INJNS (37)1 (2024) 112-121

Iraqi National Journal of Nursing Specialties

Journal homepage: https://injns.uobaghdad.edu.iq/index.php/INJNS

Effectiveness of Nurse-Led Interventional for Preventing Complications of Postoperative Open Heart Surgery

Nadia Bahir Azeez, MSc.*; Hussein Hadi Atiyah, Ph.D.**.

* Clinical Nurse Specialist, AL-Nasiriyah Heart City, Ministry of Health and Environment.

Email: nadia.aziz2102m@conursing.uobaghdad.edu.iq.

** Adult Nursing Department, College of Nursing, University of Baghdad.

Email: husseinatia@conursing.uobghdad.edu.iq

ARTICLE INFO

Article History

Received: 14/04/2023
Accepted: 12/06/2023
Published: 30/06/2024

Keywords:

Interventional Program,
Open Heart Surgery,
Post-Operative Complications,
Nurses-Led

ABSTRACT

Objective(s): The aim of this study is to determine the effectiveness of an interventional program on the knowledge of the nursing staff for prevention of post-operative open heart surgery complications.

Methods: A quasi-experimental design was conducted for the timeframe 26th of December, 2022 to the 2ed of April, 2023. A non-probability purposive sample was used to select 60 nurses at the intensive care unit, the data was gathered through a questionnaire filled out by the nurses. The descriptive and inferential statistic was used to analyze the data by SPSS version (24).

Results: The findings revealed nursing staff at both groups recorded inadequate level of knowledge for preventing complication of open heart surgery. The intervene group recorded a good level of knowledge after interventional program, and their mean and SD of responses before and after the program were (6.67 ± 4.130), (21.27 ± 1.484). The statistics showed a significant difference of knowledge for the intervene group only.

Conclusions: The interventional program served as an effective educational tool for boosting nurses' knowledge of how to prevent complications following open heart surgery.

Recommendations: Nurses need to boost their knowledge periodically for prevention of post-operative open heart surgery complications based on evidence based practice.

*Corresponding author at: Clinical Nurse Specialist, AL-Nasiriyah Heart City, Ministry of Health and Environment, Iraq. **Email**: nadia.aziz2102m@conursing.uobaghdad.edu.iq. (N. B. Azeez). **ORCID**: https://orcid.org/0009-0006-5993-7166, https://doi.org/10.58897/kscg8p88

فاعلية التداخل بقيادة ممرض لمنع مضاعفات ما بعد عملية القلب المفتوح

المستخلص

الأهداف: الهدف من هذه الدراسة هو تحديد فاعلية البرنامج الارشادي في معارف الملاك التمريضي لمنع مضاعفات ما بعد عملية القلب المفتوح.

المنهجية: تم إجراء تصميم شبه تجريبي للفترة من ٢٦ كانون الأول ٢٠٢٢ إلى ٢ نيسان ٢٠٢٣. استخدمت عينة غير احتمالية ، غرضية لاختيار 60 ممرض في وحدة العناية المركزة ، وتم جمع البيانات من خلال استبيان ملئ من الممرضين. تم استخدام الاحصائيات الوصفية و الاستدلالية لتحليل البيانات من خلال برنامج SPSS الاصدار (24).

النتائج: كشفت النتائج ان طاقم التمريض في المجموعتين سجلوا مستوى من المعارف غير كافي لمنع مضاعفات ما بعد عملية القلب المفتوح. بينما سجلت المجموعة التجريبية مستوى جيد من المعارف بعد البرنامج التداخلي ، و ان متوسط اجاباتهم قبل و بعد البرنامج كان (4.130 ± 6.67) و (1.484 ± 21.27) . اظهرت الدلالات الاحصائية وجود فرق معنوي في معارف المجموعة التجريبية فقط.

الاستنتاجات: البرنامج الارشادي استخدم كأداة تعليمية فاعلة لتعزيز معارف الممرضين لكيفية منع المضاعفات ما بعد عملية القلب المفتوح.

التوصيات: يحتاج الممرضين الى تعزيز معارفهم بصورة دورية لمنع مضاعفات ما بعد عمليه القلب المفتوح بناء على الممارسة القائمة على الدليل.

الكلمات المفتاحية: البرنامج الارشادي ، جراحة القلب المفتوح، مضاعفات ما بعد الجراحة، قيادة ممرض.

Introduction

One of the main causes of death worldwide is the cardiovascular disorder. However, the advance surgery, medicine, and adoption of adequate practices were reduce the mortality rate of individuals with cardiovascular disorders. Surgical traeatment is the tratment of choice, although the complication postoperatively is the difficult and has become exponentially more complex over time [(1)].

Postoperative complication after heart surgery are neumerous, the most frequent complication are acute myocardial infarction, atrial fibrillation with extracorporeal circulation, pulmonary dysfunctions, pneumothorax, pneumonia, diaphragmatic dysfunction, pulmonary thromboembolism, and acute renal failure. Death rates from pneumonia, acute respiratory distress syndrome, and acute renal insufficiency requiring dialysis were recordethe higher incidence [(2)].

Heart surgery is complicated operation for treating cardiovascular ailments, particularly when the disorder is located in the coronary and valvular lesions [(3)]. Postoperative care immediately, 24 hours after surgery, and the Intensive Care Unit (ICU) are essential intensive care that delivered over this period, it is related to the surgical success and adequate patient recovery [(4)]. Such care must be taken to avoid neurological, pulmonary, cardiovascular, hematological, and viral complication. The nursing team's role is crucial in this situation since it involves constant patient observation and swift decision-making due to the postoperative nature of cardiac surgery. These specialists must recognize and avoid such issues, taking quick action and limiting hospital stays [(5)].

The nursing care plan is crucial parts of ICU patient care, and its strategies is encouragement of educational attainment. Nursing care can be improved by nurse education that is conducted and organized in accordance with the needs of nurses and sound principles [(6)] .

Each nurses has a distinct personality and set of learning skills [(7)]. Training the staff of nursing and improve their knowledge periodically is supposed to be one

components to care of patient with cardiovascular diffect [8]. As educational programs are basic method to develop trainers knowledge and skills, the current interventional program is expected to improve nurses knowledge for preventing postcardiac complication. Therfore, the essential key to improve nurses knowledge is provided according to evidence base practice [9].

The nurses at critical care units need to be equipped with a comprehensive care, and evaluate their provided care based on their planning and management. The professional nurses individualize adequate base of knowledge to provide specific practice according to patients` problems [10].

Methods

Study Design and Setting

The study design was a quasi-experimental design, pre-test and post-test design with control group, to exam the effectiveness of the interventional program. The study conducted for the timeframe 26th of December 2022 to the 2ed of April 2023. The study has been conducted at the Intensive Care Unit of AL-Nasiriyah Heart Centre, Iraq. The only center specialized with cardiovascular disorder in the city, that include 125 bed distributed for open heart surgery, resuscitation, ICU for both adult and pediatric, and catheterization units for care and operation.

Study Sample and Sampling

A non-probable sample of (60) nurses at AL-Nasiriyah Heart Centre were selected to participated in the study. The sample size was calculated Raosoft application, the minimum sample size is 60 nurses, which provides a sufficient level of accuracy for the current study. The sample divided into two groups equally.

The Constructed Program

Prior to establish the interventional program, a first needs assessment showed, 70% of nurses were lack of sufficient information for preventing complication of post cardiac surgery. A planned program was provided based on the guidelines of the American Heart Association AHA, that recommend postoperative care and follow up of open heart surgery [11]. The provided program integrating the latest guidelines AHA that include recommendation that reduce risk issue after cardiac surgery.

Data Collection and Study Instruments

The data collection started from February to May 2023. The data was collected by self-administrative method. The study sample was divided into two groups and investigated their knowledge pre-test. The experimental group exposed to the intervention program only. The both groups investigated their knowledge at post-test 1 and 2.

The participants` socio-demographic data were collected by interview questionnaire sheet, including their sex, age, level of education, experience, previous training courses, and self-dependent education for prevention of post-operative open heart surgery complications.

Nurses knowledge of prevention post-operative open heart surgery complications was evaluated by a questionnaire format that including 25 MCQ with four answer options. The rating score of answers was (1) for the correct and (0) for incorrect answers, while the level of knowledge was evaluated Poor= 0-0.33, Fair= 0.34-0.67, Good= 0.68-1.

Validity and Reliability of Study Instrument

A panel of 13 professionals with more than five years of experience in their specialty decided on the validity questionnaire. The reliability of study tools determine by Alpha Cronbach r = (0.843) which means that the questionnaires had adequate level of internal consistency.

Ethical Consideration

The Ethical Research Committee at the College of Nursing, University of Baghdad approved the study protocol. In addition, to the written consent form of the nurses after reviewing study purpose. The participants were free to participate and can withdraw at

any time if they are uncomfortable or irritated with any of the questions. The confidentiality of the data used for scientific purposes related to the research only.

Data Analysis

The analysis of the data was conducted by the Statistical Package for the Social Sciences (SPSS) version 24. Descriptive statistics (frequency, percentage, mean of score, and standard deviation) and inferential statistical (cronbach alpha, spearman's rank correlation coefficient, and paired sample T-test) were used to examine the data.

Results

Table 1. Distribution of Nurses by their Socio-Demographic Characteristics.

No.	Characteristics		Intervene group N=30		Control group N=30	
			F	**%**	**F**	**%**
1	**Sex**	Male	9	30	12	40
		Female	21	70	18	60
2	**Age**	23 – 27 year	14	46.7	5	16.7
		28 – 32 year	12	40	16	53.3
		33 – 37 year	3	10	5	16.7
		38 year and more	1	3.3	4	13.3
		Mean ± SD	**28.6 ± 3.7**		**31.4 ± 4**	
3	**Level of education**	Secondary school in nursing	1	3.3	0	0
		Diploma in nursing	9	30	12	40
		Bachelor in nursing	20	66.7	18	60
4	**Years of ICU Experience**	1 – 5	21	70	21	70
		6 – 10	7	23.3	6	20
		11 – 15	2	6.7	3	10
		Mean ± SD	**4.7 ± 3.2**		**5.4 ± 3.4**	
5	**Participate in training course**	No	7	23.3	7	23.3
		Yes	23	76.7	23	76.7
6	**Self-development in field**	No	1	3.3	9	30
		Yes	29	96.7	21	70
7	**Sources of self-learning**	None	1	3.3	9	30
		Social media	20	66.7	12	40
		Scientific websites	8	26.7	4	13.3
		Hospital library	1	3.3	5	16.7
Total			**30**	**100**	**30**	**100**

No= Number, **f**= Frequency, **%**= Percentage.

Table (1) showed, 60% of the nurses in the control group and 70% in the intervene group were female, and remaining were male. The average age of the intervene group is 28.6 ± 3.7 years old with 46.7% at the age group of 23-27 years old. The average age of the control group is 31.4 ± 4 years in which 53.3% of them are associated with age group of 28-23 years old.

In terms of educational attainment, high percentage of nurses have a bachelor's degree in nursing of both groups (66.7%, 60%) respectively. Regarding years of services in ICU, the highest percentage refers to 1-less than 6 years among 70% of nursing staff in the study group (M±SD= 4.7 ± 3.2 year) and 70% in the control group (M±SD= 5.4 ± 3.4 year).

Concerning participation in training courses, both groups had a success rate of participated 76.7%. Concerning self-development in field, nurses depend on the social media as source of knowledge (66.7%, 40%) respectively.

Table 2. Nurses` Knowledge for Prevention of Post-Operative Open Heart Surgery Complications.

no.	Nurses` Knowledge	Intervene Group (N=30)				Control Group (N=30)			
		Pre-test		Post-test		Pre-test		Post-test	
		f (%)	M	f (%)	M	f (%)	M	f (%)	M
1	Off pump heart surgery is an open-heart surgery that does not require the use of an artificial heart-lung machine	8 (26.7%)	.27	27 (90%)	.90	9 (30%)	.30	14 (46.7%)	.47
2	A closed chest massage is an effective as open chest massage that does not include (CPR%).	10 (33.3%)	.33	23 (76.7%)	.77	11 (36.7%)	.37	11 (36.7%)	.37
3	A Hyporeflexia sign is an indication of magnesium poisoning?	8 (26.7%)	.27	23 (76.7%)	.77	5 (16.7%)	.17	12 (40%)	.40
4	The defects of TOF are Ventricular septal defect, pulmonary stenosis, aortic over riding, & right ventricular hypertrophy	8 (26.7%)	.27	29(96.7%)	.97	14 (46.7%)	.47	15 (50%)	.50
5	CABG is the most common surgical procedure that improves blood flow to the heart to treat coronary heart disease	7 (23.3%)	.23	25 (83.3%)	.83	10 (33.3%)	.33	11 (36.7%)	.37
6	Warfarin should be discontinued before open heart surgery two weeks of date of the operation	5 (16.7%)	.17	26 (86.7%)	.87	7 (23.3%)	.23	11 (36.7%)	.37
7	Surgical bleeding is the bleeding that occurs early after the operation when the coagulation study is almost normal	3 (10%)	.10	21 (70%)	.70	4 (13.3%)	.13	5 (16.7%)	.17
8	The normal value of PH is 7.35-7.45	5 (16.7%)	.17	24 (80%)	.80	2 (6.7%)	.07	3 (10%)	.10
9	Increased breathing rate is the change that we notice due to the increase in carbon dioxide and hydrogen ion in the body	5 (16.7%)	.17	27 (90%)	.90	13 (43.3%)	.43	15 (50%)	.50
10	Complete heart block is electrical abnormality of the heart that occurs due to damage to the atrioventricular node	27 (90%)	.90	29 (96.7%)	.97	22 (73.3%)	.73	24 (80%)	.80
11	Stroke (CVA%) are risks commonly associated with atrial fibrillation (AF%)	8 (26.7%)	.27	28 (93.3%)	.93	6 (20%)	.20	11 (36.7%)	.37

12	Pulmonary edema is the respiratory condition most associated with pink, frothy sputum	8 (26.7%)	.27	23 (76.7%)	.77	13 (43.3%)	.43	13 (43.3%)	.43
13	Surgical site infection is the most common health care acquired infection (HAI%) among hospitalized patients	4 (13.3%)	.13	28 (93.3%)	.93	5 (16.7%)	.17	8 (26.7%)	.27
14	After heart surgery, if the patient's blood pressure is 126/80. The mean arterial pressure (MAP%) is 95 mm Hg	6 (20%)	.20	28 (93.3%)	.93	5 (16.7%)	.17	8 (26.7%)	.27
15	Hypocalcemia happens to red blood cells after storage for 3 weeks	9 (30%)	.33	27 (90%)	.90	11 (36.7%)	.37	11 (36.7%)	.37
16	Why insulin is useful for potassium regulation because It prevents potassium from moving out of the cells	9 (30%)	.33	28 (93.3%)	.93	9 (30%)	.30	12 (40%)	.40
17	The suctioning process (sectioning%) should last about 15 seconds	2 (6.7%)	.07	23 (76.7%)	.77	0 (0%)	.00	0 (0%)	.00
18	Symptoms of increased blood volume include: Edema, Crackles, and Shortness of breath and wheezing	7 (23.3)	.23	24 (80%)	.80	11 (36.7%)	.37	15 (50%)	.50
19	the normal percentage of magnesium is 1.3-2.1 mg/Dl	7 (23.3%)	.23	25 (83.3%)	.83	8 (26.7%)	.27	13 (43.3%)	.43
20	In Fully compensated condition when the pH normal, but both HCO3 and CO2 are abnormal	3 (10%)	.10	24 (80%)	.80	4 (13.3%)	.13	8 (26.7%)	.27
21	Severe hypoxemia is the main causes of high lactate level after open heart surgery	0 (0%)	.00	25 (83.3%)	.83	0 (0%)	.00	0 (0%)	.00
22	Oliguria is defined as urine output less than 0.5 ml/kg/hour	6 (20%)	.20	24 (80%)	.80	9 (30%)	.30	9 (30%)	.33
23	hemodynamically stable patients with no bleeding can be considered eligible for intubation within 4-8 hours after surgery	3 (10%)	.10	25 (83.3%)	.83	3 (10%)	.10	6 (20%)	.20
24	The water cover the most important component of the drains system because It allows air to escape from the pleural space through the chest tube	9 (30%)	.30	27 (90%)	.90	8 (26.7%)	27	13 (43.3%)	.43
25	Protamine is used after the operation to reverse the effect of heparin	1 (3.3%)	.03	25 (83.3%)	.83	0 (0%)	.00	1 (3.3%)	.03

f= Frequency, **%**= Percentage, **SD**= Standard deviation, **M**: Mean, **Assessment**= (Poor= 0-0.33, Fair= 0.34-0.66, Good= 0.67-1%).

Table (2) presented the items of nursing staff's knowledge about the prevention of post-

operative open heart surgery complications; the findings in the study group reveal that nursing staff showed a poor level of knowledge during the pre-test time of all items of the scale except item (10). While the post-test result indicated, their level of knowledge among all items was good.

The nursing staff in the control group showed fair level of knowledge during the pre-test time among all items except item (10), the participants still showed inadequate level (poor level) of knowledge of preventing the complication.

Table 3. Effectiveness of the Interventional Program on Nursing Staff's Knowledge for Preventing of Post-operative Open Heart Surgery Complications

Knowledge	Intervene Group (N=30%)						Control Group (N=30%)					
	M.	SD	t	df	p-value	Sig.	M.	SD	t	df	p-value	Sig.
Pre-test	6.67	4.130	21.553	29	.001	H.S	6.23	2.812	-8.876	29	.061	N.S
Post-test	21.27	1.484					8.33	2.426				

M= Mean, **t**= t-test, **df**= Degree of freedom, **p**= Probability, **Sig**= Significance, **HS**= High Significant, **N.S**= Not Significant.

Table (3) exhibited, a significant difference between the nurses` knowledge (intervene group) before and after program intervention at p-value=0.001. Among those in control group, there is no significant difference in their knowledge during study period.

Discussion

According to the study finding, there are 60 nurses in the sample (table, 1), their average age in the study group is (28.6± 3.7) years, with high percentage of them falling into the 23–28 years. The average age of the nursing staff in the control group is (31.4 ±4) years, with highest percentage at the 28- to 33 year. The result is in line with a descriptive study at Baghdad Teaching Hospital reflected that, less than half of nurses (48.3%) were in the age range of (21-30) years old [12].

The study findings revealed, nurses female were more than male. 60% of the nursing staff in the control group and 70% of the study group were female, whereas all other staff members were male. These results are similar to a quasi-experimental study carried out in Al-Diwaniyah, which showed the participants in both groups were largely female. This is not surprising given that female make up the majority of nurses worldwide [13]. While another study, showed male nurses made up 64% of the sample [14].

In terms of educational level, more than half of the participants of both groups reported the bachelor's degree in nursing qualification. The finding was comparable to one of an Iraqi descriptive research, that showed the bachelor's degree holders in nursing make up 54%% of nurses [15].

According to the data, most of the participants (70%) had a mean duration of experience in the ICU about 1-5 years. The result is similar to the Iraqi study which stated that, the large percentage of nurses have less than five years of ICU experience [16].

Concerning participation in training courses, most nurses of both groups report success attended the training courses. This result is not consisted with Al Nasiriyah study that stated, 47.6% of the nurses who work in the ICU and surgical department did not attend training courses on complications following open heart surgery [17]. As well, a study in Baghdad stated that 80% of the sample didn't participate in any training sessions [18].

Concerning self-development in field, high percentage of nurses depend social media as sources of self-development.
This result is consistent with pre-experimental study in Iraq which stated that, the majority of nurses depend on the social media as a self-learning source [19].

Table (2) reflected the result of nursing staff knowledge about post-operative open heart surgery complications. The intervene group showed their level of knowledge is poor in

general during the pre-test period (66.7%, M SD= 6.67 ±4.130). while they demonstrated good knowledge during the post-test period (100%, MSD= 21.27 ±1.484), indicating substantial improvements in their knowledge.

With regards the nurses of control group, the data showed their level of knowledge at pre-test period (70%, M±SD = 6.32 ± 2.812) and post-test time (60%, M±SD=8.33±2.426) were poor, that indicate no significant change in knowledge

This result is consisted with pre-experimental study in Iraq which showed that, there is an improvement of nurses' knowledge after implantation of an interventional program, the overall knowledge level had increased from (38.9%) on the pretest to (84.64%) on the follow-up test [20]. As well as, a study conducted in Karbala demonstrated, the study group reactions improve in comparison to the control groups when the program is implemented [21].

Nurses` responsibilities required to assess the danger signs after surgery such control bleeding and hemostasis. Reference to standard guideline for caring post-operative cardiac patients can minimize complication and ensure adequate provided care on evidence base knowledge [22].

The statistics showed a significant differences between nurses knowledge before and after program intervention to develop the participants level of knowledge effectively. This result is agreed with quasi experimental study that concluded, the well-constructed interventional program can improve nurses` knowledge and professionality to be able provided patients a qualified care. Such programs can increase nurses confidence and update their knowledge [23].

Conclusion

The study confirms that, the interventional program is a successful training tool for boosting nurses' knowledge toward the prevention of post-operative open heart surgery problems, since there is a lack of nurses' knowledge on the complication prevention.

Recommendations

The authors recommend a successful launching the continuous education regarding prevention of post-operative complications for the various departments of the hospital. Future studies dealing with how to prevent complications following open heart surgery. Commit to the standard guideline for preventing such complication.

References

1. Lisboa Cordeiro, A. L., Matos, A. A., Bispo Silva, D., De Jesus, M. L., & Guimarães, A. R. (2020). Incidence of complications after cardiac surgery. *In International Physical Medicine & Rehabilitation Journal* (Vol. 5, Issue 1, pp. 25–28). https://doi.org/10.15406/ipmrj.2020.05.00224
2. Stammers, A. N., Kehler, D. S., Afilalo, J., Avery, L. J., Bagshaw, S. M., Grocott, H. P., ... & Arora, R. C. (2015). Protocol for the PREHAB study—Pre-operative Rehabilitation for reduction of Hospitalization After coronary Bypass and valvular surgery: a randomised controlled trial. *BMJ open*, *5*(3), e007250.
3. Dessotte, C. A. M., Furuya, R. K., Rodrigues, H. F., Rossi, L. A., & Dantas, R. A. S. (2018). Relação entre estressores e instabilidade hemodinâmica no pós-operatório de cirurgia cardíaca. *Texto & Contexto-Enfermagem*, 27.
4. Silva, L. D. C., Melo, M. V. P., Rolim, I. L. T. P., & Dias, R. S. (2018). Intervenções de enfermagem em pacientes de unidade de terapia intensiva cardiológica de um hospital universitário submetidos à cirurgia de revascularização do miocárdio. *J Manag Prim Health Care [Internet]*, *9*, e12.
5. Reisdorfer, A. P., Leal, S. M. C., & Mancia, J. R. (2021). Nursing care for patient in post operatory heart surgery in the Intensive Care Unit. *Revista brasileira de enfermagem*, *74*(2), e20200163. https://doi.org/10.1590/0034-7167-2020-0163

6. Battaglini, D., Robba, C., Caiffa, S., Ball, L., Brunetti, I., Loconte, M., ... & Pelosi, P. (2020). Chest physiotherapy: An important adjuvant in critically ill mechanically ventilated patients with COVID-19. *Respiratory physiology & neurobiology*, *282*, 103529.
7. Abdul-Wahhab, M. M., & Ahmed, S. A. (2020). Effectiveness of Self-Instructional Strategy and the Traditional Teaching Approach on Nursing Students' Knowledge toward Cardiopulmonary Resuscitation at the College of Nursing in University of Baghdad: Randomized Comparative Trial. *International Journal of Pharmaceutical Research*, *12*(2).
8. Barnason, S. , White-Williams, C. , Rossi, L. P. , Centeno, M. , Crabbe, D. L. , Lee, K. S. , & Wood, K. (2017). Evidence for therapeutic patient education interventions to promote cardiovascular patient self-managemet: A scientific statement for healthcare professionals from the American Heart Association. *Circulation: Cardiovascular Quality and Outcomes*, 10(6), 25.
9. Talboom-Kamp, E. P. W. A. , Verdijk, N. A. , Kasteleyn, M. J. , Harmans, L. M. , Talboom, I. J. S. H. , Numans, M. E. , & Chavannes, N. H. (2017). Effect of a combined education and eHealth programme on the control of oral anticoagulation patients (PORTALS study): A parallel cohort design in Dutch primary care. *BMJ Open*, 7(9), e017909.
10. Ahmed, A. , Khalil, N. , & Morsy, W. (2017). Stressors encountered by patients undergoing open-heart surgery at a Cairo University Hospitals. *Egyptian Nursing Journal*, 14, 78–86.
11. American Heart Association AHA (2020). Guidelines Pocket Guides - Professional Heart Daily | American Heart Association
12. Al-Ganmi, A. H. A., Ahmed, S. A., & Abed, K. B. (2014). Assessment of Nurses Knowledge Concerning Type 2 Diabetes Mellitus Management with Insulin Therapy in Intensive Care Units at Baghdad Hospitals. *kufa Journal for Nursing sciences*, *4*(3).
13. Al-Naeli, K., & Hassan, H. (2021). Effectiveness of an Interventional Program on Nursing Staffs' Practices toward Prevention of Peripheral Intravenous Cannula Complications in Al-Diwaniyah Teaching Hospital. *Kufa Journal for Nursing Sciences*, *11*(1), 1-11.
14. HadiAtiyah, H., & Abdul-Wahhab, M. M. (2016). Nurses Knowledge toward Essential Care for Adult Patients Undergoing Mechanical Ventilation at Critical Care Unit in Baghdad City. *Higher education*, *4*(8.0), 100-0.
15. Ahmed, S. A., Jasim, A. H., Katea, M. J., Foaad, A. S., Hashim, H. A., & Noori, D. A. (2019). Assessment of Nurses' knowledge concerning Prevention of Central Venous Catheter Infection in Intensive Care Units at Baghdad Teaching Hospitals. *kufa Journal for Nursing sciences*, *9*(1), 1-7.
16. Rajih, Q. (2020). Effectiveness of an Education Program on Nursing Staffs' Knowledge about Infection Control Measures at Intensive Care Unit in Al-Diwaniya Teaching Hospital. *Iraqi National Journal of Nursing Specialties*, *33*(1), 85-92.
17. Hameed, A. T., & Dawood, H. A. (2022). Nurses knowledge toward post open heart surgeries complications in Nasiriyah heart center. International Journal of Health Sciences, 6(S3), 8966–8977. https://doi.org/10.53730/ijhs.v6nS3.8488
18. Hassan, H. B., Abbas, S., & Abdul-Wahhab, M. M. Nurse's Knowledge toward Cardio-Pulmonary Resuscitation at critical care unit in Baghdad city. *Higher education*, 5(10.0), 100-0.
19. Waheed, N. H., & Abdulwahhab, M. M. (2022). Nurses' Knowledge and Practices concerning Physiotherapy Protocol at Intensive Care Units in AL-Nasiriyah City. *Iraqi National Journal of Nursing Specialties*, *35*(1).
20. Waheed, N. H., & Abdulwahhab, M. M. (2022b). Effectiveness of Interventional Program on Nurses' Practices concerning Physiotherapy Protocol at Intensive Care Units in AL-Nasiriyah City. *Pakistan*

Journal of Medical & Health Sciences, *16*(04), 850-850.

21. MubdirHadiDhakeel, H. H. (2021). Effectiveness of an Educational Program on Nurses' Knowledge toward Prevention of Pneumothorax Attendant with Mechanical Ventilation at Intensive Care Unit in AL-Hussein Medical City Hospital in Holy Karbala. *Annals of the Romanian Society for Cell Biology*, *25*(6), 3876-3883.
22. Henedy, D.W., & El-Sayad, D.H. (2019). Nurses ' Knowledge and practice regarding patient ' s safety Post Cardiac Catheterization. *Journal of Nursing and Health Science, 8 (3),* 43-52.
23. Majeed, M., & Hamza, R.A. (2021). Effect of Clinical Guideline Concerning Cardiopulmonary Bypass on Nurses' Knowledge in Open Heart Surgery Center. *Indian Journal of Forensic Medicine & Toxicology. 15(4), 3135-3141*. *https://doi.org/10.37506/ijfmt.v15i4.17249*