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# Management of Blood Products for Heart Transplant Recipients in a Tertiary Care Hospital

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***Abstract:***
***Introduction:*** *Transfusion services plays a vital role in transfusion of blood and blood products in heart transplantation. From past few years, there is an increase in the number of heart transplants being performed in India, and consequnetly, increase in demand for blood and blood products. To fulfill this, proper management of the blood inventory in blood bank is important.*
***Aim:*** *Analysis of management of blood components for patients undergoing heart transplant in a tertiary care hospital.*
***Material and Methods:*** *This is a retrospective observational study, in which, transfusion of blood components for heart transplantation was analysed in 23 consecutive patients operated between July 2015 to July 2017. Data was gathered from blood bank records. We analysed the amount of blood components reserved and issued for planned heart transplant surgeries.*
***Results:*** *During the study period, total 23 patients were operated for heart transplant. A total of 1006 blood components were reserved and out of these, 588 (58.44%) products were issued to the patients. Out of the total reserved units, 377/1006 (37.47%) were packed red blood cell (PRBC), 276/1006 (27.43%) were platelets, and 353/1006 (35.08%) were fresh frozen plasma (FFP). While only 173/377 (45.88%) PRBC, 247/276 (89.49%) platelets, and 168/353 (47.59%) FFP were issued to them during and after surgery. At the time of transplantation surgery, only 91/173 (52.60%) PRBC, 70/247 (28.34%) platelets and 70/168 (41.67%) FFPs were tranfused to them.*
***Discussion:*** *In our study, more than double of required blood components were reserved for the patients undergoing heart transplant. To control the emergency situations during surgery, our departmental policy is to keep 10 units of each components ready for transfusion. To prevent this blockage and wastage of blood components, it is recommended to implement patient blood management to issue blood for such patients.*
***Keywords:*** *Heart Transplantation, Blood Management,*

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## I. Introduction

Heart transplantation is the most definitive treatment for patients with severe heart disease with no other medical treatment available. Number of heart transplantation surgeries continued to increase after first successful heart transplant by Christiaan Barnard in 1967(1). Patients undergoing heart transplantation surgery required maximum amount of blood component transfusion as compared to other cardiac surgeries(2). The requirement of blood transfusion in transplant surgery is required to replace blood loss, maintain oxygen saturation and to maintain hemostasis during surgery(3). Previous studies in both adult and pediatric patients suggest that blood component transfusion in heart transplantation may independently associated with many severe unpleasant outcomes(3-6). This outcome may be increase post-operative infections, acute kidney injuries, increase intensive care unit and hospital stay, and increase mortality etc(3-6).

Continous audit and analysis of the blood transfusion practices in heart transplantation surgeries helps to reduce unnessasery transfusion, maintain blood inventory and prevents unwanted complications associated with that. So, in this study we retrospectively analysed institutional policy for transfusion of blood components in patients undergone heart transplantation surgery.

## II. Material and Methods

This is a retrospective observational study in a tertiary care cardiac surgery institute in North India. In this study, we analysed the transfusion of blood components for 23 consecutive patients undergone heart transplantation between July 2015 to July 2017. Data was gathered from blood bank records. We analysed the

amount of blood components reserved as per institutional policy and blood components issued for planned heart transplant surgeries.

Data was collected from blood bank record and analysed with the help of Microsoft excel 2016. Mean of confidence interval was calculated.

## III. Results

During the study period, total 23 patients were operated for heart transplant. The mean age of the patients was 26.67 years (range 1- 52 years). Blood groups of the patients were O Pos/Neg (8/1), A Pos/Neg (5/1), B Pos/Neg (4/0) and AB Pos/Neg (3/1).

A total of 1006 blood components were reserved and out of these, 588 (58.44%) products were transfused to the patients. Out of the total units, 377/1006 (37.47%) were packed red blood cell (PRBC), 276/1006 (27.43%) were platelets, and 353/1006 (35.08%) were fresh frozen plasma (FFP) reserved for the patients. While only 173/377 (45.88%) PRBC, 247/276 (89.49%) platelets, and 168/353 (47.59%) FFP were transfused to them. At the time of transplantation surgery, 91/173 (52.60%) PRBC, 70/247 (28.34%) platelets and 70/168 (41.67%) FFPs were transfused to them and the rest of transfusion was done during their hospital stay. Table no. 1 showed blood component requested and blood component transfused to the patients.

**Table 1.** Blood components reserved and transfused to the heart transplant patients:

| | **Total Component Reserved** | | | **Total Component Transfused** | | | **Component transfused at the time of surgery** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Component** | **Total** | **Mean** | **CI (95%)** | **Total** | **Mean** | **CI (95%)** | **Total** | **Mean** | **CI (95%)** |
| **PRBC** | 377 | 17.14 | 22.01-12.27 | 173 | 7.52 | 9.36-5.68 | 91 | 3.95 | 5.64-2.03 |
| **Platelet concentrates** | 276 | 12 | 13.91-10.09 | 247 | 10.74 | 16.97-4.51 | 70 | 3.04 | 5.31-1.80 |
| **FFP** | 353 | 15.35 | 21.3-9.4 | 168 | 7.30 | 10.73-3.87 | 70 | 3.04 | 5.31-1.80 |
| **total** | **1006** | **43.74** | **55.66-31.82** | **588** | **25.57** | **34.98-16.16** | **231** | **10.04** | **14.53-7.23** |

## IV. Discussion

Blood transfusion in heart transplantation is a vital requirement. Every institute have own policy to managing of blood transfusion requirements at the time of heart transplantation. This is depending on the patient characteristics, surgical procedures, comorbidities and institutional transfusion practices. Therefore, every institution should audit the transfusion requirements in patients undergoing cardiac surgery to reduce the blood consumption(7). To manage the blood loss emergency at the time of heart transplant surgeries the excess amount of blood is reserved as compared to actual need to the patients. Excess blood loss may be due to variable reasons like deep hypothermic circulatory arrest, hypothermia, hemodilution, long duration of CPB, or a combination of these(8). Postoperative blood loss and other complications during hospital stay also increase the need of transfusion in patients with heart transplant.

In our study mean blood transfusion in patient's undergone transplantation surgery was 7 PRBC, 10 Platelets and 7 FFPs. While at the time of surgery it was only 4 PRBC, 3 Platelets and 3 FFPs transfused to the patient. In retrospective study by Geissler et al.(2) they found that 30 PRBC, 31 FFPs and 5 apheresis platelets were transfused to the patients undergone heart transplantation surgery. So, as compared to this study we had very low transfusion rate.

Blood reservation policy in our institution for patients undergoing cardiac transplant surgery is reserve atleast 10 units of each components at the time of surgery. This components are fresh, leukoreduced, and CMV negative. This blood units are researve for from one day before the surgery to atleast 2 days after surgery or till the patient in intensive care unit(ICU).

In our study, more than double of required blood components were reserved for the patients undergoing heart transplant from one day before surgery. Facilities for on-demand test required for CMV testing is time consuming. Also, to limit the multiple donor exposure, attempt was made to issue blood components by segregating and reserving blood components from same donor.

The mean reservation of blood components in our study for PRBCs were 17, platelets were 12 and FFP were 15. This policy match the statement by Geissler et al.(2) that PRBC units ordered more as compared to FFP and platelets during cardiac surgeries.

These reserved blood units were not made available for other patients from 1 day before to the 2 days after surgery. Components, which have a short expiry like platelets, were at the risk of expiry, if they were not used for surgery.

So, presently we have overreservation policy as compared to actual requirement of blood components for transfusion at the time of the surgery. To prevent this blockage and wastage of blood components, it is recommended to implement patient blood management policy to issue blood for such patients. There is many recommendation to implement patient blood management program in previous studies(9, 10).

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