Reduction of Allogeneic Blood Transfusion in Cardiac Surgery by Lowering Cardiopulmonary Bypass Prime Volume

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Introduction

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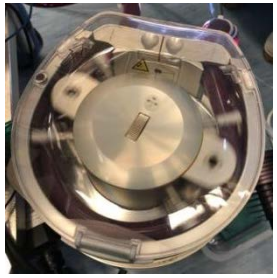
Cardiopulmonary Bypass (CPB)

Venous Reservoir

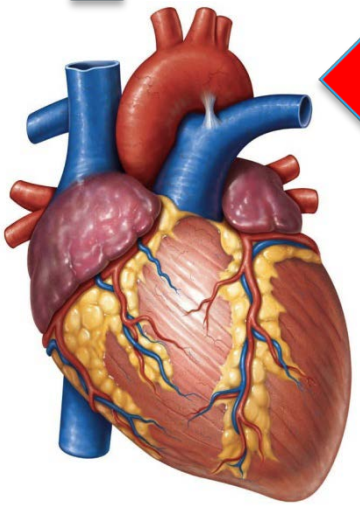
Control Panel



Pump Head

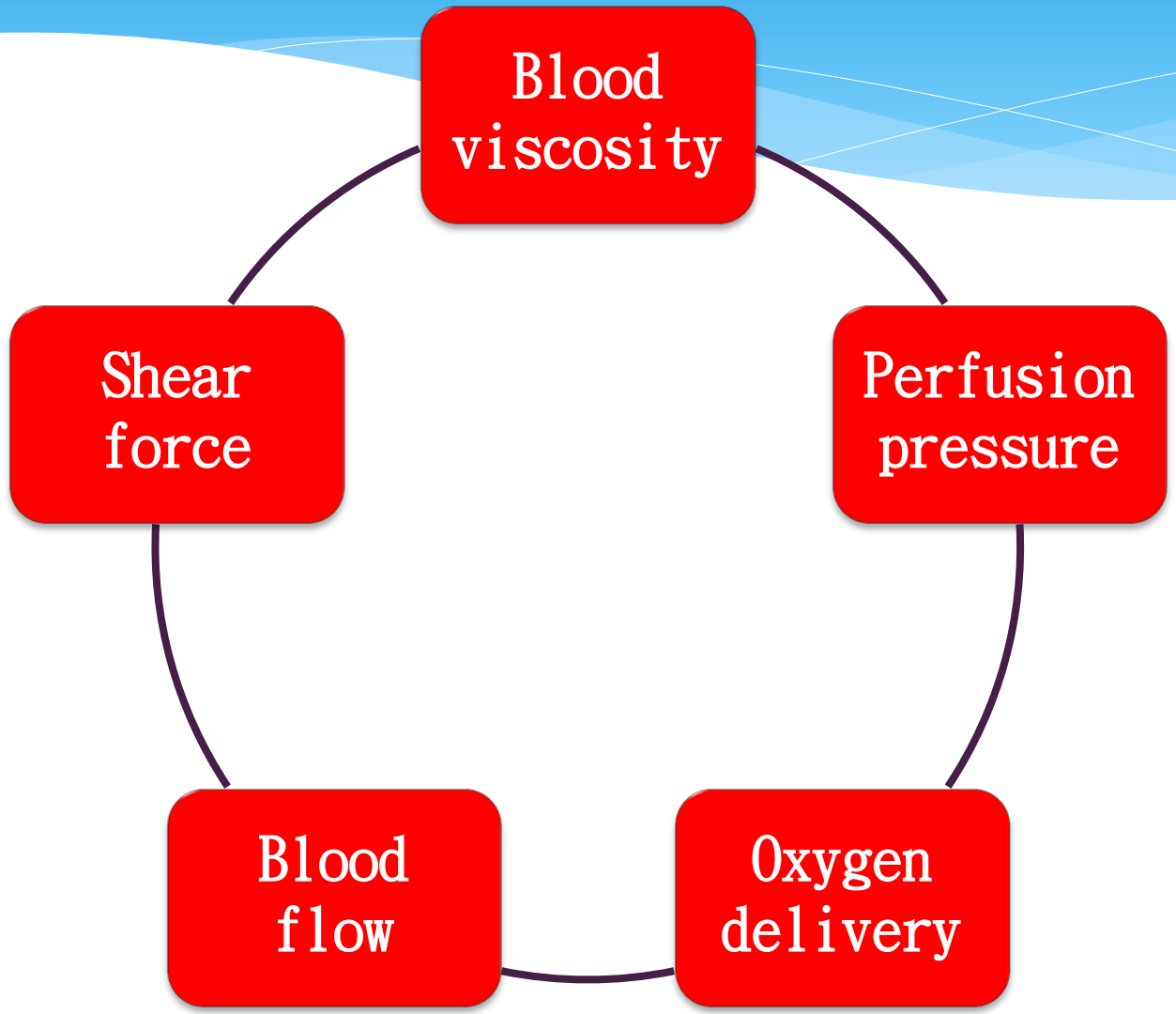
Oxygenator

Arterial Filter



Heart

Advantages of Haemodilution



Objective

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Objectives

* To minimise allogeneic blood transfusion for small size adult in priming and during CPB

* To maintain adequate organ perfusion during CPB, i.e. haematocrit (HCT) kept between 24-30%.

Methodology

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Methodology

	Conventional group	Low prime group
Period	Mid-2015 to Mid-2016	Mid-2016 to November 2017
No. of patient	316	285
Body surface area (BSA)	< 1.8	
Arterial filter	**Not** integrated	Integrated
Priming volume	**1400** ml	1000 ml

Results

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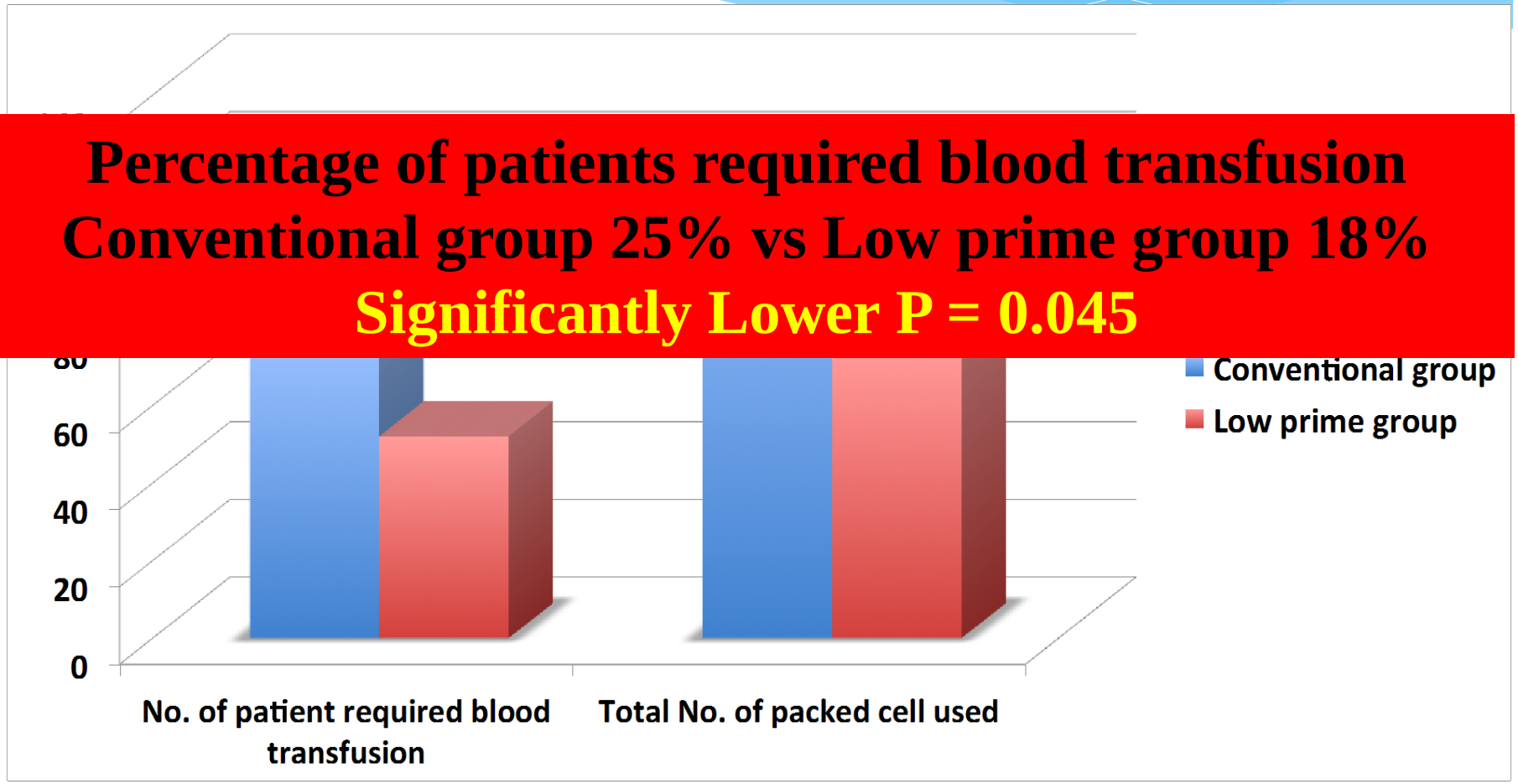
Results

No significant differences between both groups

* Baseline characteristics
* Body surface area (BSA)
* Type and urgency of the operation
* Perfusion techniques
* Haemotologic profiles

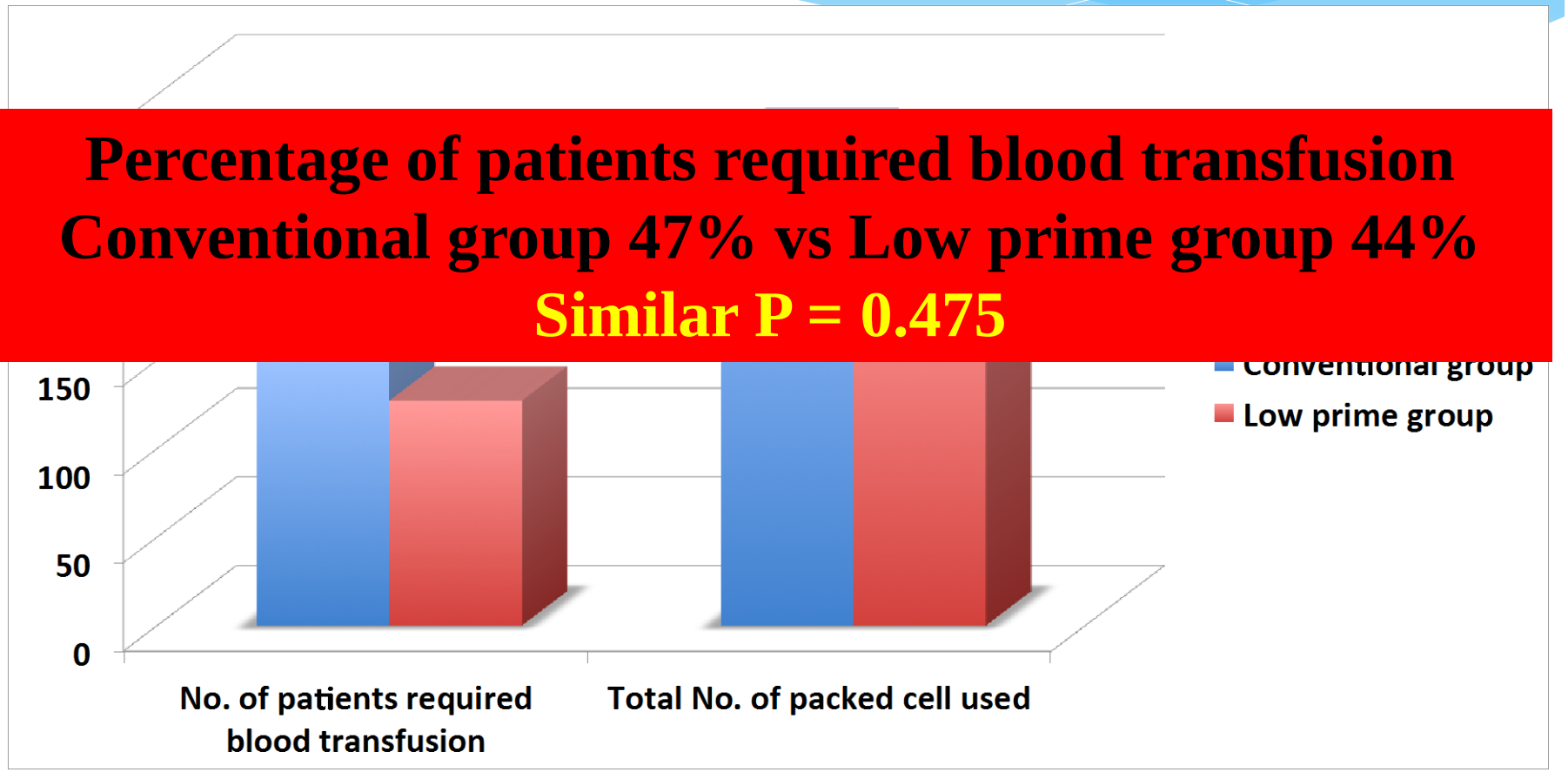
Blood Transfusion Requirement in Priming Cardiopulmonary Bypass Circuit



Percentage of patients required blood transfusion
Conventional group 25% vs Low prime group 18%
Significantly Lower P = 0.045

Blood Transfusion Requirement during Cardiopulmonary Bypass

Percentage of patients required blood transfusion
Conventional group 47% vs Low prime group 44%
Similar P = 0.475



Blood Transfusion Requirement after the Operation

They were similar in both Conventional and Low Prime group

- Chest drainage output
- First 24 hour Haematocrit
- Discharge Haematocrit

Conclusion

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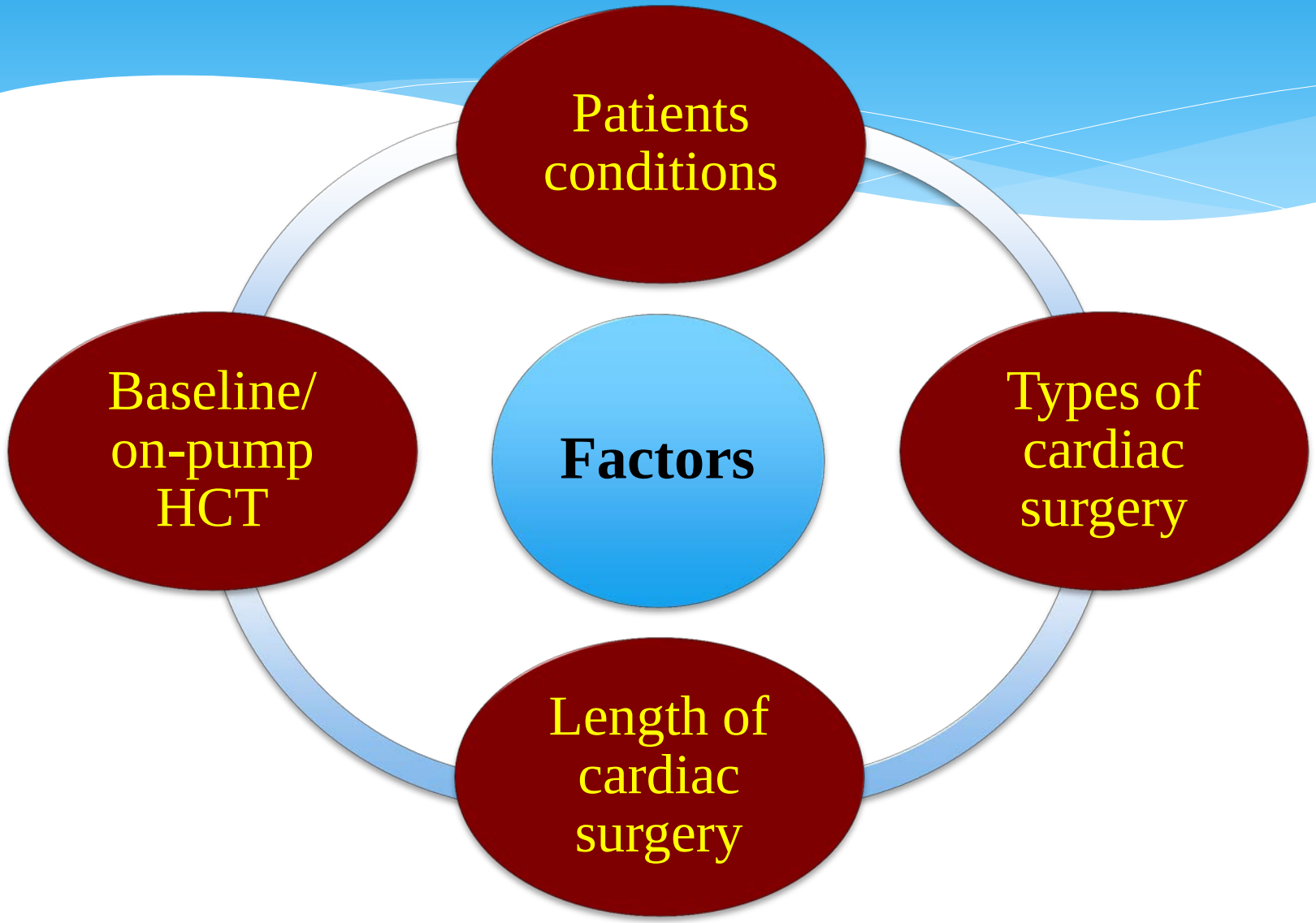
Indications for Blood Transfusion during CPB



Optimizing CPB Practice

	Capiox FX15R	Capiox FX 25R	Medtronic Affinity Fusion
Membrane Type	Microporous Polypropylene Hollow Fiber		
Arterial Filter	Integrated Arterial Filter		
Static Priming Volume	**135**ml	250ml	260ml
Blood Flow Range	**0.5-5.0** L/min	0.5-7.0 L/min	1.0-7.0 L/min

Optimizing CPB Practice

BSA < 1.8

BSA > 1.8

Small oxygenator

Large oxygenator

References

* Gravlee GP, Davis RF, Hammon H, & Kussman B (2016). Cardiopulmonary Bypass and Mechanical Support: Principles and Practice (4th ed.). Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins
* Lahanas A, Argerakis PW, Johnson KA, Burdan ML & Ozdirik JE. A retrospective comparison of blood transfusion requirements during cardiopulmonary bypass with two different small adult oxygenators. Perfusion 2013; 28(6) 541-545.
* Ranucci M, Pistuddi V, Carboni G, et al. Effects of priming volume reduction on allogeneic red blood cell transfusions and renal outcome after heart surgery. Perfusion 2015; 30 (2) 120-126.
* Bronson SL, Riley BJ, Blessing JP, et al. Prescriptive patient extracorporeal circuit and oxygenator sizing reduces haemodilution and allogeneic blood product transfusion during adult cardiac surgery. The Journal of ExtraCorporeal Technology 2013; 45 167-172.


Thank you