

Nurses Performance regarding Using of APACHE Score for Patients with Cardiac Surgery

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Abstract

Background: The assessment of the risk of death and the estimated length of stay in the intensive care unit is a relevant clinical practice to predict the severity of the disease and to outline effective strategies for patient improvement and hospital quality indicators. **Aim:** This study aimed to assess nurses' performance regarding using of APACHE scoring system. **Research design:** Descriptive exploratory research design was utilized to achieve the aim of this study. **Subjects:** A convenience sample of all available nurses (50) working in the cardiac surgery intensive care units at Ain Shams Specialized Hospital, as well in the Cardiovascular and Thoracic Academy affiliated to Ain Shams university hospitals. **Tools:** (1) Nurses' knowledge assessment questionnaire. (2) Nurses' observation checklist. (3) nurses' attitude scale. **Results:** The majority of the cardiac surgery ICU nurses had inadequate knowledge, practice and attitude regarding using of APACHE scoring system. **Conclusion:** Cardiac surgery ICU nurses had unsatisfactory performance (knowledge, practice and attitude) regarding using of APACHE score. **Recommendations:** Conducting periodic training program for cardiac surgery intensive care units' nurses in order to keep them with the updated knowledge, practice and attitude regarding using of APACHE scoring system to predict complications among patients with cardiac surgery during the first 24 hours.

Key words: APACHE Score, Cardiac Surgery, Nurses Performance.

Introduction

Cardiac procedures are performed almost exclusively through a median sternotomy of varying length, although the great vessels and valves are sometimes approached via a thoracotomy incision. Procedures that involve the pericardium or epicardium (e.g., pericardial biopsy, epicardial pacemaker insertion) are typically accomplished through a subxiphoid incision. Diaphragmatic procedures are commonly performed through either a lateral thoracotomy or a thoracoabdominal incision (Hillegass, 2022).

The American association of critical care nurses (AACN) defines critical care nursing as a specialty within nursing that deals specifically with human responses to life-threatening problems. Nurses who thrive in these areas are highly specialized and educated to assess patients efficiently and to provide appropriate, proficient, culturally relevant, and emotionally

sensitive care for both the patient and the family. These are core values of critical care nursing. Critical care nurses maintain the highest quality of care for patients, work collaboratively in an interdisciplinary team, and are an advocate for their patients and families (Hewett, 2020).

Immediate recovery start when patient arrive to intensive care unit, the nurse should receive complete history from circulating nurse and anesthesia doctor which includes: types of procedure performed, type of anesthesia, vasopressor and inotropic agents used, reversal of anticoagulants, types of airway, size and length of surgery, range of vital signs, hemodynamic parameters, ventilatory status, intraoperative complications, cardiopulmonary bypass time, estimated blood loss (EBL), amount of intravenous fluids, amount of blood products administered, intraoperative intake and output,

extent of surgical wound, restrictions of movement and position during surgery, recent laboratory data and any other preoperative medical or nursing diagnosis (Tasler, 2020).

Closely monitor patients postoperative for complications such as dysrhythmias (atrial fibrillation, atrial flutter, ventricular tachycardia, and ventricular fibrillation), acute myocardial infarction, shock, pericarditis, pericardial effusion, and cardiac tamponade. The critical care nurse caring for a patient who has just undergone cardiac surgery must have quick critical thinking skills and the ability to assess the whole picture while prioritizing interventions that must be performed (Sole et al., 2021).

APACHE II is a composite score consists of age, the chronic health index (CHI) and the acute physiology score (APS), and the latter derived from 12 physiologic parameters that include vital signs, arterial blood gas measurements, laboratory results, Glasgow coma scale (GCS). APACHE II scoring system was used to measure the severity of disease by calculating the most deranged reading during each patient's initial 24 hours in intensive care unit (Luo et al., 2021).

Significance of the study

Using of APACHE scoring system is considered important for patients with cardiac surgery because it could help nurses to determine high risk group of patients, assess hemodynamic instability depend on degree of physiological variables, predict mortality rate among patients during the first 24 hours after admission to the intensive care unit, and measures patient outcomes. So that, this study was implemented to assess nurses' performance regarding using of APACHE score with cardiac surgery patients in order to evaluate patient status, improve patient outcomes and enhance the quality of nursing care provided for such group of patients.

Aim of the study

This study aimed to assess nurses' performance regarding using of APACHE score through:

1. Assessing nurses' level of knowledge regarding using of APACHE scoring system.
2. Assessing nurses' level of practice regarding using of APACHE scoring system.
3. Assessing nurses' attitude regarding using of APACHE scoring system.

Research questions

- What are the level of nurses' knowledge regarding using of APACHE score for patients with cardiac surgery?
- What are the level of nurses' practice regarding using of APACHE score for patients with cardiac surgery?
- What are the level of nurses' attitude regarding using of APACHE score for patients with cardiac surgery?

Subject and methods

Research design: Descriptive exploratory research design was utilized to achieve the aim of this study.

Research setting: This study was conducted in the cardiac surgery intensive care units at Ain Shams Specialized Hospital and in the Cardiovascular and Thoracic Academy affiliated with Ain shams university hospitals.

Subjects: Convenience sample of all available nurses (50) caring for patients with cardiac surgery in the previously mentioned settings were included in this study.

Tools of data collection:

Three tools were used for data collection.

1.Nurses' knowledge self-administered questionnaire:

This tool includes two parts:

- Part 1 was concerned with demographic characteristics of nurses under study such as age, gender, marital status, level of education, years of experiences and previous training.

- Part 2 was used to assess nurses' knowledge regarding APACHE II scoring system. It was designed in an Arabic and developed by the researchers based on reviewing of the recent literatures (Akhter et

al., 2019; Bahtouee et al., 2019; Yalcin et al., 2019).

This tool consists of 50 questions. Twenty (20) questions were in the form of true and false questions, (25) questions in form of multiple choice questions, and (5) matching questions.

❖ Scoring system

- The total score was 50 grades.
- The correct answer was given one grade.
- Incorrect answer was given zero.
- The total scores for nurses' knowledge were categorized as satisfactory or unsatisfactory.
- $\geq 85\%$ (≥ 42 degree) was considered satisfactory level.
- $< 85\%$ (≤ 39 degree) was considered unsatisfactory level.

2. Nurses' observation checklist:

This tool was written in English based on review of pertinent literatures. It was adopted from (Peate & Hill, 2023; Albin & Zafar, 2022), to assess nurses' practice regarding monitoring of physiological parameters of patients with cardiac surgery, arterial blood gases sampling withdrawal via arterial line and Glasgow coma scale evaluation.

❖ Scoring system

- This tool consists of 122 steps.
- The responses for each step was either by checking done correctly, done incorrectly or not done.
- The correctly done was given one grade.
- The incorrectly/not done was given zero.
- The total score of the tool was categorized as follow:
- $\geq 85\%$ (≥ 103 degree) considered as satisfactory level of practice.
- $< 85\%$ (< 103 degree) considered as unsatisfactory level of practice.

3. Nurses' attitude scale:

This scale was used to assess nurses' attitude regarding using of APACHE II scoring system for patients with cardiac surgery. This scale was adapted from (Ghobadi & Habibzadeh, 2019; Bagheri & Yaghoubi,

2016; Chen et al., 2004) and was translated by the researchers into an Arabic and then back translated into English.

This scale consists of 25 statements. The responses to the statements was on likert scale ranged from 0-2 where zero=disagree, 1=somewhat agree, 2=agree.

❖ Scoring system

The total score for all scale items was 50 grade. It was categorized as positive attitude and negative attitude.

- $\geq 85\%$ (≥ 21 degree) was considered positive attitude.
- $< 85\%$ (< 21 degree) was considered negative attitude.

Tool validity and reliability:

Face validity aimed at inspecting the items to determine whether the tools measure what supposed to measure. The tools were evaluated in terms of face and content validity. It was revised by a panel of 7 experts from medical surgical nursing department, faculty of nursing, Ain Shams University. The experts reviewed the content of the tools for clarity, simplicity, relevance, comprehensiveness, and applicability. Minor modifications were done.

Testing reliability of the purposed tools was done by using alpha Cronbach test. It was 0.801 for nurses' knowledge assessment questionnaire, 0.736 for the observation checklist, 0.796 for the nurses' attitude scale.

Pilot study:

The pilot study was conducted on 10% (5) of nurses under study to test the applicability and clarity of the study tools, as well as to estimate the time needed to fill the study tools. Modifications for the used tools were done then the final form was developed. Subjects included in the pilot study were not included in the actual study subjects and were replaced by another nursing staff.

Ethical considerations:

- The research approval was obtained from the research ethical committee in the faculty of nursing of Ain Shams University before initiating the study work.
- The researcher clarified the objective and aim of the study to the study subjects.
- Verbal consent was obtained from the study subjects to participate in the study.
- The researcher assured maintaining anonymity and confidentiality of subjects' data.
- The study subjects were informed that they are allowed to withdraw from the study at any time.

Field work:

- Preparatory data collection tools were done by reviewing the related literature and theoretical knowledge of various aspects of the study using books, articles and internet periodicals.
- An official letter was issued from the faculty of nursing, Ain Shams University to the medical directors of Ain Shams Specialized Hospital and cardiovascular and thoracic academy affiliated to Ain Shams University hospitals at which the study was conducted, explaining the purpose of the study to obtain their permission to conduct this study.
- The researcher interviewed with the fifty (50) nurses under the study who are caring for patients with cardiac surgery in the previously mentioned settings to explain the aim of the study, the effect of the study on their performance as well as quality of care and to take their approval to participate in the study prior to any data collection.
- Nurses' assessment took 10 weeks starting from January (2021) until mid of March

(2021). The data collected by the researcher through 3 days per week during the morning and the afternoon shift for 6 hours per day. It took about 20-25 minutes to fill in for every nurse.

Data analysis:

Data were analyzed using SPSS version 23. Quantitative data were presented as mean and standard deviation and ranges.

Results

Table (1): showed that the mean age for nurses included in this study was 32.0 ± 10.5 years old and ranged from 20->50 years old, the majority of them (90%) were females, more than half (54%) of them were married, two fifth (42%) of nurses had technical health nursing institute. The mean years of experience for nurses under the study was 7.14 ± 2.64 years and all of them didn't attend any training courses about the use of APACHE scoring system.

Table (2): showed that 90% of nurses under the study had unsatisfactory level of knowledge about using of APACHE scoring system for patients with cardiac surgery.

Table (3): showed that 82% of nurses under the study had unsatisfactory level of practice regarding using of APACHE scoring system for patients with cardiac surgery.

Table (4): showed that 68% of nurses under the study had unsatisfactory level of attitude about using of APACHE scoring system for patients with cardiac surgery.

Table (1): Frequency and percentage distribution of demographic characteristics of the studied nurses (n=50).

Items	N=50	%
Age “years”		
20-30 years	22	44.0
>30-40 years	12	24.0
>40-50 years	11	22.0
>50 years	5	10.0
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$\bar{X} \pm SD$	32.0±10.5	
Gender		
Male	5	10
Female	45	90
Marital status		
Single	23	46
Married	27	54
Qualifications		
Nursing diploma	17	34
Technical nursing institute	21	42
Bachelor of nursing	12	24
Years of experience in cardiac surgery ICU		
Less than 5 years	23	46
From 5 years to 10 years	9	18
More than 10 years	18	36
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$\bar{X} \pm SD$	7.14±2.64	
Attend training courses about using of APACHE scoring system		
Yes	0	0
No	50	100

Table (2): Frequency and percentage distribution of the studied nurses’ total level of knowledge regarding using of APACHE II scoring system (n=50).

Nurses’ level of total knowledge	Satisfactory		Unsatisfactory	
	No.	%	No.	%
APACHE II scoring system definition, component, physiological parameters, age points and chronic health points.	4	8.0	46	92.0
Glasgow coma scale	5	10.5	45	90.0
Arterial blood gases	7	14.0	43	86.0
Normal range of laboratory values in APACHE II score	6	12.0	44	88.0
Total score of nurses’ knowledge	5	10.0	45	90.0

Table (3): Frequency and percentage distribution of the studied nurses’ total level of practice regarding use of APACHE II scoring system (n=50).

Nurses’ level of total practice	Satisfactory		Unsatisfactory	
	No.	%	No.	%
Monitor of the physiological parameters of APACHE II scoring system	7	14.0	43	86.0
Arterial blood gases sampling via arterial line	11	22.0	39	78.0
Assessment of Glasgow coma scale	9	18.0	41	82.0
Total score of nurses’ practice	9	18.0	41	82.0

Table (4): Frequency and percentage distribution of the studied nurses' total level of attitude regarding using of APACHE II scoring system (n=50).

Nurses' level of total attitude	No.	%
Positive attitude	16	32.0%
Negative attitude	34	68.0%

Discussion

Concerning the demographic characteristics of nurses under study the current study showed that the mean age for nurses was 32.0 ± 10.5 and ranged from 20->50 years old. As regard to gender, the result revealed that most of nurses were females, and more than half of them were married. These results are in agreement with **Farooq & John (2022)** who reported that the study sample comprised 50 nurses, considering age 59.5 % of the nurses varied from 19-39 years old and were all female, 96.1 % were married in their study titled "Evaluation of the parameters influencing nurses' effectiveness in the treatment of patients after coronary artery bypass surgery in ICU".

About educational level of the nurses in the current study, the result showed that 42% of the studied nurses were graduated from the technical health nursing institute. This result is in agreement with **Hussein et al., (2021)** who reported that most of nurses worked in cardiac surgery ICU was graduated from the technical health nursing institute in their study titled "Impact of educational program on nurses' knowledge toward coronary artery bypass graft surgery in Mosul teaching hospitals".

Regarding years of experience of nurses in the current study, the finding showed that the mean experience years were 7.14 ± 2.64 , 46% of nurses under study had years of experience less than 5 years in cardiac surgery ICU. This result is in agreement with **Mosatfa et al., (2017)** who mentioned that two thirds of nurses have 1-2 years of experience in their study titled "Effect of training program regarding care of patients undergoing open heart surgery on nurses' performance approach".

All of nurses in the current study didn't attend any training courses about the use of APACHE scoring system. This result is in agreement with **El-desouky et al., (2020)** who

mentioned that more than three quarters of studied nurses hadn't attended training courses in their study titled "Factors Affecting Nurses' performance regarding the care for patients underwent coronary artery bypass graft".

Concerning satisfactory level of nurse's knowledge, the current study revealed that the majority of the nurses under the study had unsatisfactory level of knowledge regarding components of APACHE scoring system.

From the researcher point of view low satisfactory level of knowledge for nurses working in cardiac surgery ICU are contribute to lack of understanding of some components of APACHE II scoring system as oxygenation calculation, double point of serum creatinine for acute renal failure, chronic health points. Also, some of the nurses could not interpret arterial blood gases correctly or assessing patients GCS completely because 42% of studied nurses were graduated from the technical health nursing institute with years of experience less than 5 years in cardiac surgery ICU, as well didn't attended any courses related to APACHE II score. Also, nurses believe that APACHE II scoring system calculation, arterial line analysis, assessment of Glasgow coma scale is the responsibility of the physician according to the hospital policy.

This finding is incongruent with **Lim (2014)** reported that majority of critical care nurses were able to answer the purpose and components of APACHE II scoring system accurately in a study that titled "Nurses' knowledge and perceptions of APACHE II scoring system in a medical intensive care unit".

Concerning satisfactory level of nurse's practice, the current study revealed that the majority of the nurses under the study had unsatisfactory level of practice regarding monitor of the physiological parameters in APACHE II scoring system, arterial blood gases

sampling via arterial line and assessment of Glasgow coma scale.

From the researcher point of view low satisfactory practice level of the nurses working in cardiac surgery ICU are contributed to that all of nurses depend on the cardiac monitor to monitor the hemodynamic stability, work overload, shortage in nursing staff that was due to corona virus pandemic and many nurses got the virus and admitted to the hospitals or staying at home, so the hospital depend on the physician for using APACHE II score as well monitoring critical care laboratory values, interpretation of ABGs and assess Glasgow coma scale according to hospital policy

These results are in agreement with **Louis (2019)** who mentioned that staff nurses working in cardiac ICU had inadequate knowledge and practice regarding prevention of cardiopulmonary complications in postoperative CABG patients in their study titled “Effect of planned teaching on knowledge and practice among staff nurses working in a selected hospital regarding prevention of selected cardiopulmonary complications in post-operative CABG patients”.

Also, **Kamal (2018)** mentioned that more than 80% of nurses in ICU had unsatisfactory level of practice regarding ABGs sampling technique and analysis among critical ill patients via arterial line, radial and femoral artery in their study titled “Factors affecting arterial blood gases analysis among critically ill patients: a suggested nurse’s performance protocol”.

Moreover, **Khatab (2017)** mentioned that 63% of nurses under the study had unsatisfactory level of practice regarding assessment of Glasgow coma scale during first golden hours in their study titled “Nursing assessment for patients with cerebral stroke during first golden hours”.

As regard to level of nurse’s attitude, the current study revealed unsatisfactory level of nurses’ attitude regarding use of APACHE II scoring system. This finding is incongruent with **Chen et al., (2004)** who mentioned that the

high level score of nurses’ attitude toward APACHE II scoring system in their study titled “ICU nurses knowledge and attitudes toward the APACHE II scoring system”.

Conclusion

- The majority of nurses had insufficient knowledge regarding APACHE scoring system.
- The majority of nurses had unsatisfactory level of practice regarding using of APACHE score.
- Two third of nurses had unsatisfactory level of attitude toward using of APACHE score for patients with cardiac surgery.

Recommendations:

1. Conducting periodic training on advanced care program for cardiac surgery intensive care units’ nurses in order to keep them with the update knowledge, practice and attitude regarding using of APACHE II scoring system to predict complications among cardiac surgery patients.
2. Develop a procedure book about cardiac surgery patients care during the first 24 hours including assessment of hemodynamic stability procedures, monitor arterial blood gases via arterial line and evaluation of Glasgow coma scale.

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Conflict of interest:

No conflicts.

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