Perioperative Risk Factors Predicting Outcomes after Cardiac Surgery at Assiut University Hospital

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Abstract

Background: Few studies have identified the perioperative risk factors of cardiac surgery because of a lack of specific researches.

Aim: This study was carried out to identify the perioperative risk factors predicting outcomes after cardiac surgery at Assiut University hospital.

Design: A descriptive expletory study design was carried out for patients undergoing open heart surgery.

Subjects: A convenient sample of 40 adult patients of both sexes affiliated to cardiothoracic surgery department from the above mentioned setting with open heart surgery.

Tools: Data were collected through: Three tools; (1) Structured interview questionnaire. It included six parts to assess open heart surgery patient' needs, pre-cardiac surgery assessment, diagnostic procedures and postoperative data.

Tool 2: EuroSCORE (European System for Cardiac Operative Risk Evaluation), for predicting the perioperative risk factors for mortality of patients undergoing cardiac surgery.

Tool 3: Observation checklist to assess nurses' practice while managing patients undergoing open heart surgery in different three times as (preoperative, immediately post-operative and late post-operative period).

Results: Of this study concluded that, more than half of the studied group were males (72.5%), (70%) married, and 40% of patients have an age ranged from (18-29).

Conclusion: A highly significant relationship was found between EURO Score value and postoperative morbidity and mortality. Also significant relation was present between postoperative nursing care regarding pain management and incision site care and postoperative morbidity and mortality. The study recommended that: The perioperative nursing care should be given by the professional nurses, and applying EuroScore for all patients undergoing open heart surgery.

Key Words: Perioperative – Cardiac surgery – Predicting outcomes.

Introduction

CARDIAC surgery carries a relatively high morbidity and mortality compared with most other surgical procedures. This is not only due to the nature of the surgery itself, but also to the presence of cardio-respiratory and other co-morbidities. Preoperative history taking and examination should focus on the assessment of the severity of ischemic heart disease and cardiac failure, as well as identifying the presence and severity of co-morbidities such as diabetes mellitus, hypertension and smoking-related diseases. Risk stratification, using one of several well-established scoring systems, can help estimate a patient's prognosis [1].

Evaluation of patient outcomes has become increasingly accepted as one important step to assess and improve quality of patient care. Because differences in outcomes may result from disease severity, effectiveness of treatment, or chance, and most outcome studies are observational rather than randomized, risk adjustment is necessary to account for case-mix [2].

In this context, risk-prediction models play an important role in current cardiac surgical practice where they may be used to assess the impact of specific predictors on outcome, to aid in patient counseling and treatment selection, and to serve as the basis for continuous quality improvement [3].

Independent preoperative variables that affect postoperative outcome can be categorized as patient demographics, preexisting health problems or comorbidities, measurements of physiological reserve, and priority of care [4].

The preoperative nursing care for cardiac surgery patients focused on an in-depth preoperative
evaluation of the patient history and cardiac status, along with collection of laboratory and possibly invasive and non-invasive procedures to provide baseline information for the postoperative period [5].

Postoperative nursing care includes: Attaching patients to bedside cardiac monitor and obtaining initial vital signs: Heart rate, blood pressure, temperature, SpO₂ and central venous pressure. The nurse verifies which fluids and vasoactive medications are being delivered, checking for dosage, rate, and accurate delivery. A quick head-to-toe assessment is performed, including sedation level, and neurologic status, breath sounds, heart sounds and adequacy of pulses. Labs also obtained in the immediate post-operative period included electrolyte, arterial blood gases, complete blood count, coagulation profile, and bleeding times [6].

Significance of the study:
Perioperative risk assessment has important implications for patient wellbeing, containment of hospital costs, and provision of data to identify perioperative issues in need of improvement and to achieve low mortality rates. So this study will help to evaluate perioperative risk factors predicting outcomes after cardiac surgery at Assiut University hospital.

Aim of the study was:
To assess the perioperative risk factors predicting outcomes after cardiac surgery.

Research question:
What is the Perioperative risk factors predicting outcomes after cardiac surgery?

Material and Methods

Design:
A descriptive study design was utilized to fulfill the aim of this study.

Setting:
This study was conducted in cardiothoracic surgery department and post-operative intensive care unit at Assiut University Hospital.

Subjects:
The sample of this study was a convenient sample of forty patients of both sexes that was available during the time of data collection, affiliated to cardiothoracic surgery department and post-operative intensive care unit. The criteria for inclusion were patients who had undergone surgery for coronary artery bypass grafting (CABG) and valve replacement with the use of cardiopulmonary bypass during the surgery, older than 18 years of age, and willing to participate in the study in the period from May 2011 to November 2011. The researchers also excluded patients if they had closed heart surgery procedures and chest surgery patients.

Tools of the study:
Three tools were used to identify the perioperative risk factors predicting outcomes after cardiac surgery at Assiut University Hospital. These tools were deducted by the researcher based on reviewing of related literatures.

Tool 1: Structured questionnaire was developed by the researchers to collect data related to socio demographic characteristics of study subjects as sex, age, educational level. Patients assessment pre-cardiac surgery as present, past, and family history, laboratory investigations as serum sodium, potassium, calcium, and magnesium. Diagnostic procedures: As chest radiography, ECG (Electrocardiogram), and echocardiography.

Intraoperative data as type of surgery, cardiopulmonary bypass time, ischemic time and any event during surgery and Post-operative data as length of ICU stay, time of ventilation, inotropic support & vasodilatation therapy in addition to any morbidity and mortality.

Tool 2: EuroSCORE (European System for Cardiac Operative Risk Evaluation) for predicting the perioperative risk factors for mortality of patients undergoing cardiac surgery. The scoring system identifies three groups of risk factors with their assigned weights-patient-related risk factors and include (age, sex, chronic pulmonary disease, extra-cardiac arteriopathy, neurological dysfunction disease, previous cardiac surgery, serum creatinine, active endocarditis, and critical preoperative state) cardiac-related risk factors which include (unstable angina, left ventricular dysfunction, recent myocardial infarction, and pulmonary hypertension), and surgery-related risk factors which include (emergency, other than isolated CABG, surgery on thoracic aorta, and post-infarct septal rupture). The sum of the scores of risk factors gives the additive EuroSCORE which is equivalent to risk of mortality for that patient.

<table>
<thead>
<tr>
<th>Scoring system</th>
<th>EuroSCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk:</td>
<td>(1-2)</td>
</tr>
<tr>
<td>Medium risk:</td>
<td>(3-5)</td>
</tr>
<tr>
<td>High risk:</td>
<td>(6 plus)</td>
</tr>
</tbody>
</table>
Tool 3: Observation checklist developed by researcher after modifications were done based on reviewing related literature; theoretical and clinical learning experience of it. Researchers and expertise selected certain items to suite the aim of the study. Content validity of this tool was tested by expertise in medical and nursing staff. This tool was used to assess nurses' practice while managing patients undergoing open heart surgery in different three times as (preoperative, immediately post-operative and late post-operative period).

Observational check list performed and confirmed by the researcher. Scoring system was rated for two levels done (1) and not done (0). Total system scores for all items were grades. Those who obtained less than (60%) were considered having unsatisfactory level while those who obtained more than (60%) were considered having satisfactory level of practice.

Techniques for data collection:
- An official letter was issued from the Faculty of Nursing, Assiut University to the Director of Cardiotoracic surgery department explaining the aim of the study to obtain permission and cooperation in conducting the study.
- Content validity is achieved through jury of expertise's in which the researchers subjected the scale to ten expertises from medical and nursing fields. The level where 1 was least important and 5 was most important. Then the researchers made the necessary modifications based on the expertise feedback.
- Consent: Consent was obtained from patients to participate in the study. The researchers initially introduced themselves to all potential subjects and they were assured that the collected data were absolutely confidential.
- A pilot study was conducted during March 2011 on 10% (4) patients before collection of data to detect any particular problem in the statements clarity, feasibility, and applicability of the tool.
- The data collection covered a period of seven months starting from May 2011 till the end of November.
- Confidentiality and anonymity were assured.

Field work:
- The researcher starts to collect data from patients on the same day of diagnosis using the pre-constructed tools.
- Questionnaire sheet was designed to identify the perioperative risk factors predicting outcomes after cardiac surgery were filled in and completed by the researcher as follows:
  - Preoperative period (data were collected from patients at the cardiothoracic surgery department).
  - Intraoperative period (data were collected at the operating room).
  - Post-operative period (Data were collected at the postoperative intensive care unit and the cardiothoracic surgery department).
  - Patients’ assessment sheet to obtain patients’ diagnosis, health history, risk factors, investigations, and treatment.

Analysis of data:

The raw data were coded and transformed into coding sheets. The results were checked then the data were entered into SPSS system files (SPSS package version 18). The following statistical measures were used: Descriptive statistics including frequency, distribution, mean, and standard deviation were used to describe different characteristics. Also Kolmogorov-Smirnov test was used to examine the normality of data distribution. And lastly Univariate analyses including: t-test and Mann Whitney test, and Kruskal-Wallis test were used to test the significance of results of quantitave variables. Chi-square test, Monte Carlo test, Fisher's exact test, Likelihood ratio, Yates-corrected Chi-square test were used to test the significance of results of qualitative variables. The significance of the results was at the 5% level of significance.

Results

Table (1): Mentioned that statistically significant relation was found between occurrence of morbidity and EURO score as regard to patient-related factors \(p=0.03\) and total EURO score \(p=0.026\); while non significant relation was found between occurrence of morbidity and cardiac related factors \(p=0.604\).

Table (2): Demonstrated that highly statistically significant relation was found between occurrence of mortality and EURO score as regard to patient-related factors \(p=0.001\) and Total EURO score \(p=0.0001\); while non-significant relation was found between occurrence of mortality and cardiac related factors \(p=0.604\).

Table (3): Presents a highly significant relationship between EURO Score value and postoperative morbidity and mortality \(p=0.001\).

Table (4): Clarifies significant relation between ischemic time, and cardiopulmonary bypass time.
(p=0.033 & p=0.01 respectively) and post-operative morbidity and mortality while non significant relation was found between duration of surgery and post-operative morbidity and mortality.

Table (5): Presents that significant relation was found between time of ventilation and ICU length of stay (p=0.006, and p=0.008 respectively) and post-operative morbidity and mortality.

Table (6): Shows that non-significant difference was found between preoperative nursing care and immediate nursing care and post-operative morbidity and mortality. While significant difference was present between post-operative nursing care regarding to pain management and incision site care and post-operative morbidity and mortality (p=.021, and p=.012 respectively).

Fig. (1): Shows that significant relation was found between patient’s age and postoperative morbidity and mortality (p=0.043).

Fig. (2): Presents postoperative morbidity among the studied group, about half of them experience postoperative morbidity. As regard to type of morbidity more than one third of them (36.8%) had wound infection, about one fourth of them had bleeding, 21.1% had chest infection and 15.8% had reexploration.

Table (1): Relation between occurrence of morbidity and EURO score among the studied group (n=40).

<table>
<thead>
<tr>
<th>EURO score</th>
<th>Occurrence of morbidity</th>
<th>Mann Whitney test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=21</td>
<td>Mean±SD</td>
<td>N=19</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>Patient-related factors</td>
<td>0.9±1.1</td>
<td>1.9±1.4</td>
<td>Z=2.175</td>
</tr>
<tr>
<td>Cardiac related factors</td>
<td>1.2±1.1</td>
<td>1.4±1.1</td>
<td>Z=0.519</td>
</tr>
<tr>
<td>Total EURO score</td>
<td>2.1±1.0</td>
<td>3.3±1.6</td>
<td>Z=2.324</td>
</tr>
</tbody>
</table>

Table (2): Relation between occurrence of mortality and EURO score among the studied group (n=40).

<table>
<thead>
<tr>
<th>EURO score</th>
<th>Occurrence of mortality</th>
<th>Mann Whitney test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=34</td>
<td>Mean±SD</td>
<td>N=6</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>Patient-related factors</td>
<td>0.8±1.0</td>
<td>2.8±0.9</td>
<td>Z=3.257</td>
</tr>
<tr>
<td>Cardiac related factors</td>
<td>1.2±1.0</td>
<td>2.5±2.4</td>
<td>Z=0.511</td>
</tr>
<tr>
<td>Total EURO score</td>
<td>2.0±0.9</td>
<td>4.3±1.0</td>
<td>Z=3.692</td>
</tr>
</tbody>
</table>

Table (3): Relation between EURO Score value and postoperative morbidity and mortality (n=40).

<table>
<thead>
<tr>
<th>Scoring system</th>
<th>Morbidity (n=14)</th>
<th>Mortality (n=6)</th>
<th>None (n=20)</th>
<th>Likelihood Ratio</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Total Euro score value)</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Low risk (1-2)</td>
<td>5</td>
<td>35.7</td>
<td>0</td>
<td>0.0</td>
<td>15</td>
</tr>
<tr>
<td>Medium risk (3-5)</td>
<td>9</td>
<td>64.3</td>
<td>5</td>
<td>83.3</td>
<td>5</td>
</tr>
<tr>
<td>High risk (6 or more)</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>16.7</td>
<td>0</td>
</tr>
</tbody>
</table>

Table (4): Relation between intraoperative data and postoperative morbidity and mortality (n=40).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group (n=40)</th>
<th>Morbidity (n=14)</th>
<th>Mortality (n=6)</th>
<th>None (n=20)</th>
<th>Likelihood Ratio</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Ischemic time (minutes):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>2</td>
<td>14.3</td>
<td>0</td>
<td>0.0</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>&gt;60-90</td>
<td>7</td>
<td>50.0</td>
<td>0</td>
<td>0.0</td>
<td>8</td>
<td>40.0</td>
</tr>
<tr>
<td>&gt;90</td>
<td>5</td>
<td>35.7</td>
<td>6</td>
<td>100.0</td>
<td>8</td>
<td>40.0</td>
</tr>
<tr>
<td>Cardiopulmonary bypass time:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90 minute</td>
<td>9</td>
<td>64.3</td>
<td>0</td>
<td>0.0</td>
<td>9</td>
<td>45.0</td>
</tr>
<tr>
<td>&gt;90 minutes</td>
<td>5</td>
<td>35.7</td>
<td>6</td>
<td>100.0</td>
<td>11</td>
<td>55.0</td>
</tr>
<tr>
<td>Duration of surgery (minutes):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>260</td>
<td>4</td>
<td>28.6</td>
<td>0</td>
<td>0.0</td>
<td>5</td>
<td>25.0</td>
</tr>
<tr>
<td>&gt;260</td>
<td>10</td>
<td>71.4</td>
<td>6</td>
<td>100.0</td>
<td>15</td>
<td>75.0</td>
</tr>
</tbody>
</table>
Table (5): Relation between postoperative data and occurrence of morbidity and mortality (n=40).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Morbidity (n=14)</th>
<th>Mortality (n=6)</th>
<th>None (n=20)</th>
<th>LR</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time of ventilation (hours):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥8</td>
<td>12</td>
<td>3</td>
<td>20</td>
<td>10.34</td>
<td>0.006*</td>
</tr>
<tr>
<td>&gt;8</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td></td>
<td>0.0</td>
</tr>
<tr>
<td><strong>ICU-Length of stay (days):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>9.75</td>
<td>0.008*</td>
</tr>
<tr>
<td>&gt;2</td>
<td>14</td>
<td>3</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (6): Relation between perioperative nursing care and postoperative morbidity and mortality (n=40).

<table>
<thead>
<tr>
<th>Observation check list</th>
<th>Morbidity (n=14)</th>
<th>Mortality (n=6)</th>
<th>None (n=20)</th>
<th>Kruskal Wallis test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative nursing care:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physiological preparation</td>
<td>61.4±5.3</td>
<td>56.7±8.2</td>
<td>58.0±6.2</td>
<td>k^2=3.348</td>
<td>0.188</td>
</tr>
<tr>
<td>Psychological preparation</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>k^2=0.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Preoperative teaching</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.8±3.7</td>
<td>k^2=1.0</td>
<td>0.617</td>
</tr>
<tr>
<td>Immediate postoperative nursing care</td>
<td>17.6±1.2</td>
<td>17.0±1.1</td>
<td>16.9±1.2</td>
<td>k^2=3.009</td>
<td>0.222</td>
</tr>
<tr>
<td>Postoperative nursing care:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemodynamic regulation</td>
<td>23.7±0.7</td>
<td>24.0±0.0</td>
<td>23.8±0.6</td>
<td>k^2=0.929</td>
<td>0.629</td>
</tr>
<tr>
<td>Pain management</td>
<td>20.0±1.4</td>
<td>15.8±4.2</td>
<td>19.1±1.2</td>
<td>k^2=7.749</td>
<td>0.021*</td>
</tr>
<tr>
<td>Respiratory monitoring</td>
<td>26.0±3.1</td>
<td>12.7±13.4</td>
<td>25.6±1.2</td>
<td>k^2=5.558</td>
<td>0.061</td>
</tr>
<tr>
<td>Incision site care</td>
<td>5.1±1.0</td>
<td>2.3±2.7</td>
<td>5.4±0.9</td>
<td>k^2=8.841</td>
<td>0.012*</td>
</tr>
<tr>
<td>Cardiac rehabilitation</td>
<td>5.3±4.3</td>
<td>2.0±4.0</td>
<td>3.4±3.6</td>
<td>k^2=4.804</td>
<td>0.091</td>
</tr>
</tbody>
</table>

Fig. (1): Age and occurrence of morbidity and mortality.

Fig. (2): Distribution of the studied group according types of postoperative morbidity.

**Discussion**

The identification of factors associated with an increased risk to develop complications after surgery is of main importance for an adequate preoperative patient selection, indicating the need of optimization of patients’ condition before surgery or cancellation of the operation for those with an excessively high operative risk. Furthermore, the identification of such risk factors and their inclusion in specific methods of risk stratification permits evaluation of the quality of treatment [7].

In the present study, findings regarding to patients’ characteristics revealed that, mean age of the studied patients was (37.8±16.2). This finding was supported by Azer [8] who reported that more than one third of the total studied patients were in...
the age group from 18-29 years old. On same line, this result disagrees with Chih-Hung ku, [9] who reported that the number of open heart surgery is increasing in patient who are 50 years old or more.

As regards gender, in the current study, more than two thirds of participants were male. This result comes in agreement with Bickley & Szilagyi [10] who stated that fewer of participated patients with open heart surgery were females (female: Male ratio=1: 4.4). As well, Giakoumidakis et al. [11] mentioned that, sixty seven percent of the studied patients were male. However, this result disagree with Hopkins [12] who mentioned that the majority of participated patients with open heart surgery were females.

In relation to educational level, one-third of the studied patients were illiterate, which explains why they were not complying with the medication regimen and routine follow-up and not responding easily to the knowledge given to them to prevent postoperative complication. On the other side highly educated patients represented less than ten percent of the sample and responded easily to the knowledge given to them besides the knowledge which they were getting on their disease and complications from their readings. This result was supported by Azer [8] who mentioned that patients with higher education had increased awareness toward the surgery and the importance of follow-up routine.

As regards the work status of the studied patients, the present study results revealed that about one-third of the studied patients were unemployed and slightly more than one fourth of them were employed. These finding may be attributed to the nature of the disease state which lead to easily fatigability and feeling of inability to perform any work.

Concerning preoperative cardiovascular clinical assessment for studied patients results revealed that more than half of the studied group were rheumatic heart disease and the rest of them were ischemic heart disease. These findings were supported by American Medical Association [13] which reported that they found a substantial decrease in the rate of CABG surgery, with approximately one-third fewer CABG surgeries being performed in 2008 compared with 2001. This decrease in CABG surgery rate occurred as a roughly linear trend throughout the 8-year period, suggesting that the decrease was not triggered by any single event occurring during the past decade.

In relation to medical history, about two thirds of the studied patients had streptococcal infection and rheumatic fever this explains the fact that two thirds of studied patients had the diagnosis of rheumatic heart disease. This also in accordance with Marijon et al. [17] who mentioned that rheumatic heart disease results from an abnormal autoimmune response to a group A streptococcal infection in a genetically susceptible host. Acute rheumatic fever-the precursor to rheumatic heart disease can affect different organs and lead to irreversible valve damage and heart failure.

However in the present study non-significant relation was found between preoperative risk factors and postoperative morbidity and mortality.

In the same context, results showed that, the majority of subjects had palpitation, dyspnea and chest pain, these results were in line with Chernecky & Berger [18] who reported that, all patients with cardiac disease had complained with palpitation and dyspnea.

Concerning health habits of the studied patients, results revealed that about two thirds of patients were drinking tea and coffee. Regarding to smoking, more than half of patient were non smoker this result was in agreement with Azer [8] who stated that more than two thirds of study and control group were non smoker. On the other hand, Kern [15] mentioned that, the majority of sample in study and control group were smokers and smoking is considered one of the risk factors for sternal surgical site infection.

In relation to practising physical exercise study findings indicated that more than half of studied group were not practicing physical exercise this may be due to lack of knowledge about the benefits of practicing exercise or the inability to do because of the disease state. According to Debacker et al. [16] who recommended that physical activity for cardiac patient should be positively encouraged because this may reduce blood pressure, cholesterol level, and body weight. Patients should be encouraged to exercise at least four times a week, but preferably daily for a period of 30 minutes.

According to the patient’s age and postoperative morbidity and mortality the current study results revealed that there was significant relation between patient’s age and postoperative morbidity and mortality. This is in agreement with Joshi, Fraser & Mullany [18] who reported that increased age is consistently identified as an important predictor of adverse outcome after cardiac surgery. Similarly,
Lahtinen [4] highlighted that patients’ age in cardiac surgery is significantly associated with mortality and morbidity.

Considering health habits and occurrence of morbidity and mortality, the present study revealed that non-significant relation was noticed regarding to health habits including drinking tea/coffee, smoking habit, and type of smoking and occurrence of post-operative morbidity and mortality (p>0.05). While statistically significant relation was found between practicing physical exercise and post-operative mortality.

Regarding to preoperative risk factors and postoperative morbidity & mortality, the current study findings indicated that non-significant relation was found between preoperative risk factors and post-operative morbidity and mortality regarding to medical risk factors, medical history and hereditary disease.

On the light of the present study finding, a highly significant relation was found between EuroSCORE and postoperative morbidity and mortality this means that, the higher EuroSCORE value the higher increased in morbidity and mortality rates. This finding was supported by Ioannis et al. [19] and Kobayashi et al. [20] who stated that EuroSCORE has been reported to have sufficient power to predict postoperative complications after cardiac surgery and their effects on long-term mortality may be covered by EuroSCORE algorithm. As well, Giakoumidakis et al. [11] highlighted that a positive association between perioperative risk (high EuroSCORE) and in-hospital mortality while this association remained statistically significant after adjusting for age, gender, BMI, type of surgery, hospital LOS, duration of surgery and CPB. On the other hand, Bhatti et al. [21] and Biancari et al. [22] reported that EuroSCORE overestimates observed mortality for isolated coronary artery surgery by a factor of two means that it would be easy to gain false reassurance by comparing observed mortality with that predicted by the algorithm.

As regards to hospital length of stay (LOS) & ICU (LOS) and EuroSCORE. The study findings mentioned that no correlation has been found between hospital LOS, ICU-length of stay and EURO score among the studied group. However this result disagrees with Massouadi [23] and Toumpoulis [24] who reported that there is a correlation between EuroSCORE and ICU stay of more than 2 days.

Concerning bypass time and postoperative morbidity and mortality, the present study revealed that significant relation has been found between cardiopulmonary bypass time and postoperative morbidity and mortality. On same line, This result comes in agreement with Duca [25] & Abbasi, [26] who reported that prolonged CPB duration independently predicts postoperative morbidity and mortality after cardiac surgery. Similary, Salis [27] mentioned that a significant (p<0.0001) correlation was found between prolonged CPB and neurologic complications also the duration of CPB was an independent predictor of early (detected immediately after surgery) stroke in 2,972 patients undergoing CABG surgery and/or valve surgery.

According to Lagan [28] prolonged cardiopulmonary bypass is a major risk factor for late extubation after CABG. Cardiopulmonary bypass is associated with a systemic inflammatory response, the production of oxygen-derived free radicals, the activation of polymorphonuclear neutrophils, and the complement cascade and release of vessel constringent factors. All these have negative influences on important organs, such as the heart, lung, brain, and kidney. Prolonged cardiopulmonary bypass was expected to negatively influence cardiopulmonary.

Regarding to ischemic time and postoperative morbidity and mortality, the current study findings indicated that significant relation was found between ischemic time and postoperative morbidity and mortality. This result is in accordance with Al-Sarra [29] and Carrier [30] who clarified that prolonged cross-clamp time significantly correlates with major post-operative morbidity and mortality in both low- and high-risk patients. This effect increases with increasing XCL time.

In relation to ventilation time and post-operative morbidity and mortality, the present study results showed that there was significant relation between ventilation time and occurrence of post-operative morbidity and mortality. This finding supported by Qiang [31], Giakoumidakis et al. [11], and Knapik [32] who stated that prolonged ventilation support may have contributed to increased morbidity, mortality, and cost.

According to Rashid [33] improvement in cardiopulmonary performance, shorter ICU and hospital stays, and reduction in costs could be achieved when cardiac surgical patients were weaned from the mechanical ventilator at the appropriate time.

Considering ICU Length of stay and post-operative morbidity and mortality, study findings
illustrated that significant relation was found between ICU Length of stay and postoperative morbidity and mortality. This finding was on line with Heimrath [34] who mentioned that patients who required prolonged ICU stay were more likely to require reoperation, have a perioperative MI and suffer a permanent stroke.

According to Burns [35] patients requiring prolonged ICU stay have been shown to have a higher short-term morbidity and mortality rate resulting in overall increased health care costs.

It was evident from the present study that mortality was higher among patients who had double valve replacement than those who had single valve and this may be related the fact the double valve replacement requires more duration of CBP, aortic cross clamping time, and length of surgery.

Finally the study findings revealed that significant relation has been found between postoperative nursing care especially pain management & incision site care and postoperative morbidity and mortality.

According to Kern [15] who stated that the nurse is responsible for providing preoperative nursing care for patients which includes assessing physical and psychological needs preparing patients for operation includes the following instruction such as listing medication routinely, limitation of eating or drinking before surgery with specific time, bathing, checking vital signs, laboratory investigation and administrating preoperative medication.

According to Weber & Kelly [36] wound infection is a major source of post operative morbidity in the United States, accounting for about a quarter of total number of nosocomial infections. As well Morton & Fontaine, [37] mentioned that Mediastinitis is the major infection in patients who have undergone cardiac surgery and may be a devastating complication that increases the length of hospital stay and mortality.

According to Wilson [38] poorly controlled pain can lead to cardiovascular consequences. The heart rate and blood pressure are increased and the blood vessels constrict, causing an increase in cardiac workload and myocardial oxygen demand. Effective pain control is important for patient comfort and hemodynamic stability.

**Conclusion:**

According to the results of the present study, it concluded a highly significant relationship existed between EUROScore value and postoperative morbidity and mortality. The study findings also concluded that significant relation exists between intraoperative & postoperative data and occurrence of morbidity and mortality. Significant relation was also present between postoperative nursing care regarding pain management and incision site care and postoperative morbidity and mortality.

**Recommendations:**

Based on the findings of the present study, the following recommendations are suggested:

**For patients:**

- Preparation and provision of information should start from time of the surgeon's decision that surgery is required. The patients must visit the cardiac surgery unit 2 weeks prior to surgery for the preoperative work up; to prepare them and provide information in the form of booklets, videos, and one to one counseling sessions.
- Advice the patient regarding effective education and information are required to enhance understanding of drug therapy (anticoagulant drug) including; right name of drug, right dose, right time and precaution when taking the drug.
- Pamphlets and simple illustration booklet should be available for illiterate patients to simple explain how to safely live after open heart surgery.

**For Nurses:**

- Nurses should be aware of postoperative complications, how to prevent it and how to deal with it when develop.
- Applying EuroScore for all patients undergoing open heart surgery.

**In services:**

- Follow-up care for patients with open heart surgery phone calls, home health visits and clinic visits would help to pinpoint problems and solve it.
- Establishment of specialized cardiothoracic clinics in all health centers to help guiding and caring for patient with open heart surgery.

**For research (future study):**

- Importance of doing separate studies of open heart surgery in males and females and will helpfully lead to more effective and preventive-based strategies for future.
- Studies should be done for those patients who high risk for morbidity and mortality after open heart surgery and apply the preventive measures.
- Replication of the current study on larger probability sample is recommended.
References


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