Patients' Safety and Its Relation to Non-technical Skills and Personality Traits among Nurses at Critical Care Units

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Abstract: Critical care nurses deal with a variety of urgent, complicated, and unpredictably occurring situations in their caring units. Non-technical skills and personality traits of nurses can affect their caring behaviors that consequently affect patients' safety. The purpose of the study is to evaluate Perceived patients' safety and its relation to non-technical skills and personality traits among nurses at critical care units. Research **design:** Descriptive correlational design was employed in this study. **Setting:** the study was conducted at critical care units in Beni Suef University Hospital. **Sample**: A convenient sample of 126 staff nurses. **Instruments:** Four instruments were used; characteristics of nurses structured questionnaire, non-technical skills likert scale, the big five personality traits inventory and nurses' perception of patient's safety likert scale. **Results:** The majority of studied nurses (96%) had a satisfactory level of non-technical skills; nearly two thirds of them (67.5%) had high perception of patients' safety culture. There was a highly statistical significant positive correlation between extroversion and patients' safety. A statistical significant positive correlation was found between neuroticism and experience. Also, there was a very highly statistical significant positive correlation between conscientiousness and experience. **Conclusion:** A positive correlation was found between some non-technical skills and patients' safety culture. Furthermore, personality traits in terms of extraversion, conscientiousness, and neuroticism were correlated positively with patients' safety. **Recommendations:** Health organizations should consider such research studies as a reference for appropriate placement and distribution of nurses on the hospital departments based on their levels of non-technical skills and personality traits. Also, training should be conducted about Non-technical skills especially for nurses at critical care settings.

Key words: Critical care units, patients' safety, personality traits, non-technical skills.

Introduction

Intensive Care Units (ICU) is a setting that is conducive to the occurrence of unfavorable occurrences because of the complexity of the care given, the seriousness of the patients treated in these units, and the job done—often under stressful circumstances and with the assistance of a multidisciplinary team (Ajri-Khameslou, Najafi, Karimollahi, 2021). Additionally, Nurses who work in critical care units are essential elements in the delivery of evidence-based, patient-centered care to patients with complex needs. While performing their career in critical care, they are expected to enhance patients' safety through their acquired skills and practical expertise (Nunes, et al., 2021).

A vital component of high-quality healthcare is patient safety. This concept, which has been addressed globally, relates to lowering the possibility of harm from needless medical treatment (Patil, et al., 2023).

A positive safety climate can lead to fewer adverse events, improve risk management and enhance patient outcomes. Conversely, a poor safety climate can affect how professionals follow best practices, compromising patient safety and quality of care (Aydemir, Zeliha, 2023 & Abdallah, Gouda, 2023).

So for enhancing patient safety culture by successful way, nurses need non-technical skills that affect their performance. Non-technical skills refer to general or life skills that are not part of formal educational programs (Hanssen, & Smith, 2020). These skills are applicable to a wide range of tasks and work environments; they are not intended for any particular set of circumstances or workplace. It is not possible to learn these skills in a short period of time, because it requires a wide application range and significant experience. They contribute to the skills, necessary for certain tasks in the work environment (Kalantari, et al., 2022).

Non-technical skills within healthcare are defined as cognitive and interpersonal skills that promote safety and complement workers' technical skills. These important skills could improve performance related to decision-making ability, situational awareness, communication, clinical reasoning, leadership and teamwork. Additionally, they are seen as collection of skills that can contribute to maintain safe, effective, high quality, and better professional care within the healthcare system (Peddle, et al., 2019 & Hurley, et al., 2020).

Non-technical skills are different from psychomotor skills in that they involve mental abilities, such as the capacity to identify and comprehend a problem or make decisions, or teamwork among members (such as communication, teamwork, and leadership). Making decisions is a process where choices are made (Jiménez, et al., 2023). Through this process, nurses are able to recognize issues, generate options, assess options, select an option, carry out the choice, and appraise the decision's efficacy. Working in large groups is not always the only aspect of teamwork; a positive atmosphere can also be created by a sense of unity.

Nurses perform better when they collaborate as a team and provide multiple ideas to select the best one (Marcomini, et al., 2022).

In addition to being said or written, communication also involves motivation, body language, information sources, socialization, and process control. Inadequate communication in the medical field can result in delayed treatment, prescription errors, incorrect diagnoses, insufficient patient assessments, patient injuries, or patient deaths. (Murtagh, et al., 2023). Finally, leadership is defined as the method of persuading nurses to get the optimum results. A true nurse leader is able to fulfill their duties, goals, and missions. Both the work and safety of patients are positively impacted by effective nurse leadership. (Costa, et al., 2023).

Critical care nurses deal with a variety of urgent, complicated, and unpredictably occurring situations in their job in specialized care units. Because critical care units are stressful environments, nurses must make quick choices, precisely monitor patients' states and medical equipment, and communicate with patients and other members of the health team. These demands reflect on nurses' compassionate behaviors, which in turn affect patients' safety. (Kwiatosz-Muc & Aftyka, 2021). Numerous personal and workplace-related internal and external factors influence the caring behaviors of nurses. A fundamental internal factor that influences nurses' compassionate behaviors and competence is their

personality (Handayani & Kuntari., 2022).

Additionally patient's safety is affected by nurses' personality traits as it was found to be associated with nurses' ability to manage their stress, overcome burnout, and their overall job performance (Kyaw, et al., 2022). The big five inventory (BFI) was found to be very reliable and the most used scale in investigating personality characteristics through its five major well-defined domains; extraversion refers to traits as talkativeness, socialization, being active, easy communication, and seeking excitement. Agreeableness indicates characteristics as warmth, trust, and kindness. Conscientiousness characterizes persons who are organized and reliable. Neuroticism includes unstable persons who experience negative emotions as moodiness, impulsiveness and nervousness. Openness to experience refers to the person's curiosity and creative thinking (Bataweel, 2023).

Personality traits affect health care providers' ability for moral reasoning in patient's care as stable nurses; in terms of conscientiousness, agreeableness, and neuroticism traits; have more self-control and can provide better reasoned care for patients (Kuilman et al., 2019). In addition, Drach-Zahavy & Srulovici (2019) revealed a strong association between conscientiousness, agreeableness, openness, and neuroticism with nurses' level of responsibility and their ability to look after their patients as nurses with high responsibility are less likely to neglect needs of their patients or

postpone any elements of required care. Moreover, nurses' self-confidence and level of competency was found to be affected by nurses' personality traits as high levels of conscientiousness was correlated negatively with stress level resulting from low competency level and lack of self-confidence while openness and extraversion were correlated to low stress caused by communication issues with patients and their families (Burgess, Irvine& Wallymahmed, 2010).

Significance of the study

Critical care nurses are members of healthcare teams who work closet to the end-of-life patients and their families. Thus, they need to have non-technical skills in providing care for particular groups of clients in order to maintain standard of care (Ajri-Khameslou, Najafi, Karimollahi, 2021). Furthermore the critical care units are a high risk and a very complex environment, in which approximately 50% of adverse events occur within a hospital. The analysis of the adverse events has shown that the causes of these events are defects in non-technical aspects of performance, rather than failures in technical expertise (Gordon, 2013).

In other words, lack the non –technical skills leads to errors and negative events. Studies show that 50–80% of care errors or adverse events are caused by human behavior associated with non-technical skills. These skills are an integral part of clinical nursing competence as they enhance patients 'safety. In addition, non-technical skills have an important role in the maintaining technical skills as when combined, they help to carry out tasks and this will turn positive on improving patients' safety (Elmohmady, Abo Gad& Abou Ramadan, 2020).

Furthermore personality traits affect a broad spectrum of caring behaviors among nurses. For example personality traits affect nursing caring attitudes (Sampe, wirmando, Paulus, and Puspita, 2023),competencies and tendency for clinical learning at the work place (Takase, Yamamoto, Sato, 2018), sense of self-efficacy (Kwiatos, Kotus, and Aftyka, 2021), communication between nurses themselves or nurses with patients leading to work place violence or medical errors (Jurado, et al., 2018). Additionally, Personality traits can predict nurses' stress tolerance and burn out (Chen, et al., 2018), patients' satisfaction (Surmad & Bashir, 2017), and impact patients' safety (Bataweel, 2023 & Chang, et al., 2016).

Building patients' safety culture among nurses at critical care units is a pivotal component of health care. It is essential to identify, recognize, and monitor human factors that can affect patients' safety. Given the strong impact of nurses' non-technical skills and personality traits on framing nursing caring attitudes and behaviors, this research paper will add a value by identifying such factors that could compromise patients' safety especially at critical care units. Furthermore, this research study can provide a reference for health organizations to guide them in nurses' placement or staff

development processes inside the organizations in order to improve the quality of safer health care.

Operational definition:

1) Patients' Safety: It is nurses' perception of patient's safety culture within a work area/unit; supervisor\manager, perception of communication on patient safety. ..It will be assessed using Nurses' Perception of Patient's Safety Scale (instrument four).

2) Non-technical Skills: It is defined as decision making, team dynamics, communication competence, and leadership behavior. It will be assessed by non technical skills questionnaire (instrument two).

3) Personality Traits: It is defined as traits a person shows consistently, such as how they think, act and respond to emotions as well as their likes and dislikes. It will be assessed using The Big Five Personality Traits Inventory [BFPI](instrument three)

Purpose

The purpose of the study is to evaluate Perceived patients' safety and its relation to non-technical skills and personality traits among nurses at critical care units.

Research Questions

1) What are the levels of nurses' non-technical skills at critical care units?

2) What are the personality traits of nurses working at critical care units?

3) What are the levels of patients' safety as perceived by nurses at critical care units?

4) Are there relations between patients' safety, non-technical skills and personality traits among nurses at critical care units?

Research Design

A descriptive correlational design was employed in the current study to find out the relationships between the study variables, namely; patient's safety, critical care nurses' non-technical skills and personality traits.

Study Setting

The study was conducted in Critical Care Units at Beni-Suef University Hospital, Beni-Suef Governorate, Egypt. The Critical Care Units were Intensive Care Unit, Intermediate Care Unit, Pediatric & Neonatal Care Unit, Epidemiological Care Unit, Surgery Intensive Care Unit, Cardiac Care Unit, neurology Care Unit, Incubator Care Unit, Chest Care Unit, and Emergency Care unit.

Study Sample

A convenience sample of 126 critical care nurses was selected and utilized in the current study. A convenience sampling is utilized to reach participants who are readily available and the investigators can have access to them, agree to participate and had experience at least six months of work at critical care units as the availability of participants is more concern during the process of implementing this research study. The sample size was calculated using:

n=z2*p*(1-p)/e21+z2*p*(1-p) e2*N

n= 126

z standard normal value with confidence of level 95% =1.96

P percent in population 0.5

e margin of error 0.05

N population size=200

Accordingly the number of nurses included in the study from each unit; Intensive care unit (17), Intermediate care unit (14), Pediatric & neonatal care unit (10), Epidemiological care unit (18), Surgery intensive care unit (9), Cardiac care unit (13), neurology care unit (7), Incubator care unit (9), Chest care unit (10),and Emergency care unit (19).

Instruments

Four instruments used to collect data:

Instrument one: characteristics of nurses structured questionnaire:

It is concerned with data of personal identification as code number, age, gender, the level of education, and years of experience. It is developed by the researcher based on review of literature (El-pasiony &Abd-Elmoghith, 2023).

Instrument two: Non-technical Skills Likert Scale

It was developed by Cooper et al., (2010) and was used to assess non-technical skills of nurses. It contained four sub-scales: decision making (9 items), team dynamics (15 items), communication competence (12 items), and leadership behavior (21 item). The questionnaire was translated into Arabic by Elmohamady, Abo Gad, and Abou Ramadan (2020) with face validity 97.82% and reliability 0.998 by Cronbach Alpha Coefficient.

Scoring: Scoring of each item Nurses' responses were measured on five points Likert Scale. Scoring ranging from 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree. The total score calculated by summing score of all dimensions. The total score statistically represented varying levels of staff nurses' non-technical skills as follow: Satisfied level of non-technical skill ≥ 75% or Unsatisfied level of non-technical skill < 75%.

Instrument three: The Big Five Personality Traits Inventory [BFPI]:

The Big Five Personality Traits Inventory was originally developed by Goldberg (1993) with many updated versions;, 10-item inventory developed by Rammstedt & John (2007), 40-item inventory developed by Sulwen (2017), and recently a brief survey developed by Debell et al. (2022). In the current study, a 50-item inventory was utilized to measure an individual on the Big Five Factors (dimensions) of personality; each of the factors is then further divided into personality facets. The Arabic version was translated by Abdullatif, (2005). The alpha reliabilities of the Arabic Big Five Personality Inventory were acceptable to good ranging from 0.78 to 0.82.

Scoring: Scoring of each item: In this a 50-item tool. Person answers questions on a likert scale of 1- 5; 1 = completely disagree, 2 = slightly disagree, 3 = Neutral, 4 = slightly

agree, and 5 = completely agree. There are five subscales (Extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience); each subscale is composed of 10 items that represents a personality type. The scoring system is reversed in the items no. (2, 3, 6, 8, 9, 10, 12, 16, 18, 19, 20, 22, 26, 28, 30, 32, 36, 38, 40, 45, 46) as the responses in these items scored as the following: 5 = completely disagree, 4 = slightly disagree, 3 = Neutral, 2 = slightly agree, and 1 = completely agree. Total scoring system: Each personality type have a score between 0-50 considering negatively scored items, higher scores in each subscale refers to stronger personality traits in this type. In each personality dimension, score above 30 is considered strong personality trait, while score below 30 referred to weak personality trait in that dimension.

Instrument four: Nurses' Perception of Patient's Safety Scale (Agency for Healthcare Research and Quality, 2003).

The scale was adopted from Agency for Healthcare Research and Quality, (2003), to measure the values, perceptions, attitudes of nurses that indicate their commitment to the style and the proficiency of the organization's health and safety management. Total items are 28 items. This instrument consists of three subdomains: the perception of patient safety culture within a work area/unit (18 items); supervisor\manager (4 items), perception of communication on patient safety (6 items). The instrument was translated into Arabic by El-pasiony and Abd-Elmoghith (2023) who checked Validity of the Arabic version as it was revised by one expert in medical-surgical nursing and two experts in nursing administration to ensure clarity and relevance. Furthermore, The Cronbach's alpha test of the instrument was 0.949.

Scoring system:

Scoring system for each item. Nurses rated each item on 5-likert scale, from 1 (strongly disagree), 2 (disagree), 3 (undecided), 4 (agree), and 5 (strongly agree) with higher scores indicating more positive perceptions of patient safety. Scores of each category summed up and converted into percent scores. Total scoring system> The nurses' perception of patient safety was considered high if the percent score was more than 75%, moderate if the percent score ranged from 60 to 75%, and low if the percent score was less than 60%.

Ethical Considerations

The research ethics committee in the Faculty of Medicine, Beni Suef University approved the study (FMBSUREC/03102023/ Sabek). In addition, official permissions were obtained from the administrators of the Beni - Suef University hospital. Regarding participants' consent to share in the study, nurses' completion of the study questionnaires granted an implicit approval to be a part in the current study in which their confidentiality and anonymity were completely granted.

Procedure

An official permission was submitted from the dean of the Faculty of Nursing, Beni Suef University, to the

director of Beni Suef University hospital. It included purpose of the study and methods of data collection. A frame list of all nurses working in critical care units at Beni Suef university hospital who met the inclusion criteria was obtained. An online google form link was sent to nurses to fill out the online questionnaires (characteristics of nurses structured questionnaire, non-technical skills likert scale, and the big five personality traits inventory and nurses, perception of patient's safety questionnaire).

The purpose of the study was explained, confidentiality, and anonymity were assured at the beginning of data collection. Finally, the investigators turned off the replies on the questionnaires once the required sample size was reached

Statistical design

Collected data were statistically analyzed using Statistical Package for Social Science (SPSS) version 22, a descriptive statistical analysis was utilized as continuous and categorical data were presented by using frequency, percentage, Mean and standard deviation. To study correlation between variables, Pearson correlation (r) test was used. ANOVA (analysis of variance) test was used. Results were considered significant if p <0.05, a highly statistical significant difference was considered if p <0.01.

Result:

Table 1 showed that nearly three quarters (72.2%) of nurses were females and more than half (57.9%) of them ranged between 25 and <35 with a mean age 27.3±4.9. Concerning marital status about half (50.7%) of the studied nurses were married.

Regarding educational level; more than three fifths (62.6%) of them had bachelor degree. Regarding years of experience, more than one third (38.9%) of the studied sample had experience ranging from 2 to 5 years.

Table 2 showed that the overall non-technical skills mean percent was (89.75%). The highest mean percent was (90.08%) as regard to team dynamics as perceived by nursing staff, while the lowest mean score was (88.48%) as regard to decision making.

Figure 1 reveals that the majority (96.0%) of studied sample had satisfactory level of non-technical skills, while few percentages (4.0%) of them had unsatisfactory level of non-technical skills.

Figure 2 reveals that 46.8% of studied sample have strong extroversion personality traits and 94.4% of them have strong conscientiousness. The same table also reveals that 99.2% and 91.3% respectively of the studied sample exhibit strong personality traits in relation to agreeableness and openness to experience. On the other hand, 78.6% of studied critical nurses have strong neuroticism as a personality trait.

Table 3 shows that the overall patients' safety culture mean percent was 80.92%. The highest mean percent was 82.60 for perception of the studied sample regarding patients' safety within unit, followed by communication (80.40%). The lowest score was supervisor\ manager with mean percent (74.17%).

Figure 3 revealed that nearly two thirds (67.5%) of studied sample had a high level of patients' safety culture

perception, while few of them (1.6%) had low level.

Table 4 clarifies a positive correlation between nurses' non-technical skills and their patients' safety culture. It also reveals that, there is a highly statistically significant positive correlation between extroversion personality traits and patients' safety culture among nurses (P=0.006). Also, there is a positive correlation between conscientiousness and Neuroticism personality traits with patients' safety

culture among nurses (P=0.03 and 0.02) respectively.

As elaborated in **table 5** there is a highly statistical significant positive correlation between conscientiousness, neuroticism personality traits and level of experience of nurses (P=0.001 and 0.049) respectively. Also, there was a statistical significant correlation between age, dimension of "supervisor\ manager actions "and between dimension of "communication" and educational level.

Table (1): Characteristics of the Studied Nurses at Beni-Suef University Hospital (n=126)

Characteristics	No.	%
Gender		
Female	91	72.2
Male	35	27.8
Age		
18-<25	45	35.7
25-<35	73	57.9
35-<45	8	6.3
Mean±sd27.3±4.9		
Marital status		
Widow	1	.8
Single	59	46.8
Married	64	50.7
Divorced	2	1.6
Education		
Bachelor	79	62.6
Technical institute	45	35.8
Diploma	2	1.6
Experience		
<2	33	26.2
2-<5	49	38.9
5-<10	31	24.6
10+	13	10.3
Mean±sd4.7±3.5		

Table (2): Dimensions of non-technical skills among studied nurses (n=126)

Non-Technical skills	Mini	Max	Mean±SD	Mean percent
Decision making	29	45	39.98±3.68	88.84
Team dynamics	46	70	63.06±5.43	90.08
Communication competence	16	60	53.96±6.66	89.93
Leadership behavior	55	105	94.32±9.58	89.83
Total	197	280	251.31±20.39	89.75

Figure (1): levels of non-technical skills among studied nurses (n=126)
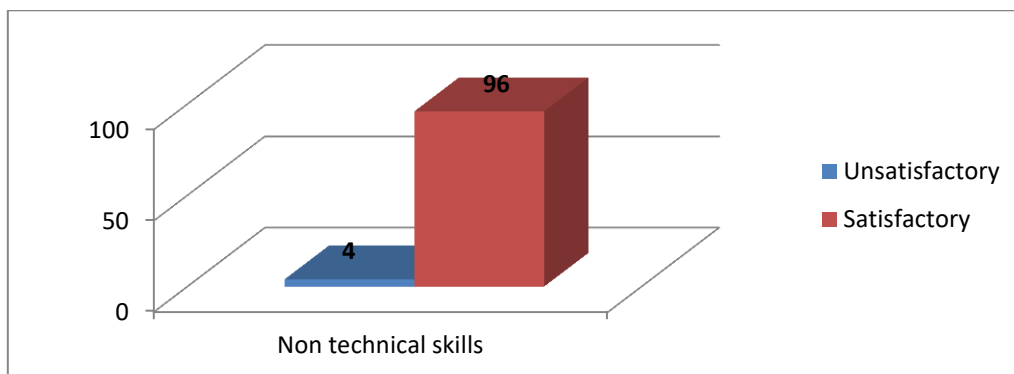

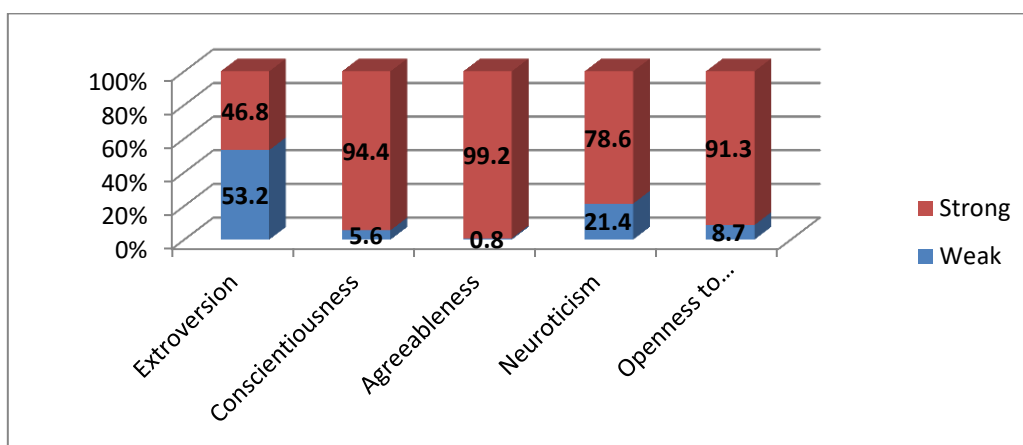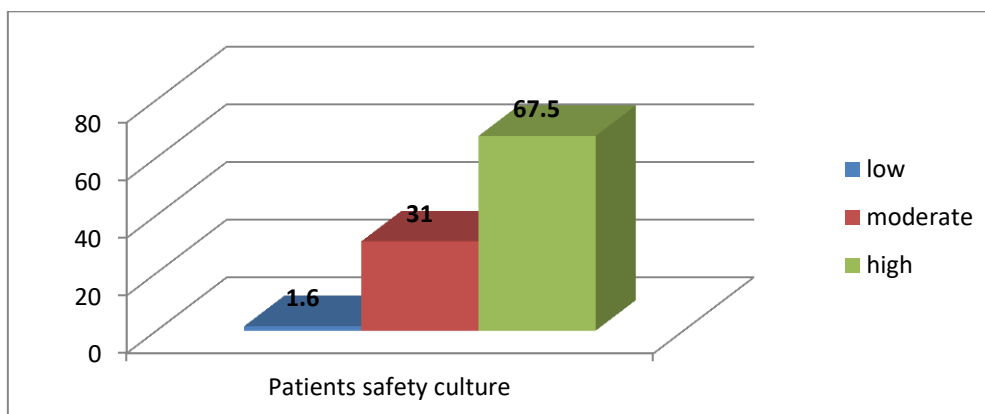**Figure (2): Levels of Personality Traits among Studied Nurses (N= 126).**

Table (3): Dimensions of Patients' Safety Culture among Studied Nurses (n=126)

Patients' safety culture	Mini	Max	Mean± SD	Mean percent
Perception of patient safety culture within unit	18	90	74.34±10.85	82.60
Supervisor/Manager actions promoting patient safety culture	4	20	14.83±3.45	74.17
Communication	6	30	24.12±4.20	80.40
Total	28	140	113.29±15.95	80.92

Figure (3): Levels of Studied Nurses, perception about patients' safety culture (n=126)

Table (4): Correlation between non-technical skills, patients' safety culture, and dimensions of Personality Traits) among Studied nurses (N= 126).

Personality traits	Non-technical skills		Patients' safety culture	
	R	P	R	P
Non-technical skills	1			
Patients' safety culture	0.5	0.0001	0.12	0.16
Personality traits:				
Extroversion	0.11	0.2	0.24	0.006**
Conscientiousness	0.14	0.1	0.18	0.03*
Agreeableness	0.16	0.07	0.05	0.51
Neuroticism	0.05	0.54	0.19	0.02*
Openness to experience	0.13	0.13	-0.15	0.08

*significant at p-value<0.05

**highly significant at p-value<0.01

Table (5): Relationship between non-technical skills, patients' safety culture, and dimensions of Personality Traits according to personal data (age, education, and experience) among Studied nurses (N= 126).

Scores	Gender		Age		Education		Experience	
	F	P	F	P	F	p	F	P
Non-technical skills								
Decision making	1.074	.302	.711	.493	.585	.626	.663	.576
Team dynamics	4.001	.048* (female higher)	.240	.787	.690	.560	1.342	.264
Communication competence	6.191	.014* (female higher)	.888	.414	.420	.739	.859	.465
Leadership behavior	.876	.351	.101	.904	.585	.626	1.464	.228
Personality traits								
Extroversion	2.340	.129	.926	.399	.776	.509	.378	.769
Conscientiousness	1.532	.218	.414	.662	.299	.826	6.514	.0001**
Agreeableness	.471	.494	.100	.905	.244	.865	1.012	.390
Neuroticism	3.505	.064	.455	.635	.400	.754	2.690	.049*
Openness to experience	.760	.385	.690	.503	.496	.685	1.172	.323
Patient safety culture								
Safety awareness	.837	.362	1.244	.292	.348	.791	.264	.851
Supervisor\Manager actions promoting patient safety culture	.257	.613	.017*	.983	.188	.904	1.019	.387
Communication	.823	.366	.396	.674	.042*	.988	.362	.781

*significant at p-value<0.05

**highly significant at p-value<0.01

Discussion

Patients' safety becomes a key priority for the quality of healthcare organizations (Ali, et al., 2022). Nurses' non-technical skills minimize the incidence of adverse events, increase the ability to work as a team, and drives toward the best practice (Ragni & Oxtoby, 2015). When the person has more non-technical skills, it is expected to have a strong personality to deal with learning process, work and other life challenges (Ghafili, et al., 2022). Also, nurses, personality traits can affect their workplace behaviors and lead to greater patient safety (Chang, et al., 2016).

Regarding the dimensions of non-technical skills among the studied sample, the present study results showed that team dynamics was the highest mean percent, while decision-making was the lowest mean percent among all dimensions. This may be to the highest nurses, awareness of the role of teamwork and coordination in providing high-quality and safe care at critical units. While, nurses had difficulties in making decisions that related to patient care due to the complexity of conditions.

These findings were not in the same line with a national study results conducted by (Elmohmady, Abo Gad & Ramadan, 2020), they found that "decision making" was the highest percent and "leadership behavior skills" was the lowest percent. Similarly these findings were incongruent with White (2012), who indicated that the failure of the surgery was related to lack of communication and team coordination. Also, Ghafili et al., (2022) found that the midwives had a lack of several of soft skills such as teamwork, acceptance of criticism and conflict management at their departments. In addition, Casali, Lock & Novoa, (2021) indicated that healthcare incidents were due to failure in non-technical skills and the system complexity and not to the lack of technical skills among healthcare professionals.

Regarding the studied nurses, total level of non-technical skills, the results illustrated that the majority of the sample had a satisfactory level of non-technical skills. This may be due to the nurses, awareness of the importance of non-technical skills in enhancing the safety of both the healthcare providers and patients. When nurses have good level of non-technical skills, they will perform their tasks successfully with little errors. This result was inconsistent with Elmohmady, Abo Gad and Ramadan (2020) who showed that less than two thirds of studied sample of nurses had a satisfactory level in their non-technical skills. Similarly, Ghafili et al., (2022) added that there was a decrease in the non-technical skills (coordination and organization of the team, calm communication, involvement of the women and their partners in both care and decision making and in the skills related to the respect of intimacy) among the midwives in Morocco.

Results of the current study revealed that, nearly half of the studied sample was extroverts; the majority of them had strong conscientiousness, openness to experience, and agreeableness

personality traits. Several research findings could align with and consolidate these results. For example, Sampe, wirmando, Paulus, and Puspita (2023) found that near two thirds of the studied nurses were extroverts. In the same line, Bataweel (2023) explored that most of studied nurses had higher conscientiousness and agreeableness scores.

These results also were compatible with Handayani & Kuntarti (2022) who concluded that approximately three quadrants of nurses were traditionalists with high extrovert personality characteristics, 11.7% had experience in seeking learning and applying new skills, 10.46 % of them were idealists with good therapeutic communication skills, while the minority of those nurses were conceptualizers with excellent thinking, analysis, judgment and evaluation skills. Additionally, the current finding is in line with Kwiatos, Kotus, and aftyka (2021) who found that the personality traits among nurses in intensive care and anesthesia units were mainly extroverts and conscientiousness with higher scores than other personality domains.

These findings prove the explanation of the merits of each component of the big five personality traits inventory (BFI) and at the same time all of these traits characterize nurses who work in critical care units. For example, nurses with high scores in extroversion domain are more motivated with optimistic attitude, communicate easily with others, conservative, energized, adapt to new situations and people as patients, their relatives, and other health care professionals. Higher scores of conscientiousness are associated with submissive and obedient nurses who comply with regulations and rules of the organization, they also have distinguished performance in every work they do and strive to solve problems for optimal satisfaction of surrounding others.

Additionally, nurses with higher scores in agreeableness are characterized by flexible, warm, interactive, and sympathetic caring attitude about all aspects of patient's health. Higher scores in openness to experience domain explain nurses' creative and innovative behaviors with distinct intellectual abilities and ability to benefit from past experiences to pass the new challenging situations. Nurses with great traits in openness to experience are broad-minded and able to create new opportunities and ways to help their patients. All of these traits characterize nurses who work in critical care units

Regarding the perception of patient safety culture by studied nurses, the current study indicated that the highest mean percent was the perception of patient safety culture within unit, followed by communication. Whereas, the lowest mean percent was for the subscale "supervisor\ manager actions promoting safety culture". The perception of nurses at all subscales was above seventy percent and this may be due to the organizations, confirmation of paying attention for patient safety especially at critical care units. Also, patient safety improvement

is a crucial factor when evaluating the healthcare organizations, quality.

These findings supported by (Elpasiony & Abd-Elmoghith, 2023), who found the same results. Also, the results done by (Shashamo, et al., 2023) indicated that the highest positively contributing dimensions were hospital handoff transition, communication openness, teamwork within hospital units and organizational learning- continuous improvement. But, there was disagreement with (Fontes-Mota & Ribeiro, 2022) who indicated that the highest percentage of positive responses of participants was for the dimension "supervisor\ manager expectations and actions promoting patient safety". Also, with (Abdi, et al., 2015) who reported that the highest three domains were working conditions, perception management and stress recognition. In addition to (Mohammed, Taddele& Gualu., 2019) who indicated that the highest positive contribution of their participants was for teamwork within hospital units, teams working across the hospital departments and supervisor's expectations among the overall dimensions of patient safety culture.

Regarding the studied critical nurses, perception levels about patient safety culture; the findings showed that nearly two thirds of sample had a high level of perception about patient safety culture. This may be due to the continuous training of staff nurses about safety and positive outcomes of the patient. Also, this indicates nurses, awareness of the importance of

preventing adverse events to patients especially at critical care units.

Controversy, this result was against the results of Mohammed, Taddele& Gualu., (2021) as their results showed that less than the half of the participants had a good perception about patient safety culture. Also, this finding disagreed with Kakemam, et al., (2021) who indicated in their results that the overall positive response reaction of the participant nurses for all the dimensions about patient safety culture were less than fifty percent. In addition to Shashamo, et al., (2023), reported that half of studied nurses had indicated good patient safety culture.

Concerning the correlations between patient safety culture, personality traits and non-technical skills among the studied sample, the results indicated that there were statistically significant correlations between patient safety culture, personality traits and non-technical skills. This may be due to the effect of personality traits on the workplace behaviors of nurses. This means that nurses, personality traits affects patients' safety. Also, not only the technical skills but also non-technical skills can cause errors for patients. Regarding the relation between patient safety and non-technical skills, this finding was supported by Ghafili et al., (2022), who showed that the ability of midwifes to communicate clearly and calmly either with themselves or with women was considered important for ensuring patient well-being and safety of care. Additionally, Casali, Lock & Novoa, (2021) illustrated that situation

awareness, effective communication, decision making, teamwork and leadership are correlated to patient safety culture.

Concerning the correlation between personality traits and patient safety, this finding was supported by Drach-Zahavy & Srulovici (2019) who revealed a strong association between conscientiousness, agreeableness, openness, and neuroticism with nurses' level of responsibility and their ability to look after their patients which in turns contributes to their safety. Also (Chang et al., 2016), who demonstrated a positive correlation between nurses openness and patient safety, but the effect of openness on the patient safety reduced with the increase of work experience. Additionally (Casali, Lock & Novoa, 2021), confirmed the association between patients' safety and nurses' personality traits in terms of human factor as the leading cause for patients errors especially at surgical settings . They also emphasized the necessity of improving patient safety through looking at the variability of human performance at all levels; individual, team and organizational ones in which personality traits constitute a significant factor.

This study illustrated a high statistical positive correlation between extroversion personality traits and patients' safety culture among nurses. In addition, personality characteristics of conscientiousness were correlated positively with patients' safety culture, which is in line with Bataweel (2023) who found that nurses with great scores in conscientiousness and agreeableness domains did less

medical errors and provided safer patient care. Chang et al. (2016) also confirmed a positive association between nurses' openness to experience and patients' safety. Additionally, Sampe et al. (2023) clarified that extrovert nurses had better caring behavior than nurses with introvert traits. Lam & Teng (2011) also proved this finding as they found that nurses with higher conscientiousness traits had greater contribution on patients' safety.

An argumentative finding was presented in this study; as approximately three quadrants of nurses reported neuroticism as a characteristic of their personalities in addition there was a positive correlation between neuroticism of nurses and their patients' safety culture. This finding appeared to be contradicted with several previous research studies. For example, Bataweel (2023) reported lower neuroticism among studied nurses which correlated positively with irrational thinking, less ability to control self, and more tendencies to make medical errors. Additionally, Kwiatos, Kotus, and Aftyka (2021) found lower scores of neuroticism among nurses who working in anesthesia and intensive care units. Furthermore, Teng, Chang, & Hsu (2009) had confirmed that nurses' emotional stability predicted patients' safety.

Rationalization for this conflicting finding may be related to the stressful nature of the clinical environment especially at critical care units which is negatively reflected on nurses'

behavioral characteristics and misperceived even by nurses themselves as if these behaviors are their innate personality traits, this concept is well known as a "trait" versus "state" personality characteristic. the clinical environment in which critical care nurses working is stressful and challenging due to many factors as nurse-patient ratio, critical patients' care, risky situations as medication administration and infection, poor nursing skills and poor collaboration from colleagues, conflicts with patient's relatives, insufficiency of materials or equipment, and frequent deaths. All of these factors lead to negative feelings in nurses as anger and frustration (state characteristics) at sometimes but at the same time those factors don't necessitates that nurses hinders patients' safety instead it may encourage them to achieve optimal performance, fight for their patients, and protect their safety.

Regarding the correlation between personal characteristics and dimensions of non-technical skills; the results showed that there was a statistical significant correlation between "team dynamics" and "communication competence" dimensions and gender. This indicates that these dimensions were higher in females than in males. This may be due to the highest percent of participants was females or it may be due to the difference in the human nature.

This result disagreed with (Hasan, et al, 2019) who illustrated that communication skills were higher among male nurses. Also (Abd Elaziz,

Shalaby & Elsherif., 2015) showed that there was a statistical difference between the communication skills (gathering information) and experience in psychiatric nursing.

Concerning the correlation between personal data and patient safety dimensions; there was a positive correlation between age and "supervisor\ manager actions" and between "communication" and educational level. This may be due to the higher the age of the nurse, the higher the perception about the work environment. In addition to the higher the educational level of the person, the higher the improvement of communication skills.

This accepted by (Mohammed, Taddele& Gualu., 2021) who illustrated that the health care professionals with age more than 34 years had good patient safety culture. On the other hand this was against the results of, (Elsayed & AlAbd, 2018) indicated that there was no correlation between personal characteristics of nurses and patient safety at psychiatric hospitals.

Present findings indicated a highly significant positive correlation between conscientiousness and Neuroticism personality traits with nurses' levels of experience. In the same direction, Bataweel (2023) indicated significant differences of BFI personality dimensions among nurses in relation to their level of experience as higher experiences at work are associated with greater levels of extraversion, agreeableness, conscientiousness and lower levels of neuroticism among nurses. This finding emphasized the

importance of experience in nursing work as with increased years of experience nurses become more mature, confident, and stable with improved abilities to communicate with others, manage stressors, solve problems, and positively adapt to surrounding environment.

Conclusion

In the light of current study findings, it can be concluded that majority of critical care nurses had a satisfactory level of non-technical skills, most of them had a high level of patients' safety culture, and the nurses were characterized by high conscientiousness, agreeableness, and openness to experience personality traits in addition to a significant percent of nurses that cannot be overlooked who characterized by neuroticism. A positive correlation between non-technical skills and patients' safety culture was demonstrated. Furthermore, personality traits in terms of extraversion, conscientiousness, and neuroticism were correlated positively with patients' safety. Concerning correlation with socio-demographic characteristics, nurses' years of experience appeared to be correlated positively with personality traits as conscientiousness and neuroticism.

Recommendations

1) Additional researches are necessary to identify the impact of specific non-technical skills and personality traits on nurses' work place behaviors.
2) Health organizations should consider such research studies as a reference for appropriate placement and distribution of nurses on the hospital departments based on their levels of non-technical skills and personality traits.
3) Training sessions must be conducted to improve nurses' non-technical skills which consequently will be reflected positively on patients' satisfaction and safety.

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