Patient Blood Management in Cardiac Surgery –
Fewer Transfusions, Improved Outcomes

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CARDIAC SURGERY

PURPOSE

Multi-disciplinary patient blood management (PBM) has demonstrated decreased blood utilization and improved outcomes in cardiac surgery (1,2). Our program instituted cardiac surgery PBM in 2016. This review investigates utilization of red blood cells (PRBCs), fresh frozen plasma (FFP), platelets, and cryoprecipitate, as well as outcomes before and after PBM implementation.

METHODS

Consecutive isolated coronary artery bypass (CABG) cases pre-PBM (2012-2014) were compared to similar PBM era patients (2019-2021). The PBM program includes interventions to optimize preoperative anemia, minimize intraoperative blood loss, and permissive intra/postoperative anemia. Specific aspects of our PBM include identification of patients at high risk for transfusion, preoperative platelet aggregation studies for patients on dual antiplatelet therapy, retrograde autologous priming of the cardiopulmonary bypass circuit, intraoperative cell salvage, and adherence to strict intra/postoperative laboratory triggers for transfusion. We compared percentages and mean rates between the two groups using Pearson chi-squared and two-sample t tests, respectively.

CONCLUSION

PBM was associated with significantly reduced transfusion of PRBCs, FFP, platelets, and cryoprecipitate in patients undergoing CABG. PBM patients experienced reduced mechanical ventilation time, surgical site infection, and LOS with no increased incidence of renal failure or stroke. Further research is needed to confirm potential benefits of PBM.

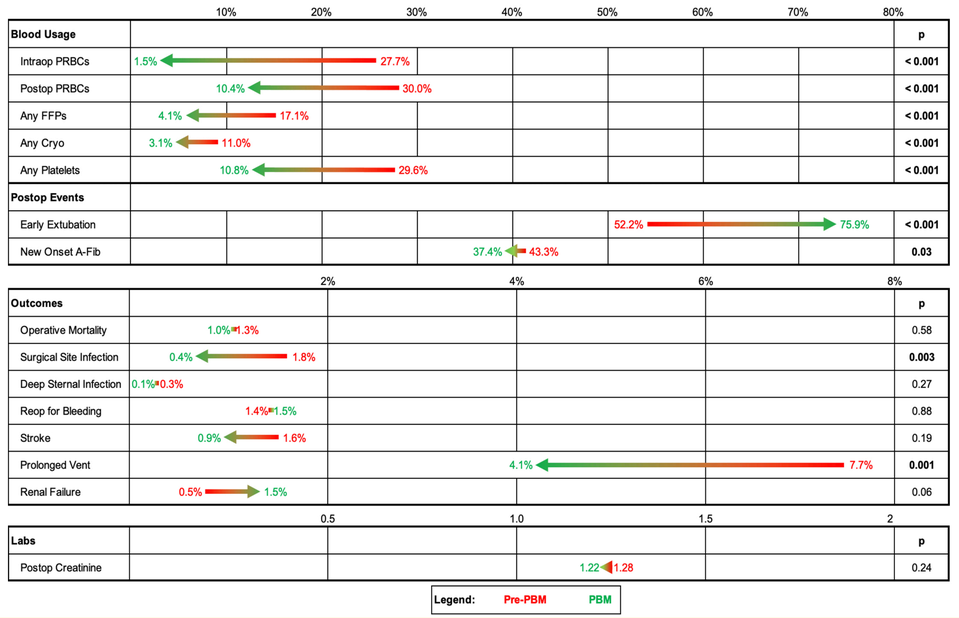
RESULTS

- A total of 1,737 isolated coronary artery bypass patients were analyzed, stratified as PBM (n=1,111) and pre-PBM (n=626) cohorts. Patient-related risk factors were similar between groups (Table 1).
- The PBM cohort received statistically less transfusion of all blood components compared to pre-PBM (17.9% v. 53.0%, p<0.001). Specifically, fewer patients treated in the PBM program received intraoperative PRBCs (1.5% v. 27.7%, p<0.001), postoperative PRBCs (10.4% v. 30.0%, p<0.001), any intraoperative or postoperative FFP (4.1% v. 17.1%, p<0.001), platelets (10.8% v. 29.6%, p<0.001), and cryoprecipitate (3.1% v. 11.0%, p<0.001), compared to pre-PBM patients.
- Operative mortality, reoperation, stroke, deep sternal wound infection, and renal failure were similar between groups (p= NS for all).
- Early extubation was more common in the PBM cohort (75.9% v. 52.2%, p<0.001) (Figure 1).
- Prolonged ventilation (4.1% v. 7.7%, p<0.001), postoperative atrial fibrillation (37.4% v. 43.3%, p=0.03), and surgical site infection (0.4% v. 1.8%, p=0.003) were all significantly less in the PBM era (Figure 1) compared to pre-PBM.
- Mean total length of stay (LOS) (7.7 days v. 9.3 days, p<0.001), intensive care LOS (46 hours v. 55 hours, p=0.02), and postoperative LOS (5.6 days v. 7.4 days, p<0.001) were all significantly shorter for the PBM cohort.

Table 1 | *Patient Characteristics*

Variable	Pre-PBM (2012-2014)	PBM (2019-2021)	P-value
Mean Age (Years)	65.5	66.4	0.06
Male %	75.6	76.5	0.66
Mean BMI	30.1	30.3	0.40
Family History of Premature CAD %	15.5	11.0	0.01
Diabetes %	44.7	48.2	0.16
Dialysis %	2.1	1.8	0.69
Hypertension %	87.1	89.8	0.08
Peripheral Artery Disease %	12.1	10.8	0.40
Prior CVA %	7.0	7.7	0.59
Mean Ejection Fraction %	53.2	53.4	0.71
Mean Predicted Risk of Mortality %	1.7	1.7	0.82

Figure 1 | *Patient Outcomes PBM v. Pre-PBM*



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