

ORIGINAL ARTICLE

Impact of Blood Transfusion on Postoperative Infection and Hospital Stay after Isolated Coronary Artery Bypass SurgeryGOHER BASHIR¹, AJWAD FAROGH², MUHAMMAD IRFAN KHAN³, ASMA HASSAN⁴, NASEEM AHMAD⁵¹PGR Cardiac Surgery Cardiac Center QAMC, Bahawalpur²Associate Professor Cardiac Surgery Cardiac Center QAMC, Bahawalpur³Associate Professor, Pathology QAMC, Bahawalpur⁴Consultant Pulmonologist Cardiac Center, QAMC Bahawalpur⁵Professor of Cardiac Surgery, SZMC Rahim Yar KhanCorrespondence to: Dr. Goher Bashir, Email: goharbaloch14@gmail.com, Cell: 03009684369**ABSTRACT****Objective:** The blood transfusion during cardiac surgeries has been demonstrated to be increased in length of hospital stay. The aim of current study was to characterize the post-operative complication.**Methodology:** A descriptive study was conducted at Cardiac Centre Bahawalpur from 1st February 2020 to 30th March, 2021 all patients were divided into two groups. who underwent cardiac surgery during this period Group A (No blood transfusion). Group B (low transfusion 1-2 units)**Results:** A total of 176 patients, 122 (69.3%) were male and 54 (30.7%) female. in our study there were 1(1%) in Group A while 5(6.6%) in Group B were found with post-operative infection with statistically significant p-value 0.049. Similarly, hospital stay in group A was 5.8 ± 1.3 while in Group B was 6.9 ± 0.3 showing insignificant p-value 0.067.**Conclusion:** A restrictive transfusion policy while considering RCC transfusion seems more useful and patients who require blood should receive the number of transfusions as minimum as possible.**Keywords:** RCC Red Cell Concentrates Transfusion, CABG Cardiac Artery Bypass Graft, LOH Length of Hospital Stay, restrictive blood transfusion.**INTRODUCTION**

Anaemia is a well-known risk factor for complications and death following cardiac surgery, and red cell transfusion improves a subgroup of patients who present with tissue hypoperfusion¹. However, transfusion has also been accepted as an individual risk factor for adverse consequences following cardiac surgery as related to patient's comorbidities such as left ventricular ejection fraction (LVEF) <35%, age >70years, pre-operative Hb < 11g/dl, type I diabetes mellitus, female gender, impaired renal function and re-operation².

Cardiopulmonary bypass, postoperative bleeding and haemodilution are factors responsible for anaemia that lead to high transfusion rates during cardiac surgery³. A 40-90% chance of perioperative blood transfusion exists, which encompasses a broad range of diseases⁴. Despite the availability of consensus guidelines by the Society of thoracic surgeons and society of cardiovascular anaesthesiologists a wide range of variation exists in blood transfusion during practice⁵. After an extensive debate it was unanimously agreed upon that there cannot be an ideal set point for RCC transfusion in cardiac surgery patients, this could vary according to patient's age and medical comorbidities like heart failure, infection etc.⁶

Perioperative bleeding has a negative impact on the outcome after cardiac surgery. However, it is difficult to disentangle the individual impact of perioperative anaemia from that of blood products on the outcome of these patients. The adverse effects of red blood cell (RBC) transfusion may partly be related to an increased risk of bloodstream infections secondary to transfusion-related immunomodulation or contamination.⁷

Blood transfusion is related to the occurrence of a transfusion reaction, transmission of infection, increased postoperative morbidity and mortality, risk of immunosuppression and the cost of hospitalization. Cardiac surgery is associated with high rates of blood transfusion, ranging from 40% to 90% in most studies. Transfusions have been associated with high morbidity and mortality in patients and some recent studies have demonstrated worse outcomes, including increased occurrence of renal failure and infection, as well as respiratory, cardiac and neurological complications in transfused patients compared to those who were not transfused after cardiac surgery.⁸

Since 1988 there has been no substantial change in the conclusion of National Institute of Health consensus conference, which stated that otherwise healthy patients with (Hemoglobin) Hb

>10g/dl rarely required perioperative blood transfusion, whereas those with Hb <8.0 frequently required blood transfusions⁹.

Blood transfusion could be associated with different risks including infections, haemolytic transfusion reactions. Transfusion-related acute lung injury (TRALI) and transfusion-related immunomodulation are two terms often used interchangeably. If a persistent infection were to develop, these morbidities would not only affect the patient's quality of life but would also place a significant economic burden on the patient and society.¹⁰⁻¹¹.

There are several studies identifying the predictors for blood transfusion and blood products in patients undergoing CABG. However, there is a scarcity of local data. We conducted this study to identify the effect of blood transfusion on hospital stay in cardiac surgery patients at our hospital.

MATERIAL AND METHODS**Population:** Study was carried out over a period of eighteen months between the A 1st February 2020 to 30th March, 2021 at Cardiac Centre Bahawalpur from, Bahawalpur**Sampling:** A total of 176 patients who underwent cardiac surgery were enrolled after institutional ethical approval. Patients were divided into two groups A (No blood transfusion). Group B (low transfusion 1-2 units).**Sample size:** Total 176 patients were enrolled**Data collection procedure:** Several blood conservation methods were employed before and during surgery. These included getting a complete blood count (CBC), discontinuation of antiplatelet and anticoagulation one week prior to operation and also screening for coagulation disorders using standard (Prothrombin Time) PT and (Activated Partial Thromboplastin Time) APTT tests. During operation blood conservation methods included activating clotting time (ACT) guided heparin dosing during prolonged cardiopulmonary bypass and salvage of pump blood.

Demographic data took into observation included patient's age, gender, type of operation, base line Hb and at which blood was transfused, any post-operative infections if acquired, post-operative length of stay in ICU and total length of stay in hospital before discharge.

All patients who underwent cardiac surgery were divided according to the number of units of RCC transfused.

1. Patients who did not receive any RCC transfusions.
2. Patients who received 1-2 units of RCC transfusions.

The length of stay in hospital was measured as

1. Post-operative ICU stay
2. Post-operative hospital stays within 5-7 days

Data analysis plan: All the data was analysed using SPSS version 20.0 (SPSS Inc., Chicago, Illinois). Quantitative variables were presented as mean ± SD and median was calculated for length of hospital stay. Comparison of continuous variables was performed using student t test and categorical variables were compared with chi-square test. Statistically significant level will be considered when the value of $p < 0.05$.

RESULTS

Out of 176 patients, 122 (69.3%) were male and 54 (30.7%) female. Mean age was 47.31 ± 15.6 years. Demographic data showed that 42 patients (23%) were hypertensive and 38 (21%) were diabetic, pre-op Hb was 12.8 ± 0.96 g/dl and 76 patients (43%) received RCC transfusions in perioperative period. Our results did not reveal any statistically significant difference based on age, BMI, Log Euro SCORE, DM, HTN, smoking status and gender except total length of hospital stay in patients who were transfused versus non-transfused group (Table-1).

Table 1: Baseline characteristics of study population.

Variables	Not transfused (n=100)	Transfused (n=76)	p-value
Age	47.3 ± 15.5	47.25 ± 16	0.988
Log Euroscore	1.2 ± 0.7	1.1 ± 0.4	0.217
BMI	24.5 ± 25	22.8 ± 7	0.554
BSA	1.63 ± 0.39	1.61 ± 0.34	0.643
Creatinine	0.95 ± 0.21	1.0 ± 0.73	0.544
Pre op Hb	12.7 ± 0.95	12.9 ± 0.99	0.212
DM	Yes	22	0.880
	No	78	
HTN	Yes	20	0.168
	No	80	
Smoking	Yes	23	0.370
	No	77	
Gender	Male	72	0.376
	Female	28	
Family history	Yes	16	0.434
	No	84	

Table 2 showed that in our study there were 1(1%) in Group A while 5(6.6%) in Group B were found with post-operative infection with statistically significant p-value 0.049. Similarly, hospital stay in group A was 5.8 ± 1.3 while in Group B was 6.9 ± 0.3 showing insignificant p-value 0.067.

Table 2: Frequency of post-operative infection and long hospital stay.

Variables	Not transfused (n=100)	Transfused (n=76)	p-value
Post-operative Infection	Yes	5 (6.6%)	0.049
	No	99 (99%)	
Hospital Stay	5.8 ± 1.3	6.9 ± 0.3	0.067

DISCUSSION

Despite the famous policy of restrictive blood transfusion during cardiac surgery, there are many factors leading to increased RCC transfusions like dilutional anaemia, coagulation disorders due to concomitant use of aspirin and anticoagulants, infection/ sepsis and hypothermia.¹²

According to our results, the rate of RCC transfusions is 43% which is similar to a previous study conducted by Suleman, Samad and Ullah¹³, however, we only took into consideration RCC transfusions while platelets, FFPs and cryoprecipitate transfusions were not included in our study. The call to administer an RCC transfusion is jointly made by the cardiac surgeon and the consultant anaesthetist by taking into account the American Heart Association (AHA) guidelines and their work expertise over the years.

Our results show that 76 (43%) patients received RCC transfusion during the operation or in the post-operative period. The practice of RCC transfusion during cardiac surgeries varies widely. In a study conducted in 2010, results showed that RCC transfusion rate in CABG patients varies between 0% - 97.5%¹⁴. Even though our results of the transfusion rate in cardiac surgeries are at par with other studies, they are still quite high considering the ample data available that supports a better outcome following restricted transfusion policy. The fact that a multicentre study did not show any improvement in post op complications despite a liberal RCC transfusion approach further makes one look again at the data that supports a restricted transfusion policy¹⁵.

In our study there was no statistical difference in age, log euro score, BMI, DM, HTN, serum creatinine levels, ICU length of stay and pre-operative Hb levels. In another study by Gales et al, it was found that patients with increased age, higher log euro score, renal disease and previously anaemic were more likely to receive RCC transfusions¹⁶. This difference might be due to the fact that our study centre is newly built and has a new cardiac surgical team, thus there is a higher chance of selecting simple and non-complicated cases for surgery initially.

Our data shows that 38(50%) of transfusions were given in the operating room, where haemodilution was probably the main reason for the low Hb levels. This observation was also supported in previous studies. The society of thoracic surgeons and the society of cardiovascular anaesthetists have developed guidelines that highlight the lack of evidence for a defined transfusion trigger after cardiac surgery.

Hebert et al in their multicentre randomised controlled trial has shown the benefits of restricted transfusion policy¹⁷. These included the avoidance of transfusion related haemolytic and non-haemolytic reactions, transfusion related acute lung injury and circulatory overload and viral and bacterial infections due to transfusion. In addition to these, an increased cost with RCC transfusions can be substantially curbed with restricted transfusion strategy, which is one of the main factors in health care systems of Pakistan.

Based on our results, we found that patients exposed to RCC transfusion had an increased total length of hospital stay, although there was no increase in the length of stay in the ICU. The median length of hospital stay was 5 days in non-transfused population versus 6 and 9 days in low transfusion and high transfusion population respectively. Therefore, high transfusion almost doubles the hospital length of stay in patients after cardiac surgery. Similar results were reported by Galas et al¹⁶. Another study by De Cocker et al demonstrated that ICU stay was prolonged in transfused patients post cardiac surgery while our data did not reveal any such evidence¹⁸. This difference might be owing to our selection criteria of cases for surgery which could also be a factor as was evidenced by our post-operative mortality which was < 1% (1 out of 176) at our centre. We studied the prolonged length of stay because where it increases the cost of healthcare it also owes to an increased risk of post-operative complications. World health organisation (WHO) has already reported that due to limited health care resources, financial burdens and availability of medical staff in developing countries many cardiac patients have no choice but to live with poor health¹⁹.

Cardiac surgery is considered one of the conditions that require a transfusion of blood and blood products in large. Total 459 patients were enrolled and . Red blood cells (RBCs) were transfused in 60.1% of the patients, and the median number of units transfused per patient was 2. The mean hemoglobin threshold for transfusion was 8.2 (standard deviation ± 3.6) g/dL. Patients receiving a blood transfusion at any stage during the intraoperative or postoperative period were 2.6 times more likely to develop an infection compared with those who did not receive a blood transfusion. The recipients of a blood transfusion experienced a longer hospital stay compared with the non-

recipients at 11.5 ± 9.8 days versus 8.7 ± 3.4 days, respectively. blood transfusion appears to increase the risk of post-CABG.²⁰

CONCLUSION

A restrictive transfusion policy while considering RCC transfusion seems more useful. All the patients who require blood should receive the number of transfusions as minimum as possible.

Ethical Approval: Given

Conflict of Interest: The authors declare no conflict of interest

Funding Source: None

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