Improvement of waiting time for patients undergoing coronary artery bypass grafting (cabg) in king abdulaziz university hospital

Abdulhadi M.Nabil Alama, Mohammed Qutub, MohamedNabil Alama, Shadi Alkhayyat, Kuljit Singh, Abdulelah Khuraybah, Ammar Abu Gharara

Abstract— Background: Coronary artery disease is the leading cause of death in the developed world. When treating coronary artery disease, coronary artery bypass grafting (CABG) is done in some severe cases. Unfortunately, some of the patients spend a long time on a waiting list for CABG procedure, some of them are readmitted for other types of intervention during there waiting period. The hospitals know this, so they are continuously trying to improve their health care services. So, we aimed in this study to show the improvement of cardiac care in King Abdulaziz University Hospital (KAUH) in Jeddah in the year after the administrative intervention compared to the year before. Design: We used a retrospective chart review design over the period from June 2014 to July 2016 in KAUH. We included patients who were referred to CABG after a coronary angiogram. The patients were distributed based on the date that administrative interventions were implemented into Before-intervention and After-intervention groups. Results: in the before-intervention group the mean waiting days for surgery was 42 days, while in the after-intervention group the mean waiting days for surgery was 34 days. P value = 0.05. Conclusion: We conclude that administrative efforts and proper management of hospital resources successfully improved the cardiac care patients on the wait list for CABG..

Index Terms— Cardiac care, CABG, Hospital resources managment, Ischemic heart diease, Wait list, Waiting time.

1 Introduction

Coronary artery disease is the leading cause of death in the developed world [1]. In 2001, more than 7 million deaths occurred across the globe because of coronary artery disease [2]. Although there is a recent reduction in mortality rate of coronary artery disease in developed countries, However, in the developing countries the mortality rate is rapidly increasing [3]. More than 4.5 million deaths are occurring in the developing countries [3]. Almost 5.5% of the Saudi population have coronary artery disease, with higher prevalence in urban regions 6.2% compared to 4% in rural regions [4]. This is becoming an increasing issue due to the epidemic of Diabetes Mellitus in Saudi Arabia.

Due to increasing mortality rate of coronary artery in the developing countries, the demand for cardiac centers and cardiac care facilities is constantly rising. On the other hand, mortality rate is decreasing in the developed countries. Despite that, the prevalence of cardiac disease is increasing due to improved health services and improved life expectancy of cardiac patients. So, the demand on cardiac centers is rising as well [5].

When treating coronary artery disease, coronary artery bypass grafting (CABG) is performed in some cases with multivessel disease as well as in high risk anatomy for improved prognosis [6],[7],[8],[9]. CABG is one of the most frequently performed procedures worldwide, done for more than 800 thousand patients each year, As the coronary disease gets more complex, the indication for CABG gets stronger [10],[11],[12],[13],[14],[15],[16],[17]. Recently there has been many studies comparing PCI versus. CABG for multivessel disease which showed superiority of CABG in reducing repeat revascularization by 12.2% in patients with myocardial infarctions when compared to PCI. This is even more evident in patients with diabetes [18],[19] as well as in patients with complex coronary anatomy [20].

Unfortunately, some of the patients spend long time on waiting lists for CABG procedure, some of them are readmitted for other types of intervention during there waiting period. Hospitals acknowledge this and, hospital administrations are continuously trying to improve their cardiac health care services by providing more ICU beds, increasing the number of cardiac surgeons, anesthesiologists and cardiac operating rooms, as well as improving post-operative care.

We sought in this study to evaluate the improvement of cardiac care in King Abdulaziz University Hospital (KAUH) in Jeddah in the year after the administrative intervention was applied compared to the previous year.

2 Materials and Methods:

This study was approved by the ethical committee of King Abdulaziz University Hospital (KAUH) in Jeddah. We used a retrospective chart review design over the period between June 2014 and July 2016 in KAUH. We targeted all cardiac patients who underwent coronary angiogram and included those who were referred for CABG by their cardiologists. Those who were not referred for CABG were excluded. Patients were divided into two groups based on the date that administrative interventions were implemented by KAUH which was in July,2015. The two groups were divided as follows:

Before-intervention group: patients were included between June 1st, 2014 and June 30th, 2015.

After-intervention group: patients were included between July 1st, 2015 and June 30th, 2016.

After clinical assessment of patients by Cardiac surgery. The patients were identified as accepted for surgery or declined due to poor targets or multiple medical comorbidities. For statistical analysis, SPSS software was used. Continuous variables were presented as means and standard deviations or median and interquartile range and were analyzed using Student's t-test. Chi square test or Fisher's exact test were used for categorical variables as appropriate. A two-sided p-value ≤ 0.05 was considered statistically significant.

3 RESULTS:

Amongst 1733 patients who performed coronary angiogram, 187 patients were referred for CABG. Before-intervention group had 103 patients while After-intervention group had 84. Despite the retrospective nature of this study, the two groups were reasonably well-matched. The baseline characteristics were shown in Table1. Before-intervention group had a mean age of 58.1 ± 10.35, after-intervention group had a mean age of 59.5 ± 9.5 (p-value = 0.3). Numerically there were more diabetic and hypertensive patients in the after-intervention group (68% versus 73.8%, P-Value = 0.5 and 61.2% versus 75%, P-Value = 3.4, respectively) But the difference didn't reach statistical significance. Also, the number of patients who had known CAD was numerically higher (15.5% versus 20.2% P-Value = 0.4) but the difference didn't reach statistical significance, on the other hand, the before-intervention group had numerically more patients with dyslipidemia and history of heart failure (23.3% versus 15.5%, P-Value = 1.3 and 13.6% versus 7.1%, P-Value = 1.4, respectively), both of which didn't reach statistical significance. The differences of nationalities in both groups are shown in Table2.The before-intervention group had 23 Saudis (22.3%), 45 non-Saudi Arabs (43.6%), 28 South Asians (27.2%), 5 East Asians(4.8%) and 2 other nationalities (1.9%). The after-intervention group contained 22 Saudis (26%), 28 non-Saudi Arabs (33.3%), 27 South Asians (32.1%), 3 East Asians (3.6%) and 4 other nationalities (4.8%).There was no statistical difference in nationalities in between both groups. In the Before-intervention Group: 103 total patients referred for surgery, 25 of them (24.3%) were declined by the surgeons due to poor target vessels or multiple medical comorbidities. For the remaining 78 (75.7%), the mean waiting days for surgery was 42 days. In the After-intervention Group: 84 total patients referred for surgery, 17 of them (20.2%) were declined by the surgeons. For the remaining 67 (79.7%), the mean waiting days for surgery was 34 day, as shown in Table 3. There was a trend toward more surgeries performed in the after-intervention group but it didn't reach statistical significance p-value = 0.23, as shown in figure 1.However, the mean waiting days was significantly lower in the after-intervention group (42 days versus. 34 days, p-value = 0.05), as shown in figure 2.

Table1. Baseline Patients Chacteristics

BASELINE CHARACTERISTICS	BEFORE-INTERVENTION GROUP	AFTER-INTERVENTION GROUP	P-VALUE
AGE (MEAN ± SD)	**58.1 ± 10.35**	**59.5 ± 9.5**	0.3
BMI (MEAN ± SD)	**28 ± 8.1**	**28.7 ± 4.9**	0.4
SMOKING N (%)	**43 (41.7%)**	**38 (45.2%)**	0.1
HYPERTENSION N (%)	**63 (61.2%)**	**63 (75%)**	3.4
DIABETES N (%)	**70 (68%)**	**62 (73.8%)**	0.5
DYSLIPIDEMIA N (%)	**24 (23.3%)**	**13 (15.5%)**	1.3
HEART FAILURE N (%)	**14 (13.6%)**	**6 (7.1%)**	1.4
PREVIOUS PCI N (%)	**16 (15.5%)**	**17 (20.2%)**	0.4
PREVIOUS CABG N (%)	**3 (2.9%)**	**5 (6%)**	0.4

Table 2. Patients' nationalities

NATIONALITIES	BEFORE-INTERVENTION GROUP N(%)	AFTER-INTERVENTION GROUP N(%)
SAUDIS	**23 (22.3%)**	**22 (26%)**
ARABS	**45 (43.6%)**	**28 (33.3%)**
SOUTH ASIANS	**28 (27.2%)**	**27 (32.1%)**
EAST ASIANS	**5 (4.8%)**	**3 (3.6%)**
OTHERS	**2 (1.9%)**	**4 (4.8%)**
TOTAL	**103**	**84**

Table 3. Number of performed surgeries and mean waiting days

	BEFORE-INTERVENTION GROUP	AFTER-INTERVENTION GROUP
TOTAL PATIENTS	103	84
DECLINED N (%)	25(24.3%)	17 (20.2%)
PERFORMED SURGERY N (%)	78 (75.7%)	67 (79.7%)
MEAN WAITING DAYS (±SD)	42(±24)	34(±26)

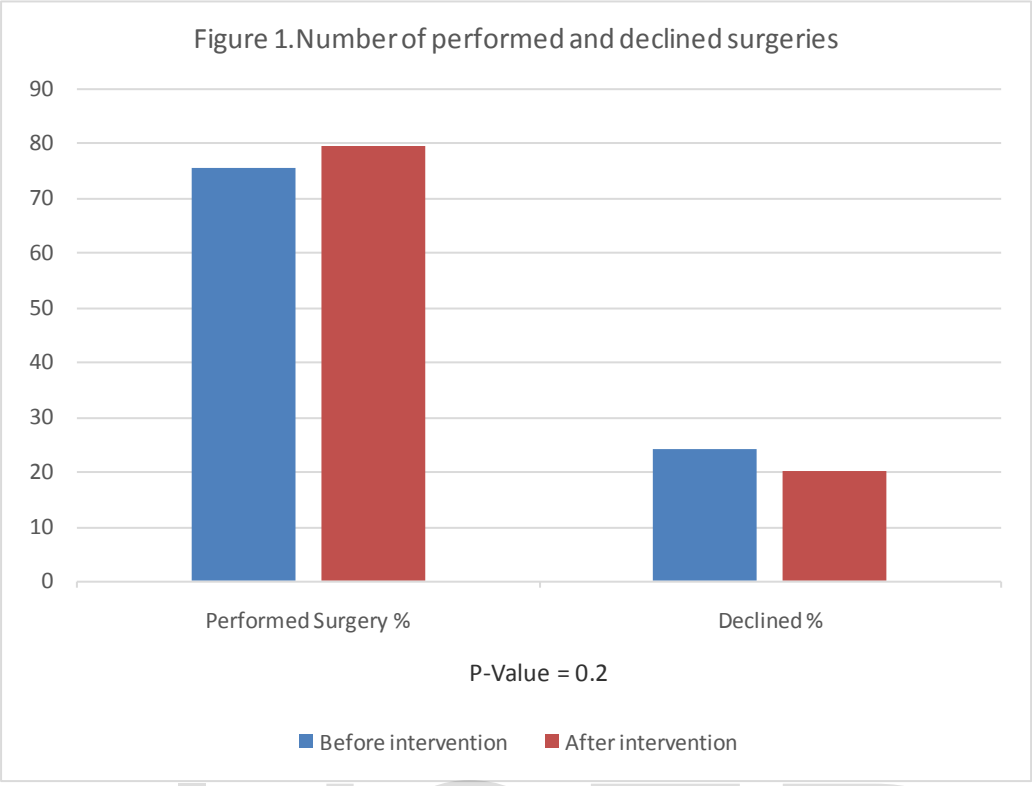
Figure 1.Number of performed and declined surgeries
90
80
70
60
50
40
30
20
10
0
Performed Surgery %
Declined %
P-Value = 0.2
Before intervention
After intervention

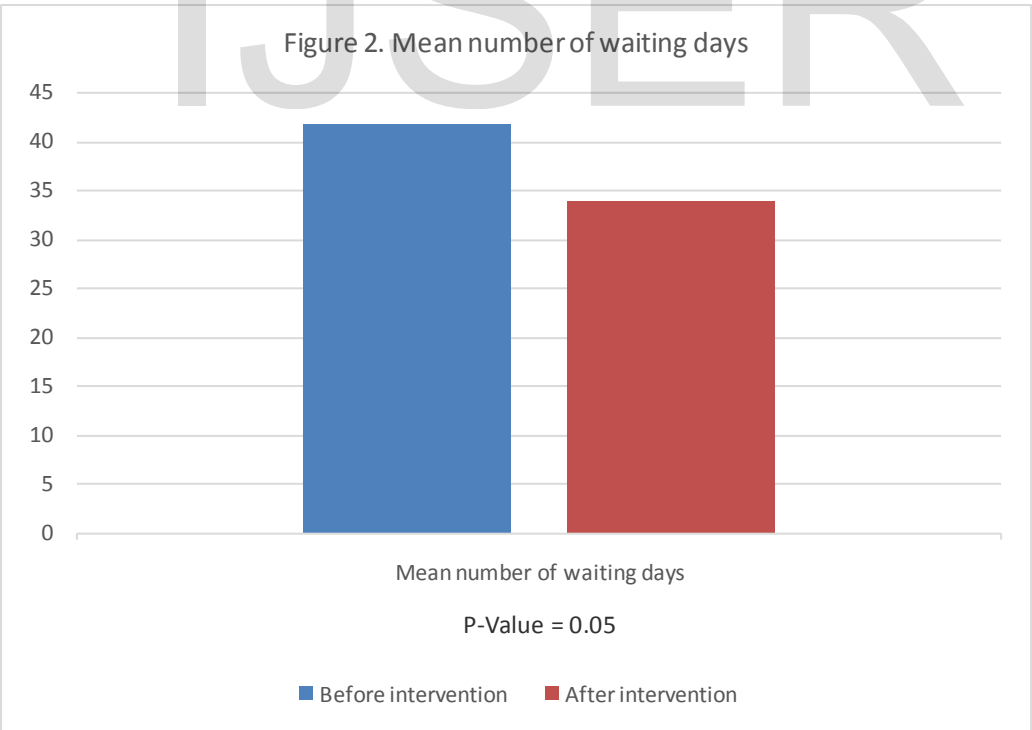
Figure 2. Mean number of waiting days
45
40
35
30
25
20
15
10
5
0
Mean number of waiting days
P-Value = 0.05
Before intervention
After intervention

4 Discussion:

we sought to evaluate the effect of recent administrative changes in the cardiac unit at King Abdulaziz University Hospital. This was mainly to address the logistic obstacles that tend to cause cancelations of CABG surgeries and hence increase the waiting days for the procedure.

The administrative efforts and proper management policies were applied in JULY 2015. These efforts included: providing ICU beds dedicated to cardiac surgery available every day to reduce the number of cancellations attributed to lack of post-operative ICU beds. With having dedicated beds on daily bases, this will increase the number of surgeries performed, dedicating two beds for post-operative care, step-down beds and allocating a cardiac anesthesiologist available every day.

We proved the improvement in cardiac care by comparing the average number of days the patients had to wait after the coronary angiogram (CAG) and before performing the surgery, between the two groups. There was a statistically significant reduction in the number of waiting days (42 versus 34 days, P-Value = 0.05).There was a study that was conducted in Montreal, Canada that compared health outcome in CABG patients based on time spent waiting for CABG. It demonstrated better quality of life pre-operatively as well as post-operatively in patients who spent less time waiting for surgery [21].

Another study was performed to assess the role and effectiveness of administrative efforts in reducing wait times for elective cases, it discussed various polices to decrease wait times and wait lists, one of the points was to use the existing capacity of care more efficiently, it suggested that reducing inefficiencies such as complicated admission processes and other unnecessary steps of booking can enhance full optimization of hospital resources and reduce the long queues created by these inefficiencies in a capable hospital [22]. This was shown to be effective in our center where efficient use of the same available resources reduced the number of the waiting days and shortened the waiting list for CABG. This proved that quality of care in a health center can be improved with better utilization of the available resources and strict policies that limit any insufficiencies or redundancies in the hospital system. Eventually, this will be translated into a better outcome.

5 Conclusion

Administrative efforts and proper management of hospital resources in King Abdulaziz University Hospital successfully improved the cardiac care of patients on the waiting list for CABG. It's our recommendation that hospital resources be used more efficiently. Long and inefficient processes are to be avoided. And more quality studies to be performed to assess the effect on long term clinical outcomes.

6 Ethical approval:

Our study was approved by the ethical committe in king abdulaziz university hospital, Jeddah, Saudi Arabia.

7 Disclosure:

The author did not receive any type of commercial support either in forms of compensation or financial for this study. The author has no financial interest in any of the products or devices, or drugs mentioned in this article.

8 Acknowledgments

We would like to thank the cardiac cathraiztion unit's and coronary care unit's workers who made these resources and data available, aimng to provide a better care for our paitents.

References

[1] J:Ashley EA, Niebauer J. Cardiology Explained. London: Remedica; 2004. Chapter 5, Coronary artery disease.

[2] : Gaziano T. A., Bitton A., Anand S., Abrahams-Gessel S., Murphy A. Growing epidemic of coronary heart disease in low- and middle-income countries. *Current Problems in Cardiology*. 2010;35(2):72–115. doi: 10.1016/j.cpcardiol.2009.10.002.

[3] Okrainec K, Banerjee DK, Eisenberg MJ. Coronary artery disease in the developing world. Am Heart J. 2004;148:7–15

[4] Al-Nozha M. M., Arafah M. R., Al-Mazrou Y. Y., et al. Coronary artery disease in Saudi Arabia. *Saudi Medical Journal*. 2004;25(9):1165–1171.

[5] :Sampalis J1, Boukas S, Liberman M, Reid T, Dupuis G.Impact of waiting time on the quality of life of patients awaiting coronary artery bypass grafting.CMAJ. 2001 Aug 21;165(4):429-33.

[6] Deb S, Wijeysundera HC, Ko DT, Tsubota H, Hill S, Fremes SE. Coronary artery bypass graft surgery vs percutaneous interventions in coronary revascularization: a systematic review. JAMA. 2013 Nov 20;310(19):2086-95. doi: 10.1001/jama.2013.281718.

[7] Moliterno DJ, Elliott JM, Topol EJ. Clinical trials of myocardial revascularization. CurrProblCardiol 1995;20:121-92.

[8] Guidelines and indications for coronary artery bypass graft surgery. A report of the American College of Cardiology/American Heart Association Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Subcommittee on Coronary Artery Bypass Graft Surgery). J Am CollCardiol 1991;17:543-89.

[9] Coronary artery surgery study (CASS): a randomized trial of coronary artery bypass surgery. Quality of life in patients randomly assigned to treatment groups. Circulation 1983;68:951-60.

[10] Anderson RP. Will the real CASS stand up? A review and perspective on the coronary artery surgery study. J ThoracCardiovascSurg 1986;91:698-709.

[11] : Frye RL, Fisher L, Schaff HV, Gersh BJ, Vlietstra RE, Mock MB. Randomized trials in coronary artery bypass surgery. ProgCardiovasc Dis 1987;30:1-22.

[12] Califf RM, Pryor DB, Greenfield JC. Beyond randomized clinical trials: applying clinical experience in the treatment of patients with coronary artery disease. Circulation 1986;74:1192-4.

[13] Julian DG. The practical implications of the coronary artery surgery trials. Br Heart J 1985;54:343-50.

[14] Katz NM. Expectations of coronary artery surgery. AmFam Physician 1987; 35:181-94.

[15] Landolt CC, Guyton RA. Lessons learned from randomized trials of coronary bypass surgery: viewpoint of the surgeon. Cardiology 1986;73:212-22.

[16] Black N, Langham S, Coshall C, Parker J. Impact of the 1991 NHS reforms on the availability and use of coronary revascularisation in the UK (1987–1995). Heart 1996;76(Suppl 4):1-30.

[17] Pepper J. Severe morbidity after coronary artery surgery. CurrOpinCardiol 2000;15:400–5.

[18] The Bypass Angioplasty Revascularization Investigation (BARI) Investigators. Comparison of coronary bypass surgery with angioplasty in patients with multivessel disease. N Engl J Med 1996;335:217-225[Erratum, N Engl J Med 1997;336:147.]

[19] Hillis LD, Smith PK, Anderson JL, et al. 2011 ACCF/AHA Guideline for Coronary Artery Bypass Graft Surgery: executive summary: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation 2011;124:2610-2642[Erratum, Circulation 2011;124(25):e9956.]

[20] Mohr F W, Morice M C, Kappetein A P, Feldman T E, Ståhle E, Colombo A. et al. Coronary artery bypass graft surgery versus percutaneous coronary intervention in patients with three-vessel disease and left main coronary disease: 5-year follow-up of the randomised, clinical SYNTAX trial. Lancet. 2013;381:629–638.

[21] 31. CMAJ. 2001 Aug 21; 165(4): 429–433. PMCID: PMC81367

[22] Sara A. Kreindler ,Br Med Bull (2010) 95 (1): 7-32.Published:10 May 2010DOI:https://doi.org/10.1093/bmb/ldq014