Effect of care protocol regarding oxygen therapy for patients after cardiac and thoracic surgery on nurses' knowledge

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ABSTRACT

Background: Oxygen is necessary for life to exist particularly for patients who are undergoing cardio- thoracic surgery; the cardiac surgery is impossible without a continuous oxygen therapy in order to improvement of all the treatment stages **Aim:** The study aimed to explore the effect of protocol of care regarding oxygen therapy for patients after cardiac and thoracic surgery on nurse's knowledge. **Subjects and method: Research design:** a quasi-experimental study design was used. **Setting:** The investigation was conducted at the critical care units of three hospitals in Port-Said, Egypt—Al-Shifa Medical Complex, Alsalam Hospital, and Alzohor Hospital—all of which are part of the Egypt Health Care Authority. **Sample:** 50 nurses who worked in postoperative cardiac and thoracic surgery units and intensive care units, **Tools of data collection:** the Nurses' Knowledge Questionnaire. **Results:** The present research found that prior putting the care protocol into place, the studied nurses' understanding levels regarding oxygen therapy for patients following heart and thoracic surgery were low. While, there was also an enhancement in the overall scores of the studied nurses' understanding and expertise regarding oxygen therapy for patients following cardiac and thoracic surgery after implementation of the protocol of. **Conclusion:** The care regimen was successful in improving the nurses' understanding of oxygen therapy for patients following heart and thoracic surgery. **Recommendations:** ongoing education and training sessions to ensure the safe delivery of oxygen therapy and the provision of high-quality medical care to patients on oxygen therapy.

***Keywords*:** cardiac and thoracic surgery, care protocol, nurses knowledge, Oxygen therapy.

INTRODUCTION

The surgical management of organs located in the thoracic cavity, namely the heart, lungs, and additional pleural or mediastinal structures, is known as cardiothoracic surgery. The specialty of cardiothoracic surgery treats conditions pertaining to the thoracic organs, including the esophagus, heart, and lungs. Long and complicated procedures often need the utilization of cutting-edge equipment throughout surgery and strict postoperative care for the patient. (Patel&Nixon, 2023).

A specialist's performance of various procedures in the chest is referred to as thoracic surgery. The processes used can be basic or complex. Cardiothoracic surgery could be necessary for a number of reasons, including the treatment of coronary artery disease (CAD). Surgeons might employ open or minimally invasive procedures. Restore blood flow to the heart, unblock blocked arteries restricted by plaque, replace or repair diseased or damaged heart valves, implant ventricular assist devices to treat heart failure, perform heart transplants, and address heart valve issues. (Panel, Hartwig, van Berkel, Bharat, Cypel, Date et al., 2023).

Oxygen is essential for life, particularly for patients undergoing cardio-thoracic surgery. Without consistent oxygen therapy, heart surgeries cannot proceed, and the overall treatment process suffers. Oxygen therapy is the primary medical intervention for tissue hypoxia. When administered correctly, it can be life-saving and enhance health outcomes; however, improper use can lead to adverse effects.

Oxygen was among the first comprehensive treatments available to people with a wide range of illnesses. (Lott, Truhlář, Alfonzo, Barelli, González-Salvado, Hinkelbein et al., 2021).

There are several causes to begin oxygen administration: higher metabolic requests; keeping oxygen levels stable during anaesthesia; treating headaches; treating lung diseases that impair oxygen transfer; and getting exposed to carbon monoxide. The body needs oxygen to meet its fundamental metabolic needs. It is also essential for maintaining chronic hypoxemic states and for resuscitation in many acute disorders. (Getahun, Bizuneh, Melesse& Chekol, 2022).

Errors in oxygen assistance have the potential to be lethal, given that oxygen treatment is an essential part of essential oxygen, resuscitation, aesthetics, preoperative

planning, and postoperative recovery. The first two include the patient being faced with extremely large amounts of oxygen during a brief period of time, while the second involves the patient being subjected to lower oxygen levels for a longer amount of time. Additional oxygen delivery has evolved into a crucial part of anesthesia due to the risks of hypoxemia throughout surgery and the generally accepted security of hyperoxia. Apart from enhancing the safety margin in case of airway compromise, there are several other advantages associated with a high fraction of inspired oxygen (FIO2) (Grensemann, Fuhrmann & Kluge, 2018).

It is the responsibility of health staff members to deliver oxygen (O2); this is a task best left to physicians or nurses. In order to effectively monitor patients, nurses must be informed about the harmful consequences of oxygen therapy, how to intervene in cases of difficulties, as well as how to provide it safely. Because ABGs and chest X-rays require vital signs, a pulse oximeter, and a level of attentiveness, these are examples of suggested early investigations that should be performed frequently and properly evaluated. (Diab, Ali, Abed, Elasrag & Ramadan, 2022).

Oxygen consumption needs to be connected with safety precautions. Although oxygen by itself is not combustible, it can help other burning elements ignite more quickly and easily. After giving the patient oxygen, urge them to take a deep breath with their nose and release it through their mouth. If a patient requires oxygen, make sure to utilize extension tubing so they can use the lavatory while wearing their oxygen apparatus. However, the extra tubing increases the risk of falling. If the oxygen tubing is maintained coiled at the top of the bed or on the bedside table next to the patient, the patient's risk of falling is decreased (Krylov& Kolchina, 2022).

Raising awareness and standards regarding the proper oxygen delivery standard and the patient assessment needed during oxygen treatment can be facilitated by nurses. This will lessen the possibility of difficulties and enhance the health results for those undergoing oxygen therapy. The oxygen administration protocol used in the care of patients following thoracic surgery must be followed by nurses working in critical care. Additionally, they need to keep an eye on oxygen therapy and, as quickly as possible, reduce the risk associated with extra oxygen (Kopanczyk, Kumar, & Bhatt, 2022).

Significance of the study

For those who need it, oxygen therapy is an essential medical intervention for patients of all ages and diseases. Inadequate oxygen medical care puts patients at danger for a host of serious health issues, such as hypoxaemia, respiratory pathology, and even death. Oxygen offers life-saving properties when used properly. Conversely, any errors in oxygen therapy could potentially be fatal or worsen a patient's condition. In Egypt, oxygen therapy's detrimental effects on patients following cardiothoracic surgery are a common health issue. Consequently, it is imperative that nurses possess sufficient understanding to administer oxygen treatment to patients following cardiac and thoracic surgery (Diab et al., 2022).

Furthermore, because there are relatively few Egyptian research examining the impact of care protocols pertaining to oxygen treatment for patients following heart and thoracic surgery on nurses' performance and health outcomes, this study was carried out.

AIM OF THE STUDY

This study aimed to explore the effect of protocol of care regarding oxygen therapy for patients after cardiac and thoracic surgery on nurse's knowledge through:

1. Assess the nurses' knowledge regarding oxygen therapy for patients after cardiac and thoracic surgery.
2. Design the protocol of care regarding oxygen therapy for patients after cardiac and thoracic surgery on nurse's knowledge.
3. Implement protocol of care regarding oxygen therapy for patients after cardiac and thoracic surgery.
4. Evaluate the effect of protocol of care regarding oxygen therapy for patients after cardiac and thoracic surgery on the nurse's knowledge.

Research hypothesis

Nurses' knowledge will significantly improve after implementing protocol of care regarding oxygen therapy for patients after cardiac and thoracic surgery implementing.

SUBJECTS AND METHOD

To conduct this study, a quasi-experimental design was used for one group (pretest and posttest

Research setting

The investigation was conducted at the intensive care units of three hospitals in Port-Said, Egypt: Alsalam Hospital, Al-Shifa Medical Complex, and Alzohor Hospital. These facilities belong with the Egypt Health Care Authority.

Sample

- The study employed a purposeful sample of patients and nurses.
- Nurses employed in postoperative cardiac and thoracic surgery centers and intensive care units Purposive sample was used.in study (nurses and patients)
- Nurses working at intensive care units and postoperative cardiac and thoracic surgery. at time of at data collection
- patients admitted to previously mentioned setting were) with followings criteria for nurses

Data collection tools

These three instruments were utilized to gather data:

Tool I : Nurses' knowledge questionnaire

It is divided into two sections:

Part I: The sociodemographic features of nurses: It focused on the age, sex, educational attainment, marital status, and qualifications of the nurses under study.

Part II: Information about work: It is about the work data of nurses .

Years of expertise and training programs are a good source of knowledge regarding oxygen therapy for patients following heart and thoracic surgery.

Part III: Nurses' knowledge questions

The researcher designed it following an assessment of literature relevant to retractions (Adipa Aziato & Zakariah, 2021). The purpose of the assessment was to evaluate nurses' knowledge in the fields as follows: oxygen delivery methods, oxygen humidification, oxygen therapy complications, oxygen toxicity manifestations, oxygen observing, patient health education, the level of oxygen and uses, and the role of nurses in oxygen therapy.

Scoring system of nurses' knowledge: The right answer is (1), while the incorrect response is (zero). Each item received one of the following scores: There were (29) questions in all. a final score ranging from 0 to 29 points. The responses provided by the observed nurses were compared to the model answer. The scores for nurses' responses to the statements were: The knowledge score was transformed to a percentage. In line with earlier research by Cosgrove, Macmahon, Bourbeau, Bradley, and Oneill (2020), the overall score was determined as follows.

- Satisfactory if total score $\geq 70\%$
- unsatisfactory if total score $< 70\%$

Protocol of care

Based on the session, the researcher devised the protocol

The researcher created the procedure based on the results of the earlier evaluation of the nurses' oxygen therapy skills and understanding. The process of providing instruction booklet was prepared in Arabic using straightforward language and illustrations, and it was updated and changed in response to the expert comments. application of the care protocol.

The protocol of care was implemented in the nurses' room of the ICU unit of the hospitals previously stated. The nurses were categorized according to their job status. The sessions were scheduled to coincide with nurses' morning shifts in an effort to maximise participation. The nurses were grouped into five smaller groups, with ten nurses in every group. They attended twice a week. In addition to the initial session, four others were conducted, lasting roughly twenty minutes each. For the theoretical portion, various techniques were employed, including a video, group discussions, powerpoints, demonstrations, and re-demonstration. Throughout the session, each nurse received a pamphlet.

B-Operational design

A stage of planning, content validity and reliability, a pilot research, and fieldwork were all part of the latest study's operational design.

1-Preparatory phase

To build the data collection tools, a comprehensive review of pertinent previous national and international research, along with conceptual understanding of several topic elements, was carried out.

2-Content validity of the tool

The investigator created the data collection instruments, and five specialists from the faculty of nursing at Port-Said University who specialize in medical and surgical nursing evaluated them for content validity. The purpose of the test was to evaluate the tool's suitability, scope, significance, and clarity. They were asked for their thoughts on the format, layout, and coherence of the instrument. The appropriate adjustments were made as a result.

3-Reliability of tool

The reliability analysis was conducted using the Cronbach's Alpha coefficient test, which demonstrated that all three instruments had moderate to high reliability and contained items that were generally homogeneous. Knowledge's internal consistency was 0.89.

4-Pilot study

The efficiency, reliability, and clarity of the tools were assessed in a pilot study including 10% of the entire sample (5); no changes were made, and the nurses who participated in the research were subsequently incorporated into the whole sample.

5-Field work

The phases of assessment, planning, implementation, and evaluation were used to complete this fieldwork.

Preparatory phase

The competent hospital authorities were informed of the study's purpose and design before granting permission to carry it out. The researcher created the data gathering instrument by reading pertinent literature.

Assessment phase (Pre-test phase)

The researchers gave an introduction, conducted interviews with all of the nurses, clarified the purpose of the study, and obtained the participants' verbal permission before gathering baseline information about the knowledge of the nurses and collecting sociodemographic data using tool (I). It took the nurses 25 minutes to complete this form. Seven experts in the relevant field wrote and reviewed the guidelines based on the results of the pre-test questionnaire for nurses' knowledge.

The researcher started interviewing the nurses after introducing herself and obtaining their permission to take part in the study. She then completed the questionnaire and gave an explanation of the study's objectives. The study sample received assurances regarding the confidentiality of all data gathered.

Planning phase

According to the program's goals and the assessment requirements of the nurses, it was chosen. A theoretical portion regarding the nursing management of oxygen treatment following heart and thoracic surgery was given to the subject group.

After returning from the two days of literature study, the researcher developed the health teaching session. It was created in plain Arabic to increase the nurses' understanding of oxygen therapy following heart and thoracic surgery. Additionally, the researchers created an Arabic booklet with supporting material, the content of which was written in an easy-to-understand Arabic language.

Implementation Phase

For the purpose of the training course, the nurses, who were divided into five subgroups with ten nurses each, would meet twice a week from 9:00 a.m. to 3 p.m. and from 3 p.m. to 9:00 p.m. The program was run over ten weeks, with one week dedicated to each subgroup. Each subgroup's training consists of a two-hour theoretical portion and a four-hour practical portion. Every theoretical lesson was followed by a skills instruction session. The following is how the program sessions were carried out:

Theoretical and sessions

Session (1) The participant was met by the researcher during this session, who also gave an explanation of the protocol's goals, content, methods of evaluation, and the anatomy and physiology of the respiratory system.

Session (2) such as what oxygen is, why it's needed, how to get it, humidification of oxygen, and oxygen complications.

Session (3) include oxygen toxicity manifestation.

Session (4), such as the nurse's function in oxygenation and oxygen toxicity, and patient wellness training.

Debriefing

Researchers immediately conducted debriefing as a reflecting exercise after training skills. After the debriefing, this lasted for roughly thirty minutes, during which the team was asked whether they had any more questions.

Evaluation Phase

Following the training program's execution, the researchers investigated how nurses' knowledge was affected by the oxygen therapy protocol for patients following heart and thoracic surgery using the same prior assessment technique.

Administrative Design

Official approval from the relevant authorities was secured to conduct the study. In order to get permission to perform the study, an official letter was sent to the Egypt Health Care Authority facilities in Port-Said city, the faculty of nursing, Alsalam hospital, Al-Shifa medical complex, and Alzohor hospital. At the time of data collection, every study participant was given a thorough explanation of the goal of the study before obtaining their verbal consent.

Ethical Consideration

Before beginning the study, the scientific research ethical commission of the Port-Said University faculty of nursing granted research permission. Inform the director of

Alsalam Hospital at Al-Shifa Medical Complex about the study's purpose. Additionally, Alzohor Hospital in Port-Said, which is connected to Egypt's Health Care Authority hospitals, asked permission to conduct this study. The nurses gave their oral consent. Make sure every participant understands the purpose of the study and the significance of her involvement. To reassure the nurses that the information collected would be kept private and utilized exclusively for the purpose of the study, a brief explanation of the investigation was provided. The harmony of the work was not disrupted during the data collection process. Every piece of information was gathered.

D-Statistical analysis

The data were gathered, sorted, coded, computerised, and examined using relevant statistical techniques and tests (X2 for qualitative data, mean and standard deviation for quantitative data, and correlation tests). The data were then presented in appropriate tables and figures using relevant statistical techniques and tests of significance

RESULTS

Table (1) Reveals that more than half (58%) of the nurses under study were under under the age of 25, and more over one-third (42%) were above the age of 25. Regarding sex, the majority of them (84%) obtained their degrees from a technical institute of nursing, nearly three quarters (74%) were female, and the majority (80%) were unmarried.

Table (2) demonstrates that less than 25% of the nurses under study had three to less than six years of experience, and 90% of them did not participate in programs or courses about oxygen therapy.

Table (3) Demonstrates an important enhancement in the investigated nurses' comprehension of particular oxygen therapy and iys administration techniques following implementing a care protocol for oxygen therapy, with a highly statistically significant difference ($P<0.01$) in comparison to pre-applying the care protocol. As evidence, more than two thirds of the studied nurses (68.0%) had unsatisfactory knowledge about the item "definition of oxygen therapy," whereas most of them (80.0%) had satisfactory knowledge following implementing the care protocol. More than two thirds of the studied nurses (68.0%) had unsatisfactory knowledge regarding the item "The percentage of

blood gases is done to determine the percentage of oxygen for the patient after heart and chest surge.

Table (4) Reveals that the knowledge of the nurses under study for the benefits and drawbacks of oxygen therapy improved significantly after the care protocol was applied, with an extremely significant variance ($P<0.01$) from the pre-application care protocol.

Table (5) indicates a very highly significant variation ($P<0.01$) between the pre- and post-application care protocols, indicating an outstanding enhancement in the investigated nurses' understanding of some aspects of their function in oxygen therapy. A highly statistically significant difference ($P<0.01$) was observed between the majority of the nurses being studied (54.0%) who had satisfactory level of knowledge post-applying care protocol and the majority of them (96.0%) who had unsatisfactory level of knowledge about the item "The nurse evaluates the patient if he suffers from a lack of oxygen and, as a result, he is connected to oxygen."

Figure (1) Demonstrates that while the majority of the nurses (82.0%) had satisfactory knowledge regarding oxygen therapy for patients after cardiac and thoracic surgery post-applying care of protocol, less than two thirds of the studied nurses (62.0%) had unsatisfactory knowledge regarding this topic.

Table (1): The distribution of the nurses under study based on their sociodemographic attributes (n=50)

Sociodemographic characteristics	No.	%
Age (years)		
<25	29	58.0
≥25	21	42.0
Min. – Max.	21.0 – 27.0	
Mean ± SD.	24.28 ± 1.50	
Median	24.0	
Sex		
Male	13	26.0
Female	37	74.0
Marital status		
Single	40	80.0
Married	10	20.0
Qualification		
Technical Secondary School of Nursing	7	14.0
Technical institute of Nursing	42	84.0
Bachelor of Nursing	1	2.0

SD: **Standard deviation**

Table (2): The distribution of the nurses under study based on their work attributes (n =50)

Data related to work	No.	%
Hospital name		
Al-Salam Hospital	16	32.0
Alta Damon hospital	18	36.0
Al Zohour Central Hospital	16	32.0
Years of Experience		
From 1 < 3 years	41	82.0
From 3 < 6 years	9	18.0
Attendending training courses about oxygen therapy		
Yes	**5**	**10.0**
No	45	90.0
If yes or no of courses (n = 5)		
1 - 2	5	100.0

Table (3) Comparison between studied nurses' understanding of oxygen treatment and how to administer pre- and post-care protocol implementation (n = 50)

Knowledge regarding oxygen therapy	Pre				Post				Test of sign. (McN)	P-value
	Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory			
	No.	%	No.	%	No.	%	No.	%		
Definition of oxygen therapy	34	68.0	16	32.0	10	20.0	40	80.0	16.531*	<0.001*
Method of oxygen therapy										
Oxygen is delivered through a cannula and a face mask for patients	37	74.0	13	26.0	8	16.0	42	84.0	22.40*	<0.001*
Oxygen monitoring must be followed by an oxygen measuring device or a pulse oximeter	32	64.0	18	36.0	7	14.0	43	86.0	17.455*	<0.001*
Oxygen is given by means of an oxygen flumeter or compressed gas systems	26	52.0	24	48.0	14	28.0	36	72.0	3.361	0.067
The types of oxygen delivery devices used in the flow of oxygen should be noted to respond to the situation and the changes that occur in it	37	74.0	13	26.0	8	16.0	42	84.0	3.012	0.108
The types of oxygen delivery devices used in the flow of oxygen should be noted to respond to the situation and the changes that occur in it	37	74.0	13	26.0	18	36.0	32	64.0	4.036	0.108
There is more than one way to deliver oxygen to the patient after heart and chest surgeries	25	50.0	25	50.0	6	12.0	44	88.0	2.66	1.000
The percentage of blood gases is done to determine the percentage of oxygen for the patient after heart and chest surgery	7	14.0	43	86.0	7	14.0	43	86.0	3.568	1.000
The method of giving oxygen in terms of using the mask is determined according to the age of the patient	27	54.0	23	46.0	12	24.0	38	76.0	15.024*	0.004*
It is preferable to use oxygen cylinders with integrated high flow regulators. Instead of oxygen (central)	29	58.0	21	42.0	10	20.0	40	80.0	12.0*	0.001*
The patient suffers from a lack of oxygen if the percentage is less than 90%.	4	8.0	46	92.0	4	8.0	46	92.0	3.568	1.000
The oxygen rate is adjusted from 1 to 6 liters by 24% to 40% when connecting the nasal cannula	45	90.0	5	10.0	26	52.0	24	48.0	17.654*	<0.001*
The oxygen rate of the face mask is adjusted from 6 to 10 liters / minute, at a rate of 40% to 60%	45	90.0	5	10.0	27	54.0	23	46.0	18.455*	<0.001*
The oxygen rate in the face mask is set between 60% and 80% in high flow and oxygen is delivered at a rate of 10 to 15 liters / minute	48	96.0	2	4.0	4	8.0	46	92.0	17.636*	0.001
The oxygen rate is set from 10 to 12 liters / minute, at a rate of 80% to 90%. For patients who require high levels of oxygen in a face mask for rebreathing	49	98.0	1	2.0	9	8.0	41	82.0	16.488*	<0.001*
The concentration in the venturi mask is 24% to 60% for oxygen, at a rate of 4 to 12 liters / minute.	48	96.0	2	4.0	6	12.0	44	88.0	21.455*	<0.001*

Table (4) Comparison between studied nurses' understanding of oxygen treatment and how to administer pre- and post-care protocol implementation (n = 50)

Knowledge regarding oxygen therapy	Pre				Post				Test of sign. (McN)	P-value
	Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory			
	No.	%	No.	%	No.	%	No.	%		
Positive effect of oxygen therapy										
Long-term oxygen therapy reduces the risk of death for people after heart and chest surgery	31	62.0	19	38.0	7	14.0	43	86.0	6.021	1.000
Lack of oxygen can harm heart function and cause complications and the oxygen therapy prevent it	26	52.0	24	48.0	8	16.0	42	84.0	8.036*	0.005*
Negative effect of oxygen therapy										
The oxygen mask causes a feeling of anxiety and suffocation in some patients in ICU	33	66.0	17	34.0	14	28.0	36	72.0	3.025	0.629
Includes symptoms of poisoning resulting from increased oxygen in patients with cardiothoracic surgery Changes in eyes and vision	27	54.0	23	46.0	5	15.0	45	90.0	4.025	0.017*
The oxygen mask causes a feeling of anxiety and suffocation in some patients in ICU	33	66.0	17	34.0	14	28.0	36	72.0	3.025	0.629
The body is affected in different ways when exposed to increased oxygen, and poisoning occurs in the central nervous system	38	76.0	12	24.0	10	20.0	40	80.0	9.633*	0.002*
Prevention of oxygen poisoning depends on taking appropriate precautions to prevent the most harmful effects	29	58.0	21	42.0	9	18.0	41	82.0	4.587	0.839

Table (5): Distribution of the studied nurses according to their understanding of the pre- and post-treatment protocols for oxygen therapy and the role of nurses in this regard (n = 50)

Knowledge regarding oxygen therapy	Pre				Post				Test of sign. (McN)	P-value
	Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory			
	No.	%	No.	%	No.	%	No.	%		
Role of nurse for oxygen therapy										
The role of the nurse in oxygen therapy in patients with cardiothoracic surgery includes monitoring the rate and level of flow	31	62.0	19	38.0	4	8.0	46	92.0	1.241	0.265
The role of the nurse includes making sure that the breathing tube is connected to the patient and monitoring the oxygen level	15	30.0	35	70.0	8	16.0	42	84.0	1.358	0.167
The nurse must know the signs and symptoms of hypoxia in the blood from the history of patients with diseases of the heart and thoracic surgery	14	28.0	36	72.0	6	12.0	44	88.0	10.222	0.039*
Patients who suffer from oxygen need are admitted to the intensive care unit for cardiothoracic surgery	23	46.0	27	54.0	10	20.0	40	80.0	12.238	0.002*
The nurse, when using oxygen in the care of patients with heart and chest surgery, examines the ears and lips	47	94.0	3	6.0	7	14.0	43	86.0	13.885*	<0.001*
The nurse evaluates the patient if he suffers from a lack of oxygen and, as a result, he is connected to oxygen	48	96.0	2	4.0	3	6.0	47	94.0	13.874	<0.001*

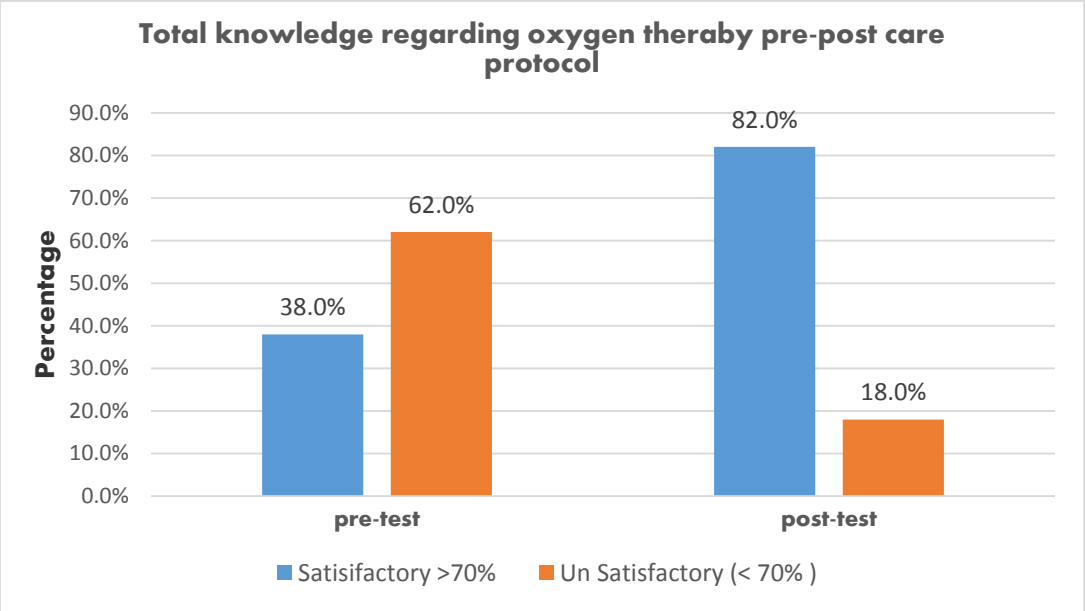

Figure (1): Analysis of the investigated nurses' descriptive data based on their overall knowledge of the oxygen therapy pre- and post-care procedure

DISCUSSION

All surgical operations involving the heart, lungs, and great vessels are categorised as cardiothoracic surgery. Recovery from cardiothoracic surgery patients is significantly impacted by their post-operative treatment and management. Individuals undergoing cardiac surgery who have pre-existing lung diseases are more likely to experience lung issues after the procedure and frequently need additional breathing assistance. To assist patients breathe, make sure that adequate oxygen enters their blood, and eliminate carbon dioxide, they could require an oxygen therapy (Earwaker, Villar, Fox-Rushby, Duckworth, Dawson&Steele et al., 2022).

For patients of all ages and illnesses, oxygen therapy is an essential medical intervention, particularly in the case of cardiothoracic surgery. Inadequate oxygen medical care puts clients at danger for a host of serious health issues, such as hypoxaemia, respiratory pathology, and even dying. Therefore, it is imperative that carers make sure that chemical element medical assistance is provided accurately, safely, and promptly. Thus, the purpose of this study was to determine if a consistent approach to oxygen medical support may enhance the outcomes of patients and nurse performance (Wang, Huang & Liang, 2020).

The present study's findings demonstrated a highly statistically significant difference between the pre- and post-application care protocols for oxygen therapy, as

well as an important enhancement in the investigated nurses' knowledge of certain oxygen therapy items and administration techniques. As proof, it was found that while the majority of the nurses in the study had satisfactory understanding of the post-applying care protocol, over two thirds of them reported insufficient knowledge of the item "definition of oxygen therapy".

Furthermore, regarding the item "The percentage of blood gases is done to determine the percentage of oxygen for the patient after heart and chest surgery," the majority of the studied nurses had an inadequate level of knowledge. However, this shifted to a satisfactory level of knowledge regarding the post-applying care protocol.

According to the researcher, these results can be the result of the educational sessions, which helped the nurses under study increase their level of expertise. Additionally, the nurses' lack of education and training about oxygen therapy information resulted in a decline in their level of awareness prior to administering care regimen.

These findings are consistent with a study by Diab et al. (2022), which found that when nurses followed a standardized procedure for oxygen therapy instead of the pre-protocol, their knowledge of the treatment improved. These findings are further corroborated by a prior study conducted in 2019 by Mostafa, Mehany, and Ahmed, which indicated that whilst most nurses had inadequate knowledge prior to the educational program, the majority of them exhibited strong knowledge following it.

In terms of the studied nurses' knowledge of both the beneficial and adverse consequences of oxygen therapy before and after the care protocol, the current study found that there was a substantial increase in the studied nurses' understanding of particular aspects of the benefits and drawbacks of oxygen therapy after the care protocol was applied, with a highly statistically significant difference from before the care protocol.

As evidence, the item "Lack of oxygen can harm heart function and cause complications and the oxygen therapy prevent it" was not well understood by more than half of the nurses in the study; however, most of them had a satisfactory level of understanding about the post-application care protocol. Furthermore, regarding the item "Includes symptoms of poisoning resulting from increased oxygen in patients with cardiothoracic surgery changes in eyes and vision," more than half of the nurses being

studied experienced an unsatisfactory level of knowledge, whereas more than two thirds of them had a satisfactory level of knowledge regarding the post-applying care protocol.

According to the researcher, the majority of the nurses under study had technical institute of nursing in education, which could explain these results. It's possible that they don't know enough about oxygen treatment, and they should learn more about it. As a result, their level of understanding increased after following the care routine.

These findings are consistent with a study by Wang Tan, Xiao, and Deng (2017), which found that less than half of the nurses had insufficient information about the effects of O2 therapy throughout the preliminary test. Following intervention, it was evident that the majority had acquired information.

Furthermore, these results are consistent with those of Jang, Ryu, Kang, Kang, Kwon, Lee, & Bae (2020), who showed that nurses' knowledge of oxygen therapy had significantly improved following a training program.

In terms of the studied nurses' understanding of their task in providing oxygen therapy, the results of the research showed a significant improvement in their understanding of certain aspects of their role after implementing the oxygen therapy care protocol, with a highly statistically significant difference from the pre-implementation phase. There was an extremely significant difference in the overwhelming majority of the studied nurses' knowledge regarding the item "The nurse evaluates the patient if he suffers from a lack of oxygen and, as a result, he is connected to oxygen" compared to their satisfactory knowledge of the post-applying care protocol.

This outcome might be explained by the fact that the majority of the nurses in the study had few years of qualifications, which decreased their level of understanding regarding their specialized responsibilities in oxygen therapy before implementing the educational program.

According to Al-Wily & Aziz (2020), the study and control groups for the constructional program (pre-test, post-test) for oxygen administration techniques and the nurse's role showed statistically significant differences. However, the pre-test results show no discernible difference between the study group and control group. On the other hand, the findings of the post-test show a substantial correlation between the study group and the group acting as a control.

In terms of the studied nurses' overall knowledge of oxygen therapy for patients following cardiac and thoracic surgery, prior to and subsequent to implementing care protocol, the results of this research made it clear that, with a substantial significantly significant variation, less than two thirds of the studied nurses had unsatisfactory knowledge concerning oxygen therapy for patients following cardiac and thoracic surgery pre-applying care of protocol, whilst the majority of them experienced satisfactory knowledge concerning oxygen therapy for clients following cardiac and thoracic surgery post-applying proper care of protocol.

The results of the present research may help to clarify that the participants' understanding of oxygen therapy was greatly improved after the educational sessions were provided, that were skilfully prepared in plain Arabic and after the educational booklet was made available and approved by an expert group of medical and surgical nursing experts. The improvement of nurses' knowledge of OT, including oxygen delivery systems, oxygen saturation monitoring, and patient assessment, need to be the main goal of these programs.

This outcome is corroborated by Mustafa (2023), who reported that following the execution of the instructional program, nurses' practices and knowledge of oxygen therapy much improved. Additionally, Jang et al. (2020) provided support for this finding, demonstrating that following the implementation of the educational program, the experimental group was more satisfied and educated concerning oxygen therapy than the control group.

CONCLUSION

According to the study's findings, the following can be concluded:

When it came to oxygen therapy for patients following cardiac and thoracic surgery, less than two thirds of the nurses in the study had inadequate knowledge, while the majority of them had satisfactory knowledge about oxygen therapy for patients following cardiac and thoracic surgery post-applying care of protocol.

A significant enhancement in the extremely important disparities in the knowledge of the study nurses was observed following the adoption of the protocol of care regarding oxygen therapy for patients following cardiac and thoracic surgery. Consequently, the care protocol

was efficient in achieving its goal of raising the examined nurses' degree of oxygen therapy expertise substantially.

RECOMMENDATIONS

According on the study's findings, the following suggestions are made:

1. To ensure the safe administration of oxygen treatment and the provision of high-quality medical care for patients undergoing oxygen therapy, the leadership of the hospital should be urged to set up ongoing training sessions and workshops.
2. Hospital units should use a consistent protocol for oxygen medical assistance.
3. The planning and execution of oxygen seminars, conferences, and lectures at the hospital's continuing education departments ought to involve various Port-Said city hospitals.
4. Supply clients undergoing heart and thoracic surgery with instructional guidebooks that include all the information and instruction required for oxygen therapy.
5. More study is suggested to create and execute a training curriculum for nurses at large hospitals in Port-Said about oxygen therapy for patients following thoracic and cardiac surgery..

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أثر بروتوكول الرعاية تجاه العلاج بالأكسجين للمرضى بعد جراحة القلب والصدر على معلومات الممرضين

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الـخـلاصـــــة

الأكسجين ضروري لوجود الحياة خاصة للمرضى الذين يخضعون لجراحة القلب والصدر،لا يمكن إجراء جراحة القلب دون العلاج المستمر بالأكسجين لتحسين جميع مراحل العلاج .**هدف الدراسة:** هواستكشاف تأثير بروتوكول الرعاية فيما يتعلق بالعلاج بالأكسجين للمرضى بعد جراحة القلب والصدر على معلومات الممرضين. **التصميم:** تم استخدام بحث شبه تجريبي لمجموعة واحد (قبل – بعد). **مكان الدراسة:** تم تنفيذ الدراسة في وحدات العناية المركزة بمستشفى السلام ومجمع الشفاء الطبي ومستشفى الزهور التابعة لمستشفيات هيئة الرعاية الصحية المصرية بمدينة بورسعيد. **البحث** :تضمنت الدراسة عينة من 50 ممرضة تعمل في وحدات العناية المركزة وجراحة القلب والصدر بعد العملية الجراحية و50 مريضًا في الأماكن السابقة في وقت جمع البيانات. **أدوات جمع البيانات** :تم استخدام أداة أ لجمع البيانات، الأولى، استبيان معارف الممرضات. **النتائج:** أشارت نتائج الدراسة إلى انخفاض مستوى المعرفة لدى الممرضات المدروسات فيما يتعلق بالعلاج بالأكسجين للمرضى بعد جراحة القلب والصدر قبل تنفيذ بروتوكول الرعاية، في حين كان هناك تحسن في مجموع درجات المعرفة للممرضات المدروسات فيما يتعلق بالعلاج بالأكسجين للمرضى بعد جراحة القلب والصدر بعد تطبيق بروتوكول الرعاية مع وجود فروق ذات دلالة إحصائية عالية. **الخلاصة:** كان بروتوكول الرعاية فعالاً في تحسين معرفة الممرضات فيما يتعلق بالعلاج بالأكسجين للمرضى بعد جراحة القلب والصدر. **التوصيات:** يجب عمل دورات تدريبية وورش عمل مستمرة للحفاظ على الإدارة الآمنة للعلاج بالأكسجين والجودة القياسية للمساعدة الطبية للمرضى الذين يتلقون العلاج بالأكسجين.

الكلمات المرشدة :جراحة القلب والصدر, بروتوكول الرعاية , معلومات الممرضين, العلاج بالأكسجين.