

Nurses' knowledge and practice regarding care of patients connected to intra-aortic balloon pump at Cairo university hospitals.

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Abstract

Background: Intra-aortic balloon pump (IABP) is the first and the most commonly used mechanical circulatory support for patients with acute coronary syndromes and cardiogenic shock. Therefore, critical care nurses not only have to know how to monitor and operate the IABP, but also to provide interventions for preventing possible complications. **Aim of the study:** to assess nurses' knowledge and practices regarding care of patients connected to IABP at the ICUs of Cairo University Hospitals. **Research design:** A descriptive exploratory design was utilized. **Sample:** Convenience samples of 40 nurses were included in the current study. **Setting:** This study was carried out at the Intensive Care Units of Cairo University Hospitals. **Tools of data collection:** Three tools were developed, tested for clarity, and feasibility: **a-** Nurses' personal background sheet, **b-** IABP nurses' knowledge self-administered questionnaire, and **c-** IABP Nurses' practice observational checklist. **Results:** The majority of the studied sample had unsatisfactory knowledge and practice level (88% & 95%) respectively with a mean of 9.45 ± 2.94 & 30.5 ± 8.7 respectively. Unsatisfactory knowledge was found regarding description and physiological effects, nursing care, indications, contraindications, complications, weaning and removal of IABP in percentage of 95%, 90%, 72.5% & 57.5%, respectively with a mean total knowledge score of 9.45 ± 2.94 . In addition, unsatisfactory practice was found regarding about preparation and initiation of IABP therapy, nursing practice during therapy, weaning and removal of IABP in percentages of (97.5%, 97.5% & 90%), respectively. Finally, knowledge level was found to differ significantly in relation to gender ($t=2.46$, at $P \leq 0.018$). However, gender didn't play a role in relation to practice ($t= 0.086$, at $P \leq 0.932$). **Conclusion:** In spite of having vital role in assessment and management of critically ill patients, critical care nurses in the current study had in general unsatisfactory knowledge and practice regarding care of patients connected to IABP. **Recommendation:** updating knowledge and practice of ICU nurses through carrying out continuing educational programs about IABP; strict observation of nurses' practice when caring for patients connected to IABP and provision of guidance to correct of poor practices; and replication of this study on larger probability sample selected from different geographical locations.

Key Words: Knowledge, Practice, Intra-aortic balloon pump (IABP), ICU nurses, Intensive care unit (ICU).

Introduction

The care of critically ill patients can be very challenging as a result of altered ventricular filling, poor myocardial perfusion, abnormal cardiac rhythm, and sever valvular lesions all contribute to a complex interaction. Thus there is a need for interventions and several procedures that can stabilize and help in treatment of cardiac patient. In addition, critically ill patients require continuous assessment of their cardiovascular system to diagnose and manage their complex medical conditions. As the complexity of the patient's status increases, invasive devices may be utilized to provide a more advanced

assessment and to guide therapeutic interventions (Cuculich & Kates, 2008 and Morton & Fontaine, 2012).

One of these devices is Intra-aortic balloon pumping (IABP), which is considered as the first hemodynamic support device. It was developed in the 1960s to help in improvements in the myocardial oxygen supply/demand ratio and circulatory support. It remains the most widely used mechanical cardiac-support device because of its simplicity, ease of insertion, and long clinical track record. As well, IABP is a mechanical device that increases myocardial oxygen perfusion while at the same time increasing cardiac output.

Increasing cardiac output increases coronary blood flow and therefore myocardial oxygen delivery increases (Parissis, Leotsinidis, Akbar, Apostolakis & Dougenis, 2010).

Therefore, nurses working in intensive care unit (ICU), coronary care unit (CCU), operating room (OR), pediatric acute care unit (PACU), and cardiac catheter laboratory (CCL) not only have to know how to monitor and operate the IABP, but also how to recognize and provide interventions for the possible complications of IABP therapy. IABP therapy requires a high degree of nursing skills because of the complexity of the equipment and the need for frequent monitoring to avoid potential complications. Nurses must combine vigilance with careful and methodical assessment skills to care for this group of patients. The nurse must make sound clinical assessments and ensure accurate and consistent observations. Assessments and observations which must be undertaken are those specific to cardiac function, the IABP function and possible complications ((Depta, 2011 and Lewis, 2007).

2-Aim of the study

The aim of this study is to assess nurses' knowledge and practices regarding care of patients connected to Intra-Aortic Balloon Pump at the ICUs of Cairo University Hospitals.

3-Research questions

To fulfill the aim of this study, two research questions were formulated:

3.1) what is the level of nurses' knowledge regarding care of patients connected to intra-aortic balloon pump at Cairo University Hospitals?

3.2) what is the level of nurses' practice regarding care of patients connected to intra-aortic balloon pump at Cairo University Hospitals??

4-Subjects and Methods

4.1. Research Design:

A descriptive exploratory design was utilized in the current study.

4.2. Setting:

This study was conducted at different ICUs at Cairo University hospitals. It encompasses Cardiothoracic ICU in the 3rd floor, Critical Care Medicine Department, The Cardiothoracic ICU of El-Manial Specialized University hospital and Cardiothoracic ICU which is located at New Kasr El Aini Teaching Hospital.

4.3. Sample:

A convenience sample of 40 bedside male and female nurses, working in different ICUs at Cairo University Hospitals, providing direct patients care and willing to participate in the study, represented subjects of the current study. They had different nursing educational backgrounds; Bachelor, Secondary Nursing School Diploma and technical nursing institute diploma.

4.4. Tools:

Three tools for data collections were utilized; they included:

4.4.1 .Tool 1: Nurses' personal background sheet: It covered data related to gender, age, educational level, and years of experience in nursing and ICU.

4.4.2. Tool 2: IABP nurses' self-administered questionnaire: to assess nurses' knowledge regarding indication, contraindication, complication and nursing care of patients connected to IAB. It consists of 25 items classified into four main domains. The first domain concerned with knowledge about description and physiological effects of IABP. The second domain concerned with indications, contraindications and complications of IABP. While, the third domain, covers knowledge related to nursing care of patient connected to IABP and the fourth domain concerned with

knowledge related to nursing care required during weaning and removal of IABP. A total score of the questionnaire was 25 grades. The scoring system classified as follows; scores less than 75% was considered unsatisfactory and the scores equal or more than 75% considered satisfactory.

4.4.3. Tool 3: IABP nurses' practice observational checklist: It was designed by the researcher through literature review to assess nurses' practices regarding care of patient connected to IABP. It consists of 72 items classified under three main domains: the first domain concerned with nursing practice during preparation and connection of IABP; the second domain concerned with nursing care of patient connected to IABP; and the third domain concerned with nursing practice during weaning and removal of IABP. Each nurse's performed action was recorded in the checklist as either done or not done. One score was given to each correct practice and zero was given to each not or incorrectly done practice. A total score of the questionnaire was 72 grades. The scoring system classified as follows; scores less than 75% was considered unsatisfactory and the scores equal or more than 75% considered satisfactory.

4.5. Validity and reliability of tools

The developed tools were examined by a panel of three medical and three critical care nursing experts to determine whether the included items were clear and suitable to achieve the aim of the current study. As well, test - retest reliability was calculated using SPSS with a Pearson correlation value of 0.7 for nurses' knowledge self-administered questionnaire and a Pearson correlation value of 0.85 for nurses' practice observational checklist indicating reliability of the developed data collection tools.

4.6. Pilot Study

A pilot study was carried out on 4 nurses to test feasibility, objectivity, and applicability of the study tools. Based on the results of the pilot study, needed refinements and modifications were made.

5-Protection of Human Rights

An official permission to conduct the study was obtained from the ethical committee - Faculty of Nursing, Cairo University, and directors of Intensive Care Units at Cairo University Hospitals. Written consents for staff agreements to be included in the study were obtained after explanation of the nature and purpose of the study. Each nurse was free to either participate or not, and had the right to withdraw from the study at any time without any rationale. Also, nurses were informed that the obtained data will not be included in any further re searches or their annual appraisal. Confidentiality and anonymity of each subject were assured through coding of all data.

6-Procedure

The current study was conducted through two phases.

6.1. Designation phase:

It was concerned with construction and preparation of different data collection tools. In addition, managerial arrangements were carried out and the investigator prepared formal requests to selected ICU's managers and directors of Cairo University Hospitals. The purpose and nature of the study were explained to gain acceptance, and support. This stage lasted for two month duration and ended by carrying out the pilot study

6.2. Implementation phase:

Data were collected from October 2013 to June 2014. The researcher visited the selected settings on daily basis during the morning and afternoon shifts. The average number of nurses who answered the questionnaire was five to seven nurses per day.

Answering the nurses' personal background sheet and IABP nurses' knowledge self-administered questionnaire (tool A & B) required about 20-30 minutes. The researcher was available to answer any questions or explanations and to check each questionnaire after its completion, to be sure that there are no missed items. Later, two nurses were observed directly by the researcher in each shift. Each nurse was observed in two different occasions for 20- 30 minutes, while performing each step of the procedure in the observational checklist. Obtained data were converted into numeric data, and the average of the two observations was calculated.

7-Results

The study revealed that more than half of the studied sample was females (88%). 57.5% of the study sample' age was ranged between 18 and 27 years with a mean age of (26.13±3.78). As regards to educational level, more than half of the studied sample (55%) was bachelor nursing degree. Concerning years of experience in the work place and the ICU, more than two thirds of the studied sample had a total of one to four years of experience in their work place as nurses and in the ICU in percentages of 65% & 72.5%, respectively.

Figure (1) clarifies percentage distribution of the studied sample as regards to knowledge about Intra-Aortic Balloon Pump (IABP): As indicated from figure (13), the great majority (88%) of the studied sample had unsatisfactory knowledge level (< 75%), with a mean total knowledge scores of 9.45±2.94.

Table (1) clarifies percentage distribution of the studied sample as regards to total & subtotal mean knowledge scores: It showed that the great majority of the studied sample

had unsatisfactory knowledge regarding description and physiological effects, nursing care, indications, contraindications, complications, weaning and removal of IABP in percentage of 95%, 90%, 72.5% & 57.5%, with subtotal mean scores of 2.88 ± 1.2, 2.58 ± 1.43, 2.68± 1.29 & 1.33±0.79, respectively and a mean total knowledge score of 9.45±2.94.

Figure (2) clarifies percentage distribution of the studied sample according to practice level regarding nursing care for patients connected to IABP: it showed that the great majority (95%) of the studied sample had unsatisfactory practice level (less than 75%) regarding care of patient connected to IABP with a total mean practice score of 30.05±7.43.

Table (2) clarifies percentage distribution of the studied sample as regards to total and subtotal mean practice scores. It showed that the majority of studied sample had unsatisfactory practice level about preparation and initiation of IABP therapy, nursing practice during therapy, weaning and removal of IABP in percentages of 97.5%, 97.5% & 90%, with subtotal mean scores of 9.98±3.15, 9.98±3.15 & 11.96±3.39, respectively, and a total mean score of 30.05±7.43

Table (3) clarifies comparison of total mean knowledge scores in relation to gender and age category of the studied sample: It revealed that there was a high significant statistical difference in the mean knowledge scores in relation to gender (t=2.46 at P ≤ 0.018) with tendency of female nurses to have higher mean scores than males 10.47±3.12 as compared to 8.31±2.31. However, the mean knowledge scores didn't differ significantly in relation to age category (t=1.05, at P ≤ 0.98).

Table (4) clarifies comparison of mean practice scores in relation to gender and age category of the studied sample: It showed that no significance statistical difference in the mean practice scores in relation to gender and age category ($t= 0.086$, at $P \leq 0.932$, and $t= 0.137$ at $P \leq 0.176$) respectively.

Table (5) clarifies relationship between age, total mean knowledge and practice scores of the studied sample: it revealed that there was no significant statistical correlation between age, total knowledge score and total practice score.

Figure (1): Percentage Distribution of the Studied Sample as regards to Knowledge about Intra-Aortic Balloon Pump (IABP)

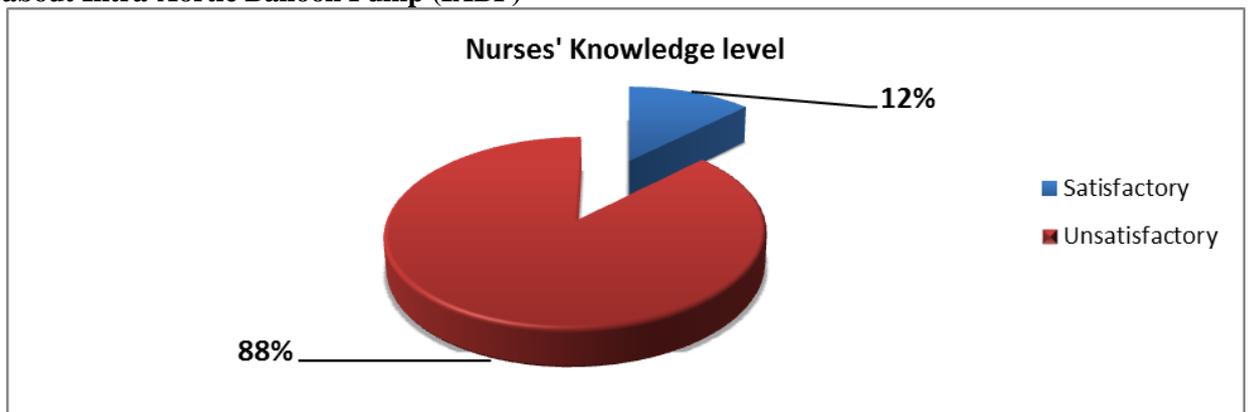


Table (1): Percentage Distribution of the Studied Sample as Regards to Total & Subtotal Mean Knowledge Scores (N=40).

Knowledge assessment domains	Knowledge level				Subtotal Mean \pm SD
	Satisfactory ($\geq 75\%$)		Unsatisfactory ($< 75\%$)		
	No.	%	No.	%	
1. Description and physiological effects of IABP	2	5%	38	95%	2.88 \pm 1.2
2. Indications, contraindications and complications of IABP	11	27.5%	29	72.5%	2.68 \pm 1.29
3. Nursing care of patient connected to IABP	4	10%	36	90%	2.58 \pm 1.43
4. Weaning and removal of IABP.	17	42.5%	23	57.5%	1.33 \pm 0.79
Total knowledge score	5	12%	35	88%	9.45 \pm 2.94

Figure (2): Percentage Distribution of the Studied Sample According to Practice Level Regarding Nursing Care for Patients Connected to IABP (N= 40).

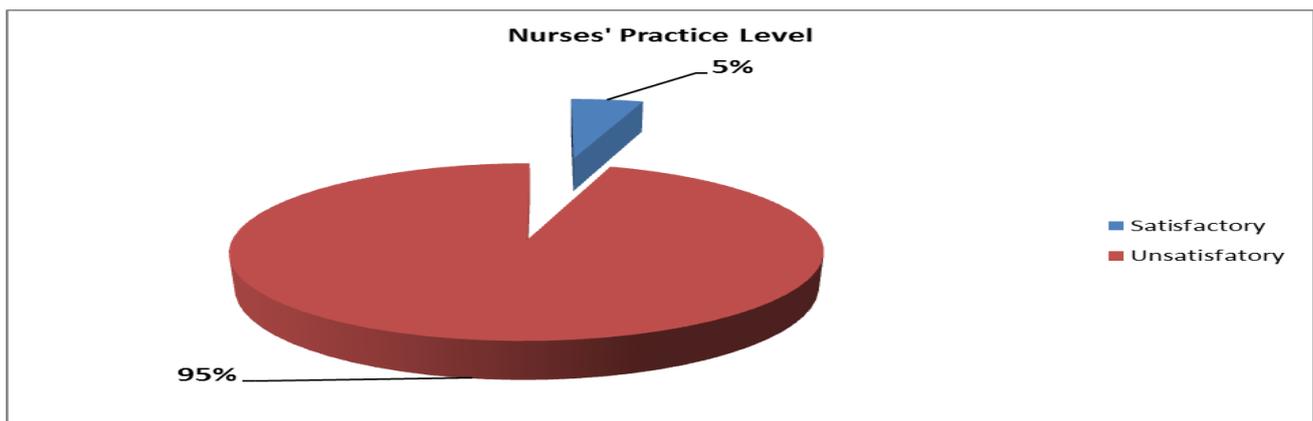


Table (2): Percentage Distribution of the Studied Sample as Regards to Total and Subtotal Mean Practice Scores (N= 40).

Practice assessment domains	Practice level				Average subtotal Mean \pm SD
	Satisfactory		Unsatisfactory		
	No.	%	No.	%	
1. Preparation and initiation of IABP therapy	1	2.5	39	97.5	9.98 \pm 3.15
2. Nursing practice during IABP therapy	1	2.5	39	97.5	9.98 \pm 3.15
3. Nursing practice during weaning and removal of IABP	4	10	36	90	11.96 \pm 3.39
Average total Mean \pm SD	30.05 \pm 7.43				

Table (3): Comparison of Total Mean Knowledge Scores in Relation to Gender and Age Category of the Studied Sample (N = 40).

Items	Mean \pm SD	t-test	P. value
Gender			
Male	8.31 \pm 2.31	2.46	0.02**
Female	10.47 \pm 3.12		
Age category (years)			
18-	9.86 \pm 2.78	1.05	0.98 Ns
28 - 37	8.88 \pm 3.14		

** Significant at $P \leq 0.02$.

Ns: No significant statistical difference.

Table (4): Comparison of Mean Practice Scores in Relation to Gender and Age Category of the Studied Sample (N = 40).

Variables	Mean \pm SD	t-test	P value
Gender			
Male	30.15 \pm 7.15	0.086	0.932 Ns
Female	29.95 \pm 7.85		
Age category (years)			
18-	28.67 \pm 4.56	1.37	0.176 Ns
28 - 37	31.91 \pm 9.97		

Ns: No significant statistical difference

Table (5): Relationship between Age, Total Mean Knowledge and Practice Scores of the Studied Sample (N=40)

Variables		Total mean knowledge scores	Total mean practice scores
Total mean knowledge scores	Pearson Correlation		
	Sig. (2-tailed)		
Total mean practice scores	Pearson Correlation	0.252	
	Sig. (2-tailed)	0.303 Ns	
Age	Pearson Correlation	0.167	0.195
	Sig. (2-tailed)	0.116 Ns	0.228 Ns

Ns: No significant statistical difference.

8-Discussion

Sample characteristics

The current study revealed that more than half of the studied sample was females. This finding is in agreement with that of Rashdan, (2007) who conducted a study about implications for advancement of Egyptian nursing, and found that nursing in Egypt is primarily a female occupation and very few men are admitted to nursing programs in the university sector. As well, Abudahi, Fekry, & Abd el-wahab, (2012) conducted a study about relationship between perceived organizational climate and conflict management strategies among nurses in Cairo University Hospitals and revealed that the majority of nurses were female.

As regards to age group, more than two thirds of the studied sample was young adults and had one to four years of ICU experience. This finding is in agreement with that of El Feky, & Ali, (2013) who studied "nurses' practices and perception of delirium in the intensive care units in Egypt" and revealed that around three quarters of the studied sample was approximately in same age groups of the current study subjects. A young adult is generally a person in the age range of 20 to 40 year. Young adulthood can be considered as a period of stabilization in which the individual makes career decision and becomes more adaptable and responsive to challenges. Concerning young adult behavior during provision of medical care, they become more aware of the impact of medical care on the patients; sensitive to their fears; honestly explain medical procedures and expected outcomes (Maville & Huerta, 2012)

Concerning qualifications, the current study revealed that more than half of the studied sample had bachelor nursing degree. Finding of the present study is in agreement with that of Abd el- kader, & Ali, (2012) who studied critical care nurses' knowledge and practice of fever management at a university hospital and revealed that more than two thirds of the studied sample had bachelor degree. However, this finding is contradicted by El Feky, & Ali, (2013) and Abudahi, Fekry, & Abd el-wahab, (2012) who revealed that the great majority of their studied samples were diploma nurses. These differences "from the researcher's point of view" may be related to different types of nursing recruitment and variation of patient acuity level in the selected ICUs.

Nurses' knowledge level about care of patients connected to IABP:

In the current study, the finding data that answered the first research question, it states "what is the level of nurses' knowledge about care of patients connected to intra-aortic balloon pump at Cairo University Hospitals?" and revealed that the majority of the studied sample had unsatisfactory knowledge level. On the same line with this findings was that of Huang & Hsu (2012) who constructed a clinical teaching program about "standardized operating procedure for intra-aortic balloon pump support" and revealed that many nurses were hesitant to use IABPs due to lack of knowledge regarding their use

The reasons for lack of knowledge pertinent to IABP "from the researcher's point of view" may be related to lack of: continuing educational programs or sessions about this therapeutic intervention, supervision, continuous evaluation of nurses' practice, and cooperation between multidisciplinary health care team members (nurses - physicians). This view is supported by Tremper (2006) who studied behavioral objectives and examination of a program about IABP therapy "A primer for perioperative nurses" and concluded that perioperative nurses are responsible for

many aspects of patients' care. Although it may not be necessary for a nurse to be able to operate an IABP independently, it is extremely helpful for nurses to have a basic understanding of this therapy. Having knowledge about IABP therapy allows perioperative nurses to better anticipate the needs of the surgical team and helps to improve patients' outcomes.

In an attempt to identify areas of knowledge deficit among the majority of the studied sample who had unsatisfactory knowledge, it was found to be specifically related to helium use as the drive gas, assessment of the effectiveness of the balloon inflation, deflation timing and physiological effects of IABP, when to stop IABP catheter insertion, complication suspected if a sudden drop occurs in urine output, nursing actions in case of temporary stoppage of the balloon cycle, the width of the balloon pressure waveform, maintenance of positioning for patients connected to IABP, nurses' assessment of tissue perfusion among patients connected to IABP, nursing interventions for IABP catheter insertion site, discontinuing heparin infusion before removal of IABP and criteria for weaning from IABP therapy.

In spite of, having total unsatisfactory general knowledge level about IABP, the studied sample had satisfactory specific knowledge about IABP definition, correct positioning of the IAB catheter, position check of IABP catheter, action of IABP at the onset of cardiac systole and diastole, indications for IAB pumping, causes of high pressure alarm, complications and contraindication for the use of IABP, indicator of a rounded balloon pressure waveform, exerting firm pressure at the site after percutaneous balloon removal and nursing care after removal of IABP catheter. Thus, there is a need to strengthen what nurses know and provide them with the needed knowledge necessary to improve their practice and so, patient' care.

Nurses' practices level regarding care of patients connected to IABP:

The current study findings that answered the second research question, it states, "what are different levels of nurses' practices regarding care of patients connected to intra-aortic balloon pump at Cairo university hospitals?" and revealed that the majority of the studied sample had unsatisfactory practice levels regarding care of patient connected to IABP. Assessment of nurses' practice was done during preparation for insertion, caring of patient connected to IABP and during weaning and removal of IABP. As regards to, preparation for IABP insertion, the majority of the studied nurses didn't perform the following actions: explain the procedure to the patients', adjust augmentation alarm setting, obtain patients' or families' consents for agreement to insert IABP, assess circulation to extremities, capillary refill, record assisted and unassisted pressures, and check all IABP connections for tightness.

Concerning nurses' practice during care of patients connected to IABP, the majority of the studied nurses didn't do the following: check if inflation occur at the dicrotic notch, observe helium tank, change the helium tank or switch to a new pump, assess and demonstrate intervention for errors in timing, perform peripheral vascular assessment, logroll patient to give skin care and perform active or passive range of motion exercises. As regards to nurses' practice during weaning and removal of IABP, the majority of studied nurses didn't record parameters that demonstrate clinical readiness to wean from IABP, and didn't instruct patients to notify for presence of pain or wetness around the insertion site. Unexpectedly, the majority of the studied nurses performed hand washing don gowns and gloves, performed hemodynamic and cardiovascular assessment, and documented assessment data in the nurses' notes. As well, nurses maintained patients at strict bed rest, applied a sterile occlusive dressing

at the IABP catheter insertion site, and documented weaning events in the nurse's notes. This could reflect nurses' familiarity with certain basic aspects of care for patients connected to IABP in spite of having unsatisfactory knowledge and practice levels.

As well, the current study findings are in agreement with that of Lewis, Ward & Courtney (2009), who conducted a study about IABP in heart failure management and concluded that; to achieve the best possible outcome for a patient managed with IABP, nursing and medical staff require specialized skills. Nurses must continually assess changes in patients' condition which require knowledge of the cardiovascular system, therapeutic effects of IABP and potential adverse events. Consequently, Jing et al (2010) conducted a study to investigate postoperative nursing of percutaneous coronary intervention therapy combined with IABP in patients with cardiogenic shock and revealed that, the main points of nursing care related to those patients were strengthening observation, choosing the appropriate posture of patients, choosing appropriate cessation time of the counterpulsation pump and preventing complication actively.

The reasons of low practice level in the current study may be relevant "from the researcher's point of view" to increased number of patients and work load. In addition, nurses' practices were based on traditions and imitations. This point of view is supported by Bateson & Kennedy (2011), who studied nurses' experiences in caring for conscious patients receiving IABP therapy for treatment of heart failure, and revealed that the initial fear of participants was when they called for first caring of patients receiving IABP therapy and this was overcome through education and supported experience. Although participants recognized the general importance of technical competence, general nursing care was prioritized by participants more than specific care related to IABP. This in addition to participants' feeling that IABP therapy was a means to an end and representing hope for survival.

The correlation between background data with nurses' knowledge and practices

Comparison of mean knowledge scores in relation to gender in the current study revealed that females had higher mean knowledge scores than males. However, the mean knowledge scores didn't differ significantly in relation to age. This finding is in line with that of Qaddumi & Khawaldeh (2014) who revealed no significant relationship between nurses' knowledge and their age, clinical nursing experience, education, research participation, and attendance of training. In contrast, gender was found to have a significant relationship with nurses' knowledge. However, the present study is inconsistent with findings of Abdullah, Mohammed, & Ismail, (2014) who conducted a study on nurses' knowledge and practices about medications administration via nasogastric tube among critically ill patients and found no significant statistical difference in knowledge scores in relation to gender

The current study revealed that nurses' practice level didn't differ significantly in relation to nurses' gender, qualifications, ICU experience and total years of experience. This finding is in agreement with that of Taha and Ali, (2013) who conducted a study about the impact of a training program on critical care nurses' knowledge and practice regarding physical restraints and reported that nurses' age, qualification, and years of experience had no influence on practice scores. This finding is not consistent with that of Thomas (2013) who conducted a study to evaluate the effectiveness of video assisted teaching program on knowledge and practice regarding cardioversion and defibrillation and revealed a highly significant

statistical association between practices scores and work experience. Also, this finding is in concordance with that of Aziz (2014) who conducted a study on nurses' practices provided to patients undergone open heart surgery and revealed the impact of years of experience on nurse's practices.

On the other hand, Choudhry, Fletcher, & Soumerai (2005), conducted a systematic review to assess the relationship between clinical experience and quality of health care and showed a negative association between increasing experience and practice. In addition, Hill, (2010) conducted a study on improving quality and patient's safety and revealed that the years of experience had a positive impact on the quality of care provided.

9-Conclusion

Based on findings of the current study, it can be concluded that, although nurses have vital role in assessment and management of critically ill patients, they had unsatisfactory knowledge and practice regarding care of patients connected to IABP. However, unexpectedly nurses were found to have specific knowledge and practices regarding certain items concerned with care of patient connected to IABP. Thus, there is a need to emphasize and maintain what they know and can do, and improve what they don't know and do.

10-Recommendation

- Updating knowledge and practice of ICU nurses through carrying out continuing educational programs about IABP.
- Conduction of periodic training sessions to improve practices about assessment and management of patients connected to IABP.
- Ongoing monitoring of staff nurses' practice by head and charge nurses when caring for patients connected to IABP and provision of guidance to correct poor practices.
- Study the impact of a designed nursing intervention protocol on the outcome of patients connected to IABP.
- Replication of the study on a larger probability sample from different geographical locations in Egypt .

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Effect of Designed Nursing Care.



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