

Effect Of Educational Program Regarding Missed Nursing Care On Patients' Safety Culture Among Nurses

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ABSTRACT

Background: The quality of care and patient safety are at risk due to missed nursing care over the past decade. Promoting nursing skills in intensive care units could decrease missed care. **Aim:** Assess the effect of an educational program regarding missed nursing care on patients' safety culture among nurses in intensive care units. **Design:** A quasi-experimental design was used. **Setting:** Five intensive care units at Mansoura University Hospital. **Subject:** A convenient sample of 98 nurses working in the intensive care units. **Tools:** Three tools were used; Missed nursing care Knowledge questionnaire, Observational checklist for nurses' skills regarding the missed nursing care and hospital survey on patient safety culture. **Results:** The study revealed that nurse's knowledge related to missed nursing care was pre-program 54.1%, which improved post-program to 61.2%, and slight decreased in follow up to be 60.2%. The percentage of nurses who scored satisfactory nursing skills increased from (36.7%) in the pre-program to (75.5%) in the post-program, and slightly decreased in follow up to be (69.4%). While, 10.2% of nurses were having high perception regarding culture of patient safety in pre-program and increased post-program to 92.9% and 94.9% in follow up phase. **Conclusion:** Developing an educational program leads to decrease missed nursing care events, improve nurses' knowledge and skills about missed nursing care, and improve patient safety culture with statistical differences were in pre, post, follows up. **Recommendations:** Extending the missed nursing care program to all nursing staff in the hospital and emphasizing on its negative effect on patients, nurses, and hospital.

Keywords: Intensive care units, knowledge, patient safety culture, missed nursing care.

INTRODUCTION

Missed nursing care is a problem in the world of medicine that mostly refers to the aspects of the best nursing care that the nurses either postpone or skip giving to the patients. Missed nursing care, also referred to as a "error of omission," is an accidental phenomena that can happen as a result of increased patient demands at the bedside or as a result of significant competing pressures on the nurses to complete numerous priorities within a constrained amount of time (AlFaouri, Obaidat & AbuAlRub, 2021). Missed nursing care complications might result in death; for instance, the mortality rates from bloodstream infections, urinary tract infections, and pneumonia were 30.8%, 89.0%, 23.8-50%, and 14.8-71%, respectively, according to (Sheykhsaran et al., 2022). It is vital to develop instructional programs on missed care, which could lead to better nursing knowledge & skills and possibly a decrease in missed care incidents (Dixon-Brown, 2020).

Many medical services, including anesthesia, critical care for patients who are severely sick or on the verge of death, resuscitation, and pain management, are offered in intensive care units (ICUs). The primary responsibilities of nurses working in intensive care units (ICUs) include 24-hour monitoring of patients' vital signs, nutritional support to prevent malnutrition in comatose patients, ensuring good personal hygiene, and maintaining patient records (Młynarska, Krawuczka, Kolarczyk & Uchmanowicz, 2020). Nursing care refers to tasks that are developed by the nursing staff, such as giving medication, assisting patients with ambulation and turning, changing their positions, washing them, taking care of their mouths, documenting their intake and output, providing nutrition advice, and preparing them for hospital departure. Missed nursing care occur when the patient is not provided with these crucial components of care (Diab & Ebrahim, 2019).

Patients' safety is a crucial element of health care quality. A patient safety culture (PSC) characterized by a shared perspective among health care providers on the importance of safety, transparency In communication, fidelity, and shared trust in the effectiveness of preventive measures. PSC has accompanied with improved patient outcomes. When positive culture of patient safety maintained inside the health care organization, staff nurses engaged in patients' safety behavior, and will be able to handle

unanticipated or difficult problems effectively during their routine nursing activities (Hessels et al., 2019; Ibrahim & Abohabieb, 2020)

Reducing medical errors and boosting efficiency among healthcare workers are both greatly aided by a patient safety culture. In order to improve patient care and lower the risk of patient harm, patient safety culture comprises recognizing, assessing, and controlling patient-related risks and occurrences. Instead than fostering a culture of blame, guilt, and punishment, patient safety culture aims to sustain a culture that works toward identifying safety concerns and implementing workable solutions (Azyabi, Karwowski, Hancock, Wan & Elshennawy, 2022). Patients' and healthcare workers' resistance as well as poor infrastructure were barriers to safety culture. Encouragement of patients, information sharing with patients, building trusting connections, promoting patient-centered care, and enhancing organizational resources were themes associated to facilitators (Chegini, et al., 2021).

Assessing missing nursing care in various healthcare contexts has received a lot of interest and effort in recent years all around the world. This is not shocking because neglected nursing care is seen as a crucial sign of the caliber of nursing care and patient safety. To improve the overall quality of healthcare and improve patient outcomes in healthcare institutions, it is crucial to evaluate and identify solutions to this significant healthcare delivery problem (Albsoul, FitzGerald, Finucane & Borkoles, 2019). To effectively manage the care of a variety of patients with challenging disease processes, nurses must exercise critical thinking and draw from a vast body of knowledge. In the framework of systems, structures, and processes, they must also swiftly respond to changing patient care needs (McCauley, Kirwan, Riklikiene & Hinno, 2020).

Significance of the study

Missed nursing care is widespread problem which lead to adverse events and threats to patient outcome (Duffy, Culp & Padrutt, 2018). Dixon (2020) suggested, in the same context, that nurses be given educational training programs pertaining to missed nursing care that can enhance nursing knowledge of the causes and prevention of missed care events and improve patient outcomes, reduce adverse events, and continuously balance and reprioritize nursing staff work as they provide care for multiple patients.

Patient safety is defined by the World Health Organization (WHO) as the reduction or avoidance of mistakes and patient harms related to the delivery of healthcare (World Health Organization, 2020). The Ministry of Health reported that the total number of admissions to intensive care units was 40273 and the number of deaths was 1807, in a ratio of 4.5%. Critical deaths in Egypt account for more than half a million hospital deaths annually. Moreover, patients' safety culture is a crucial factor affecting missed nursing care (Diab & Ebrahim, 2019). Therefore, the current study aims to assess the effect of an educational program regarding missed nursing care on patients' safety culture among nurses in intensive care units.

AIM OF THE STUDY

The study aim was to assess the effect of an educational program regarding missed nursing care on patients' safety culture among nurses in intensive care units. Through objectives;

1. Assessment of nurses' knowledge regarding missed nursing care.
2. Assessment of nurses' skills regarding missed nursing care.
3. Assessment of patient' safety culture.
4. Implementation of the developed educational program about missed nursing care.

Research hypothesis

The implementation of the developed educational program will decrease missed nursing care events, improve nurses' knowledge and skills regarding missed nursing care, and improve patient safety culture among nurses in intensive care units than pre the educational program.

SUBJECTS AND METHOD

A. Technical design

This design provides a description of the research design, setting, subjects, and data collection tools.

Research design

A quasi-experimental design (one group pre – posttest) was used in conducting this study.

Study setting

The study was conducted in Mansoura University Hospital's five intensive care units, which comprise the anesthetic unit, neurology unit, surgical unit, medical unit, and gynecological unit. **Study sample:**

A convenient sample of 98 staff nurses were included in the study's subject , provided direct patient care, had at least six months of experience in their current position, and were willing to take part in the study. Their nursing staffing was as follows: the anesthesia unit had 29, the neurology unit had 20, the surgery unit had 25, the medical unit had 11, and the gynecological unit had 13.

Tools for data collection

The data collection process involved three tools. The researchers updated these instruments, translated them into Arabic, and evaluated their validity and applicability.

Tool I: Missed nursing care questionnaire: it consists of three parts:

Part 1: Personal and job characteristics

The researchers created this component. It contained information about the personal and professional qualities of nurses, such as age, work unit, qualifications, and years of experience in the nursing profession.

Part 2: Missed nursing care Knowledge questionnaire

This part was developed by Zelenikova, Gurkova and Jarosova (2019), This tool consists of 92 items under 13 domains included: Patient assessment: it consists of 13 items, 8 of them are under two subdomains vital signs (4 items), and focused reassessments according to patient health condition (4 items), nursing process: it consists of 9 items, 5 of them are under subdomain (patient assessment), Blood sample taking and diagnostic examination: it consist of 3 items, medication administration: it consists of 10

items, 5 of them are under subdomain (ensure patient's rights), avoiding bed scores: it consists of 7 items, avoid falling: it consists of 9 items, 3 of them are under subdomain (assessment of patient vulnerability to the risk of falls using the Morse fall scale or other scale), Feeding patient: it consists of 3 items, Hygiene items: it consists of 7 items, 4 of them are under subdomain (hand washing), respond to patient health needs: it consists of 2 items, Health education: it consists of 9 items, 8 of them are under two subdomains, emotional support to patient and/or family (4 items), and patient teaching about his/ her health condition, ensuring discharge planning (4 items), Professional ethics in maintaining patient privacy: it consists of 8 items, 3 of them are under subdomain (physical privacy), and 5 items under subdomain (information privacy), communication: it consists of 4 items, and documentation: it consists of 8 items, 7 of them are under two subdomains follow good documentation characteristics (3 items), and make incident report in the unit (4 items).

Scoring: Responses ranged from (1) always missed to (5) never missed on a 5-point Likert scale.

Part 3: Reasons of missed nursing care:

Zelenikova, Gurkova, and Jarosova (2019) created this section, which contains reasons for missed nursing care, to measure nurse's opinion for missed nursing care pre, post, and after three months of program implementation. It comprises of 20 elements divided into four domains: communication problems (eight items), material resource items (three item), and Labor resources (five items) and training items (four items).

Scoring: Responses will be scored on a 4-point Likert scale, from (1) not a reason for unmet nursing care to (4) significant factor.

Each knowledge item's scores were added up, and the result was divided by the number of items to produce the part's mean score. These scores were transformed into percent scores. The percentage score was regarded as high if it was 60% or more and low if it was less than 60% (Attia, Abdeen, & El-sayed, 2014).

Tool II: Observational checklist for nurses about missed nursing care:

The researchers prepared this observational checklist based on related literature (Kiekkas, Tsekoura, Fligou, & Tzenalis 2021; Ahmed, Abdelhamid, Abd Esalam, 2017). This tool was intended to measure nurses' skills regarding missed nursing care. The checklist included 92 items to be checked "Done" or "Not done", it included: patient assessment: it consists of 13 items, 8 of them are under two subdomains vital signs (4 items), and focused reassessments according to patient health condition (4 items), nursing Process: it consists of 9 items, 5 of them are under subdomain (patient assessment), blood sample taking and diagnostic examination: it consist of 3 items, medication administration: it consists of 10 items, 5 of them are under subdomain (ensure patient's rights), avoiding bed scores: it consists of 7 items, avoid falling: it consists of 9 items, 3 of them are under subdomain (assessment of patient vulnerability to the risk of falls using the Morse fall scale or other scale), feeding patient: it consists of 3 items, hygiene items: it consists of 7 items, 4 of them are under subdomain (hand washing), respond to patient health needs: it consists of 2 items, health education: it consists of 9 items, 8 of them are under two subdomains, emotional support to patient and/or family (4 items), and patient teaching about his/ her health condition, ensuring discharge planning (4 items), professional ethics in maintaining patient privacy: it consists of 8 items, 3 of them are under subdomain (physical privacy), and 5 items under subdomain (information privacy), communication: it consists of 4 items, and documentation: it consists of 8 items, 7 of them are under two subdomains follow good documentation characteristics (3 items), and make incident report in the unit (4 items).

Scoring: The tool items were ranged as "not done" and "done" were scored "0" and "1", respectively. To calculate the mean practice of each nurse, all questions were measured and divided by the total number of questions. When the percentage below 75%, it's considered to be unacceptable, while 75% or more was considered to be acceptable. (Fuzzed, 2016).

Tool III: Hospital Survey on Patient Safety Culture:

It was developed by agency for health research and quality (AHRQ) (Sorra et.al, 2016) to measure change in assessment of patient safety culture. It consisted of 42 items that measure 12 dimensions, including: teamwork within units (four items), manager

expectations & actions (four items), organizational learning (three items), management support (four items), overall perceptions of safety (four items), feedback & communication about error (four items), communication openness (four items), frequency of event reporting (three items), teamwork across hospital units (four items), staffing (four items), hospital handoffs & transition (four items), and non-punitive response to error (three items). In addition, two outcome variables that measure overall grade on patient safety (A-Excellent, B-Very Good, C-Acceptable, D-Poor, E-Failing) and the number of self-reported safety events over the past six months, No events, one to two events, three to five events, six to ten events, 11 to 20 events, or 21 events or more.

Scoring: Responses ranged from (1) strongly disagree to (5) strongly agree on a 5-point Likert scale. By dividing each respondent's total score by the highest possible score, the total score for each respondent was determined and converted into a percent score. The results of each participant were then divided into "Low" scores (less than 60%), "Average" scores (between 60% and 75%), and "High" scores (above 75%) (Halema, Ali, Metwally, 2016).

B. Operational design:

The following phases were used to conduct the study field of work:

Preparation phase

Using all official websites, including Egyptian Knowledge Bank (EKB), PUBMED, GOOGLE SCHOLAR, MEDLINE database, CINAHL, EBSCO Cochrane Database, and Scopus, it includes reviewing the pertinent and recent literature related to the research topic, various studies, and theoretical knowledge of various aspects of the problems. This helps the researchers become more familiar with the subject and develop the tools for data collection.

Tools validity

A jury of seven specialists from the medical-surgical and nursing administration departments from the nursing faculties in Mansoura, Ain Shams, Cairo, and Port Said made the determination. Professors evaluated the tools for clarity, relevance,

comprehensiveness, and understanding applicability. The jury's opinions and suggestions were taken into account, and the appropriate changes, corrections, and point clarifications were made as a result.

Tool reliability

Cronbach's alpha was used to evaluate the study's tools in order to determine their internal consistency. The results are as follows: tool 1 "Missed nursing care", 0.825, which refers to be reliable, & tool 2 "observational checklist" 0.766, and tool 3 "hospital survey on patient safety" 0.849.

Pilot study

Prior to beginning the actual study, a pilot study was carried out on 10% (10 nurses) of the sample selected from the above mentioned setting to evaluate the tool's clarity, viability, and feasibility as well as to determine the appropriate interview duration needed. Appropriate modifications were made according to the results of pilot study and they were excluded from the original sample, 20 - 30 minutes was the time needed to complete the questionnaires by nurses.

Field work

After receiving official approval from the hospital director and the head nurses of the intensive care units at Mansoura university hospitals, the researchers collected data from nurses in the intensive care units. The researchers met with the nurses to explain the purpose and methodology of the study in order to gain their acceptance and request their cooperation. The research process was divided into the following four phases:

Phase I (Assessment Phase): In this stage questionnaires distributed to study subjects to identify needed knowledge and observational checklist applied to measure nurses' skills regarding missed nursing care. The researchers met (10-15) nurse per day in the afternoon shift by three days per week. Filling of the questionnaires took about 20-30 minutes. The questionnaires were filled out in front of the researchers to help with any ambiguities. After the questionnaires were finished, the researchers verified that all the information was provided, and all the data were collected between January1 and January 14, 2023, a period of two weeks.

During the morning and afternoon shifts, the researchers noticed staff nurses' actual skills in action. The observation period ran from 8:00 AM to 6:00 PM. The researcher had three days per week of rotational availability in the study locations already specified. Using the observational checklist, the researchers observed 7-8 staff nurses in their actual work settings each day. From 15 January to 15 February 2023, this process took one month.

Phase II (the educational program development): Using the findings from the assessment phase, the missed care program's aim, general and specific objectives, content, teaching methods, teaching aids, time plan, and methods of evaluation were developed in English and translated into Arabic. This helped the program achieve its educational objectives. As a result, the researchers created the educational program and its schedule.

Phase III (The educational program Implementation): The educational program was conducted between 16/February and 16/March 2023. During this phase, the entire sample was divided into twenty groups, each of which contained five nurses on average or more, depending on the shift conditions. To cover the whole sample, each group took part in five of the total of one hundred sessions.

Phase IV (Evaluation phase): Following program implementation, the evaluation phase was conducted right away and three months later to verify through a follow-up visit that the level of nurses' knowledge, skills, and patient safety had changed as intended using the same pre-post (knowledge questionnaire, observation checklist, and patient safety questionnaire) tools.

Ethical considerations

Before conducting the study, an official letter was taken from the Dean of the Faculty of Nursing at Port Said University to the director of Mansoura University Hospital. The research consent was obtained from the scientific research ethics committee of the faculty of nursing, at Port Said University with code number NUR (6/8/2023) (28). The critical care unit directors of the hospital gave their official approval for the study's execution and then obtaining each nurse's written consent to participate. The researchers emphasized that all nurses included in the trial were able to discontinue their participation at any moment and that participation in the trial was entirely voluntary.

By coding the data, anonymity and confidentiality were guaranteed. Verbal informed consent was obtained from nurses who agreed to participate in the study.

C. Administrative design

To gain the consent for data collection at the study setting (Mansoura University Hospital), the Dean of the Faculty of Nursing - Port Said University submitted an official letter to the director of the study's setting containing title and purpose the study.

D. Statistical design

The various types of acquired data was sorted, tabulated, and examined separately. SPSS 20.0 was used as the statistical software tool for data entry and analysis. For qualitative variables, data were presented using frequencies and percentages, and for quantitative variables, means, standard deviations, and medians were used. By percentage and number, demographic data was summarized. The number and percentage of study variables were provided. Chi-square and t-tests were used to compare study variable results. In order to evaluate the constructed scale's internal consistency and reliability, the Cronbach alpha coefficient was computed. Data were evaluated using descriptive statistics in the form of a frequency distribution, percentage, Pearson correlation, standard deviation, and Friedman test during various assessment periods (pre-post program and follow program) of implementation. At a p-value of 0.05, statistical significance was taken into account.

RESULTS

The current study results shows that more than half of the studied nurses their age group was 23-26 years old with a mean age of 26.4 ± 2.8 . The highest percentages of them (62.2 %) were female nurses, while 37.8% were male nurses. More than half (54.1%) were married and had technical nursing institutes, while 43.9% had a bachelor's degree. Most nurses (89.8%) had 1-5 years of nursing experience, and only 10.2% had 6-10 years of nursing experience, with a mean score of 3.4 ± 2.0 . Meanwhile, 29.6% of nurses worked in the anesthesia unit, while 13.3% worked in gynecology.

Table (1) shows that the nurses knowledge scores regarding missed nursing care had seen improved post-program implementation, with a statistically significant

difference in patient assessment items , nursing process, medication administration, avoiding bed scores avoid falling, feeding patient, hygiene items , respond to patient health needs, communication, and documentation scores at ($p=0.000$, $p=0.000$, $p=0.014^*$, , $p=0.035^*$, $p=0.000^{**}$, $p=0.004^*$, $p=0.000^{**}$, $p=0.003^*$, $p=0.000^{**}$ and $p=0.000^{**}$) respectively.

Table (2) shows that the majority of nurses at ICU had high knowledge regarding reasons for missed nursing care, communication defects were the most significant issue identified by the nurses, with a statistically significant difference between pre-program and post-program scores ($p=0.000^{**}$). Material resources were also a significant concern, with a significant difference in scores between pre-program and post-program ($p=0.001^*$). Labor resources showed a significant difference in scores between pretest and posttest ($p=0.009^*$), but not as significant as material resources. Training was identified as a concern, but with a lower level of significance ($p=0.039^*$) than the other domains.

Figure (1) displays that, there was a significant improvement in total nurses' knowledge regarding missed nursing care from pre-program to post-program, with an increase in the number of nurses scoring in the high category (61.20%). However, the follow-up results show a slight decrease in the number of nurses scoring in the high category (60.20%).

Table (3) demonstrates that the nurses' skills domains regarding missed nursing care analysis between pre-program, posttest, and follow-up the program shows that more than half of the studied nurses performed unsatisfactory skill level regarding patient assessment, nursing process, patients' health needs response and health education pre the educational program implementation which improved post and at follow up with statistically differences at ($p=0.026^*$, $p=0.001^*$, $p=0.000^{**}$, $p=0.008^*$ and $p=0.000^{**}$) respectively.

Figure (2) shows more than one third 36.7% of the intensive care units nurses had satisfactory skills pre the educational program implementation which improved to 75.5% at post and 69.40% at follow up of the program implementation.

Table (4) demonstrates that the largest proportion of the studied nurses had a high perception of patients' safety culture regarding teamwork within units,

supervisor/manager expectations & actions promoting patient safety, management support for patient safety, frequency of events reported, teamwork across units, staffing, handoffs & transitions and non-punitive response to errors at post and follow up of the educational program implementation respectively compared with the vast minority of them who had a high level of perception regarding these patients' safety culture domains at pre the program implementation ($p=0.000^{**}$, $p=0.000^{**}$, $p=0.000^{**}$, $p=0.021^*$, $p=0.000^{**}$, $p=0.000^{**}$, $p=0.000^{**}$, $p=0.000^{**}$) respectively with a highly statistically significant difference.

Figure (3) illustrates that, shows the percentage of nurses who were categorized as having a high level of perception regard patient safety increased from (10.2%) in the pre-program to (92.9%) in the post-program.

Table (5) demonstrates that there is a significant relationship between missed nursing care knowledge, patient safety, and nurses' skills. Specifically, the pre-program results indicate that missed nursing care knowledge is positively correlated with nurses' practice ($r=0.022$, $p=0.834$) and patient safety ($r=0.096$, $p=0.350$). However, the post-program results show a significant negative correlation between missed nursing care knowledge and patient safety ($r=-0.289$, $p=0.003^*$) and a positive correlation between missed nursing care knowledge and nurses' skills ($r=0.280$, $p=0.004^*$).

Table (1): Distribution of nurses' knowledge about missed nursing care (n=98).

Domains	Pre-program				Post-program				Follow up				Significance Fr (P)
	Low		High		Low		High		Low		High		
	No	%	No	%	No	%	No	%	No	%	No	%	
Patient assessment items	52	53.1	46	46.9	48	49	50	51	47	48	51	52	28.040 (0.000*)
Nursing Process	48	49	50	51	40	40.8	58	59.2	37	37.8	61	62.2	28.490 (0.000*)
Blood sample taking and diagnostic examinations	23	23.5	75	76.5	21	21.4	77	78.6	20	20.4	78	79.6	0.624 (0.732)
Medication administration	41	41.8	57	58.2	29	29.6	69	70.4	34	34.7	64	65.3	8.604 (0.014*)
Avoiding bed sores	30	30.6	68	69.4	22	22.4	76	77.6	19	19.4	79	80.6	6.718 (0.035*)
Avoid falling	46	46.9	52	53.1	29	29.6	69	70.4	33	33.7	65	66.3	27.268 (0.000*)
Feeding patient	43	43.9	55	56.1	34	34.7	64	65.3	39	39.8	59	60.2	10.984 (0.004*)
Hygiene items	27	27.6	71	72.4	24	24.5	74	75.5	26	26.5	72	73.5	2.266 (0.322)
Respond to patient health needs	55	56.1	43	43.9	38	38.8	60	61.2	40	40.8	58	59.2	23.115 (0.000*)
Health education	57	58.2	41	41.8	43	43.9	55	56.1	46	46.9	52	53.1	11.411 (0.003*)
Professional ethics in maintaining patient privacy.	44	44.9	54	55.1	33	33.7	65	66.3	30	30.6	68	69.4	5.164 (0.076)
Communication	29	29.6	69	70.4	22	22.4	76	77.6	25	25.5	73	74.5	25.828 (0.000*)
Documentation	43	43.9	55	56.1	32	32.7	66	67.3	31	31.6	67	68.4	43.466 (0.000*)

Table (2): Distribution of reasons for missed nursing domains (n=98).

Domains	Pretest				Posttest				Follow up				Significance Test Fr (P)
	Low		High		Low		High		Low		High		
	No	%	No	%	No	%	No	%	No	%	No	%	
Communication defects	31	31.6	67	68.4	12	12.2	86	87.8	30	30.6	68	69.4	31.182 (0.000*)
Material Resources	22	22.4	76	77.6	22	22.4	76	77.6	15	15.3	83	84.7	14.128 (0.001*)
Labor resources	13	13.3	85	86.7	7	7.1	91	92.9	9	9.2	89	90.8	9.333 (0.009*)
Lack of training	10	10.2	88	89.8	6	6.1	92	93.9	7	7.1	91	92.9	6.500 (0.039*)

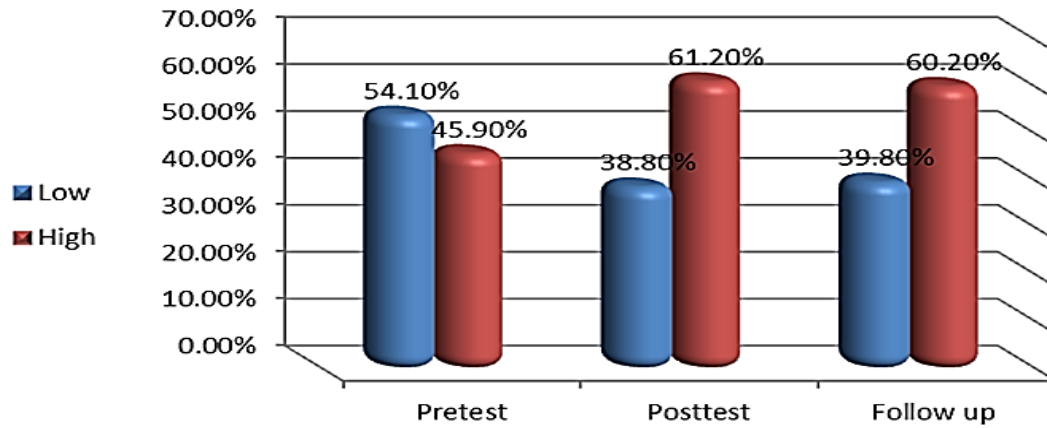


Figure (1): Total nurses knowledge regarding missed nursing care levels (n=98).

Table (3): Distribution of nurses' skills regarding missed nursing care (n=98).

Domains	Pretest				Posttest				Follow up				Significance test Fr (P)
	Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory		
	No	%	No	%	No	%	No	%	No	%	No	%	
Patient assessment items	54	55.1	44	44.9	45	45.9	53	54.1	44	44.9	54	55.1	7.280 (0.026*)
Nursing Process	51	52	47	48	37	37.8	61	62.2	35	35.7	63	64.3	13.029 (0.001*)
Blood sample taking and diagnostic	26	26.5	72	73.5	21	21.4	77	78.6	26	26.5	72	73.5	1.282 (0.527)
Medication administration	44	44.9	54	55.1	32	32.7	66	67.3	40	40.8	58	59.2	7.226 (0.027*)
Avoiding bed score	25	25.5	73	74.5	18	18.4	80	81.6	22	22.4	76	77.9	4.353 (0.113)
Avoid falling	42	42.9	56	57.1	34	34.7	64	65.3	35	35.7	63	64.3	3.353 (0.187)
Feeding patient	41	41.8	57	58.2	37	37.8	61	62.2	43	43.9	55	56.1	1.806 (0.405)
Hygiene items	30	30.6	68	69.4	21	21.4	77	78.6	23	23.5	75	76.5	3.436 (0.179)
Respond to patient health needs	58	59.2	40	40.8	36	36.7	62	63.3	38	38.8	60	61.2	27.750 (0.000*)
Health education	53	54.1	45	45.9	40	40.8	58	59.2	43	43.9	55	56.1	9.586 (0.008*)
Professional ethics	47	48	51	52	31	31.6	67	68.4	29	29.6	69	70.4	18.250 (0.000*)
Communication	33	33.7	65	66.3	25	25.5	73	74.5	28	28.6	70	71.4	2.513 (0.285)
Documentation	48	49	50	51	36	36.7	62	63.3	35	35.7	63	64.3	5.815 (0.049*)

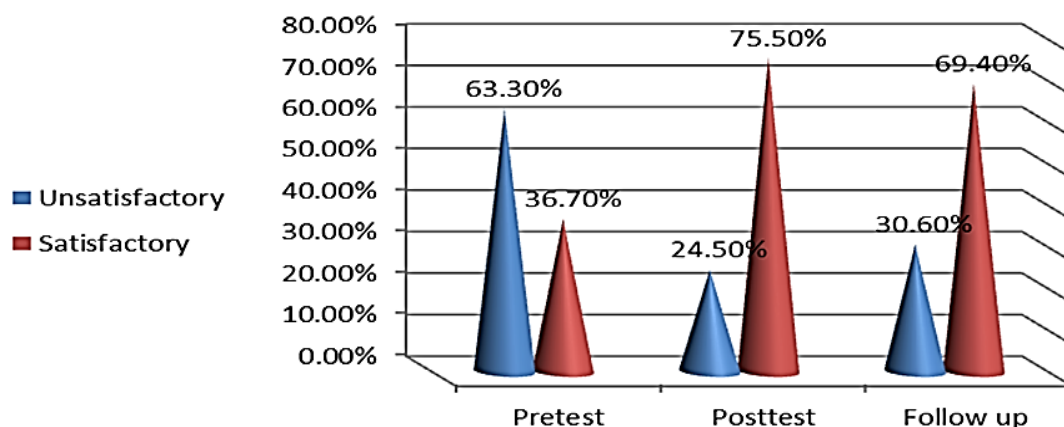


Figure (2): Total nurses skills regarding missed nursing care in the study sample (n=98).

Table (4) Nurses' perception regarding patient safety culture

Domains	Pretest						Posttest						Follow up						Significance Test Fr (P)
	Low		Average		High		Low		Average		High		Low		Average		High		
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	
Teamwork within units	49	50	44	44.9	5	5.1	29	29.6	43	43.9	26	26.5	34	34.7	48	49	16	16.3	22.227 (0.000*)
Supervisor/manager expectations & actions promoting patient safety	43	43.9	47	48	8	8.2	24	24.5	53	54.1	21	21.4	25	25.5	62	63.3	11	11.2	16.720 (0.000*)
Organizational learning—continuous improvement	8	8.2	63	64.3	27	27.6	11	11.2	66	67.3	21	21.4	12	12.2	66	67.3	20	20.4	2.555 (0.279)
Management support for patient safety	41	41.8	49	50	8	8.2	3	3.1	61	62.2	34	34.7	21	21.4	57	58.2	20	20.4	54.613 (0.000*)
Overall perceptions of patient safety	17	17.3	62	63.3	19	19.4	2	2	75	76.5	21	21.4	6	6.1	72	73.5	20	20.4	4.288 (0.117)
Feedback & communication about error	35	35.7	56	57.1	7	7.1	31	31.6	57	58.2	10	10.2	34	34.7	56	57.1	8	8.2	2.889 (0.236)
Communication openness	34	34.7	57	58.2	7	7.1	30	30.6	45	45.9	23	23.5	31	31.6	46	46.9	21	21.4	5.570 (0.062)
Frequency of events reported	30	30.6	60	61.2	8	8.2	18	18.4	57	58.2	23	23.5	20	20.4	60	61.2	18	18.4	7.681 (0.021*)
Teamwork across units	48	49	41	41.8	9	9.2	27	27.6	47	48	24	24.5	30	30.6	51	52	17	17.3	22.388 (0.000*)
Staffing	38	38.8	54	55.1	6	6.1	6	6.1	65	66.3	27	27.6	15	15.3	70	71.3	13	13.3	52.294 (0.000*)
Handoffs & transitions	29	29.6	69	70.4	0	0	13	13.3	68	69.4	17	17.3	10	10.2	76	77.6	12	12.2	28.863 (0.000*)
Non-punitive response to errors	43	43.9	55	56.1	0	0	30	30.6	42	42.9	26	26.5	31	31.6	57	58.2	10	10.2	20.615 (0.000*)

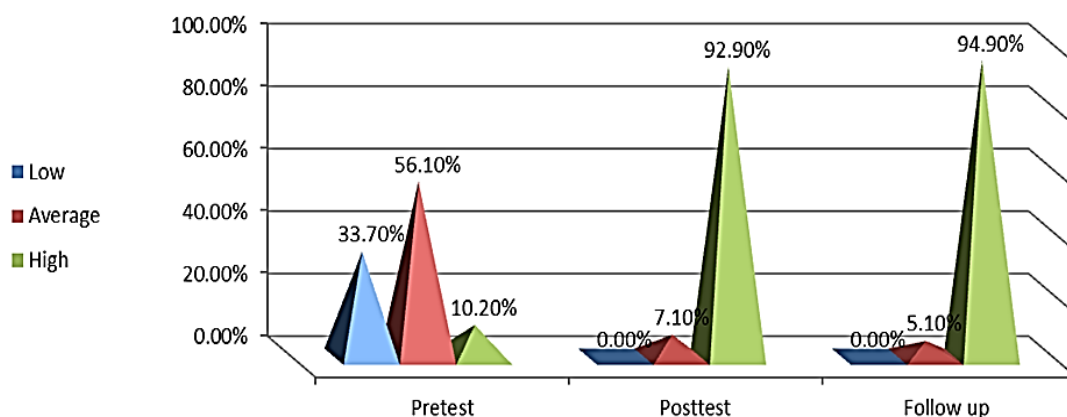


Figure (3): Total nurses' perception regarding patient safety culture in the study sample (n=98)

Table (5): Correlation between different variables (Missed nursing care knowledge, nurses' skills & patient safety culture)

Phase	Variables	R	P
Pre-program	missed nursing care knowledge and nurses' ski	0.022	0.834
	missed nursing care knowledge and patient safety culture	0.096	0.350
	patient safety culture and nurses' skills	0.101	0.321
Post-program	missed nursing care knowledge and nurses' ski	0.310	0.002*
	missed nursing care knowledge and patient safety	0.289	0.003*
	patient safety culture and nurses' skills	0.029	0.777
Follow up	missed nursing care knowledge and nurses' ski	0.261	0.010*
	missed nursing care knowledge and patient safety	0.210	0.038*
	patient safety culture and nurses' skills	0.212	0.036*

r=Pearson correlation

*significant at P≤0.01

DISCUSSION

The frequency of missed nursing care has been established in recent years as a quality indicator for nursing care and patient safety and is used as a "red flag" to signal insufficient staffing levels (Recio-Saucedo et al., 2021). Nursing care refers to tasks performed by the nursing staff, such as giving medication, assisting patients with ambulation and turning, changing their positions, washing them, caring for their mouths, taking their vital signs, documenting their intake and output, providing nutrition advice, and preparing them for hospital departure (Elpasiony & Abd-Elmoghith, 2023). So that the present study was aimed to explore effect of health education program regarding missed nursing care on patient safety culture among nurses.

Concerning nurses' knowledge regarding MNC' domains through program phases implementation, the current study findings demonstrated that there was a statistically significant improvement in the post-program and follow-up phase of the studied nurses' knowledge domains regarding patient assessment items, nursing process, medication administration, avoiding bed scores avoid falling, feeding patient, hygiene items, respond to patient health needs, communication, and documentation compared with low knowledge pre the educational program. This may be due to the effectiveness of the educational program about missed nursing care, which increases nurses' knowledge and enhances their responses.

This finding was in agreement with Diab and Ebrahim, (2019), who conducted an Egyptian study about " Factors Leading to Missed Nursing Care among Nurses at Selected Hospitals." and reported that, the majority of the studied nurses had a high level of knowledge regarding each domain of missed nursing care after the the program implementation with highly statistically significant differences between the study settings at Benha University hospital and Menoufia university hospital. Also, Hammad, Guirguis, and Mosallam (2021) concluded that the overall dimensions "assessment and vital signs" and "interventions and individual needs" had less missed opportunities when compared to the overall dimensions "basic needs" and "planning". This present finding may be due to the studied nurse didn't have any previous training related to missed nursing care, its domains and reduction.

It was noted that the studied nurses had low knowledge regarding health education and respond to patient needs domains in preprogram. While they had high knowledge regarding blood sample taking and diagnostic examinations, hygiene items, and professional ethics in maintaining patient privacy domains, pre, post and follow up the program implementation. Possible explanation for these results is that those tasks that nurses perceived as important (as regarding blood sample taking, hygiene items,) and infection control team may be follow special protocol to avoid infection in intensive care units. Concerning to professional ethics in maintaining patient privacy domain, Egyptian nurses have ethical traditions and habits that guide them in preserving patients' privacy and security, besides studying professional nursing ethics in their education. On the other hand, care items which may be perceived as less serious (as health education and respond to patient call) were more likely to be missed.

Moreover, one of the current study findings explained that, the majority of nurses at ICU had high knowledge regarding reasons for missed nursing care post the educational program implementation. This present study' finding might be due to the higher percentage of the studied nurses had the greatest work' experiences for more than six years of working at intensive care units which helped them to pose a higher chance for adequate and correct knowledge about reasons and leading factors of missed nursing care. Also regarding material and labor resources improved after program implementation due to financial support to the hospital, and new employment in this time of year (January month). This finding was not corresponded with Al-Dossary, (2022), who conducted study about "The effects of nursing work environment on patient safety in Saudi Arabian hospitals" and found that, the highest proportion of the studied nurses had the lowest knowledge about factors leading to missed nursing care before the intervention program which improved after the program implementation.

Regarding the nurses' overall knowledge of MNC, the study findings revealed that over half of the ICU nurses had low knowledge before implementing the educational program. However, their knowledge improved after the program and at the follow-up. This improvement may be attributed to the fact that the nurses did not receive training on missed nursing care and its domains before the program. Additionally, the improvement after the program could be due to the fact that the nurses showed a positive interaction and interest in the program content during the sessions. These results versus with Hammad, Guirguis and Mosallam, (2021), who studied "Missed nursing care, non-

nursing tasks, staffing adequacy, and job satisfaction among nurses in a teaching hospital in Egypt" and reported that, the majority of ICU nursing staff had a good level of knowledge of Missed nursing care before an educational program which improved at follow up of the educational program.

Relating to nurses' skills domains regarding missed nursing care through program phases implementation, the current study findings demonstrate that over half of the studied nurses had satisfactory skill levels in patient assessment, nursing process, medication administration, response to patients' health needs and health education, professional ethics, and documentation at post and follow-up program implementation compared with pre-program, with highly statistically significant differences. This finding may be attributed to the intensive training and knowledge that studied nurses received in program sessions, which may positively affect their skills. The present finding was in harmony with Janatolmakan and Khatony, (2022) who conducted a study about " Explaining the consequences of missed nursing care from the perspective of nurses: a qualitative descriptive study in Iran " who portrayed that, the majority of nurses had poor practice score regarding missed nursing care items before program implementation.

The result of the current study pointed out the total nurses' skills about missed nursing care pre, post and at follow up of the program implementation which showed that, more than one third of the ICU nurses had satisfactory skills pre the educational program implementation which improved post and at follow up of the program implementation. This outcome can be attributed to the thorough training and knowledge acquired by the nurses during the program sessions, leading to enhanced skills. This finding was supported by Saqer and AbuAlRub (2018) who studied "Missed Nursing Care and its Relationship with Confidence in Delegation among Hospital Nurses" and found that, a few nurses had a low level of practices regarding the missed nursing care domains before the program implementation.

Concerning the nurses' perception of patient safety culture, the study showed a statistically significant improvement in their perception of it in several areas after the program implementation. These areas include teamwork within units, supervisor/manager expectations and actions promoting patient safety, management support for patient safety, frequency of reported events, teamwork across units, staffing, handoffs and transitions, and non-punitive response to errors. This improvement was observed at post-program and

follow-up compared to before the program implementation. These findings may be attributed to the nurses' attendance at the missed nursing care program sessions, which likely contributed to an improved perception of patient safety culture. Additionally, nurses may have a clearer understanding of their role in shared clinical decision-making and their contribution to providing a safe therapeutic process as a whole. This finding was not identical to the finding of Ibrahim & Abohabieb (2020) who conducted a study about "Associations between nursing work environment, patient safety culture, and missed nursing care among staff nurses in Port Said, Egypt " and mentioned that, the higher percentages of nurses had good perception toward patient safety culture dimensions after the program implementation.

Regarding the total studied nurses' perception of patients' safety culture, the present study's findings showed a statistically significant improvement in the nurses' perception of patient safety culture after and during the follow-up of the program compared to before the program. This improvement could be attributed to the fact that information can be enhanced and updated periodically through continuing education. Additionally, nurses may value skills acquired through active training as well as knowledge, leading to an improved perception of patients' safety culture after and during the follow-up of the program implementation. This result of the current study in line with the finding of Ricklin, Hess & Hautz, (2020) who conducted a study about Patient safety culture in a university hospital emergency department in Switzerland—a survey study " and reported that, the most of nurses had poor perception toward patient culture before the program implementation.

Moreover, it was indicated from the same study that, there was, a significant positive association between total knowledge score of missed nursing care and total skill score as well as between total knowledge score and patient' safety post and at follow up the program implementation. These finding may be due to nursing staff seeking for updating their information continuously which lead to the improvement of their performance. This result was agreed with Tubbs-Cooley, Mara, Carle, Mark & Pickler, (2019) who studied "Association of nurse workload with missed nursing care in the neonatal intensive care unit" and reported that there was a highly statistical significance difference and a positive correlation between the total score of missed nursing care' knowledge, their practice and patient safety after training program.

Limitation of the study

The study was conducted in a teaching hospital which limits the generalization of the results to other setting as private and Ministry of Health and Insurance settings. Also, the heavy workload of nurses leads to delay nurses' response to fulfill the questionnaire which requires more waiting time from the researcher.

CONCLUSION

Based on study findings of the current study, it can be concluded that: the nurses in the intensive care units of Mansoura University Hospital have low knowledge, and unsatisfactory skills regarding missed nursing care pre-program implementation. Meanwhile, there was a significant improvement in nurses' knowledge about missed nursing care from pre-program to post-program and significant improvement in the performance of nurse's skills after the educational program implementation; also missed nursing care educational program had a positive effect on patient safety culture level.

RECOMMENDATIONS

- Ongoing nursing education and personnel advancement activities are expeditiously needed to strengthen nurses' knowledge and skills in connection with missed nursing care.
- It is advised that nursing practice be continuously monitored by routine auditing, with helpful input, disciplinary measures for defaulters, and honors for exemplary performance.
- Uninterrupted evaluation of nurses' skills to handle missed nursing care issue with the fundamental nursing care standards.
- Expanding the missed nursing care program to all nursing staff in the hospital and integrating on its adverse effect on patients, nurses, and hospital.

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تأثير برنامج تعليمي بخصوص الرعاية التمريضية المفقودة على ثقافة سلامة المرضى بين الممرضين

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الخلاصة

تتعرض جودة الرعاية التمريضية وسلامة المرضى للخطر بسبب الرعاية التمريضية المفقودة على مدار العقد الماضي و لحل هذه المشكلة يجب تعزيز مهارات التمريض في وحدات العناية المركزة. لذا تهدف هذه الدراسة إلى تقييم تأثير البرنامج التعليمي عن الرعاية التمريضية المفقودة على ثقافة سلامة المرضى بوحدات العناية المركزة بمستشفى المنصورة الجامعي تم استخدام التصميم الشبه تجريبي في إجراء الدراسة. وتألقت العينة من جميع الممرضين العاملين في وحدات الرعاية المركزة في وقت الدراسة بعدد إجمالي ٩٨ ممرض و ممرضة. تم استخدام ثلاثة أدوات لجمع البيانات وهم استبيان معلومات الممرضين بخصوص الرعاية التمريضية المفقودة ، قائمة مرجعية لملاحظة مهارات الممرضين حول الرعاية التمريضية المفقودة، و استبيان ثقافة سلامة المرضى. كشفت الدراسة عن تحسن معلومات الممرضين المتعلقة بالرعاية التمريضية المفقودة بعد البرنامج لتصبح ٦١.٢٪ ، و المتابعة ٦٠.٢٪ مقارنة بما قبل البرنامج ٥٤.١٪ ، ارتفع مستوى مهارات الممرضين من ٣٦.٧٪ قبل البرنامج إلى ٧٥.٥٪ ، بعد البرنامج، ثم حدث انخفاض طفيف في المتابعة ليكون ٦٩.٤٪ ، و كذلك زادت نسبة تصور الممرضين تجاه ثقافة سلامة المرضى من ١٠.٢٪ قبل البرنامج إلى ٩٢.٩٪ بعد البرنامج ثم زادت إلى ٩٤.٩٪ في المتابعة. وقد استنتجت الدراسة أن البرنامج التعليمي أدى إلى تحسين معرفة و مهارات الممرضين حول الرعاية التمريضية المفقودة ، وتحسين سلامة المرضى. لذا يوصى بتمديد برنامج الرعاية التمريضية المفقودة إلى جميع الممرضين في المستشفى والتأكيد على التأثير السلبي للرعاية التمريضية المفقودة على المرضى والممرضين والمستشفى..

الكلمات المرشدة: : الرعاية التمريضية المفقودة، المعلومات، المهارات، وحدات العناية المركزة ، ثقافة سلامة المرضى.