care? (3) What impact does nurse collaboration have on patient-safety attitudes in inpatient care?

Material and Method

Aims: This study was conducted to examine the relationship between nurse-nurse collaboration and patient safety attitudes in inpatient care.

Design: This study was used cross-sectional study. The results of the present study were reported in accordance with the STROBE guidelines.

Sample/Participants: This study was conducted from January to March 2020 at Antalya Kepez Public Hospital, which is under the Ministry of Health. Established in 2016, this hospital is among the largest in the city, with a capacity of 400 beds, and continues to serve a population of two and a half million. The study sample consisted of 260 nurses from the internal medicine and surgical departments of inpatient care clinics. Internal inpatient clinics included those for children's health and diseases, newborns, internal medicine, palliative care, dermatology, physical therapy and rehabilitation, infectious diseases, neurology, orthopaedics and traumatology, chest diseases, and intensive care. The surgical inpatient clinics included gynaecology and obstetrics, general surgery, otolaryngology, urology, ophthalmology, and brain and nerve surgery. A proportional stratified random sampling method was employed to ensure an

equal number of nurses from both internal and surgical inpatient care clinics. The formula used to calculate the proportional stratified random sampling in this study is as follows: (stratified no (i), number of nurses (N_i), stratified weight ($N_i / N = a_i$), number of nurses to be included in the sampling ($a_i X n = n_i$). Since the total target population was known, Yamane's formula was used to calculate the target sample size (Adam, 2020). The target sample calculation formula used in this study is as follows: $n = N / (1 + N(e)^2)$; $n = 260 / (1 + 260(0.05)^2)$; $n = 157.57$ (or 158). (N = Total Population in the sampling frame, n = Target Sample size, and e^2 = allowable error at 0.05). The target sample size was calculated to reach a total of 174 nurses with an error value of $0.1 \pm 10\%$. Recruitment stopped when the target sample size of 174 participants was reached. Recruitment stopped when the target sample size of 174 participants was reached. 14 participants (heterogeneous) were excluded due to missing data in the questionnaires. The final sample size was of 160.

Data collection: The sample was collected using the following steps. Initially, researchers secured written approval from the institution's management. Subsequently, the director of nursing services was approached to extend the invitation to nurse managers and clinical nurses from inpatient care clinics to join the study. Participants were informed that their involvement was voluntary and that the data collected would be used solely for scientific research. Those who agreed to participate were required to sign participation forms. The completion of the survey took an average of 15-20 minutes. Each nurse signed an informed consent form, confirming that they had received and understood all relevant information about the study. The inclusion criteria were as follows: (a) nurses employed in inpatient care clinics, (b) working full-time with at least 50% of their work dedicated to direct patient care, and (c) having a minimum of one year of work experience. Nurses working in areas such as education and infection control units who were not involved in direct inpatient care were excluded.

Measures

Sociodemographic characteristics forms:

The researchers developed a questionnaire consisting of eight questions to examine

nurses' professional skills and sociodemographic details, such as age, gender, marital status, education level, work experience, department, and their specific role within that department.

Nurse-Nurse Collaboration (NNC) Scale: NNC, Scale was originally developed by Dougherty and Larson to assess collaboration among nurses (Dougherty & Larson, 2010). Temucin et al. (2019) performed validity and reliability studies of the scale in the Turkish language. This scale included 25 items examining five collaboration sub-dimensions: professionalism (8 items), coordination (5 items), conflict management (4 items), communication (4 items), and shared process (4 items). Answers given to items were graded on a four-point Likert scale as “totally disagree (1 point)”, “disagree (2 points)”, “agree (3 points)”, “totally agree (4 points)”. The total score was established by summing up the points given to items in each area of collaboration. The lowest score that could be obtained from the scale was 25, while the highest score was 100. Higher scores pointed out that there was an increase in nurse-nurse collaboration. Temucin et al. (2019) reported the Cronbach alpha value of the scale as 0.90. Internal consistency of Cronbach's alpha values for NNC scale was reported as 0.815 in this study.

Patient Safety Attitude Questionnaire (PSAQ): SAQ, was originally developed by Sexton et al. (2006) to uncover attitudes of healthcare professionals towards patient safety. (Sexton et al., 2006) In order to ensure the scale could be used in all clinics, Baykal et al. (Baykal et al., 2010) used the operating room, intensive care clinics, and inpatient care versions of SAQ scale items about patient safety attitude in their Turkish validity and reliability study and named it Patient Safety Attitudes Questionnaire (PSAQ). This scale was reported to be valid in recognizing patient safety attitudes of nurses. (Baykal et al., 2010) The Turkish version of the PSAQ includes 46 items assessing six sub-dimensions of patient safety attitudes: teamwork (12 items), satisfaction (11 items), perception of management (7 items), working conditions (6 items), safety environment (5 items), and stress recognition (5 items). The answer to each item was graded on a five-point Likert scale as “strongly disagree (1 point)”,

“disagree (2 points)”, “neutral (3 points)”, “agree (4 points)”, “strongly agree (5 points)”. The 10 items in the questionnaire were negatively worded and were therefore reverse scored (21., 36., 37., 38., 39., 40., 41., 42., 43. ve 45. Items). The total score was obtained by summing up the points given to items in each patient safety sub-dimensions. The lowest score that could be obtained from the scale was 46, and the highest score was 230. Higher total score obtained from the scale suggested that nurses had more positive attitudes towards patient safety. Baykal et al. reported the Cronbach alpha value of the scale as 0.93 (Baykal et al., 2010). Internal consistency of Cronbach's alpha values for PSAQ was reported as 0.791 in this study.

Ethical considerations: Approval was received from the Akdeniz University Antalya, Faculty of Medicine Clinical Research Ethics Committee (Approval No: 1189; Date: 11.12.2019) on all human studies which were conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Institutional approval was received from the Public Hospital where the data were collected. Scale usage permissions were obtained from the scale authors. Participants signed informed consent forms, confirming they were given and that they confirmed all information concerning this study.

Data analysis: Data analysis was conducted using SPSS 25.0. Once the data were organised and examined, descriptive statistics were employed to encapsulate sociodemographic details and test scores in terms of percentages, means, and standard deviations. The Kolmogorov-Smirnov test was used to determine whether the data conformed to a normal distribution. Given that the scales and measurements exhibited a normal distribution, parametric tests were used for statistical evaluations. To determine whether there was a significant difference in test scores between two independent samples from quantitative variables, an independent sample t-test was performed. To assess whether scores from three or more independent samples differed significantly from our variables, one-way ANOVA was performed. The Pearson correlation test was used to calculate correlations between the

scales. Subsequently, linear regression was applied to evaluate the associative factors related to nurse-nurse collaboration and patient safety attitudes. The findings were interpreted with a 95% confidence interval and significance level of $p < 0.05$.

Results

Sociodemographic findings

In examining the basic demographics of the participants ($n = 160$), it was found that a large segment (71%) was aged between 30 and 39 years. The majority (67.5%) were women, almost all held undergraduate degrees, and 55% had been working for a period of one to nine years. The vast majority of the participants were clinical nurses (94%) employed in internal clinics (Table 1).

Nurse-nurse cooperation and patient safety attitude findings of nurses

The average total score of the participants on the NNC scale was 78.55 ± 8.86 , conflict management 13.01 ± 1.77 , communication 11.70 ± 2.06 , shared processes 12.00 ± 1.75 , coordination 15.69 ± 2.12 , professionalism 26.13 ± 3.51 , and the average total score on the PSAQ scale was 162.68 ± 20.59 , job satisfaction 34.67 ± 6.87 , teamwork climate 45.84 ± 6.15 , safety climate 19.40 ± 2.66 , perceptions of management 26.73 ± 4.30 , stress recognition 14.21 ± 4.17 , working conditions 21.88 ± 3.77 .

Univariate analysis results

Table 2 shows mean scores of the NNC scale sub-dimensions according to the sociodemographic characteristics of the participants in the study. There were no statistically significant differences between the total mean score of NNC scale, and mean scores of sub-dimensions according to age ($F = 1.306$; $p = 0.273$), gender ($t = 0.011$; $p = 0.990$), marital status ($t = 1.030$; $p = 0.304$) or employment status ($t = -0.542$; $p = 0.588$) of participants ($p > 0.05$). A statistically significant difference was found between the mean score for communication according to the clinic participants were working ($t = -2.199$; $p = 0.029$) and their years of employment ($F = 3.732$; $p = 0.026$) of participants ($p < 0.05$). A Bonferroni post hoc analysis was performed to show which group

constituted the significance. The communication score of the scale was found to be statistically significant for those nurses who were working at surgical unit and had work experience for a minimum of 20 years. A statistically significant difference was found between the total mean score of NNC scale based on years of employment ($F = 3.369$; $p = 0.036$) of the participants ($p < 0.05$). A Bonferroni post hoc analysis was performed to show which group constituted the significance. It was revealed that the nurses with work experience for a minimum of 20 years had higher NNC total scores than others ($p < 0.05$). Coordination scores of nurses with work experience for a minimum of 20 years ($F = 4.806$; $p = 0.009$) were found to be significantly higher.

Table 3 presents mean scores of the PSAQ scale sub-dimensions according to the sociodemographic characteristics of the participants in the study. There were no statistically significant differences between the total PSAQ scale, and the sub-dimension mean scores according to age ($F = 1.303$; $p = 0.274$), gender ($t = -0.378$; $p = 0.705$), the clinic participant was working ($t = 1.750$; $p = 0.082$) and years of employment ($F = 1.205$; $p = 0.302$) ($p > 0.05$). A statistically significant difference was established between the mean score for stress recognition according to marital status ($t = -1.976$; $p = 0.049$) of the participants ($p < 0.05$). The stress recognition scores of single nurses were higher than the relevant scores of married nurses. A statistically significant difference was found between the mean PSAQ score according to the employment statuses ($t = -2.520$; $p = 0.012$) of the participants ($p < 0.05$). PSAQ scores, and job satisfaction, safety environment and perceptions of management scores of the participant nurses in managerial positions were higher than those of clinical nurses.

Relationship between the NNC and PSAQ scores of nurses

Table 4 demonstrates the relationship between NNC scale and mean scores of PSAQ sub-dimensions. A moderately strong, statistically positive correlation was found between the total mean scores in NNC scale of the participants, and total mean scores in

PSAQ scale ($r = 0.498$; $p < 0.001$). A moderately strong statistically positive correlation was found between mean scores in working conditions ($r = 0.435$; $p < 0.001$), teamwork environment ($r = 0.486$; $p < 0.001$), perceptions of management ($r = 0.435$; $p < 0.001$) sub-dimensions of the PASQ scale and the mean scores in total, communication, shared processes, coordination, and professionalism sub-dimension of NNC scale. A moderately strong statistically positive correlation was established between safety environment ($r = 0.371$; $p < 0.001$) sub-dimension mean scores of the participants in the PASQ scale and total mean scores in shared processes, coordination, professionalism sub-dimensions of the NNC scale. A weak positive correlation was found between mean scores of the participants in job satisfaction ($r = 0.282$; $p < 0.001$) sub-dimension of the PASQ scale and conflict management, communication, shared processes, professionalism dimension mean

scores of the total NNC scale. A weak positive correlation was found between the mean scores in stress recognition ($r = 0.144$; $p < 0.001$) dimension of PASQ scale and total and sub-dimensions mean scores of the NNC scale. A weak positive correlation was found between mean scores of the participants in sub-dimensions ($r = 0.173$; $p = 0.028$) of PASQ scale and mean scores in conflict management dimension of the NNC scale.

The effect of nurse-nurse collaboration on patient safety attitudes

Considering the β coefficient, t value, and significance level of nurse-nurse collaboration ($\beta = 1.157$), it can be deduced that it has a statistically significant effect on patient safety attitude of nurses ($p < 0.001$) (Table 5). Thus, it could be argued that, increasing level of nurse-nurse collaboration would also increase the level of patient safety attitude of nurses. The results show that 24% of the

change in patient safety attitude in nurses could be explained by nurse-to-nurse collaboration.

Table 1. Sociodemographic characteristics of the nurses (N=160)

Sociodemographic characteristics		N	%
Age	20-29	54	33.8
	30-39	71	44.4
	40-49	35	21.9
Gender	Female	108	67.5
	Male	52	32.5
Educational status[†]	Undergraduate degree	160	100.0
Marital status	Married	95	59.4
	Single	65	40.6
Working year	1-9 year	88	55.0

	10-19 year	56	35.0
	20 year and upper	16	10.0
Working clinic	Internal clinics	101	63.1
	Surgical clinics	59	36.9
Working position	Clinical nurse	151	94.4
	Nurse manager	9	5.6
Total		160	100.0

[†]High-school graduate: 3; Master's degree: 2

Table 2. Comparison of mean scores of NNC scale and sub-dimensions according to the introductory characteristics of the nurses

Sociodemographic characteristics		NNC scale and sub-dimensions					
		Total	Conflict management	Communication	Shared processes	Coordination	Professionalism
		Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD
Age	20-29 years	77.90±8.58	12.77±1.60	11.74±1.98	12.07±1.39	15.33±1.90	25.98±3.657
	30-39 years	77.98±8.62	13.04±1.76	11.47±1.94	11.78±1.88	15.61±2.23	26.05±3.35
	40-49 years	80.68±9.65	13.31±2.02	12.11±2.37	12.34±1.93	16.40±2.10	26.51±3.68
Test value		F=1.306 p=0.273	F=0.985 p=0.375	F=1.127 p=0.326	F=1.234 p=0.293	F=2.815 p=0.062	F=0.270 p=0.763
Gender	Female	78.55±8.72	13.15±1.80	11.64±2.02	12.00±1.75	15.64±2.19	26.10±3.40
	Male	78.53±9.23	12.71±1.69	11.82±2.13	12.01±1.77	15.78±1.99	26.19±3.76
Test value		t=0.011 p=0.990	t=1.492 p=0.137	t=-0.512 p=0.608	t=-0.064 p=0.948	t=-0.390 p=0.696	t=-0.151 p=0.879
Marital Status	Married	79.14±8.68	13.03±1.789	11.71±1.90	12.15±1.78	15.91±2.10	26.32±3.52
	Single	77.67±9.11	12.98±1.77	11.69±2.28	11.78±1.69	15.36±2.13	25.84±3.51
Test value		t=1.030 p=0.304	t=0.163 p=0.870	t=0.070 p=0.943	t=1.325 p=0.186	t=1.605 p=0.110	t=0.847 p=0.397
Working clinic	Internal	78.54±8.49	13.00±1.67	11.43±2.01	11.99±1.68	15.88±2.12	26.23±3.47
	Surgical	78.55±9.53	13.03±1.94	12.16±2.07	12.03±1.87	15.37±2.10	25.94±3.60
Test value		t=-0.010 p=0.991	t=-0.116 p=0.907	t=-2.199 p=0.029*	t=-0.151 p=0.879	t=1.465 p=0.144	t=0.499 p=0.618

Working Years	1-9 year ^a	77.53±8.15	12.85±1.65	11.50±2.06	11.84±1.61	15.35±2.01	25.98±3.30
	10-19 year ^b	78.67±8.90	13.07±1.80	11.66±1.88	12.05±1.69	15.83±2.19	26.05±3.70
	20 year upper ^c	83.68±11.04	13.68±2.24	13.00±2.30	12.75±2.46	17.06±1.94	27.18±4.00
Test value		F=3.369 p=0.036* c>a	F=1.553 p=0.214	F=3.732 p=0.026* c>a	F=1.870 p=0.157	F=4.806 p=0.009* c>a	F=0.805 p=0.448
Working Position	Nurse	78.45±8.79	13.02±1.77	11.68±2.09	11.96±1.71	15.64±2.06	26.12±3.50
	Manager	80.11±10.33	12.77±1.92	12.00±1.41	12.66±2.29	16.44±2.96	26.22±3.92
Test value		t=-0.542 p=0.588	t=0.406 p=0.684	t=-0.439 p=0.661	t=-1.164 p=0.246	t=-1.091 p=0.276	t=-0.079 p=0.936

*p < 0.05; SD: Standard Deviation; F: ANOVA test was performed; Type I error was adjusted by the Bonferroni correction for multiple tests (c>a); t: Independent-sample test.

Table 3. Comparison of mean scores of PSAQ and sub-dimensions according to the introductory characteristics of the nurses

		PSAQ and sub-dimensions						
Sociodemographic characteristics		Total	Job Satisfaction	Teamwork Climate	Safety Climate	Perceptions of Management	Stress Recognition	Working Conditions
		Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD
Age	20-29 years	163.07±19.59	35.25±6.90	45.51±6.13	19.42±2.77	26.66±3.60	14.07±3.99	22.12±3.44
	30-39 years	160.23±20.64	33.77±6.51	45.07±6.29	19.18±2.43	26.01±4.49	14.45±3.96	21.78±3.80
	40-49 years	167.05±21.79	35.60±7.48	47.91±5.55	19.80±2.94	28.31±4.59	4.89±0.82	21.68±4.28
Test Value		F=1.303 p=0.274	F=1.122 p=0.328	F=2.674 p=0.072	F=0.630 p=0.533	F=3.463 p=0.033	F=0.201 p=0.817	F=0.182 p=0.833
Gender	Female	162.25±21.81	34.62±7.38	45.37±6.30	19.59±2.65	26.74±4.41	14.30±4.14	21.72±3.85
	Male	163.57±17.95	34.76±5.73	46.82±5.76	19.00±2.65	26.73±4.11	14.03±4.26	22.21±3.63
Test Value		t=-0.378 p=0.705	t=-0.119 p=0.904	t=-1.40 p=0.161	t=1.322 p=0.188	t=0.013 p=0.989	t=0.378 p=0.705	t=-0.766 p=0.444
Marital status	Married	163.28±20.53	34.89±6.353	46.17±6.45	19.40±2.70	27.24±4.42	13.68±4.35	21.96±3.62
	Single	161.81±20.81	34.35±7.61	45.35±5.68	19.40±2.62	26.00±4.03	15.00±3.78	21.75±4.01
Test Value		t=0.441 p=0.659	t=0.487 p=0.626	t=0.832 p=0.406	t=0.000 p=1.000	t=1.805 p=0.072	t=-1.976 p=0.049*	t=0.351 p=0.725
Working clinic	Internal	164.85±21.33	35.26±7.12	46.41±5.81	19.52±2.50	27.08±4.25	14.38±4.27	22.27±4.01
	Surgical	158.98±18.86	33.66±6.35	44.86±6.62	19.18±2.92	26.13±4.34	13.93±4.01	21.20±3.26
Test Value		t=1.750 p=0.082	t=1.430 p=0.154	t=1.545 p=0.124	t=0.774 p=0.439	t=1.355 p=0.177	t=0.663 p=0.508	t=1.745 p=0.082
Working years	1-9 year	160.77±18.57	34.73±6.65	45.10±5.83	19.28±2.50	26.34±3.58	13.73±3.98	21.60±3.36
	10-19 year	166.12±22.31	35.21±7.15	47.07±6.70	19.41±2.97	27.017±5.30	14.87±3.69	22.53±3.90
	20 years upper	161.18±24.48	32.43±7.02	45.62±5.45	20.00±2.42	27.93±3.99	14.56±6.27	21.12±5.22
Test Value		F=1.205 p=0.302	F=1.024 p=0.361	F=1.781 p=0.171	F=0.487 p=0.615	F=1.116 p=0.330	F=1.334 p=0.266	F=1.407 p=0.247
Working position	Clinical nurse	161.70±20.03	34.39±6.77	45.66±6.06	19.26±2.58	26.55±4.22	14.15±4.13	21.74±3.78
	Nurse manager	179.22±24.03	39.44±7.12	48.88±7.14	21.66±3.08	29.77±4.73	15.22±4.89	24.22±3.03
Test Value		t=-2.520 p=0.012*	t=-2.167 p=0.032*	t=-1.535 p=0.126	t=-2.680 p=0.008*	t=-2.207 p=0.028*	t=-0.741 p=0.459	t=-1.929 p=0.055

*p < 0.05; SD: Standart Deviation; F: ANOVA test; t: Independent-sample test

Table 4. Relationship between NNC scale and PSAQ sub-dimensions mean scores

PSAQ and sub-dimensions	NNC scale and sub-dimensions											
	Total		Conflict management		Communication		Shared processes		Coordination		Professionalism	
	r	p	r	p	r	p	r	p	r	p	r	p
Total	0.498	0.000*	0.304	0.000*	0.336	0.000*	0.381	0.000*	0.456	0.000*	0.437	0.000*
Job Satisfaction	0.282	0.000*	0.173	0.028*	0.108	0.171	0.172	0.029**	0.343	0.000*	0.268	0.000*
Teamwork Climate	0.486	0.000*	0.280	0.000*	0.374	0.000*	0.401	0.000*	0.385	0.000*	0.431	0.000*
Safety Climate	0.371	0.000*	0.266	0.001*	0.209	0.008*	0.309	0.000*	0.324	0.000*	0.328	0.000*
Perceptions of Management	0.491	0.000*	0.280	0.000*	0.328	0.000*	0.346	0.000*	0.455	0.000*	0.457	0.000*
Stress Recognition	0.144	0.068	0.125	0.115	0.127	0.108	0.130	0.100	0.092	0.247	0.105	0.185
Working Conditions	0.435	0.000*	0.251	0.001*	0.383	0.000*	0.344	0.000*	0.384	0.000*	0.340	0.000*

**p < 0.05; *p < 0.001

Table 5. The effect of nurse-nurse collaboration on patient safety attitudes

Dependent variable	Independent variable	β	t	p	F	Model (p)	Adjusted R ²
Patient safety attitude	Constant	71.799	5.666	0.000*	52.091	0.000*	0.243
	Nurse-nurse collaboration	1.157	7.217	0.000*			

*p < 0.001

Discussion

This study aimed to explore the relationship between nurse collaboration and perspectives on patient safety within inpatient environments. Collaboration is an essential component of patient safety culture, with nurses playing a pivotal role in these collaborative efforts (ICN, 2019; WHA, 2019). Despite this, the effect of collaboration among nurses on patient safety in inpatient care settings has not yet been clearly established. Our findings suggest that enhanced collaboration among nurses correlates with more favourable attitudes towards patient safety. According to Eun-Jeoung (2016), attitudes towards patient safety are the most critical factors affecting safety care practices among nurses in small-to medium-sized hospitals (Eun-Jeoung, 2016). This study revealed that nurses demonstrate a strong attitude towards patient safety. Supporting these results, other study (Chi et al., 2017; Durgun & Kaya, 2018; Zhao et al., 2019) has indicated that nurses generally possess above-average and positive attitudes

regarding patient safety. Conversely, it has been noted that attitudes towards patient safety among nurses, midwives, and physicians in maternity hospitals (Tuncer Unver & Harmanci Seren, 2018), as well as among nurses and physicians in paediatric hospitals (Gasparino et al., 2021) and emergency services (Alzahrani et al., 2018), were low and negative.

Nevertheless, researchers (Alzahrani et al., 2018; Gasparino et al., 2021; Tuncer Unver & Harmanci Seren, 2018) have consistently observed that nurses' attitudes towards patient safety are more positive than those of physicians. This difference may be explained by the fact that these studies were conducted in more specialised areas and included various healthcare professionals in their samples. On the other hand, the researchers' observation that nurses' attitudes toward patient safety were more positive than those of other healthcare professionals may be related to the fact that nurses are directly and continuously involved in patient care (Lee et al., 2019). In addition, nurses' education programs and

work environments may be structured to contribute to the development of patient safety culture. However, it should be taken into consideration that this difference may vary according to the health system structure, working conditions and cultural factors. Therefore, it is essential to further examine this issue within the national and cultural context to gain a comprehensive understanding of the factors shaping healthcare professionals' attitudes toward patient safety and to inform effective, context-specific strategies.

One of the results of this study is that nurses' attitudes towards patient safety do not vary significantly based on their individual characteristics, such as their age, gender, marital status, the clinic where they are employed, or their work experience. Similarly, other studies focusing specifically on nurses have shown that nurse-related factors such as age (Durgun & Kaya, 2018), gender, educational background, and work experience do not significantly affect nurses' perspectives on patient safety. However, some studies have highlighted that certain nurse-specific characteristics, such as nurses' age (Elsous et al., 2017; Zhao et al., 2019), work experience, and education level (Chi et al., 2017; Elsous et al., 2017; Zhao et al., 2019), may significantly influence their attitudes toward patient safety. It is consistently noted that these attitudes tend to improve among nurses with more work experience, higher educational attainment, and advanced age. These findings indicate that nurses' attitudes toward patient safety are influenced by multiple factors and that individual characteristics alone may not fully explain these attitudes. Therefore, it is important for healthcare institutions to consider a multifaceted approach when aiming to improve patient safety attitudes among nursing staff rather than focusing solely on demographic or background characteristics (Hibbert et al., 2023).

In this study, the role of nurse managers was crucial in determining patient safety attitude levels. Nurse managers exhibited significantly higher levels of patient safety attitudes, job satisfaction, safety climate, and perceptions of management than clinic nurses. Previous research (Chi et al., 2017;

Elsous et al., 2017; Zhao et al., 2019) has indicated that nurse managers possess superior patient safety attitudes. While clinical nurses are at the forefront of ensuring patient safety, nurse managers frequently offer guidance and advice in patient care, and are involved in quality management and patient safety committees. Consequently, it can be concluded that more frequent and active involvement of nurse managers in quality and patient safety initiatives enhances patient safety attitudes.

According to Elsous et al., (2017), nurses with strong attitudes towards patient safety tend to work more effectively with other healthcare professionals (Elsous et al., 2017). This study found a high level of collaboration among nurses, which is consistent with findings from earlier research (Hassona & El-Aziz, 2017; Lemetti et al., 2021; Tadayon et al., 2019; Ylitörmänen et al., 2019). Durmus et al., (2018) reported that the degree of collaboration between nurses exceeds the minimum expected level. Nurses are expected to enhance patient safety by identifying potential harm and risk through collaboration with fellow nurses and other healthcare professionals (Sermeus et al., 2016). In this study, nurses scored highest in professionalism, coordination, and conflict management, and lowest in shared processes and communication dimensions. Similarly, Tadayon et al. (2019) found that nurses achieved the highest scores in professionalism, coordination, and conflict management and the lowest scores in shared processes and communication aspects (Tadayon et al., 2019). Ylitörmänen et al., (2019) examined nurse cooperation in Finland and Norway, reporting that professionalism, shared processes, and communication received the highest scores (Ylitörmänen et al., 2019). To foster effective collaboration among nurses, areas such as communication, shared processes, and conflict management require attention.

In this study, no notable differences were observed in age, gender, marital status, or job roles of nurses in inpatient care concerning nurse-to-nurse collaboration. Similarly, Lemetti et al. found no variations in age, gender, education level, or nurse-to-nurse collaboration (Lemetti et al., 2021).

Conversely, other studies have indicated that as nurses' age (Tadayon et al., 2019) and education level increase, collaboration among nurses improves. Ylitörmänen et al. Ylitörmänen et al. reported that female nurses have a more positive perception of communication and conflict management than their male counterparts do (Ylitörmänen et al., 2019). Following a workshop by Ibraheem, Eid, and Rashad aimed at enhancing nurse cooperation, it was noted that increased nurse-to-nurse cooperation significantly boosted nurses' performance (Ibraheem et al., 2020). To foster better collaboration among nurses, nurse managers must promote cooperative relationships.

This study demonstrated that nurse-to-nurse collaboration improves with increased work experience, particularly for those over 20 years in the field. Similarly, Ylitörmänen et al. found that nurses with more than two decades of experience exhibited superior coordination and conflict resolution skills (Ylitörmänen et al., 2019). Hassona and El-Aziz also reported that as nurses aged, their conflict management and communication skills improved, and their professionalism significantly increased with more work experience (Hassona & El-Aziz, 2017). Conversely, some studies (Lemetti et al., 2021; Tadayon et al., 2019) have indicated no significant difference in nurse collaboration based on work experience. Performing professional duties with accumulated experience may increase awareness of patient safety and enhance collaboration skills (Elsous et al., 2017).

This study found that an increase in cooperation among nurses led to a significant improvement in their attitudes toward patient safety in inpatient care. According to Hassona and El-Aziz, enhanced collaboration between nurses resulted in a notable reduction in missed nursing care (Hassona & El-Aziz, 2017). Similarly, Blair et al. Blair et al. reported that ineffective nurse-to-nurse collaboration was closely linked to unsafe practices (Blair et al., 2021). The findings of this study indicate that 24% of the variation in patient safety attitudes among nurses in inpatient settings can be attributed to nurse-nurse cooperation. Enhancing collaboration among nurses in inpatient care could serve as an effective strategy to improve patient safety.

Limitations: The first of such limitations of the study was its cross-sectional design which prevents causal inferences. When causal inferences of nurse-nurse collaboration and patient safety attitudes would be investigated, a follow-up study would give more reliable results than a cross-sectional study. Sample size was another limitation of the study. Considering the fact that this study was conducted in only one public hospital, it must be noted that its results cannot be generalized to the entire population. This study established relationship between nurse-nurse collaboration and patient safety attitudes of nurses in inpatient care. However, to inquire development of nurse-nurse collaboration, further qualitative studies are required. This study's reliance on self-reported data was another limitation. Further studies should include patient safety reports and variables related to the inpatient care. In addition, only nurses actively working in inpatient care clinic at one public hospital were included in this study, which necessitates further multi-centric studies with samples of nurses working in primary health care to support these results.

Conclusions and Recommendations: The results of this study indicate that collaboration among nurses significantly influences attitudes toward patient safety. As nurse-to-nurse collaboration intensifies, there is a corresponding notable improvement in patient safety attitudes. It has been discovered that nurses with more work experience tend to collaborate more effectively, and nurse managers exhibit higher patient safety attitudes compared to clinical nurses. Nurses play a crucial role in ensuring patient safety through collaborative care practice. Consequently, the findings of this study hold substantial importance in both clinical practice and institutional management. This study proposes that enhancing nurse-nurse collaboration should be considered as a key strategy for boosting patient safety. It is essential for nurse managers to promote collaborative relationships to increase nurses' awareness of patient-safety attitudes.

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