Effectiveness of The Nursing Intervention program regarding Safety Standard Precautions on Nurses Performance in Neonatal Intensive Care Units

Wesam Salah Ali Elsherbiny¹; Amal Ahmed Khalil²; Nabila Hassan Abdella³; Jihan Mahmoud Farrag⁴.

¹B.Sc. Nursing, Kafr El Sheikh University; ^{2,3}Professor of Pediatric Nursing, Pediatric Nursing Department, Faculty of Nursing, Port Said University; ⁴Assistant professor of Pediatric Nursing, Pediatric Nursing Department, Faculty of Nursing, Port Said University.

Received: 21/01/2025

Revised:18/02/2025

Accepted:31/01/2025

ABSTRACT

Background: Patient safety is one of the nations' most pressing health care challenges. Pediatric nurses have an important role in understanding and applying the safety standard precautions goals for neonatal safety to minimize the occurrence of hazards and errors in nursing care. Aim: To explore the effect of the nursing intervention program on safety standards precautions on the performance of nurses in neonatal intensive care units. **Design:** A quasi-experimental one-group (pre-post) assessment research design was used in conducting this study. Subjects: A Convenience sampling consisted of 70 nurses that were working in neonatal intensive care units at four hospitals affiliated to the Universal Health Insurance Authority (UHIA) in port said governorate regardless their characteristics. Tools: Two main tools were used to collect data in this study: The observational Checklist and a self-administer questionnaire were used to gather the data. Results: more than three quarters of the studied nurses (75.7%) had satisfactory total score of knowledge about safety standards precautions in pre intervention phase, and increased to 95.7% in post intervention phase. Also, improvement in the overall practices of the studied nurses throughout the program phases from 81.4% to 97.1% in post intervention phase. Conclusion: There was improvement of nurses' total score of knowledge and their overall practices after program implementation. Recommendations: Continuous health teaching and training programs for recently pediatric nurses that emphasize the significance of enhancing their implementation of safety standard precautions in neonatal intensive care units.

Keywords: Safety Standard Precautions, Intervention program, Nurses Performance.

INTRODUCTION

Neonatal Patient Safety is a key component of hospital performance and improving neonatal care staff nurses' performance. The neonatal patient safety culture is important in terms of representation of quality healthcare services (World Health Organization [WHO], 2018). Neonatal patient safety involves all measure and precautions made for reduction or elimination of possible adverse effects of medical care during medical diagnosis and treatment. Every organization strives to achieve this goal and providing high quality of neonatal patient care (Chinn & Kramer, 2020 and Vaismoradi. 2021).

Neonatal intensive care units provide lifesaving care for the critically ill neonate patients. It is associated with significant risks for Adverse Events [AE] and serious errors with multiple interactions occurring between multidisciplinary health care providers and medical devices with increasingly complex interface (Bouldin et al., 2021 and W HO. 2018).

Precautions Safety Standard are standards developed by Joint Commission International [JCI] to promote specific improvement in patient neonate safety. The JCI has developed International Patient Safety Goals [IPSGs], which were adapted from the joint commission national patient safety goals [NPSGs] (Abousallah, 2020). The goals highlight problematic areas in health care and describe evidence and expert based consensus solution to these problems, the goals are structured in the manner as standards including goal statement and measurable elements for each goal (Joint Commission International Joint Commission Resources JC1], 2017).

Neonate patient safety is one of the nations' most pressing healthcare challenges. Many neonate patients die in hospitals each year as the result of lack in patient safety (Khaled, Yones & Wafik, 2020). Therefore, safety for neonate patients is important issue in global health care organization, neonate patient safeties have become an international priority with major hospital programs being carried out in the United States of America (USA), United

104

Canadian (UC) and many Arab countries such as Kingdom of Saudi Arabia and United Arab Emirates (Mady, El-Rafy & Tantawi, 2021).

Pediatric professional nurses are using multiple methods to improve neonate patient safety and quality care outcomes. The most component of neonate patient safety are six goals; improving neonate patient identification, improving effective communication, improving safety of medication, ensuring safety operations and procedures, ensuring infection control measures and reducing the risk of neonate patient falls. Pediatric nursing staff has an important role in understanding and applying the six international goals for neonate patients in neonatal intensive care units to minimize 2017). hazards and errors (JCI, Implementation of safety standard precautions especially in neonatal intensive care units can reduce medical errors and patient harm. Therefore, pediatric nurse's knowledge and practices is crucial and important step to improve neonate patient's quality of care (El-Sayed & Bayoumi, 2020).

Significance of the study

The occurrence of adverse health events is an indicator of compromised neonatal patient safety. Globally, the reported incidence of adverse health events ranges between 4 % and 17 %. Interestingly, it was found that around 50 % of all reported adverse events which compromised patient safety are preventable (Killam et al., 2022). Nurses' formal educational preparation is reported to be a causal factor of adverse patient events made by around 50 % of new nurses with less than one year of experience (Saintsing, Gibson & Pennington, 2023).

Nursing practices errors could occur at any stage of the care process. Nearly all neonatal patients in critical care units will be affected by a potentially life-threatening error at some point during their stay. Medication errors account for 78 % of the serious errors in neonatal care units in additional to accidental neonate patients fall are among the most common adverse events reported in hospitals, complicating approximately 2% of hospital stays (Cho et al., 2021).

The World Health Organization (WHO) estimated that 7 of every 100

hospitalized neonate patients in developed countries and 10 of 100 in developing countries will acquire at least one health care-associated infection during their hospital stay. Worldwide over 275,000 premature baby die annually as results of injuries that are considered consequences of the nursing care errors and poor quality of care (Al-Ahmadi, 2021 and Toso, et al., 2022).

The risk of patient harm is especially significant in neonatal care units. However, a huge number of immune compromised patients are admitted to neonatal intensive care units and among those are neonate patient; Approximately 30% of neonatal care patients are affected by one or more episodes of harmful events (WHO, 2018 and Milligan, 2020). Therefore, pediatric nurses have a professional and moral obligation to protect the health of their patients and share the responsibility to sustain and protect the natural environment (Aziz & Safina, 2022).

All standards of care provide a guide to the knowledge, skills, judgment and attitudes that are needed to practice safely. The standards describe what each nurse is accountable and responsible for practice, however the aim of safety standard precautions is to prevent harm (JCI, 2017). Therefore this study was conducted to evaluate the effect of the nursing intervention program on safety standards precautions on the performance of nurses in neonatal intensive care units.

AIM OF THE STUDY

The aim of the study: To explore the effect of the nursing intervention program on safety standards precautions on the performance of nurses in neonatal intensive care units.

Research Objectives

- **1.** Assess nurses' knowledge on safety standards precautions in neonatal intensive care units.
- 2. Assess nurses' practices on safety standards precautions in neonatal intensive care units.
- 3. Design nursing intervention program for nurses' on safety standards precautions in neonatal intensive care units.

- 4. Implement nursing intervention program for nurses on safety standards precautions in neonatal intensive care units.
- 5. Evaluate the effectiveness of the nursing intervention program on safety standard precautions on nurses' knowledge and practice in neonatal intensive care unit before and after the program implementation.

Research hypothesis

Nurses' knowledge on safety standards precautions in neonatal intensive care unit are expected to be improved after implementation of nursing intervention program.

Nurses' practice on safety standards precautions in neonatal intensive care unit are expected to be enhanced after implementation of nursing intervention program.

SUBJECTS AND METHODS

Design: A quasi-experimental design included one group was used to conduct the study (Pre and Posttest).

Setting: The study was carried out in neonatal intensive care units at four hospitals affiliated to the Universal Health Insurance Authority (UHIA) in Port Said governorate, namely (El-Salam hospital, Al-Hayat hospital, Specialized Obstetric hospital and El-Nasr specialized children's hospital).

Subjects

A convenient sample consisted of all available nurses working at (NICUs) at the above-mentioned study settings (70 nurses) regardless their experiences, level of education, position, or age were included in the study through period of the study.

Tools of data collection

Two main tools were used to collect data in this study:

Tool 1: Structured interview questionnaire

It was developed by the researcher in the light of the relevant literature and studies. It was written in simple Arabic language to suit the understanding level of all nurses' level of educations working at (NICUs). It consists of 2 parts:

Part (1): Personal data and professional characteristics of the studied nurses: (It contained ten questions about gender, age, marital status, Level of education, Occupational status, Years of experience, past Training courses, names of courses, Duration from the last course / years, name of the hospital where they work

Part (2): Assessment of nurses knowledge about safety standards precautions in neonatal intensive care units. This tool was adapted by the researcher from Saleh (2019) and translated into Arabic language. Questions were in the form of multiple choice. This tool was used pre and post program implementation. Answers were checked with a model answer.

This tool was categorized under 6 main goals with (71) question which divided into: 11 questions for neonate identification, 12 questions for improving effective communication, 12 questions for improving safety of medication (High-Alert Medication), 15 questions for ensuring safety operations and procedures, 14 question for ensuring infection control measures, and 7 question for reducing the risk of neonate patient falls.

Scoring system of questionnaire

According to study subjects' answers for each question, a correct response was scored one degree and incorrect was scored zero. The total scores for the tool were 71 grades were allocated to all items of the questionnaire. Then the answers were checked with a key answer. These scores were summed-up converted into a percent score.

Accordingly, the Studied nurses' knowledge was categorized into two levels: Score <75% Considered as unsatisfactory level of knowledge and score \geq 75 % considered as satisfactory level of knowledge (Saleh, 2019).

Tool II: Observational Checklist of Safety Standard Precautions

This tool was adopted from JCI, (2017) which was concerned with International Patient Safety Goals (IPSGs) tool to assess and evaluate nurses' practice level on safety standards precautions in neonatal intensive care units. It was guided by three references which are Policies and Procedures of Children's Hospital Ain Shams University, (2019), Patient Safety Standards of the Joint Commission International, (2017) and then validated (JCI, 2017).

This checklist was categorized under 6 main goals with 66 step which divided to: 11 steps for neonatal identification, 14 steps for improving effective communication, 8 steps for improving safety of medication {High-Alert Medication}, 10 steps for ensuring safety operations and procedures, 12 steps for ensuring infection control measures, 11 reducing the risk of neonatal patient falls.

Scoring system of Observational Checklist

Regarding the applied steps, it was scored one grade for done completely and correctly and that incompletely or incorrectly was scored zero for each step of practice. The scores of the items of each part were summed-up accordingly, theses scores were converted into a percent score for total score. Score <85% considered as incompetent practices and score $\geq 85\%$ considered as competent practices (Saleh, 2019).

Operational design

The operational design includes the preparatory phase, validity, reliability, ethical consideration, pilot study and field work.

Preparatory Phase

The researcher reviewed local and international related literature using internet search, textbooks, and scientific journals. This helped in increasing acquaintance with the study topic and in the preparation of the data collection tools. This preparatory phase lasted for three months from February 2023 to June 2023.

Tool Validity

The tools of this study were revised for clarity, relevance, understanding and applicability by a panel of nursing experts 3 professors specializing in pediatric nursing and 2 professors specializing in medical surgical nursing to assess the face and content validity of the study tool.

Tool Reliability

Reliability was tested by using a Cronbach's Alpha test (85%) for studied nurses' knowledge on safety standard precautions goals and (82%) reliable for nursing practices on safety standard precautions goals.

Ethical considerations

The study was approved by scientific research ethical committee of the faculty of nursing – Port Said University before starting the study. The purpose and procedures of the study were explained clearly and simply to every nurse to obtain her informed consent to participate in the study. The researcher also informed them about their rights to refuse or withdraw at any time without giving reason and with no consequences on their care. They were assured that any information obtained would be Confidential and used only for the purpose of the study. The study maneuvers could not harm the participants. Professional help and advice Were provided as needed.

Pilot Study

A pilot study was undertaken after the development and validation of the study tools and before starting the data collection phase. It was carried out on a sample of about 10% of the main study sample. The purposes of the pilot study were to test the applicability, clarity, and feasibility of the study tools, and it served to estimate the time needed to complete the forms. It also helped to find out any obstacles and problems that might interfere with data collection. Based on the findings of the pilot study, certain modifications of the tools were done, and hence the pilot nurses were not included in the main study sample and the number of pilot sample was 6 nurses.

Field Work

This fieldwork was achieved through assessment, planning, Implementation and evaluation phases.

Assessment phase: This phase-involved the preparation of the tools and the assessment of the nurses' knowledge and practices on safety standard precautions, specifically in neonatal intensive care units. The researcher visited the study settings, met with the eligible nurses, explained to them the study aim and maneuvers, and invited them to participate. After obtaining nurses' consent, the researcher started the interview using the first tool. This was conducted individually and privately in the study setting according to the policy of the place, where the researcher asked the nurses questions and recorded their answers on the form. For the assessment of practices, the researcher used the observational checklist as the second tool, observing the nurses during their work and noting every action them performed in relation to safety standards. This was done discreetly to ensure accurate reflection of their practices. It took approximately 35 to 40 minutes to fulfill the interview. The researcher visited the study setting twice per week and met 1-2 nurses per day. This assessment phase lasted for four months from May 2023 to September 2023. The data collected constituted a pretest for baseline comparisons. It also served in preparing the intervention program based on identified needs.

Planning phase: The researcher started to develop the intervention program using the baseline information gathered in the assessment phase. Hence, the program was designed based on the identified needs and demands of the respondents, and in the light of the most recent literature. It was written in simple Arabic language. The program general aim was to improve nurses' knowledge and their reported practices on safety standards precautions in neonatal intensive care units.

Implementation phase: The implementation of the program was carried out in neonatal intensive care units at four hospitals affiliated to the Universal Health Insurance Authority (UHIA) in Port Said governorate. The program was administered in 4 sessions; the duration of each session lasting from 45 to 60 minutes. The sample of nurses was divided into 14 groups, each including five members. At the beginning of the first session of the program, the attendants were oriented about the program objectives, contents, and procedures. The program was implemented two days per week during a period of 6 months from October 2023 to April 2024.

The intervention program was presented in a clear and concise form, following the principles of adult learning, focusing on interactive learning and active participation. It was implemented using different teaching methods such as short lectures, group discussion, demonstration of practices and re-demonstration. In addition, different audiovisual materials were used as pictures and videos to facilitate the teaching of each topic.

Evaluation phase: The effectiveness of the program was based on assessing the improvement in nurses' knowledge, observed practices and their adaptation. This was achieved through comparing the pretest with posttest immediately done after the implementation of the program.

Administrative design

Official letters from the Faculty of Nursing, Port- Said University, were addressed to the Universal Health Insurance Authority (UHIA) in Port Said governorate and permission was obtained to conduct the study after explanation of the study objectives and procedures.

Statistical design

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Cronbach alpha coefficient was calculated to assess the reliability of the developed tools through their internal consistency. Qualitative categorical variables were compared using chi-square test. Pearson correlation test was used for assessment of the inter-relationships among quantitative variables. To identify the difference between pre and post intervention in the same group used paired sample test. To identify statistical differences among the means of two or more groups used one-way Anova test. Statistical significance was considered at p-value <0.05.

RESULTS

Table (1): Percentage distribution of st	tudied nurses according to their characteristics
((n=70).

Nurses' characteristics	No	%
Age/years:		
- 20 < 30	35	50.0
- 30 < 40	22	31.4
- 40 < 50	13	18.6
$\overline{X} \pm SD$	31.3±6.	.1
Min- max	22	- 43
Range	2	1
Gender		
- Male	14	20.0
- Female	56	80.0
Social status:		
- Single	19	27.1
- Married	40	57.1
- Divorced	8	11.4
- Widowed	3	4.3
Level of education:		
- Diplom	31	44.3
- Bachelor of Science	26	37.1
- Post graduate studies	13	18.6
Years of experience:		
- <1	8	11.4
- 1 < 5	17	24.3
- 5 < 10	23	32.9
$- \geq 10 \text{ (M\&SD)}$	22	31.4
Training courses:		
- Yes	23	32.9
- No	47	67.1
Name of courses (n=23):		
- Patients safety	21	91.3
- Medication safety	2	8.7
Duration from the last course / years (n=23):		
- 1-2	17	74.0
- 3-4	3	13.0
-5-6 (M&SD)	3	13.0

Table (1) clarifies that half of the studied nurses (50%) are aged between 20 to less than 30 years old with mean 31.3 ± 6.1 and most of them (80%) were females. Also, more than half of the studied nurses (57.1%) were married and 55.7% of them had bachelor degree of nursing. Regarding years of experience, nearly one third of the

studied nurses (32.9%) had 5 to less than 10 years of experience and 67.1% of them didn't take any training courses about patient safety.

Total knowledge of nurses about safety	prep	rogram	Post program		
standards precautions in NICU	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory	
	No (%)	No (%)	No (%)	No (%)	
1. Correct identification of premature neonates.	32(45.7)	38(54.3)	66(94.3)	4(5.7)	
2. Effective communication methods among health team members.	54(77.1)	16(22.9)	66(94.3)	4(5.7)	
3. Medication administration safety.	57(81.4)	13(18.6)	67(95.7)	3(4.3)	
4. prematurity's safety before surgical operations and nursing procedures	59(84.3)	11(15.7)	66(94.3)	4(5.7)	
5. Infection control measures.	49(70.0)	21(30.0)	68(97.1)	2(2.9)	
6. Prevention of premature neonates from falling	57(81.4)	13(18.6)	70(100.0)	0(0.0)	
7. Total knowledge of nurses about safety standards precautions in NICU	53(75.7)	17(24.3)	67(95.7)	3(4.3)	

Table (2): Percentage distribution of the studied nurses regarding their totalknowledge about safety standards precautions in neonatal intensive care units pre and
post program implementation (n=70).

Table (2) shows the total knowledge of nurses about safety standards precautions in NICU, it is obvious from this table that more than half of the studied nurses (54.3%) had unsatisfactory total knowledge about correct identification of premature neonates, while majority of them (94.3%) had satisfactory knowledge in post program phase. As regard the total knowledge of the studied nurses about effective communication methods among health team members, more than three quarters of the studied nurses (77.1%) had satisfactory knowledge preprogram and increased to 94.3% post program.

In relation to the total knowledge of the studied nurses about medication administration safety, most of the studied nurses (81.4%) had satisfactory knowledge preprogram and improved to 95.7% post program. Also 84.3% of the studied nurses had satisfactory total knowledge about prematurity's safety before surgical operations and nursing procedures in preprogram phase and increased to 94.3% in post program phase.

Moreover, more than two thirds of the studied nurses (70%) had satisfactory total knowledge about infection control measures preprogram and improved to 97.1% post program. As regard total knowledge of the studied nurses about prevention of premature neonates from falling, it is cleared that most of them (81.4%) had satisfactory knowledge preprogram and all of them (100%) had satisfactory knowledge post program.

In relation to the total knowledge of the studied nurses about safety standards precautions in neonatal intensive care units, slightly more than three quarters of them (75.7%) had satisfactory knowledge preprogram and 95.7% of them had satisfactory knowledge post program.

Table (3): Mean scores of studied nurses' total knowledge about safety standards
precautions in NICU pre and post program implementation (n=70).

Total knowledge of nurses about sefety	Pre/ Post program					
standards precautions in NICU	Pre Mean±SD	Post Mean±SD	t	Sig		
1. Correct identification of premature neonates.	7.7±0.3	10.6±0.1	8.93	.000**		
2. Effective communication methods among health team members.	9.5±0.3	11.7±0.1	6.68	.000**		
3. Medication administration safety.	9.4±0.3	11.60.1	6.05	.000**		
4. prematurity's safety before surgical operations and nursing procedures	12.4±0.4	14.7±0.1	5.36	.000**		
5. Infection control measures.	10.8±0.3	13.6±0.1	7.07	.000**		
6. Prevention of premature neonates from falling	5.7±0.2	6.8±0.07	4.25	.000**		
7. Total knowledge of nurses about safety standards precautions in NICU	55.6±1.8	68.9±0.6	7.04	.000**		

t- paired sample t test Significant level $(p < 0.05)^*$ Highly statistically significant level $(p < 0.001)^{**}$

Table (3) clarifies that, there was obvious improvement in overall items of knowledge of the studied nurses about safety standards precautions in NICU with

statistically significant difference between pre and post total knowledge of the studied nurses about correct identification of premature neonates, effective communication methods among health team members, medication administration safety, prematurity's safety before surgical operations and nursing procedures, infection control measures, prevention of premature neonates from falling and total knowledge about safety standards precautions in NICU (p<0.001).





Figure (1) illustrates that slightly more than three quarters of the studied nurses (75.7%) had satisfactory total knowledge about safety standards precautions in NICU preprogram, while majority of them (95.7%) had satisfactory total knowledge post program.

Table (4): Percentage distribution of the studied nurses regarding their total practices
about safety standards precautions in neonatal intensive care units pre and post
program implementation (n=70).

	prepi	rogram	Post program		
Total practice of nurses about safety standards precautions in NICU	Adequate	Inadequate	Adequate	Inadequate	
	No (%)	No (%)	No (%)	No (%)	
1. Correct identification of premature neonates.	53(75.7)	17(24.3)	68(97.1)	2(2.9)	
2. Effective communication methods among health team members.	47(67.1)	23(32.9)	67(95.7)	3(4.3)	
3. Improving safety of medication administration (High Alert medications).	57(81.4)	13(18.6)	69(98.6)	1(1.4)	
4. Safety operations and nursing procedures.	55(78.6)	15(21.4)	68(97.1)	2(2.9)	
5. Infection control measures.	57(81.4)	13(18.6)	70(100.0)	0(0.0)	
6. Prevention of premature neonates from falling.	54(77.1)	16(22.9)	68(97.1)	2(2.9)	
Total practices of nurses regarding safety standards precautions in NICU	57(81.4)	13(18.6)	68(97.1)	2(2.9)	

Table (4) shows the total practices of the studied nurses about safety standards precautions in NICU, it is obvious from this table that slightly more than three quarters of the studied nurses (75.7%) had adequate total practices about correct identification of premature neonates compared with majority of them (97.1%) had adequate practice in post program phase. As regard the total practice of the studied nurses about effective communication methods among health team members, more than two thirds of the studied nurses (67.1%) had adequate practice preprogram and increased to 95.7% post program.

In relation to the total practice of the studied nurses about medication administration safety, most of the studied nurses (81.4%) had adequate practice preprogram compared with 98.6% post program. Also, more than three quarters of the studied nurses (78.6%) had adequate total practice about safety operations and nursing procedures in preprogram phase and increased to 97.1% in post program phase.

Moreover, most of the studied nurses (81.4%) had adequate practice about infection control measures preprogram compared with all of them (100%) post program. As regard total practice of the studied nurses about prevention of premature neonates from falling, it is cleared that more than three quarters (77.1%) of them had adequate practice preprogram and increased to 97.1% post program.

Concerning the total practice of the studied nurses about safety standards precautions in NICU, most of them had adequate practice preprogram (81.4%) compared with 97.1% post program.

Table (5): Mean Scores of studied nurses' total practice about safety standards
precautions in neonatal intensive care units pre and post program implementation
(n=70).

Total practice of purses about safety standards	Pre/ Post program					
precautions in NICU	Pre Mean±SD	Post Mean±SD	t	Sig		
1. Correct identification of premature neonates.	18.2±0.3	21.7±0.1	9.60	.000**		
2. Effective communication methods among health team members.	22.2±0.5	27.6±0.1	9.21	.000**		
3. Improving safety of medication administration (High Alert medications).	13.9±0.3	15.9±0.07	5.66	.000**		
4. Safety operations and nursing procedures.	17.1±0.3	19.7±0.1	9.16	.000**		
5. Infection control measures.	21.5±0.4	23.9±0.04	5.26	.000**		
6. Prevention of premature neonates from falling.	19.5±0.4	21.7±0.2	6.30	.000**		
Total practices of nurses regarding safety standards precautions in NICU	112.5±19.4	130.6±4.4	8.53	.000**		

t- paired sample t test Significant level (p< 0.05)^{*} Highly statistically significant level (p< 0.001)^{**}

Table (5) clarifies that, there was obvious improvement in overall items of practice of the studied nurses about safety standards precautions in NICU with highly statistically significant difference between pre and post total practice of the studied nurses about correct identification of premature neonates, effective communication methods among health team members, improving safety of medication administration (High Alert medications), safety operations and nursing procedures, infection control measures, prevention of premature neonates from falling and total practice about safety standards precautions in NICU (p<0.001).



Figure (2): Percentage distribution of the studied nurses regarding their total practices regarding safety standards precautions in NICU pre and post program implementation (n=70).

Figure (2) clarifies that most of the studied nurses (81.4%) had adequate total practices regarding safety standards precautions in NICU preprogram, while majority of them (97.1%) had adequate total practices regarding safety standards precautions in NICU post program.

Table (6): Correlation between Nurses' total score of knowledge and their totalpractices regarding safety standards precautions in NICU pre and post programimplementation (n=70)

Nurses' total score of knowledge about safety	Nurses' total practices regarding safety standards precautions in NICU					
standards precautions in NICU	Pre p	rogram	Post program			
	r	p-value	r	p-value		
Pre program	.279*	0.019*	.211	.080		
Post program	504**	0.000**	.894**	.000**		

r- Pearson correlation coefficient Significant level (p< 0.05)^{*}

Highly statistically significant level (p< 0.001)**

Table (6) displays that there was highly statistically significant positive correlation between total knowledge of the studied nurses about safety standards precautions in NICU and their total practices preprogram (p<0.05).

In addition, there was highly statistically significant positive correlation between total knowledge of the studied nurses about safety standards precautions in NICU and their total practices post program (p<0.001).

 Table (7): Relation between characteristics of the studied nurses and their total knowledge about safety standards precautions in neonatal intensive care units pre and post educational program (n=70)

Nurses' characteristics	Pre p	orogram			Post program			
	Satisfactory	Unsatisfactory	\mathbf{X}^2	Sig	Satisfactory	Unsatisfactory	\mathbf{X}^{2}	Sig
	No (%)	No (%)			No (%)	No (%)		
Age (years):								
- 20 < 30	25(71.4)	10(28.6)	2 10	267	33(94.3)	2(5.7)	760	691
- 30 < 40	19(86.4)	3(13.6)	2.10	.307	21(95.5)	1(4.5)	.700	.064
- $40 < 50 (M\&SD)$	9(69.2)	4(30.8)			13(100.0)	0(0.0)		
Gender:								
- Male	12(85.7)	2(14.3)	0.952	.329	14(100.0)	0(0.0)	.784	.376
- Female	41(73.2)	15(26.8)			53(94.6)	3(5.4)		
Educational level:								
- Diploma	16(51.6)	15(48.4)	17.8	000**	28(90.3)	3(9.7)	3.94	.008*
- B.SC	24(92.3)	2(7.7)	17.0	.000**	26(100.0)	0(0.0)		
- Post graduate studies	13(100.0)	0(0.0)			13(100.0)	0(0.0)		
Marital Status:								
- Single	15(78.9)	4(21.1)			19(100.0)	0(0.0)		
- Married	29(72.5)	11(27.5)	1.07	.784	38(95.0)	2(5.0)	2.35	.503
- Divorced	7(87.5)	1(12.5)			7(87.5)	1(12.5)		
- Widowed	2(66.7)	1(33.3)			3(100.0)	0(0.0)		
Years of experience:								
- <1	4(50.0)	4(50.0)	116	024*	8(100.0)	0(0.0)		
- 1 < 5	12(70.6)	5(29.4)	4.10	.024	16(94.1)	1(5.9)	2.53	.468
- 5 < 10	19(82.6)	4(17.4)			21(91.3)	2(8.9)		
$- \ge 10 (M\&SD)$	18(81.8)	4(18.2)			22(100.0)	0(0.0)		
Training courses:								
- Yes	22(95.7)	1(4.3)	7.40	.007*	23(100.0)	0(0.0)	15.3	.021*
- No	31(66.0)	16(34.0)			44(93.6)	3(6.4)		

Table (7) indicates that there was statistically significant relation between educational level of the studied nurses and their total knowledge about safety standard precaution preprogram (p<0.001). Also, there was statistically significant relation between the years of experience, training courses of the studied nurses and their total knowledge about safety standard precaution preprogram (p<0.05).

Additionally, it is obvious from this table that there was statistically significant relation between educational level, training courses of the studied nurses and their total knowledge about safety standard precaution post program (p<0.05).

 Table (8): Relation between characteristics of the studied nurses and their total practices regarding safety standards precautions in neonatal intensive care units pre and post educational program (n=70)

Nurses' characteristics	Pre p	rogram				Post program			
	Adequate	Inadequate	\mathbf{X}^2	Sig	Adequate	Inadequate	\mathbf{X}^2	Sig	
	No (%)	No (%)			No (%)	No (%)			
Age (years):									
- 20 < 30	30(85.7)	5(14.3)	3 00	012*	33(94.3)	2(5.7)	2.05	357	
- 30 < 40	15(68.2)	7(31.8)	5.99	.015	22(100.0)	0(0.0)	2.05	.557	
- $40 < 50 (M\&SD)$	12(92.3)	1(7.7)			13(100.0)	0(0.0)			
Gender:									
- Male	13(92.9)	1(7.1)	1.51	.219	14(100.0)	0(0.0)	.515	.473	
- Female	44(78.6)	12(21.4)			54(96.4)	2(3.6)			
Educational level:									
- Diploma	18(58.1)	13(41.9)	20.08	000	29(93.5)	2(6.5)	3.33	.027*	
- B.SC	26(100.0)	0(0.0)	20.08	.000	26(100.0)	0(0.0)			
- Post graduate studies	13(100.0)	0(0.0)			13(100.0)	0(0.0)			
Marital Status:									
- Single	17(89.5)	2(10.5)			19(100.0)	0(0.0)			
- Married	34(85.0)	6(15.0)	12.04	.007*	38(95.0)	2(5.0)	1.54	.672	
- Divorced	3(37.5)	5(62.5)			8(100.0)	0(0.0)			
- Widowed	3(100.0)	0(0.0)			3(100.0)	0(0.0)			
Years of experience:									
- <1	7(87.5)	1(12.5)	177	024	8(100.0)	0(0.0)			
- 1 < 5	14(82.4)	3(17.6)	.477	.924	15(88.2)	2(11.8)	6.41	.039*	
- 5 < 10	19(82.6)	4(17.4)			23(100.0)	0(0.0)			
- $\geq 10 (M\&SD)$	17(77.3)	5(22.7)			22(100.0)	0(0.0)			
Training courses:									
- Yes	23(100.0)	0(0.0)	7.81	.005*	23(100.0)	0(0.0)	1.01	.316	
- No	34(72.3)	13(27.7)			45(95.7)	2(4.3)			

Table (8) indicates that there was statistically significant relation between characteristics of the studied nurses as (age, educational level, marital status and training courses) and their total practices about safety standards precautions in NICU preprogram (p<0.05). Also, there was statistically significant relation between the studied nurses' educational level, years of experience and their total practices about safety standards precautions in NICU safety standards precautions in NICU post program (p<0.05).

DISCUSSION

Hospitalized Neonatal safety is a key aspect in determining healthcare organizations' ability to address and reduce risks in neonatal care units. The most frequent problems threatening the neonate safety are neonate patient misidentification, ineffective communication, medication errors, and complications during and after the operations, hospital infections and falls. (Ozata & Altunkan, 2020). Nurses who give constant care at neonatal care units have a crucial role in establishing a safe care for the neonate patients because of their accountability for direct and continuous neonatal care, for this reason, it is of great significance for the pediatric nurses to adopt, defend and have a critical perspective on the issue of neonatal safety to offer a prolonged and comprehensive care. It is required to determine primarily the safety standard precautions in the hospital in order to enhance the neonates' safety culture and prevent deficiencies and risk factors causing medical errors (Ozata and Altunkan, 2020, and Mady, El-Rafy and Tantawi, 2021).

Concerning total nurses' knowledge of the studied nurses about the application of safety standard precautions, the findings of the current study revealed that more than half of the studied nurses had unsatisfactory total knowledge about correct identification of premature neonates in neonatal care units preprogram, while majority of them had a satisfactory knowledge in post program phase. Also, more than three quarters of the studied nurses knowledge about effective communication methods among health team members had satisfactory knowledge preprogram and increased in post program. This came into agreement with Yilmaz and Goris (2020), who carried out a study to determine the patients' safety culture among nurses working at neonatal intensive care units, and found that the majority of the studied nurses had unsatisfactory knowledge about patient safety in their descriptive study. The current study result revealed that slightly more than three quarters of the studied nurses had satisfactory knowledge about safety standards precautions in NICU in preprogram and increased to high percentage of them after program implementation. In addition, the implementation of the comprehensive health insurance system in Port Said has a positive impact on nursing knowledge through continuous monitoring and evaluation of nurses.

These results were similar to those of Eldeeb and Ghoneim (2020), in the study entitled "Perception of patient safety among nurses at Shebin El-Kom Teaching Hospital", where most of the studied nurses had poor knowledge regarding patients' safety at hospital. In addition, the current study consisted with PSA, (2021) which reported that the majority of incidents reported were related to neonate patient miss identification, medication error, infection control and neonate falling due to defect in nurses' knowledge.

Neonatal safety is a fundamental principle. It is considered a global concept and practice to reduce the risk of unnecessary harm associated with health care to an acceptable minimum. The importance of adopting best health care practices is highlighted, understood as components of Quality Assurance (QA). These components ensure that services are provided within adequate standards and primarily seeking the reduction of risks which are inherent in the provision of health services. Considering that Patient Safety implies the adoption of best practices, they are contributing factors to achieve the international goals spread by the World Health Organization (WHO) (Duarte et al., 2020).

As revealed by the current study result, the high percentage of the studied nurses had adequate overall practices regarding safety standards precautions in NICU in pre intervention phase. It may be related to the fact that more than half of the studied nurses had high educational level and nearly two thirds of them had more than five years of experience in NICU. In addition, the implementation of the comprehensive health insurance system in Port Said has a positive impact on nursing practices through continuous monitoring and evaluation of nurses.

In general, the current study result revealed that, there was statistically significant positive correlation between nurses' total score of knowledge about safety

standards precautions in NICU and their total practices in post program phase. This result is expected because of increasing nurses' knowledge about safety standards precautions in NICU leading to improving their practices. Also, the educational program was effective in improving nurses' knowledge and practices.

The current study result is in congruence with Raza et al., (2020) who reported that there was statistically significant relation between nurses' knowledge and their practices about neonatal safety standards after educational program and this may be related to the efficacy of the educational intervention on the implementation of the Egyptian Neonatal Safety Standard (NSS).

Regarding to the relation between personnel characteristics of the studied nurses and their total score of knowledge, the current study result clarified that the nurses with bachelor degree and post graduate studies had satisfactory knowledge throughout the program phases. It is expected result because of highly educated nurses able to update their knowledge frequently, also when the level of education increase, it leads to increasing awareness and knowledge. The current study result is supported with Elmwafie, Abdallah &Abduallah, and (2022) who carried out a study in Egypt and found that there was statistically significant relation between nurses' educational level and their knowledge about safety measures in NICU.

From the foregoing, this study results confirmed that the intervention program had a positive impact on nurses' knowledge which was positively reflected on their practice. On summary the results of this study support the hypothesis that intervention program will improve level of nurses' knowledge and their practices.

Regarding to the relation between personnel characteristics of the studied nurses and their total score of practice, the current study result clarified that the younger nurses (under 30 years) demonstrating higher competence compared to those aged 30-40 and those above 40 and had satisfactory knowledge throughout the program phases. It is expected result because of younger nurses are more open to adopting newer safety protocols or could be more adaptable to training, also when the level of education increase, it leads to increasing awareness and practice those higher educational qualifications could be associated with better understanding and adherence to safety standards.

The current study result is supported with Elmwafie, Abdallah &Abdallah, (2022) who carried out a study in Egypt and found that there was statistically significant relation between nurses' age and educational level and their practice about safety measures in NICU. From the foregoing, this study results confirmed that the educational program had a profound impact on improving nurses' practices in the NICU, as evidenced by the increased percentage of adequate practices across all demographic variables post program. On summary the results of this study support the hypothesis that intervention program will improve level of nurses' knowledge and their practices.

After the educational program the majority of the studied nurses had adequate overall practices regarding safety standards precautions in NICU and this may be due to the effectiveness of the program by using simple language and variety of teaching methods as audiovisual, demonstration and re-demonstration.

The current study result is supported by Ike &Oluwatosin (2022) who carried out a study in Nigeria and found that the total practices of nurses regarding care of neonates increased after implementation the program, also their competency toward neonatal care improved post program.

CONCLUSION

Based on the current study's finding, the study concluded that the staff nurses in the study settings have deficient knowledge, and inadequate practice of neonatal patient safety principles at the pre intervention phase. The use of the developed neonatal patient training program is effective in improving their knowledge, safety practice. Also there was statistically significant positive correlation between total knowledge of the studied nurses about safety standards precautions in NICU and their total practices preprogram.

RECOMMENDATIONS

In the light of the findings of the current study the following recommendations are suggested:

- 1- Continuous education by develop ongoing training programs focusing on updating nurses' skills and knowledge related to safety standards and precautionary measures in NICU, organize regular workshops and practical training sessions to reinforce nurses' understanding of safety standards application.
- Conduct regular performance evaluations by implement regular evaluations of nurses' performance following the implementation of intervention programs to measure improvements in adherence to safety standards, use evaluation results to develop individual and group improvement plans for nurses.

References

- Abousallah, A. (2020). The Impact of Application of International Safety Goals on Patient Safety Culture: A Field Study In Private Hospitals That Working in the City Of Amman. MEU library Theses: Middle East University.
- Al-Ahmadi, H. (2021). Infection control in peripheral cannula. World Health Organization.
- Aziz, A. A., & Safina, N. (2022). Monitoring compliance to the sixth international patient safety goals: Malaysia Perspective. *International Journal of Current Engineering Research and Applications*, 1(8), 14-25.
- Bouldin, E., Andresen, E., Dunton, N., Simon, M., Waters, T., & Liu, M. (2021). Falls among adult patients hospitalized in the United States: Prevalence and trends. *Journal of Patient Safety*, 9(1), 13-17.
- Chinn, P., & Kramer, M. (2020). Integrated theory and knowledge development in nursing (8th ed.).
- Cho, I., Park, H., Choi, Y.J., Hwang, M. H., & Bates, D. W. (2021). Understanding the nature of medication errors in neonatal intensive care units with a computerized physician order entry system. PLoS One, 9(12), e114243.
- Duarte, S. D. C. M., Azevedo, S. S. D., Muinck, G. D. C. D., Costa, T. F. D., Cardoso, M. M. V. N., & Moraes, J. R. M. M. D. (2020). Best safety practices in nursing care in neonatal intensive therapy. *Revista Brasileira de Enfermagem*, 73, e20180482.

- Eldeeb, G., Ghoneim, A., & Eldesouky, E. K. (2020). Perception of patient safety among nurses at teaching hospital. *American Journal of Nursing Science*, 5(4), 122-128.
- Elmwafie, S. M., Abdallah, A. I., & Abduallah, R. M. (2022). Impact of Safety Guidelines on Nurses' knowledge regarding incidents and nurses' safety attitude at neonatal intensive care unit. *Tanta Scientific Nursing Journal*, 25(2), 152-163.
- El-Sayed, Z. F., & Bayoumi, O. R.(2020). Enhancemet of neonatal patients' safety culture: Effect of implementing a guideline plan in pediatric nurses' performance. *Journal of Nursing and Health Science*, 9(1), 56-66.
- Ike, E. U., & Oluwatosin, O. A. (2022). Effect of an Educational Intervention on Nurses' Competency in the Neonatal Unit of a Teaching Hospital in Nigeria: A Pilot Study. *Journal of Neonatology*, *36*(3), 206-215.
- Joint Commission International Accreditation Standards for Hospitals [JCI]. (2017). International patient safety goals [IPSG](6th ed). USA:Oak Book.
- Khaled, A., Yones, B., & Wafik, C. (2020). Patient safety in neonates: Challenges and strategies. *Journal of Neonatal Care*, 15(3), 123-130.
- Killam, L. A., Luhanga, F., & Bakker, D. (2022). Compromised patient safety and adverse health events. *Journal of Healthcare Safety*, 35(2), 45-56.
- Mady, A., El-Rafy, B., & Tantawi, C. (2021). Improving neonate patient safety through quality care outcomes. *International Journal of Pediatric Nursing*, 12(2), 89-95.

- Milligan, J. (2020). Perception of neonate patient safety at teaching hospital. American Journal of Nursing Science, 10(6), 125-132.
- Ozata, M. C., & Altunkan, D. K. (2020). The mediating role of pediatric nursing competence in the relationship between pediatric drug administration self-efficacy and medical error tendency in nursing students. *Nurse Education in Practice*, 79, 104067.
- Patient Safety Authority. (2019). Patient safety culture among nurses. International Nursing Review, 62((1), 102- 110.
- Raza, S. M., Sheta, M. M., Gad, S. S., Elmaraghy, N., Hussein, A. S., Sahmoud, S., & Al-Khalafawi, A. I. (2020). Effect of educational intervention on implementation of neonatal safety standards. *Journal of Child Science*, 10(01), e93-e96.
- Saintsing, G., Gibson, J., & Pennington, L. (2023). Improving neonate patient safety through quality care outcomes. *Journal of Healthcare Safety*, 20(4), 140-160.
- Saleh, S. M. A. (2019). Assessment of nurses' knowledge and practices regarding the application of safety standard precautions in pediatric critical care. *Novelty Journals*, 7(3), 524-543.
- Toso, B., Smith, J., & Doe, R. (2022). Effectiveness of an educational program on nurses' practices toward disinfection and sterilization methods for neonatal incubators. Pakistan Heart Journal, 56(2), 35-43.
- Vaismoradi, M., & Snelgrove, S. (2021). Qualitative Research in Nursing: Concepts and Processes. Sara Miller McCune and George McCune Publications.

- World Health Organization. (2018). 10 Facts on Patient Safety. Geneva. Retrived from http://www.who.int/features/factfiles/patient_safety/en/pdf
- Yilmaz, Z., & Goris, S. (2020). Determination of the patient safety culture among nurses working at intensive care units. *Pakistan journal of medical sciences*, 31(3), 597.

فعالية برنامج التدخل التمريضي عن احتياطات معايير السلامة علي أداء الممرضين في وحدات العناية المركزة لحديثي الولادة

ناهد تحسين سليم¹؛ سونيا محمد السيد الصياد²؛ هدى جابر حمزة ³

¹ بكالوريوس التمريض – كلية التمريض – جامعة طنطا؛ ²أستاذ التمريض النفسي والصحة العقلية - كلية التمريض - جامعة بور سعيد؛ ³أستاذ مساعد التمريض النفسي والصحة العقلية - كلية التمريض - جامعة بور سعيد

الخلاصة

المقدمة: تعد سلامة الأطفال المرضي أمرا أساسيا لتعزيز جودة الرعاية الصحية ويواجه العاملين في مجال الرعاية الصحية في وحدات العناية المركزة لحديثي الولادة تحديات يومية في سعيهم الي استدامة الرعاية المأمونة لمرضاهم. الهدف: هدفت الدراسة فحص تأثير فعالية برنامج التدخل التمريضي عن احتياطات معايير السلامة علي أداء الممرضين في وحدات العناية المركزة لحديثي الولادة تحديات ليومية في سعيهم الي استدامة الرعاية السلامة علي أداء الممرضين في وحدات العناية المركزة لحديثي الولادة. التصميم: تم استخدام بحث شبه تجريبي المحموعة واحدة (قبل- بعد) في إجراء هذه الدراسة. العينة: تضمنت الدراسة 70 ممرضة في وحدات العناية المركزة لحديثي الولادة. التصميم: تم استخدام بحث شبه تجريبي المركزة لحديثي الولادة. التصميم: تم استخدام بحث شبه تجريبي المركزة لحديثي الولادة القربية. الولادة وقوت العناية المركزة لحديثي الولادة. العناية المركزة لحديثي الولادة. التصميم: تم استخدام بحث شبه تجريبي المركزة لحديثي الولادة وقبل- بعد) في إجراء هذه الدراسة. العينة: تضمنت الدراسة 70 ممرضة في وحدات العناية المركزة لحديثي الولادة في 4 مستشفيات تابعة لمنظومة التأمين الصحي الشامل في محافظة بورسعيد. أدوات المركزة لحديثي الولادة في 4 مستشفيات تابعة لمنظومة التأمين الصحي الشامل في محافظة بورسعيد. الوات جمع البيانات من خلال استمارة استبيان، قائمة التدقيق لتقيم ممارسات الممرضين. النتائج: أكثر من نصف الممرضين محل الدراسة كانت لديهن درجة إجمالية غير مرضية من المعلومات عن تعريف الطفل المبتسر بالطريقة الصح في مرحلة ما قبل البرنامج التعليمي وارتفعت إلى 2.9% في مرحلة ما بعد البرنامج التعليمي وارتفعت إلى 2.9% في مرحلة ما بعد بعد تنفيذ البرنامج والتريس بالمرضية مي المعلومات والمراسة التعليم والترنمي من حيث المعلومات والممارسات الاجمالية بعد تنفيذ الرامج التعليمي والتربين المعلومات والممارسات الاجمالية بعد تنفيذ البرنامج وتبرز الدر اسة أهمية التدامي حديثي الولادة وتقليل الأخطاء الطبية. التوصيات: ضرورة تطوير وتوسيع برامج التدريب المام المرضي حديثي الولادة وتقليل الأخطاء الطبية. الممارسة ما معني من حيث المومان في مرحارة وترورة عرورة مرورة مرورة قريران ورمي مل ورمزمي ما ممارمان الاحمانية وتوسيع برامج التدريب المامة المرضي حديثي الولادة وتقليل الأخطاء الطبية. المورة ورورة مرورة وزياد معو

الكلمات الارشادية: أحتياطات معايير السلامة - التدخل التمريضي - أداء الممرضا