Original Research Paper

Anaesthesiology

# FACTORS ASSOCIATED WITH LENGTH OF HOSPITAL STAY AFTER CARDIAC SURGERY

| Dr .Sarath .K | Assistant Professor ,Dept. of Anaesthesiology. Malabar Medical College Hospital And Research Center, Modakkallur |
|---|---|
| Dr. Sukanya Prince Mary.A.J* | Associate Professor, Dept. of Anaesthesiology. Malabar Medical College Hospital And Research Center, Modakkallur. *Corresponding Author |
| Dr.Rajesh.S | Professor And Head, Dept. of Cardiothoracic And Vascular Surgery, Govt. Medical College, Kozhikode |
| Dr. Sisir Balakrishnan Pillai | Assistant Professor, Dept. of Cardiothoracic And Vascular Surgery, Malabar Medical College Hospital And Research Center, Modakkallur |

**ABSTRACT** Cardiac surgery involves both morbidity and mortality. Length of hospital stay can depend on many factors. The aim of this study is to analyse the factor which were responsible for prolonged hospital stay in a tertiary care center .We retrospectively analysed cardiac surgery patients over a period of four months from hospital registers. Only elective surgery was considered. 83 patients were studied.

The patients were divided into two groups(Group 1 and Group 2) based on length of hospital stay in cardiac intensive care postoperatively. We considered prolonged hospital stay if patient was discharged after 4th postoperative day. Data was analysed using Chi squared test , One way ANOVA and Unpaired t test. We observed that the mean duration of stay in the intensive care unit during this study period was 3.98 days in Group 1 and 6 days in Group 2 which is significant(t=-11.70, and p<0.0001).Diabetes mellitus, hypertension ,left ventricular systolic dysfunction ,chronic kidney disease and increased creatinine were factors responsible for prolonged hospital stay in our study.

## INTRODUCTION

One of the outcome of cardiac surgery is usually measured by how long the patients stay in hospital after the procedure. The length of stay can depend on preoperative ,intraoperative and postoperative factors. The duration which is considered prolonged differs. Some consider >96 hours (1) as prolonged postoperative hospital stay after cardiac surgery. Some stratified patients into short stay (less than 48 hours) or long stay (more than 48 hours)(2).

## AIMS AND OBJECTIVES

1. To determine the length of stay in intensive care unit after cardiac surgery
2. To determine the factors associated with prolonged stay in intensive care unit after cardiac surgery.

## MATERIALS AND METHODS
### INCLUSION CRITERIA

All the patients above the age of 25 years who underwent elective cardiac surgery from August 2021 to November 2021 in a tertiary hospital were included in the study.

## EXCLUSION CRITERIA

The patients less than 25 years of age ,who expired and emergency cardiac surgery cases where excluded.The data was collected from the hospital Medical records and staff nurse register .Required permission and ethical clearance was obtained. Patient consent was taken. The patients were divided into two groups(Group 1 and Group 2) based on length of hospital stay in cardiac intensive care postoperatively. We considered prolonged hospital stay if patient was discharged after 4th postoperative day(Group 2).The factors associated with prolonged stay after cardiac surgery were tabulated on excel sheet and analysed with SPSS and MedCalc Software Ltd. Chi squared test ,One way ANOVA and Unpaired t test were used to analyse data. Odds ratio and relative risk were calculated.

## OBSERVATIONS

A total of 83 patients underwent cardiac surgery from August 2021 to November 2021. 2 patients underwent emergency cardiac surgery and were excluded. 2 patients expired within 96 hours of surgery and were excluded .59 patients were males and 24 were females. 25 patients underwent valvular surgeries and 62 patients underwent coronary artery bypass grafts(21 on pump and 41 off pump). 46 patients had surgery with cardiopulmonary bypass support.

The mean duration of stay in the intensive care unit postoperatively during this study period was 3.98 days in Group 1 and 6 days in Group 2 . 35 patients had diabetes mellitus and 34 had hypertension. Other comorbidities included hypothyroidism(1), seizure disorder(1), cerebrovascular accidents(1), psychiatric illness(1),liver dysfunction(4) and elevated renal parameters(8).15 had left ventricular systolic and 3 had diastolic dysfunction.2 had right ventricular dysfunction.

## RESULTS

83 patients' details were included in the study. They were consecutive patients who underwent cardiac surgery from the period August 2021 to November 2021. 57 patients had hospital stay of 4 or less days(group 1).26 patients had hospital stay of 5 or more days(group 2).

The mean age of the patients was 54.78(n=83,SD: 8.51). The mean age in group 1 (control) is 54.61, whereas the mean age in group 2 was 55.15 years. The unpaired t test between the groups were not significant(p:0.39, t:-0.2).

The number of females in group 1 were 16 and males were 41. The number of females in group 2 were 8 and males were 18. The chi-square test between groups were not significant(0.063, p:0.80). The mean duration of hospital stay pre-operatively between the groups were not significant, (6.6 days, n=57 in group 1 vs 7.31, n= 26 in group 2, t= -0.86, p= 0.19).

A chi squared test showed no significant association between surgeons and prolonged hospital stay.(3, n=83, =2.32, p=0.31). A chi squared test between Anaesthesiologist and prolonged hospital stay returned a significant difference at p

<0.05, but not at 0.01(3,n=83, = 6.67, p=0.03). This may be because the senior Anaesthesiologist might be leading the more complicated cases.

The average days spent in hospital in group 1 was 3.98 days, whereas in group2 was 6, which is significant(t=-11.70, and p<0.0001).

The odds ratio of patients who had prolonged post operative hospital stay having associated diabetes mellitus was 1.4783. (95% CI=0.5813 to 3.7590, p=0.4117).

The relative risk of patients with diabetes ending up with 5 or more days of post operative hospital stay was 1.3056(95% Cl= 0.6922 to 2.4623).

The odds ratio of association of patient with left ventricular systolic dysfunction ending up with hospital stay of 5 or more is greater than patient with no LV dysfunction, although the ratio is just 1.12 (1.1190, 95% CI=0.3403 to 3.6800 , p=0.8531). The relative risk ratio was 1.0794 (0.4854 to 2.4001).

The odds ratio of association of patient with hypertension ending up with hospital stay of 5 or more is greater than patient with no hypertension. (odds ratio:2.5227, 95% CI=0.9763 to 6.5187, p=0.05). The relative risk ratio was 1.8701(95% CI: 0.9815 to 3.5631).

Post-covid status had no significant association with prolonged hospital stay(odds ratio:0.3400, 95%CI =0.0388 to 2.9792,P = 0.3300).

The importance of Chronic kidney disease or just elevated creatinine were analysed as odds ratio and relative risk. The odds ratio was 1.8909.(95% CI= 0.4634 to 7.7152, p= 0.37). The relative risk ratio was 1.4949( 95% CI= 0.6650 to 3.3608 , p=0.33)

The odds ratio and relative risks were calculated for association of valve surgery and on pump surgery with post op duration of hospital stay.

The odds ratio for association of valve surgery to prolonged hospital stay was 1.0458 (95% CI= 0.3815 to 2.8649, p= 0.9 ) and the relative risk ratio was 1.0311 (95% CI= 0.5181 to 2.0522, p= 0.9)

Odds ratio for association of prolonged post op hospital stay with on pump surgery was 1.03 (0.4906 to 2.6191, p=0.9) and relative risk ratio was 1.0244(0.5417 to 1.9370 p= 0.94)

One way ANOVA was done to analyse if significant difference were present between the two groups, namely post op hospital stay of 4 or less days or 5 or more days when 3 comorbidities, diabetes, LV dysfunction and hypertension were considered together, which suggested that the f-ratio value is 3.04523. the p-value is 0.082218. The result is significant at p<0.10 but not at 0.05.

|  | 5 or more days | 4 or less days |
|---|---|---|
| DIABETES | 13 | 23 |
| NO DIABETES | 13 | 34 |

|  | 5 or more days | 4 or less days |
|---|---|---|
| LV DYSFUNCTION | 5 | 10 |
| NO LV DYSFUNCTION | 21 | 47 |

|  | 5 or more days | 4 or less days |
|---|---|---|
| hypertension | 15 | 20 |
| NO hypertension | 11 | 37 |

|  | 5 or more days | 4 or less days |
|---|---|---|
| CKD or elevated creatinine | 4 | 5 |
| No CKD or elevated creatinine | 22 | 52 |

## DISCUSSION

Length of hospital stay depends on multiple factors . The patient factors are important determinants of post cardiac surgery discharge from intensive care unit. The duration of hospital stay after cardiac surgery especially coronary artery bypass graft depended on age, sex, race, admission status, geographic area, comorbid illnesses (congestive heart failure, valvular disease, hypertension, paralysis, neurological disorders, chronic obstructive pulmonary disease, blood loss, deficiency anaemia , alcohol or drug abuse, diabetes and its complications, renal failure, obesity, weight loss, electrolyte disorder), and if an internal mammary graft was used during the procedure(3).

Other factors associated with increased intensive care unit length of stay included increased age, atrial fibrillation/ arrhythmia, chronic obstructive pulmonary disease , low ejection fraction, renal failure/ dysfunction and emergency surgery status(4).

Postoperative psychiatric disorders like anxiety, depression and psychosis are responsible for prolonged hospital stay. Oliveira et al found that hospital stay >3 days in the ICU occurred for 22.1% patients and >7 days in the ward for 27.9%. Diabetes (OR=3.17) and smoking (OR=4.07) were predictors of prolonged stay in ICU(5). Kao et al observed that potential signs of infection denoted by WBC higher than 10,000/L (OR: 3.41), body temperature higher than 38°C (OR:5.67) and acute renal failure (OR: 8.97) were the most significant predictors of stay more than 3 ICU days(5). Longer the stay in hospital, more the mortality .Causes of mortality after cardiac surgery have been found to be deep sternal wound infection, stroke, and pneumonia (all p<0.05)(6).

Limitations of our study was that the study sample was small.

## REFERENCES
1. Azarfarin R, Ashouri N, Totonchi Z, Bakhshandeh H, Yaghoubi A. Factors influencing prolonged ICU stay after open heart surgery. Res Cardiovasc Med. 2014 Oct 14;3(4)
2. Meadows K, Gibbens R, Gerrard C, Vuylsteke A. Prediction of Patient Length of Stay on the Intensive Care Unit Following Cardiac Surgery: A Logistic Regression Analysis Based on the Cardiac Operative Mortality Risk Calculator, EuroSCORE. J Cardiothorac Vasc Anesth. 2018 Dec;32(6):2676-2682.
3. Auerbach AD, Hilton JF, Maselli J, Pekow PS, Rothberg MB, Lindenauer PK. Case Volume, Quality of Care, and Care Efficiency in Coronary Artery Bypass Surgery. Arch Intern Med. 2010;170(14):1202–1208.
4. Almashrafi, A., Elmontsri, M. & Aylin, P. Systematic review of factors influencing length of stay in ICU after adult cardiac surgery. BMC Health Serv Res 16, 318 (2016).
5. Oliveira EK, et al. - Risk factors for prolonged hospital stay after isolated coronary artery bypass grafting Rev Bras Cir Cardiovasc 2013;28(3):353-63
6. Kai-Di Kao, Shiu-Yu Katie C. Lee, Chieh-Yu Liu, Nai-Kuan Chou .Risk factors associated with longer stays in cardiovascular surgical intensive care unit after CABG .Journal of the Formosan Medical Association. Vol 121, Issue 1, Part 2,2022: 304-313.
6. Mazzeffi M, Zivot J, Buchman T, Halkos M. In-hospital mortality after cardiac surgery: patient characteristics, timing, and association with postoperative length of intensive care unit and hospital stay. Ann Thorac Surg. 2014 Apr;97(4):1220-5.