

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

Nadia Mostafa Elsalamony¹, Amal A. Elsheikh²,
Seham Mohamed Abd El-alem³, Wafaa Mohamed Elwan⁴

¹*B.Sc. Nursing Science - Menoufia University*

²*professor of Medical Surgical Nursing,*

³*Assistant Professor of Medical Surgical Nursing,*

⁴*lecturer of Medical Surgical Nursing,*

^{2,3,4} *Faculty of Nursing, Menoufia University*

Abstract: Background: Post anesthesia care unit (PACU) is considered as the gold standard practice for the management of post operative complications. **Purpose:** To assess the effect of applying post anesthesia care competency program on nurses' knowledge and practices. **Design:** A quasi experimental research design (one group pre/posttest) was utilized. **Setting:** The study was conducted in post anesthesia care unit in general surgery and orthopedic surgery at Menoufia University Hospital. **Sampling:** A convenience sample of all available nurses (50) nurses who are working in the selected setting were selected. **Instruments:** Two instruments were used structured interview questionnaire about post anesthesia care and observational checklist for post anesthesia care competency assessment checklist). **Results:** There was highly statistical significant improvement in nurses' total knowledge mean score in post program (78.2±4.31) and in follow- up (77.6±3.99) than preprogram (51.8±5.92). Also, there was highly statistically significant improvement in nurses' total mean practice related to post anesthesia care in post program (97.6±4.70) and follow up (93.8±5.59) than preprogram (49.7±15.1). **Conclusions:** Post anesthesia care competency program was effective in improving nurses' knowledge and related to post anesthesia care unit. **Recommendations:** The study suggested that post anesthesia care unit should be equipped with simple illustrated educational guidelines covering knowledge & practice about post anesthesia care.

Key words: *Competency program, nurses 'knowledge, practice, post anesthesia care*

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

Introduction:

Post anesthesia care units (PACUs) have been shown to enhance recovery from anesthesia and are correlated with improved surgical outcomes. It is staffed by professionals trained in the recognition and response of postoperative complications. PACUs should have delineated spaces for each patient, ideally with a bed or a reclining chair. As with all units, natural light as well as sufficient airflow is optimal for patient safety and satisfaction, though as patients often spend only limited periods of time in the recovery room (RR), these qualities can be prioritized less when necessary (Joshi, 2021).

Patients are admitted to a PACU for continuous observation of their physiological condition, maintaining airway, breathing and cardiovascular status. During the immediate post anesthesia phase, Patients have a higher chance of unfavorable outcomes and are susceptible to instability with an increased risk of adverse events and remain in the PACU until they are safe to be transferred to a ward or second-stage recovery unit based on specific discharge criteria (Skovbye et al., 2022).

Nurses assess the patient for hemodynamic stability, acquire regular vital signs, perform physical exams to monitor for bleeding and other postoperative complications, evaluate patients for pain and nausea, provide medication as needed for postoperative orders, draw labs, assess for cognition and recovery from anesthesia and readiness to transition out of the

PACU. Nurses are typically the first-line providers to initiate a call to action when recognizing a deteriorating patient. Indeed, communicating their critical findings to the supervising practitioner is among the important role's that nurses serve in the PACU (Brentjens& Martinez,2023).

To enhance a safe and successful recovery after surgery and anesthesia, the nurse working in the PACU should have special training in postoperative care. It has long been established that nurses working in PACU should be able to provide specialized nursing care to ensure safe and successful recovery after surgery and anesthesia. As it is essential to detect and prevent complications due to surgery or anesthesia, the patients are closely monitored in PACU until they are stable enough to be transferred to wards or to the patients' homes after surgery (Jaensson et al., 2022).

The International Council of Nurses defines nurse competence as comprising knowledge, skills, and judgement. It is important to note that nurse competence is not a goal but a journey. As nurses acquire deeper knowledge and skills, they move through five competence levels, beginner, advanced beginner, competent, proficient, and expert to enable safe and successful recovery for patients who are taking general anesthesia during surgery (Hansen., 2021).

Significance of the study:

PACUs play an important role in the provision of safe patient's care. The

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

time immediately following an operation or procedure is a critical period for the patient's recovery. The intensive nursing observation of patients in the PACU by nurses can result in the early detection of complications and adverse events. Postoperative complications among patients admitted to PACU are frequent encounters and approximately account about 10% of patients undergoing surgery in the USA are at high risk of complications (Smedley& Nicholas ,2022).

Major postoperative complication and these occurrence are important predictors of functional recovery and long-term survival. As reported by Abebe et al., (2022), most patients 74.34% had mild to moderate pain whereas 47% of them were hypothermic in the PACU. About 12.71% of patients had experienced postoperative nausea and vomiting. Patients were developed respiratory and airway related adverse events 43.32% and cardiovascular related adverse events 18.9% (Kifle et al., 2022).

Recovery from anesthesia is a hazardous process and patients require a high standard of care until the recovery is complete. So that the nurses must be competent when providing postoperative care in this unit to prevent postoperative complications and enable safe successful recovery for patients undergoing surgery. So, it is hoped that the current study opens the door for evidence -based practice to determine the effect of applying post anesthesia care competency program

on nurses' knowledge and practice for patient undergoing surgery and anesthesia (Chekol et al., 2021).

Purpose of the study

The purpose of the current study is to assess the effect of applying post anesthesia care competency program on nurses' knowledge and practices.

Research hypothesis:

- The nurses' knowledge level about post anesthesia care will be higher on post program than preprogram.
- The nurses' practice level about post anesthesia care will be higher on post program than preprogram.

Operational definition:

- Post Anesthesia Care Competency: is operationally defined as the nursing care giving to the patients undergoing surgery to prevent or decrease of errors, adverse effects or complications that may occur and cause harm to patients such as respiratory complications, cardiovascular complications, hypothermia, postoperative pain, postoperative nausea and vomiting (PONV) and other adverse events.
- Nurses' Knowledge: is operationally defined as a systematic information that will be designed by researcher to update and increase nurses' information about post anesthesia care as definition and characteristics of post anesthesia care unit, role of nurse, complications and its management in post anesthesia care unit evaluated by structured interview questionnaire about post anesthesia care (instrument one).

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

- Nurses' practice: is operationally defined as procedure that a researcher will be develop in order to increase the efficiency of nurses in the PACU after surgery such as airway management, oxygen therapy and postoperative nausea& vomiting management, pain management, assessment of surgical wound and discharge from PACU evaluated by observational checklist for post anesthesia care competency assessment checklist (instrument two).

Methods:

Research Design:

A quasi experimental research design (one group pre/posttest) was utilized to achieve the purpose of this study.

Setting:

The study was conducted in post anesthesia care unit in general surgery and orthopedic surgery at Menoufia University Hospital.

Sample:

A convenience sample was used to select all available nurses (50 nurses) who are working in the previous selected setting and willing to participate in the study.

Instruments of the study:

Two instruments were utilized by the researcher in this study. These instruments were as the follow:

Instrument one: -Structured interview questionnaire:

It was developed by the researcher based on the review of the related literature Alipoon, 2020 and Dahlberg

et al., 2022), to assess socio demographic data and nurses' knowledge level. It contained two parts:

- **Part 1:** Socio demographic characteristics of nurses:

It contained questions about nurse's age, gender, marital status, qualification and years of experience.

- **Part 2:** Nurses' knowledge about post anesthesia care

It was used to assess nurses' knowledge about post anesthesia care: knowledge about (PACU), communication in (PACU), respiratory system assessment, hemodynamic assessment and management, assessing the level of consciousness, fluid balance, pain management in (PACU) and management of nausea & vomiting after anesthesia and postoperative surgical wound care.

Scoring system:

Each knowledge item had three alternative responses as in the following table:

Knowledge	Score
complete	2
incomplete	1
Do not know	0

Then all marks were summed up to give the total knowledge score that categorized If the percent of total score $\geq 80\%$ (≥ 68 degree) This could indicate that the level of nurses' knowledge was considered satisfactory. If the percent of total score was $< 80\%$ (< 68 degree), this indicated that the level of nurses' knowledge was considered unsatisfactory.

Instrument two: Post anesthesia care competency observational checklist

It was developed by the researcher after reviewing the relevant literatures (Alipoon, 2020) to assess nurses' practice related to post anesthesia care. It was assessed through 34 items in 2 parts:

▪ **Part 1: Assessment of immediate care in the (PACU)**

It included 7 items e.g. identification of patient, review surgeon's orders, discharge of patients from PACU etc.....

▪ **Part 2: Program of immediate care in the (PACU)**

It included 27 items such as assessment of all vital signs, maintaining patent airway, assessment of the circulatory perfusion, assessment of cardiovascular and pulmonary complications, assessment of neurological responses etc.....

Scoring system:

Each item in the post anesthesia care competency observational checklist had four alternative responses in the following table:

Practice	score
Expert	3
Proficient	2
Limited ability and need help	1
Unable to perform	0

Then all items were summed up to give the total score from 0-102 that categorized as follow:

- The total score < 50% (51 degree). It indicated that the nurses' care

competency level was considered unable to perform.

- The total score from 50 <70% (51 to <72 degree). It indicated that the nurses' care competency level was considered limited ability and need significant help.
- The total score from 70 < 90% (72 to < 92 degree). It indicated that the nurses' care competency level was considered proficient capable and experienced need no assistance to complete the task.
- The total score from 90-100% (92 to 102 degree). It indicated that the nurses' care competency level was considered expert.

Validity of the instruments:

The instruments were tested for content validity by five professors in the field of Medical Surgical Nursing to ensure that data are sound and replicable, the integrity and quality of a measurement instrument are accurate and assure.

Reliability of the instruments:

The instruments were tested for reliability using test-retest method to ascertain consistency. The period between each test was 2 weeks. The reliability of instruments was done to determine the extent to which items in the instruments was related to each other. The reliability score was 'r' = 0.869 for instrument I, 'r' = 0.816 for instrument two. So, it can be concluded that all instruments have adequate level of reliability.

Ethical considerations

Approval of the Ethical and research committee decision, research No:923

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

was obtained from all nurses to participate in this study after explanation the purpose of the study. Confidentiality and anonymity of nurses was assured through coding all data and all information obtained would only be used for the purpose of the study. All participants were informed about the purpose, procedure and benefits of the study and explained that participation in the study was voluntary and they can withdraw from the study at any time without penalty. Moreover, they were assured that the nature of all instruments would not cause any physical or emotional harm to them.

Pilot study:

a pilot study was conducted on 10% (5 nurses) of the sample to assess the constructed instruments for feasibility, clarity and applicability, then the necessary modification was carried out before the main study. The nurses of pilot study were excluded from the actual study sample.

Procedure:

An official letter was sent from the Faculty of Nursing Menoufia University to the responsible authorities (the directors and the head nurses) of Menoufia University Hospital to carry out the study after explanation of the purpose of the study. Data collection extended over a period of 6 months from July 2023 to December 2023. The study was conducted on four phases: Assessment & planning, implementation, evaluation phases as a following:

Assessment Phase:

During this phase each nurse was interviewed individually and this interview took about 20 to 30 minutes to collect base line data using the following instruments: Instrument one (part one) was used to assess nurses' demographic characteristics. Part two was used to assess nurses' knowledge level regarding post anesthesia care. Instrument two was used to assess nurses' practice level regarding post anesthesia care.

Planning Phase:

A post anesthesia care competency program was developed to provide nursing care for patients post anesthesia on the basis of required standards of care and required knowledge and skills to improve nurse's knowledge and practices. Therefore, a colored illustrative booklet with pictures was prepared by the researcher including the knowledge about: definition of PACU, components of PACU, role of the nurse in the PACU, stages of patient care at PACU, the time for evaluation vital signs at every stage in PACU and knowledge about care in PACU and observational checklist that contained nurse's practice in PACU as receive hand off report of practice enter PACU etc..

Implementation phase:

Nurses were divided into 10 small groups; each group contains 4-5 nurses in each session. Each nurse obtained a copy of colored illustrative booklet and CD that contained educational program regarding post anesthesia care (knowledge and practice). The

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

Researcher applied educational program in 4 sessions: 2 sessions for theoretical part and other 2 sessions for practical part, at morning shift. The duration of each session was about 30-40 minutes and the researcher used teaching methods as lecture, group discussion, demonstration and redemonstrations.

The first session: the researcher provided nurses with knowledge about definition and characteristics of PACU, nursing care provided and role of the nurse in PACU. **The second session:** the researcher revised the previous learned knowledge and provide information about care in the PACU, complications occurred, and its management and characteristics of discharge from the PACU. **The third session** (practical session): the researcher refreshed previously learned knowledge and demonstrated procedure related to post anesthesia care that should be done in PACU that included the following: receive hand - off report as patient entered PACU and ensuring that all tubes as (o₂, drainage and indwelling catheter) were connected, attach cardiac monitor, assess of all vital signs, provide comfort, maintain patent airway, assessment of circulatory perfusion, assessment of cardiovascular and pulmonary complications, assess neurological system, monitor fluid balance (I & O).

The fourth session (practical session): the researcher revised previously learned knowledge and demonstrate procedures that should be done in PACU as airway management, pain management, postoperative nausea &

vomiting management and discharge from the PACU. Evaluation phase: Evaluation of all participants was carried out by the researcher using instrument one (part 2) and instrument two. It was done at preprogram, immediately post program and after two months (follow up). A comparison was done between preprogram, post program and follow up to determine the effect of applying post anesthesia care competency program on nurses' knowledge and practices.

Statistical analysis:

Data were collected, tabulated, statistically analyzed using an IBM personal computer with Statistical Package of Social Science (SPSS) version 22 (SPSS, Inc, Chicago, Illinois, USA). Where the following statistics were applied: Descriptive statistics: in which quantitative data were presented in the form of mean, standard deviation (SD), range, and qualitative data were presented in the form numbers and percentages. Shapiro- Wilk test was used to assess distribution of data. Analytic statistics: Chi-square test (χ^2): was used to study association between two qualitative variables.

Student t test is a test of significance used for comparison between two groups having quantitative variables normally distributed. Marginal homogeneity test and Mc Nemar test were used to study association between related qualitative variables.

Paired t test: was used to study association between related quantitative variables for one group. ANOVA (F): is a test of significance used for comparison between more

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

than two groups having quantitative variables normally distributed Spearman's correlation is a test of significance used for correlation between quantitative variables.

P -value of <0.05 was considered statistically significant.

Results

Table 1 illustrates distribution of the studied nurses according to their socio demographic characteristics. It was observed that about more than one quarter (36%) aged between 25 to <35 years and less than half of the studied nurses (46%) had 5 to 10 years of experience in PACU. Regarding gender, about two thirds of them (72%) was females. More than half of them (58%) were married. As regards to level of education, more than half of them (60%) had a technical nursing institute and only 18% had a bachelor education.

Table 2 illustrates total knowledge mean score about post anesthesia care at preprogram, post program and follow up. This table revealed that there was highly statistically significant increasing in total knowledge mean score about post anesthesia care at post program and follow up than preprogram.

Figure 1 illustrates total knowledge mean score about post anesthesia care unit at Preprogram, post program and follow up. This figure revealed that there was increase in total knowledge mean score about post anesthesia care

unit at post program and follow up than preprogram.

Table 3 presents total mean value of nurse's practice. this table shows that there was highly statistically significance increase in nurses' grand total practice about immediate care in the PACU (assessment – intervention) mean score while total practice mean score in preprogram with mean \pm SD (49.7 ± 15.1) and increase in post program with mean \pm SD (97.6 ± 4.70) and in follow up phase with mean \pm SD (93.8 ± 5.59). There was statistically significant difference between preprogram, post program and follow up for all items of immediate care in the PACU (assessment - intervention).

Fig 2 illustrates distribution of total nurses' practice levels for immediate care in the PACU. This table revealed that there was an improvement in total nurses' practice about immediate care in the PACU as 86% of nurses were experts, 14% were proficient in post program and 64% had expert practice whereas, 36% were more proficient in follow up than preprogram as 56% of nurses were unable to perform, 32% had limited ability and 12% had proficient level of practice.

Table 4 presents correlation between total knowledge and total practice for nurses at preprogram, post program and follow up. This table showed that there was highly statistically significance positive correlation between total nurses' knowledge and their total practice as p value < 0.001 .

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

Table (1): Distribution of the studied nurses according to their socio-demographic characteristics (N = 50)

Socio demographic characteristics	No.	%
Age / years		
<25years	12	24.0
25 – <35 years	18	36.0
35 – < 45 years	15	30.0
45 – 55 years	5	10.0
Gender		
Male	14	28.0
Female	36	72.0
Marital status		
Single	14	28.0
Married	29	58.0
Divorced	7	14.0
Educational level		
Secondary diploma in nursing	11	22.0
Technical institute for nursing	30	60.0
Bachelor of nursing	9	18.0
Experience / years		
Less than 5 years	12	24.0
5 – 10 years	23	46.0
More than 10 years	15	30.0

*Significant

** highly Significant <0.001

P1: comparison between pre and post program P2: comparison between pre and follow-up

P3: comparison between post and follow-up

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

Table (2): Mean score of nurses' knowledge about post anesthesia care throughout the study period (N=50):

Total knowledge items in PACU	Pre program (N=50)	Post program (N=50)	Follow up (N=50)	Paired t-test	P value
	Mean±SD	Mean±SD	Mean±SD		
Knowledge about PACU	6.42±1.71	9.32±0.86	9.20±1.08	15.1 14.4 2.20	P1:<0.001** P2:<0.001** P3:0.032*
Knowledge about communication in PACU	5.84±1.61	9.42±1.32	9.30±1.12	16.5 15.2 1.52	P1:<0.001** P2:<0.001** P3:0.135
Knowledge about respiratory assessment	13.9±1.66	18.8±1.26	17.1±0.96	19.7 15.8 16.6	P1:<0.001* P2:<0.001* P3:0.001*
Knowledge about hemodynamic assessment	10.1±1.67	14.7±1.61	14.5±1.66	22.2 20.1 2.47	P1:<0.001** P2:<0.001** P3:0.017*
Knowledge about assessing the level of consciousness	5.50±0.99	9.54±0.64	9.28±0.83	31.6 25.8 3.77	P1:<0.001** P2:<0.001** P3:0.012*
Knowledge about fluid balance assessment	3.24±0.65	5.74±0.44	5.48±0.73	27.3 18.7 2.90	P1:<0.001* P2:<0.001* P3:0.031*
Knowledge about pain management in PACU	2.46±0.50	3.90±0.30	3.86±0.35	15.1 13.5 1.42	P1:0.001** P2:0.001** P3:0.159
Knowledge about managing nausea and vomiting after anesthesia	2.10±0.67	3.86±0.35	3.80±0.45	19.9 20.7 1.13	P1:0.001* P2:0.001* P3:0.261
Knowledge about management of surgical wound in PACU	2.20±0.53	3.94±0.23	3.92±0.27	25.2 24.4 0.573	P1:0.001* P2:0.001* P3:0.569
Total knowledge	51.8±5.92	78.2±4.31	77.6±3.99	46.8 43.8 2.42	P1:<0.001** P2:<0.001** P3:0.019*

Significant

** highly Significant <0.001

P1: comparison between pre and post program P2: comparison between pre and follow-up

P3: comparison between post and follow-up

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

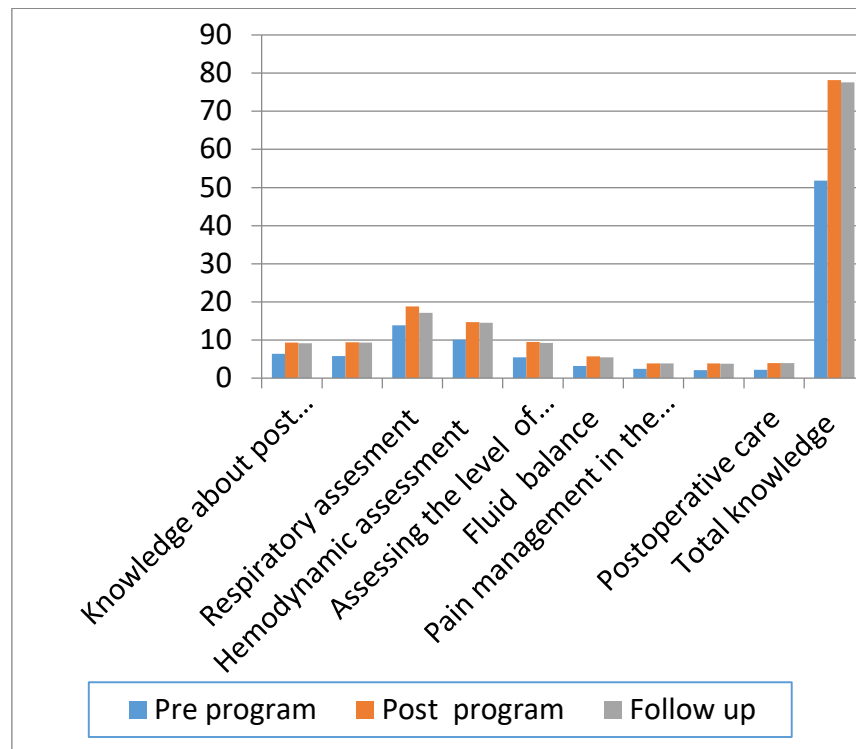


Figure (1): Mean score of nurse's knowledge about post anesthesia care unit throughout the study period (N=50)

Table (3): Mean Level of nurses' practice throughout the study period (N=50):

Nurses' practice	Pre program (N=50)	Post program (N=50)	Follow up (N=50)	Paired t-test	P value
	Mean±SD	Mean±SD	Mean±SD		
Assessment of immediate care in the PACU	9.54±3.09	19.6±2.03	18.6±2.66	27.4 27.2 3.78	P1:<0.001** P2:<0.001** P3:0.001*
Intervention of immediate care in the PACU	40.2±12.5	78.0±3.51	75.2±3.70	26.0 23.9 6.22	P1:<0.001** P2:<0.001** P3:0.001*
Total practice	49.7±15.1	97.6±4.70	93.8±5.59	29.1 29.4 8.26	P1:<0.001** P2:<0.001** P3:0.001*

*Significant ** highly Significant <0.001 P1: comparison between pre and post program P2: comparison between pre and follow-up P3: comparison between post and follow-up

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

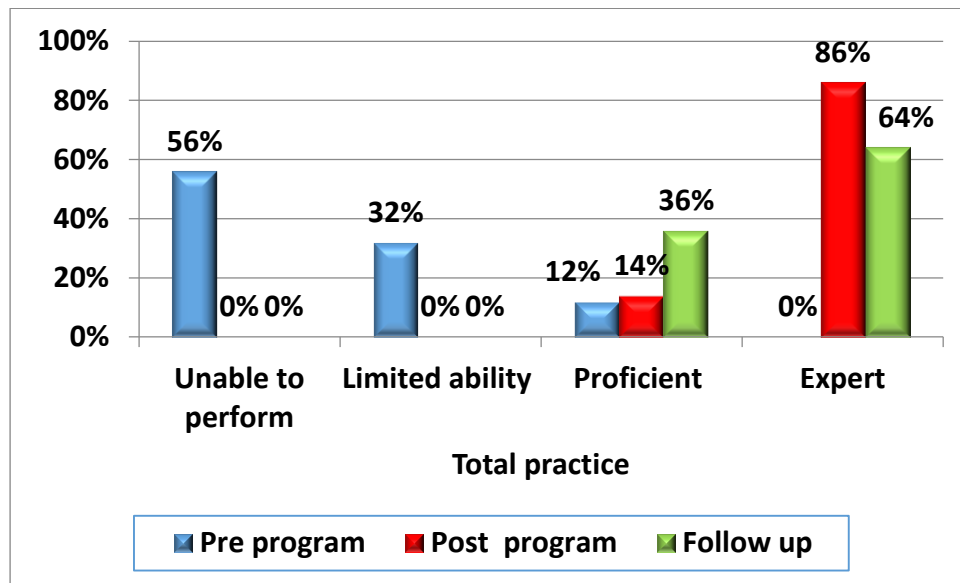


Figure (2): Distribution of the studied nurses' according to their level of practice related to immediate care in the PACU throughout the study period.

Table (4): Correlation between levels of Nurses knowledge and practice throughout the study period (N=50):

Practices	Knowledge	
	R	P value
Pre program	0.814	<0.001**
Post program	0.832	<0.001**
Follow up	0.826	<0.001**

** highly significant < 0.001

Discussion:

The post anesthesia care unit is a dynamic and acute clinical area where a patient's condition may fluctuate rapidly due to different, and challenging, factors. Recovery from anesthesia is a hazardous process and patients require a high standard of care until recovery is complete. Many problems associated with anesthesia and surgery may occur in the immediate postoperative period, and it is essential that appropriate care by trained and experienced personnel should be provided. The aim of patient

care in the PACU is to ease the transition back to the ward without complications. The care is intended for the patients' safety until they become fully awake and able to resume their daily lives (Chekol et al.,2021).

Regarding total knowledge about post anesthesia care, the result of the current study revealed that the majority of studied nurses had highly statistically significance improvement of nurses' total knowledge about post anesthesia care in post program and in follow up than in preprogram. This

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

finding is consistent with Ael-Guindy et al., (2022) who revealed that the majority of the studied nurses had reported inadequate total knowledge mean score pre implementing the program and the majority of nurses has satisfactory level of knowledge post program and follow up. These findings not supported by the results of Elsayed et al., (2023) who revealed that the majority of nurses had an unsatisfactory level of total knowledge regarding care of patients with total knee arthroplasty in PACU. The result of the present study supports the hypothesis one, the nurses' who are exposed to post anesthesia care competency program will have increase their level of knowledge on post program than preprogram.

In relation to mean total nurses' practice, there were statistically significant difference between preprogram, post program and follow up for all items of immediate care in the PACU (assessment -intervention). This result supported by Spencer & Scott, (2022) who found that the improvement in nurses' total practice about intervention of immediate care in the PACU in post program implementation. Also, this result is consistent with Dutton et al., (2021) who indicated that the majority of the staff nurses were having improvement practice in post than pre-educational program. From researcher point of view, the enhancement of nurses' practice post program might be due to highest education and training about practice necessary in PACU that applied by the researcher using assistive material as guideline booklet

and audiovisual material. On the other hand, these findings are contradicted with Talamini & Tassiopoulos, (2023) who reported their poor performance after programs.

. In this study, there was a positive correlation between total nurses' knowledge and total practice scores which means that when the nurses' knowledge is adequate the nurses' practice will be adequate. These findings are supported by Dahlberg et al., (2022) who revealed that there was a statistically significant positive correlation between knowledge score and practice score. From the researcher point of view, educational program administered to studied nurses working in the PACU was effective enough to improve their level of knowledge and practice. Moreover, this result contradicted with Elsayed et al., (2021) who revealed that more than two thirds of studied nurses had satisfactory knowledge, more than three quarters of them had unsatisfactory practice

Conclusions

The present study seeks to evaluate the effect of applying post anesthesia care competency program on nurses' knowledge and practices. Based on the findings of this study, it can be concluded that:

- There was highly statistically significant improvement in nurses' knowledge and practices after implementation of post anesthesia care competency program.
- There was highly statistically significant of mean total knowledge score and mean total practice score post program.

Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

- There were significant correlations between total knowledge and total practices of post anesthesia care.
- There was a significant relation between socio-demographic characteristics (level of education, age and years of experience) and total knowledge and total practices among studied nurses.

Recommendations

Based on the findings of the present study, the following recommendations were derived and suggested:

- A colored illustrative booklet, audiovisual materials covering knowledge & practice about post anesthesia care should be available to all nurses in PACU.
- Continuous education training program should be implemented for PACU nurses to update their knowledge and practice regarding PACU care.
- Nurses should follow all instructions about post anesthesia care to ensure the safety of patients in PACU after surgery.

Recommendations for further research:

Replication of the study using a larger sample and at different hospitals settings to attain more generalized results.

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Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

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Effect of Applying Post Anesthesia Care Competency Program on Nurses' Knowledge and Practices

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