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Readmission after Open Heart Surgery: Study of Predictors and Frequency

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Abstract
Background: Hospital readmissions after cardiac procedures are believed to be associated with higher in-hospital mortality and may predict poor outcomes. In addition high rate of readmission following discharge is associated with increased cost of care. Therefore, awareness of factors that predict increased risk for hospital readmission after cardiac surgery may improve the ability to reduce early readmission rates among this category of patients. **Aim of the study;** to assess predictors for hospital readmission after cardiac surgery. **Design:** A descriptive exploratory design was utilized in the current study. **Subjects:** A sample of Convenience including 115 adult male & female patients who were admitted to the cardiothoracic surgery departments at Kasr Al-Aini Hospital, Cairo University over a period of six months were recruited. **Tools of data collection:** Four tools were utilized to collect data pertinent to the current study: Socio-demographic/medical data sheet; Perioperative open heart surgery assessment Sheet; Hospital readmission assessment sheet; and the LACE index Scale (Lengths of hospital stay in days; Acuity of illness at the time of admission; Carlson co-morbidity score; and Emergency department visits numbers during previous six months. **Results:** the current study revealed that the majority of the studied sample were males, married, having an elective admission with percentages of (67.8%), (86.1%) & (87%) respectively, and nearly half of them were between 40–59 years & came from rural area in percentages of (50%) & (52.2%) respectively. Out of the 115 patients who discharged from the hospital 18 % required a second hospital and ICU readmission. Main reasons for readmissions were wound problems (42.9%), congestive heart failure (14.3%), atrial fibrillation (9.5%), pleural effusion (9.5%), renal failure (9.5%) and respiratory failure (4.8%). Binary logistic regression analysis revealed that preoperative renal failure, delayed extubation (mechanical ventilation > 8 h), re-exploration for bleeding, perioperative use of intraaortic ballon pump (IABP), postoperative dysrhythmias, postoperative heart failure and postsurgical (ICU) length of stay (> 3 day) were independent predictors for readmission. **Conclusion & Recommendations:** Based on findings of the current study, it can be concluded that readmission following discharge is an important adverse outcome of cardiac surgery that needs continued attempts to explore and manage the risk factors of readmission. So the study recommends identification & close monitoring of those at risk for readmission; Establishment of hot line services for providing proper consultation after hospital discharge, especially for emergent cases; and provision of surveillance units for detection of high risk patients.
Keywords: Open Heart Surgery- Hospital Readmission-Predictors- Frequency.

1. Introduction

Open heart surgery plays an important role in the management of wide range of cardiovascular diseases and encompasses the care of a patient with greater acuity and complexity [1]. Cardiac surgery, including coronary artery bypass grafting (CABG) and vavular surgery represent the most common classes of surgical procedure performed globally [2]. Nearly 800,000 cardiac surgical procedures are performed annually worldwide [3]. However, in Egypt, according to statistics and medical record department (2009) at Kasr El Aini hospital, the number of patients admitted for cardiac surgeries during the last three years starting from January 2006 to December 2008 was recorded as: 987 patients during the year 2006, 1256 patients during the year 2007, and 1280 patients during the year 2008, which reveals gradual increment in patients' number.

Early hospital readmissions following discharge after cardiac operations are common, and account for 8% to 24% of discharged patients, and are likely related to patient co-morbidities and perioperative care [4]. Among the most common causes of readmission are complications that may be encountered by patients following surgery. So, it is important to direct the attention to perioperative complications as important source of patient morbidity [5]. Readmission to the intensive care unit (ICU) after cardiac surgery is associated with higher costs and may be correlated with an increased mortality [6]. Hospital readmission is a complex, multi factorial outcome, and it remains unclear how hospital readmission rates can effectively and safely be lowered [7].

Therefore, a study that helps to identify risk factors and predictors of readmission among patients undergoing open heart surgeries could be beneficial. The nurse as one of the health care team should have a

significant role in identification of risk factors for readmission. This could help in two ways: First; providing database about the main risk factors predisposing to hospital readmission. These data can be utilized by the health team members in the future plan of care for such group of patients. Second; proper post operative care for patients after cardiac surgeries can improve their condition, and reduce readmission rate that may be associated with higher costs and place a significant burden on health care resources and may be correlated with increased mortality. Thus predicting and managing patients at high risk for readmission to the hospital and intensive care unit (ICU) after cardiac surgery is paramount and allows resources to be targeted appropriately. Furthermore; it could decrease morbidity and mortality [8]. The nurse can identify patients at the greatest risk for re-hospitalization. By understanding factors associated with readmissions following cardiac surgery the nurse can implement effective interventions, and develop strategies to promote the quality of life and functional abilities of their patients as well as reduce rates of hospital readmissions [9]. This can be achieved through post hospital discharge care that helps in earlier identification and treatment of complications that evolve after discharge, and lead to re hospitalization.

2. Aim of the study

The current study was conducted to assess frequency & predictors of hospital readmissions among patients undergoing open heart surgery at Kasr Al-Aini Hospital, Cairo University.

3. Research Questions

To achieve the aim of the current study the following research questions were formulated:
Q1-What is the frequency of readmissions following open heart surgery at Kasr El Aini Hospital - Cairo University?
Q3-What are the most common reasons for readmissions after open heart surgery at Kasr El Aini Hospital?
Q3-What are predictors of readmissions after open heart Surgery?

4. Subjects and Method

4.1 Research design:

A descriptive exploratory research design was utilized in the current study.

4.2 Setting

The current study was carried out at the cardiothoracic critical care departments and cardiothoracic surgical wards affiliated to Kasr El Aini Hospital - Cairo University.
Sample: A sample of convenience including 115 patients who undergone open heart surgery was recruited in the current study, with the following inclusion criteria: adult, male and female, undergone different types of cardiac surgeries such as coronary-artery bypass grafting (CABG), cardiac valve replacement (CVR), combined CABG and CVR, repair of atrial or ventricular septal defects and aneurysm repair.

4.3 Tools of data collection

Four tools were used to collect data pertinent to the study. Three tools were developed by the researchers; Sociodemographic and medical data sheet, perioperative open heart surgery assessment sheet, and hospital readmission assessment sheet. The fourth tool: the LACE (Lengths of hospital stay; Acuity of illness at the time of admission; Carlson co-morbidity score; and Emergency department visits) index score. It was adopted from Walraven, (2010) to quantify and predict the risk of early unplanned readmission of medical or surgical patients after discharge. All tools were revised by a panel of five nursing experts, and then piloted by the investigator.
A-Socio-demographic and medical data sheet: it includes data related to age, sex, occupation, marital status, body mass index in addition to comorbidities.
B- Perioperatitve assessment data sheet. It consists of three parts: Preoperative assessment which covers data related to; vital signs, preoperative laboratory values, current medications therapy, cardiac assistive devices. Intraoperative assessment which covers data regarding: type of operation, operation technique, types & numbers of grafts for CABG patients, inotropic administration, blood transfusion, in addition to intraopertive events such as cardiac arrhythmia. Postoperative assessment covers data related to postoperative period such as patients' initial vital signs at the immediate postoperative period, postoperative lab investigations, postoperative complications, length of ICU stay, vital signs before hospital discharge & total length of hospital stay.
C- Hospital Readmission Assessment Sheet. It covers data related to readmission such as: frequency, type, interval between discharge and readmission times, main complaint, readmission sitting, and different reasons for readmission including: pulmonary; cardiac; gastrointestinal; genitourinary; hematological; metabolic; and neuropsychiatric problems, in addition to assessment of surgical wound problems. This sheet was fulfilled only for readmitted cases.
D-The LACE index uses four factors to gauge the risk of death or unplanned readmission after hospital discharge. These factors are: Lengths of hospital stay in days; Acuity of illness at the time of admission; Carlson co-morbidity score (a measure of the number and severity of a person's chronic condition); and Emergency

department visit numbers during previous six months. Total LACE scores range from 0 to 19, high-risk patients for readmission are those who obtained LACE ≥ 10. Patients who get scores 10-19 have 2.0% expected risk of readmission, while those who get score >19 have 43.7% expected risk for readmission.

Subtotal LACE score include: Length of hospital stay accounts a score starting from one point for one day hospital stay to seven points for ≥ 14. Acute emergent illness on admission has a score of three. Carlson co-morbidity scale (a measure of the number and severity of a person's chronic condition) takes score that ranged between 0-5. Emergency department visit numbers during previous six months accounts a score starting from one (for one time emergency department admission) to four (for more than four times emergency admission.

Protection of Human Rights

The current study was approved by human research committee at the faculty of nursing – Cairo University. Official permissions to conduct the study were obtained from directors of Cardiothoracic Surgical Intensive Care Unit at El Manial University Hospital & El Manial Specialized University Hospital in addition to cardiothoracic surgical wards affiliated to each hospital. Written consents for patients' agreements to be included in the in study were also obtained. Confidentiality and anonymity of each subject were assured through coding of all data.

Procedure

The current study was conducted on two phases: the designation phase and implementation phase. As regards the designation phase, it was concerned with construction and preparation of different data collection tools, in addition to obtaining managerial agreements to carry out the study. A pilot study was carried out on 15 patients who had undergone cardiac surgery and who fulfilled the inclusion criteria over a period of one month to test feasibility, objectivity, and applicability of the study data collection tools. Carrying out the pilot study gave the investigator experience to deal with the included subjects, and the data collection tools. Based on the results of the pilot study needed refinements and modifications were done in the data collection instruments. Because modifications were minor and didn't affect the main data so that subjects who shared in the pilot study were included in the actual study sample.

Concerning the implementation phase; it was carried out after obtaining the official permissions from the research committee, and from the heads of the selected hospital ICUs and wards to proceed in the current study. The researcher visited the selected settings on daily basis alternatively. Patients' medical files were reviewed to identify those who matched the inclusion criteria. Then patients were informed individually about the purpose and nature of the study and the researcher obtained written consents from those who could read and write and from responsible care givers in case of inability to read and write. The study was conducted over a period of 12 months divided into six months for data collection and other six months for follow up.

Data collection instruments were fulfilled for each patient throughout four different times: The first time was preoperatively where selected patients interviewed at cardiothoracic surgical wards then the researcher fulfilled sociodemographic and medical data sheet, LACE index scale, and Preoperative assessment sheet. The second time was done postoperatively in cardiothoracic surgical intensive care unit to fulfill intraoperative, and postoperative assessment sheets which included immediate postoperative assessment and identification of early postoperative complications. The third time was done postoperatively after returning back to the cardiothoracic surgical ward to assess for late postoperative complications, and obtain pre discharge data.

The fourth and final assessment time was done over a period of six months after hospital discharge to assess occurrence and frequency of hospital readmission, which was done after six months of discharge, through using hospital readmission assessment sheet. The follow up was done either by phone call in addition to meetings of patients during their follow up, or through visiting cardiothoracic surgical wards, cardiothoracic surgical intensive care units and sometimes critical care units affiliated to Kasr Aini hospital. During follow up period, the researcher was concerned with identification of: Occurrence of readmission; obtaining data about readmission such as (main compliant or reasons of readmission, frequency, the sitting where they readmitted, and the treatment plan).

Statistical Analysis Data

Upon completion of data collection, data were tabulated and analyzed using SPSS version 20. Descriptive and inferential statistics were done such as mean and standard deviation; frequency; percentage; chi square test; and logistic regression.

5. Results

Findings of the current study revealed that a total of 115 patients with open heart surgery were included. Most of the studied sample were males, married, between the ages of 40–59 years, came from rural area and had elective admission to the hospital, in percentages of 67.8%, 86.1%, 50%, 52.2% & 87% respectively (Table 1).

Hypertension, dyslipidemia & diabetes mellitus were the commonest comorbidities among the studied sample in percentages of 60 %, 55.7%, 53.9 % respectively, followed by cardiac comorbidities including recent

MI, preoperative AF, and heart failure in percentages of 36.4%, 22.6%, 8.7%, 7% respectively. Also results of the current study showed that more than half of the studied sample 66% undergone CABG surgery & 36% had triple vessel graft (Figure 1). As regards the surgery type the current study indicated that the most common type of cardiac surgery was CABG and Valve Surgery in percentages of 66.1% and 23.5% respectively (Figure 2). In addition (Figure 3) indicates that the majority (97.4%) of the studied sample undergone cardiac surgery by using on pump technique.

Concerning post-operative complications, table (6) demonstrates that prolonged mechanical ventilation (more than 8 hours) was the most common postoperative respiratory complications which occurred among 54.8% of studied sample, and occurred among the majority of the readmitted group (85.7%). Postoperative dysrhythmia was the commonest cardiac complication among one third (36.5%) of the studied sample, representing the majority of the readmitted group (80.9%). There was a significant statistical difference between the readmitted and non-readmitted patients in relation to prolonged ventilation & postoperative cardiac arrhythmia, ($\chi 2$ = 9.923, 17.470 at $p < 0.002$, < 0.000 respectively).

According to LACE index score, about one third of the studied sample (31.3%) were at high risk for readmission, of them, approximately one third actually readmitted, representing more than half of the readmitted patients (52.4%) (Table2). Regarding the exact number of readmitted patients, the current study revealed that, out of 115 patients who discharged, (n= 21, 18%) readmitted to the hospital within 6 months of discharge (Figure 4), also the result showed that more than half of the readmitted patients (67%) had an urgent/emergent readmission (Figure 5).

As indicated by the current study more than half of the readmitted patients were in the age group from 40-59 years & obese with BMI 30 kg or above) (Table 4) & (Figure 8). While the majority of them were males, had prolonged postoperative ICU stay (>3days) and prolonged hospital stay (> 10 days), with means of 4.42 day ± SD=2.80, and 20.381 day ± SD =8.66 respectively (Table 4) & (Table5). As regards to factors predisposing to readmission, the current study revealed that preoperative renal failure, prolonged mechanical ventilation, use of IABP, postoperative dysrhythmia, postoperative heart failure, reoperation for bleeding, postsurgical (ICU) Length of Stay (LOS > 3 day) were significantly associated with hospital readmission were at p 0.05, 0.001, 0.006, 0.008, 0.02, 0.001 respectively (Table 3).

6. Discussion

Despite the fact that cardiac surgery has made significant advances over the past fifty years, early & unplanned hospital readmission following discharge after cardiac operations is common. As revealed from the current study, the age of approximately one half of the sample ranged between 40 –60 years, with a mean age of 51.77 years + SD= 13.89. These finding is in concordance with that of Sharaf Eldein (2008), who studied predictors of early post-operative atrial fibrillation and indicated that, the mean age was 55 years + SD= 7.3.

CABG was the most common type of cardiac surgery among two thirds of the studied sample. The same finding was reported by Abdallah (2012) who found that around one half of the sample undergone CABG. In this regard, Bharadwaj & Luthra (2008) and Wilson etal. (2007) revealed that CABG surgery is among the most frequently performed surgical procedure on the heart worldwide and constitutes the keystone of adult cardiac surgery. Regarding the technique of surgery, the current study showed that majority of the studied sample undergone cardiac surgery by using cardiopulmonary bypass (CPB) - on pump technique. This finding is consistent with that of Oliveira & Westphal, Mastroeni (2012) who reported that CPB was performed in the majority of their sample.

In relation to postoperative complications, respiratory complications were prevalent in the current study. This is in consistence with that reported by Mullen-Fortino & O'Brien, (2008) who stated that the incidence of pulmonary dysfunction following cardiac surgery ranges between 30% and 60%, and prolonged mechanical ventilation (more than 8 hours) affected more than half of studied sample. In this regards, Canet (2010) described pulmonary complications to be due to several procedure-related factors such as use of general anesthesia, need for a median sternotomy incision, cooling for myocardial protection, use of CPB, and harvest of the internal mammary artery (IMA), which required pleural dissection.

In reference to postoperative cardiac complications, the current study showed that postoperative atrial fibrillation (AF) was the dominant dysrhythmia and found among more than one third of the studied sample. Similarly, Hussien (2008) indicated that most studies suggest that post-operative AF frequency ranges between 25-40%. This as explained by Ho & Tan (2009) may be attributed to both local and systemic inflammatory response of the atrium that are believed to contribute to the pathogenesis of A.F after cardiac surgery. Furthermore, Tokmakoglu (2010) indicated that AF is seen with increased BMI. Consequently, renal impairment was found among more than one fifth of the studied sample; of them a minority developed failure and required dialysis. In this regards Stafford etal (2008) attributed perioperative renal impairment to; procedure-specific interventions (e.g. deep hypothermic circulatory arrest); presence of preoperative hypertensive nephrosclerosis; diabetic nephropathy; and silent renal ischemia.

The current study revealed that hospital readmission after cardiac surgery was found among 18.2% of the studied sample. This result was in agreement with Li (2012) who conducted a study of predictors for hospital readmission after CABG and stated that readmission rates within 30 days of CABG range from 6% to 21% in the medical literature. Regarding to the type of readmission, the present study revealed that more than half of patients had urgent/emergent readmission, while the rest had arranged readmission. Of these, more than half admitted to ICUs while the rest readmitted to cardiothoracic surgical wards. This is in concordance with Hiesmayr & Schmidlin (2008) who found readmission to critical care among 34% of patients.

Findings of the current study revealed that more than half of the readmitted patients were at the age group of ≤ 40-59, a mean 56.10 years ± SD=2.905. In this regards, Hannan etal. (2011) reported that hospital readmission rates are highly correlated with increasing age. In relation to gender, the majority of readmitted patients were males. In this regards, Claassen etal (2012) indicated that women had improved long-term survival outcome after cardiac surgery as compared to men.

The current study revealed that more than one half of the readmitted patients were obese and one third was overweight, representing globally most of the studied sample. Consistent with this finding was that of McGinn (2011), who studied prevalence of dysglycemia among CABG surgery patients and indicated the dominance of overweight. In this regards, Morries (2011), stated that the higher the BMI, the lower the level of self-reported physical health and the greater chances of being readmitted to the hospital.

Concerning the readmitted group, the majority had prolonged postoperative ICU stay (> 3 days) and hospital stay (> 10 days), with means of 4.42 day ± SD=2.80, and 20.381 day ± SD =8.66 respectively. Comparison of mean ICU and hospital length of stay indicated high significant statistical differences between the readmitted and not readmitted groups, ($t = 7.5$ & 18.013 at $p < 0.00$ respectively). Prolonged postoperative ICU stay, and thus total length of hospital stay from the researcher's point of view could be attributed to inadequate preoperative preparation, and occurrence of postoperative complications. Klein (2011) as well attributed long hospital length of stay after coronary artery bypass graft surgery to preoperative factors such as; congestive heart failure; preoperative coronary care unit stay; renal failure; insulin-dependent diabetes mellitus; and emphasized that patients with at least one risk factor had a significantly higher incidence of length of stay >7 days.

Wound problems were the most common causes for readmission among more than one third of the readmitted patients. In this regards, Magnus (2011) studied causes of 30-day readmission after cardiac surgery and found that infection was one of the primary causes of readmission and accounted for more than one quarter of the readmission causes. However, Okonta etal., (2011), studied surgical site wound infection after open heart surgery and had contradicting finding to that of the current study. They indicated that the incidence of sternal wound infection worldwide is low.

As regards to predictors / risk factors associated with hospital readmission following cardiac surgery, the current study showed that prolonged mechanical ventilation was one of the most common postoperative respiratory complications especially among the majority of the readmitted group. In this regards, Lola etal., (2011) revealed that mechanical ventilation >24 hours was one of the independent predictors for readmission after cardiac surgery. As well, congestive heart failure was one of the independent predictors of readmission. These findings are similar to those found by Lee (2012), who studied early readmission for congestive heart failure after cardiac surgery, and indicated that congestive heart failure is risk factor for readmission at 30 days after hospital discharge.

In addition, IABP was one of the predictor of readmission after hospital discharge. This is in consistence with that of Durham & Gold (2008), who revealed that the need for pre and post-operative IABP is independent predictor for early readmission. On the other hand Miceli (2009) reported that IABP has favorable short and long-term outcome in patients with left main coronary artery disease, unstable angina, left ventricular dysfunction and congestive heart failure requiring medical treatment. Prolonged ICU stay was also a predictor for readmission following cardiac surgery. This is in concordance with that of Joskowiak etal., (2011), who studied readmission to the intensive care unit after cardiac surgery and documented that extended stay in the ICU was the most powerful variables to predict ICU readmission. Contradicted with this finding was that of Elliott and Cowper etal.,(2007), who indicated that although shorter stays offer clinical benefits, premature discharge could increase adverse events and thus risk factors for ICU readmission.

Furthermore, reoperation for bleeding in the current study was a significant predictor for readmission following discharge. Similarly, Boeken et al., (2011), studied ICU-readmission after cardiac surgery and found that re-exploration for bleeding was an independent predictor of readmission. Assessment of independent risk factors in the current study revealed that, preoperative renal dysfunction was proved to be an important factor that predisposes patients to readmission following discharge. This is in agreement with that of Polate (2012), who proved that preoperative renal insufficiency was an independent predictor for readmission to intensive care unit after cardiac surgery.

Conclusion

Hospital readmission following open heart surgery remains a problem and was related to patients' co-morbidities, intraoperative factors, as well as postoperative management. Identification of predictors of readmission such as preoperative renal failure, postoperative prolonged mechanical ventilation, perioperative use of IABP, postoperative dysrhythmia, postoperative heart failure, reoperation for bleeding, postsurgical prolonged ICU LOS > 3 day could help to identify patients at risk of hospital readmission. Strategies aimed at the prediction and management of these risk factors may decrease the need for subsequent readmission and may improve patients ' outcomes.

Recommendations:

- Establishment of specialized hospital documentation system to be concerned with recording intraoperative data to be available and accessible for health care staff members and documentation of readmitted cases to provide an accurate statistics for readmission rate.
- Provision of surveillance units responsible for detection of high risk patients & providing intense monitoring for those patients.
- Patients at risk for readmission should be followed up through a strict system following discharge that includes telephone follow-up and home visits.
- Establishment of hot line services for providing proper directions after hospital discharge, especially for emergent cases.

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-Tables & Figures:

Table (1): Frequency Distribution of the Studied Sample as regards Socio- demographic Characteristics (N =115).

Variable	N	%
Age group		
18-40	19	17
41-60	58	50
61-80	38	33
X ± SD 51.77 ± 13.89		
Gender		
Male	78	67.8
Female	37	32.2
Residence		
Urban	55	47.8
Rural	60	52.2
Marital status		
Single	9	7.8
Married	99	86.1
Divorced	6	5.2
Widowed	1	0.8

Figure (1): Percentage Distribution of the Studied Sample as Regards to Preoperative Comorbidities (N=115).

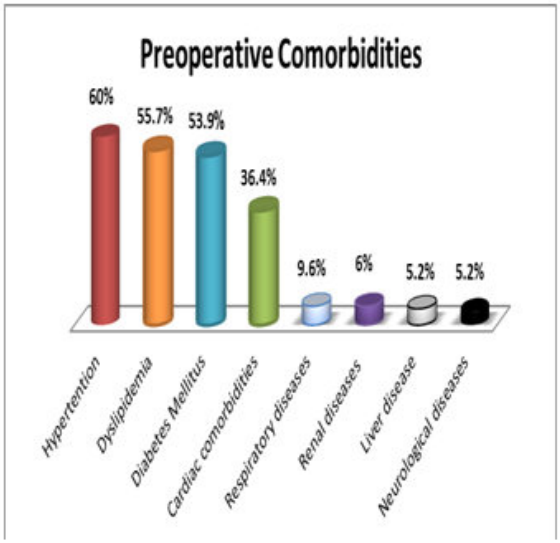

Figure (2): Percentages Distribution of the Studied Sample According to Surgery Technique (N=115)

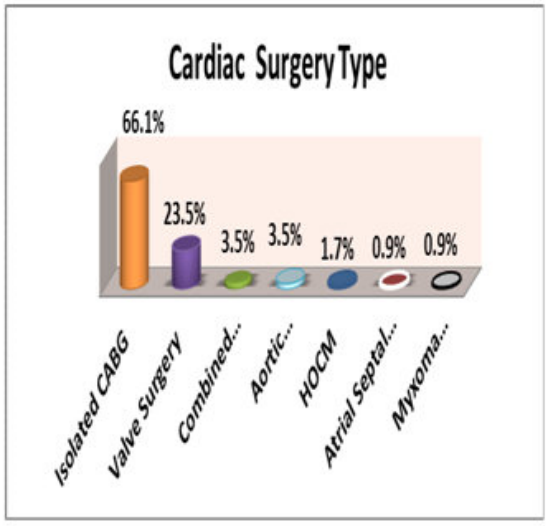

Figure (3): Percentages Distribution of the Studied Sample According to Surgery Technique (N=115).

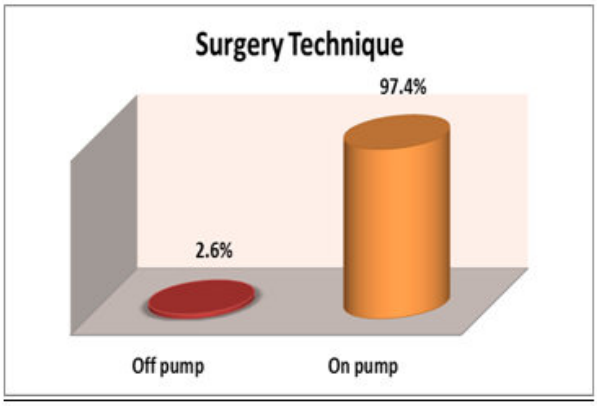

Figure (4): Frequency Distribution of Hospital Readmission among the Studied Group (N =115).

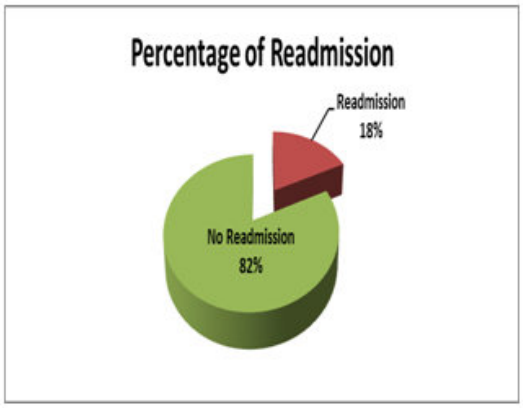

Figure (5): Percentage Distribution of the Readmitted Group Regarding the Type of Readmission (n=21).

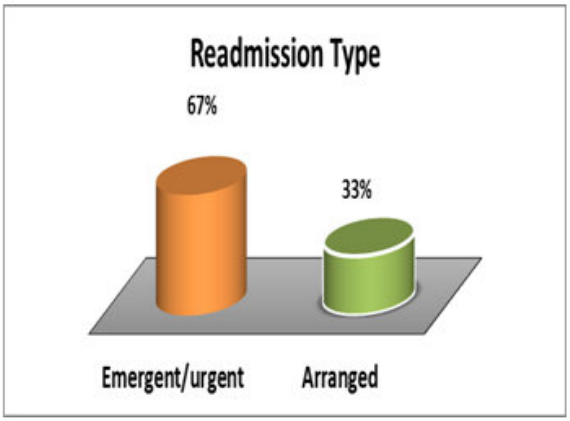

Figure (6): Percentage Distribution of the Readmitted Group Regarding Intervals of Readmission after Cardiac Surgery (n=21).

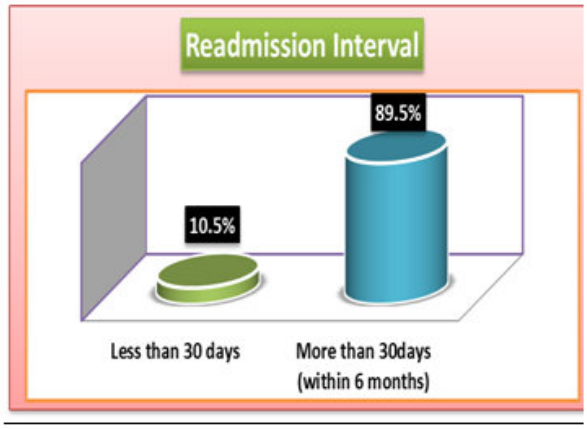

Table (2): Classification of the Studied Sample According to LACE Index Scores (N=115).

LACE score	No Readmission (n = 94)		Readmission (n = 21)		Total (N=115)		T	P
	N	%	N	%	N	%	22.43	0.000
Low risk for readmission	69	73.4	10	47.6	79	68.7		
High risk for readmission	25	26.6	11	52.4	36	31.3		
X ± SD	8.87 ± 2.13		10.28 ±1.70		8.99 ± 2.1			

Figure (7): Percentages Distribution of the Readmitted Group Regarding Reasons of Readmission (n=21).

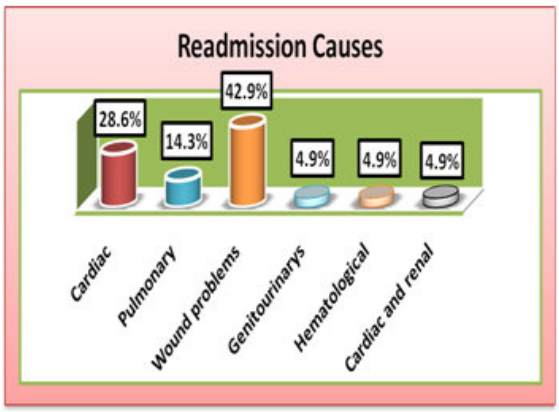

Figure (8): Percentage Distribution of the Readmitted Group as Regards Body Mass Index (n=21).

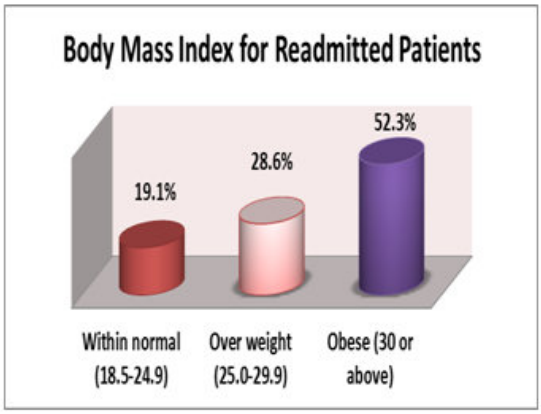

Table (3): Predictors of Hospital Readmission Following Open Heart Surgery Based on Logistic Regression Analysis (N=115).

Risk Factor	Adjusted Odds Ratio (95% Confidence Interval)	P. Value
Preoperative renal failure	1.57 (1.01-2.44)	*0.05
Prolonged mechanical ventilation	1.84 (1.28-2.65)	**0.001
Perioperative use of IABP	1.47 (0.99-2.19)	*0.006
Postoperative dysrhythmias	1.33 (0.97-1.82)	**0.008
Postoperative heart failure	1.95 (1.13-3.37)	*0.02
Reoperation for bleeding	1.15 (1.05-1.26)	*0.002
Postsurgical (ICU) LOS (> 3 day)	1.78 (1.38-2.31)	**0.001

Table (4): Comparison between the Non-Readmitted and Readmitted Group in Relation to Socio-Demographic Data (N=115).

Study Variables	Not readmitted (n = 94)		Readmitted (n = 21)		Total (N = 115)		χ^2	P
	No	%	N	%	N	%		
Age groups								
≥ 18-39	17	18.08	2	9.52	19	16.52	0.979	0.613
≥40-59	47	50	11	52.38	58	50.43		
≥60-79	30	31.91	8	38.09	38	33.04		
Gender								
Male	62	65.95	16	76.19	78	67.82		
Female	32	34.04	5	23.81	37	23.17	0.824	0.364
Marital status								
Married	78	82.98.	21	100	99	86.09		
Not married	16	17.02	0	0	16	13.91	4.152	0.245
Occupation								
Employee	23	24.47	3	14.28	26	22.6		
Farmer/worker	24	25.53	6	28	30	26.08		
Free work	8	8.51	1	4.76	9	7.83		
Retired	3	3.19	5	23.81	8	6.96	12.09	0.017
Doesn't work	36	38.29	6	28.57	42	36.52		
Residence								
Rural	52	55.32	8	38.09	60	52.17	2.041	0.153
Urban	42	44.68	13	61.90	55	47.83		

Table (5): Frequency Distribution of the Readmitted and Non-Readmitted Groups in relation to Length of ICU and Hospital Stay (N=115).

Variable	No Readmission (N = 94)		Readmission (N = 21)		Total (N = 115)		T	P
	N	%	N	%	N	%		
Length of ICU stay								
≤3 days	58	61.7	4	19	62	54	7.50	0.000
> 3 days	36	38.3	17	81	53	46		
X ± SD	5.06 ± 6.26		4.42±2.80		5.58 ± 8.48			
Length of hospital stay								
≤10 days	17	18.1	2	9.5	19	16.5	18.013	0.000
> 10 days	77	81.9	19	90.5	96	83.5		
X ± SD	20.6±11.26		20.381±8.66		23.16 ± 13.98			

Table (6): Comparison between the Non-Readmitted and Readmitted Groups in Relation to Postoperative Complications (N =115).

Variable	Not readmitted (n = 96)		Readmitted (n = 21)		Total (N = 115)		χ^2	P
	N	%	N	%	N	%		
Respiratory complications								
Prolonged ventilation`	45	47.8	18	85.7	63	54.8	9.923	0.002
Respiratory failure	3	3.1	3	14.2	6	5.2	4.836	0.028
Pleural effusion	4	4.2	0	0	4	3.4	0.455	0.500
Pneumothorax	0	0	1	4.7	1	0.9	4.515	0.034
Cardiac complications								
Postoperative MI	6	6.3	1	4.7	7	6	0.013	0.909
Postoperative arrhythmia	25	26.5	17	80.9	42	36.5	17.470	0.000
Postoperative H .F	6	6.3	7	33.3	13	11.3	12.435	0.000
Cardiac pacing	6	6.3	3	14.2	9	7.8	1.486	0.223
Renal complications								
Renal impairment	18	19.1	6	28.5	24	20.8	0.923	0.337
Renal dialysis	2	2.1	2	9.2	4	3.4	1.655	0.198
Hematological complications								
Postoperative bleeding	6	6.3	8	38	14	12.2	10.75	0.001
Chest re-exploration	3	3.1	4	19	7	6.1	7.55	0.006
Psychological complications								
Postoperative delirium	3	3.1	1	4.7	4	3.5	0.126	0.723
ICU psychosis	0	0	2	9.2	2	1.7	9.111	0.003
Wound related complications								
Post. operative wound infection	1	1	2	9.2	3	2.6	0.688	0.407
Metabolic complications								
Diabetic ketoacidosis	6	6.3	4	19	10	8.6	4.836	0.028