



**AN AUDIT OF BLOOD PRODUCTS USAGE in
adult cardiac surgery at CMJAH/WITS
towards minimal or zero blood usage**

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SAHA SANDTON CONVENTION CENTRE

PREAMBLE

- Blood products- limited, expensive
- Usage not without risk
- Historically- liberal usage (10:30 rule)
- Risk benefit ratio supported by clinical evidence offering guidelines
- Observation that CMJAH blood product usage is excessive

2017 BLOOD AND PLATELET PRODUCTS PRICES

SANBS-BHF Codes

Red Cells	Nappi Codes	Description	Price Excl. VAT 2017	Price VAT 2017
78040	708800-001	Red Cell Concentrate	R 1 554,52	R 1 757,52
78051	708802-001	Red Cell Conc. Leucocyte Depleted	R 2 540,00	R 2 948,00
78043	708803-001	Red Cell Conc. Paed. Leucodepleted	R 1 436,65	R 1 640,65

Platelets	Nappi Codes	Description	Price Excl. VAT 2017	Price VAT 2017
78124	708804-001	Platelet Conc. Single Donor Apherisis	R 9 009,49	R 10 360,49
78125	708805-001	Platelet Conc. Leucocyte Depleted, Pooled	R 8 245,99	R 9 450,99
78127	708808-001	Platelet Concentrate (Paediatric)	R 1 976,56	R 2 271,56
78122	708806-001	Platelet Concentrate Pooled	R 6 549,31	R 7 549,31

Whole Blood	Nappi Codes	Description	Price Excl. VAT 2017	Price VAT 2017
78001	708807-001	Whole Blood	R 1 721,53	R 1 945,53
78059	708809-001	Whole Blood Leucocyte Depleted	R 2 707,03	R 3 098,03

TRANSFUSION STRATEGIES

- Liberal (Hb \leq 9g/dl)
- Restrictive (Hb \leq 7.5g/dl)
- MSBOS: Maximum surgical blood ordering schedule (Friedman 1979)
- SBOE: Surgical blood order equation ([Nuttall et al. 1998](#))([Sakurai and Okada 2001](#))
- Patient specific blood ordering system (Palmer et al. 2003)
- Landmark trials: TRACS (Hajjar et al. 2010)-2000 pts
: TITRe2 (Murphy et al. 2005)-502 pts

A WORD OF CAUTION (TITRe TRIAL)

[N Engl J Med](#). 2015 Mar 12;372(11):997-1008. doi: 10.1056/NEJMoa1403612.

Liberal or restrictive transfusion after cardiac surgery.

[Murphy GJ¹](#), [Pike K](#), [Rogers CA](#), [Wordsworth S](#), [Stokes EA](#), [Angelini GD](#), [Reeves BC](#); [TITRe2 Investigators](#).

CONCLUSIONS:

A restrictive transfusion threshold after cardiac surgery was not superior to a liberal threshold with respect to morbidity or health care costs.

STANDARD ORDERING PROTOCOLS

- Nottingham university hospital, UK
3units crossmatch/6units for reoperation
- Presbyterian medical centre, USA
2units for CABG(1ST)/3units redo CABG+ valve surgery(Carson et al. 2013; Zimmerman, Fogt and Logan 1999)
- CMJAH/WITS Jhb, South Africa
4units RBC/4units FFP(TSH)/2mega platelets(TSH)

PREOPERATIVE

- 1. Four adult packed red cells
- 2. Four FFP's TSH
- 3. Two platelets TSH

INTRAOPERATIVE AND POSTOPERATIVE

- No protocol
- Anaesthetist and perfusionist decision
- Surgeon's decision postoperative

AUDITING METHODS

- 2016 CMJAH adult cardiac patients
- Mean age
- Gender
- Preoperative blood count
- Procedure variables
- Preoperative blood products ordered
- Perioperative transfusion trigger
- Surgeries and length of stay

OTHER VARIABLES

- Electronic vs manual crossmatch systems-efficiency
- SANBS at CMJAH – manual system
- Some patients inherent high risk
 1. Comorbidities
 2. Elderly
 3. Small BSA
 4. Emergency or complex procedures
 5. Other medications e.g. antiplatelet and anticoagulant therapy

RESULTS

Sample

During this one-year period, 194 patients had a total 274 “cardiac” procedures. The SANBS only provided data for 183 procedures. Of these, 50 procedures were excluded because there was no blood bank data available or the procedure was non-cardiac (rather, related to a complication of cardiac surgery such as sternal sepsis or the need for a tracheostomy). This resulted in a sample size of 133 cardiac procedures, performed on 113 patients.

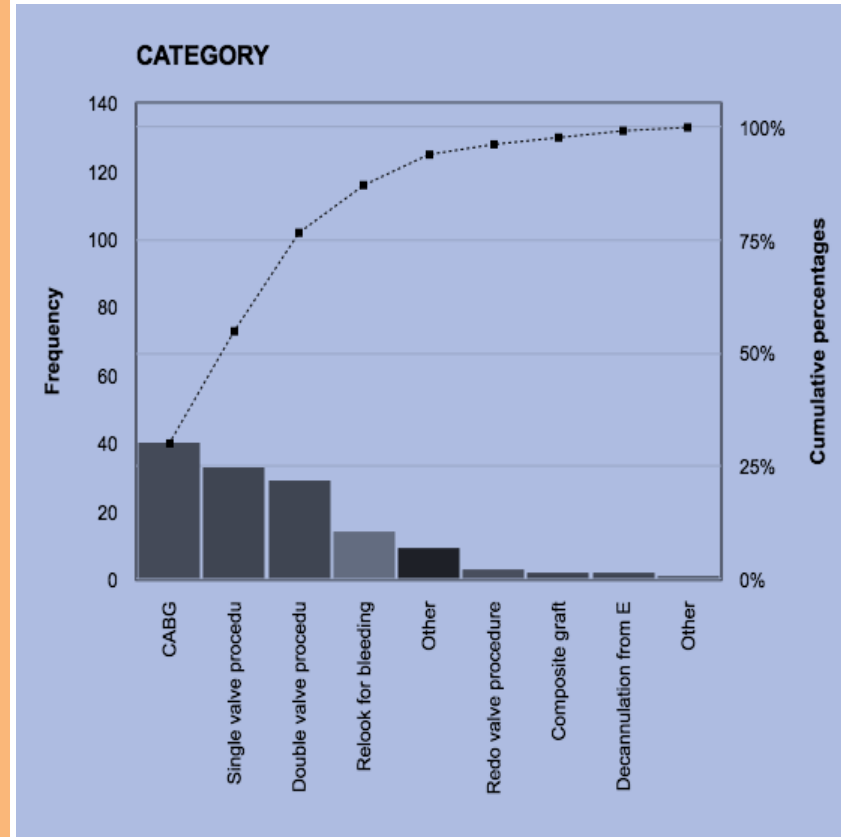
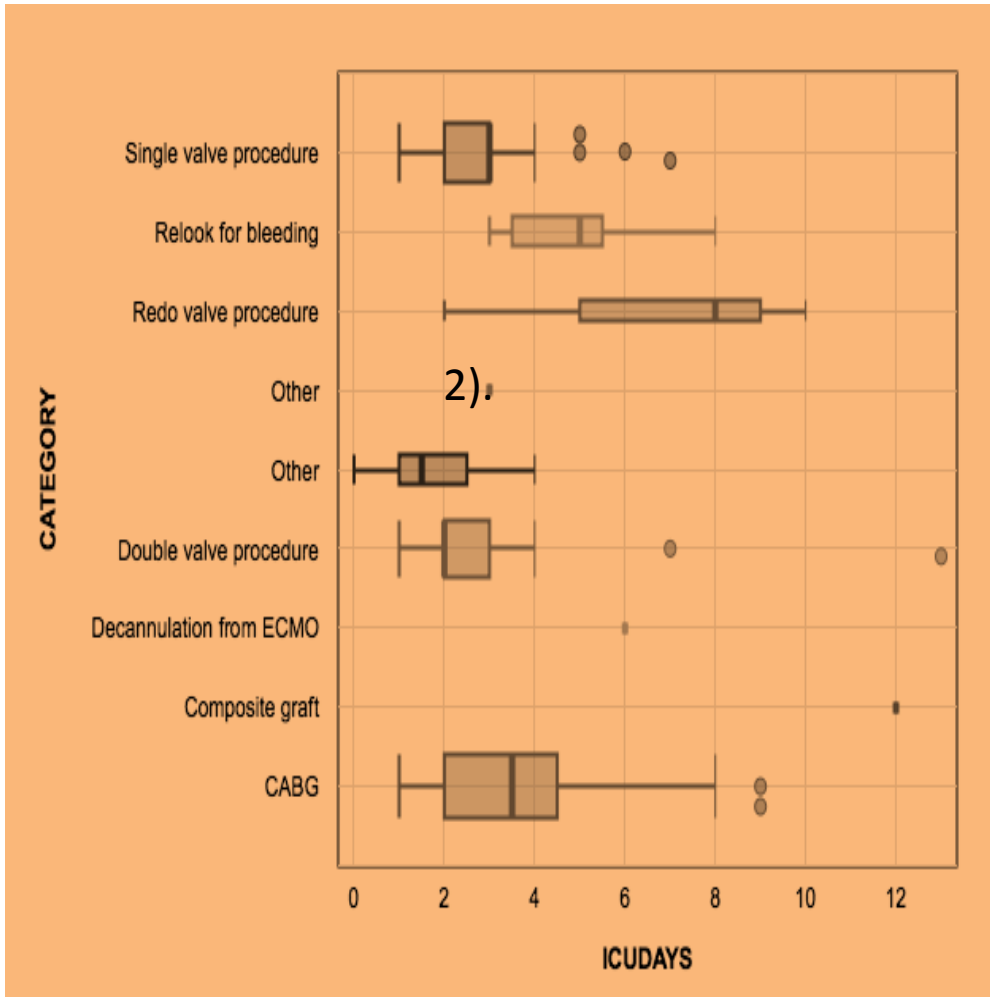
Patient demographics

The mean age of the sample was 50, with more male patients than females (62 vs 51).

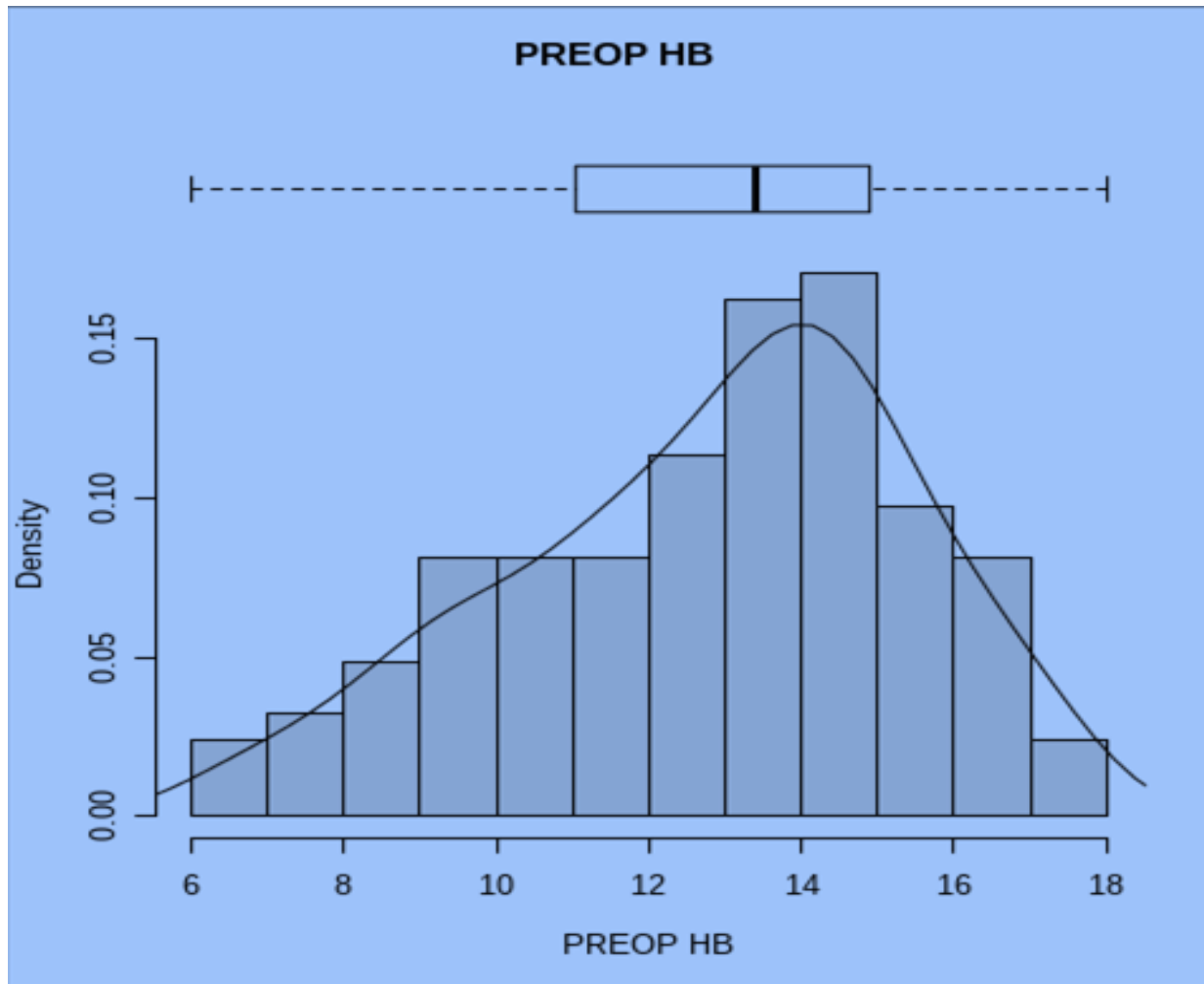
Surgeries and length of ICU stay

Of the 133 procedures performed; coronary artery bypass grafts, single valve procedures, and double valve procedures accounted for approximately 75% of the surgeries performed.

The patients were admitted to ICU for a mean of 3.3 days (sd 2.2)



PREOPERATIVE HB



PLATELETS

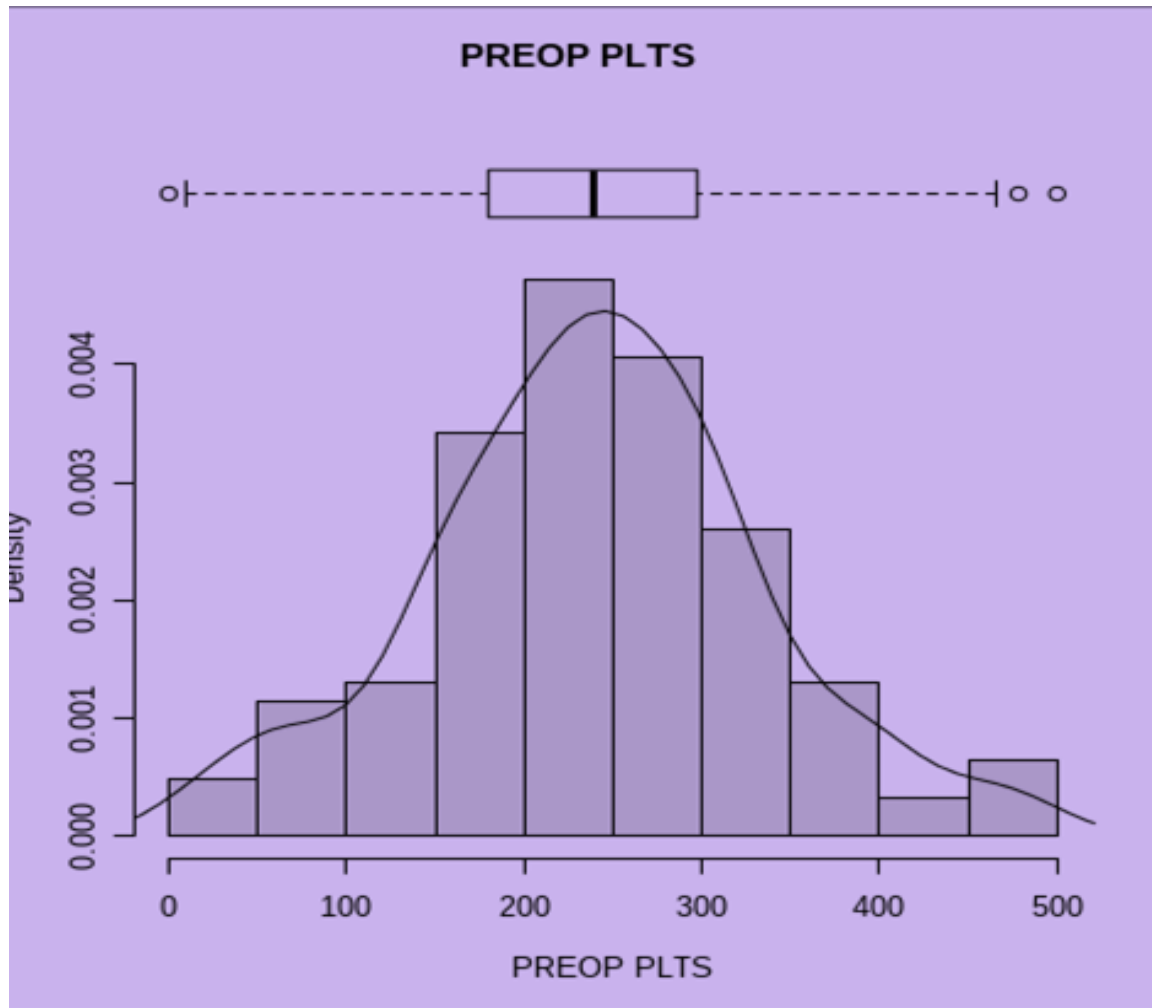
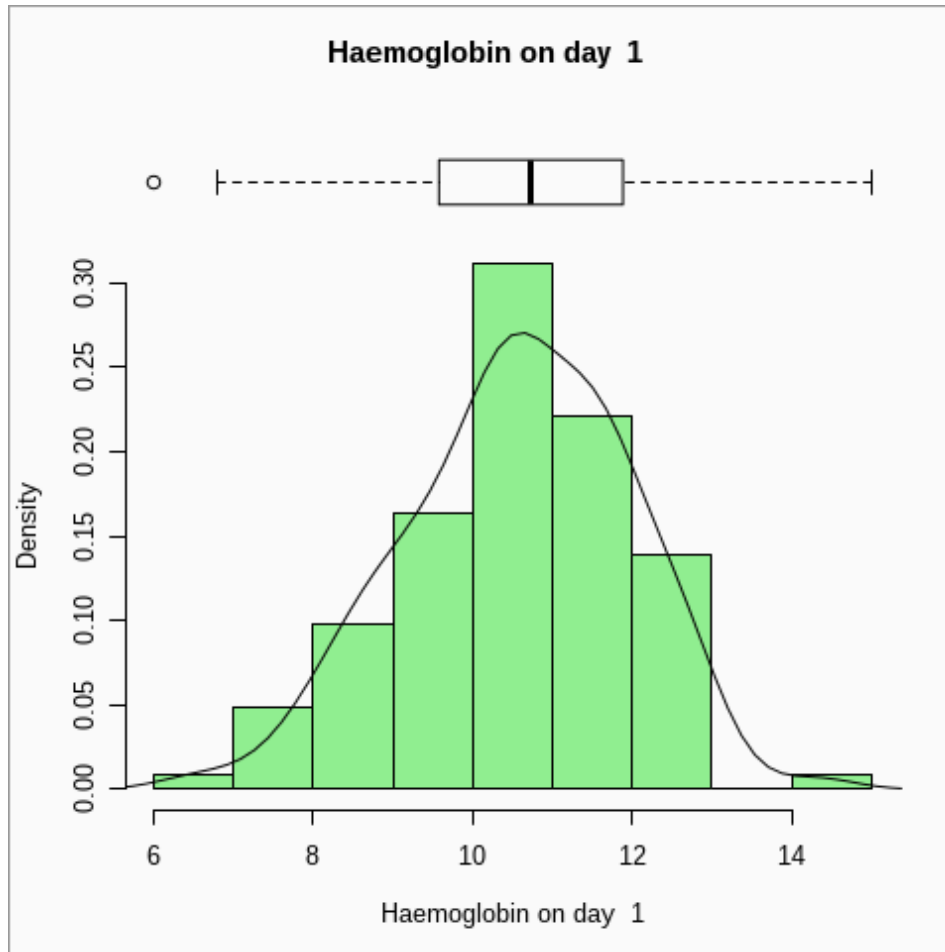


TABLE 1: BLOOD PRODUCTS USED IN 2016

		Ordered	Issued	Returned
Packed red cells (units)	<i>Total</i>	525	262	27
	<i>Mean (per case)</i>	3.9	2.0	0.2
FFP (units)	<i>Total</i>	540	379	20
	<i>Mean (per case)</i>	4.1	2.8	0.15
Platelets (units)	<i>Total</i>	186	54	1
	<i>Mean (per case)</i>	1.4	0.4	0.0075

POSTOPERATIVE Hb



CONCLUSION

- Standard preoperative ordering schedule is inefficient
- Unnecessary transfusion with Hb > 9g/dl
- Mean preoperative Hb > 12,8g/dl could benefit from perioperative optimization
- Implementation of blood transfusion strategy may decrease usage of blood products

RECOMMENDATIONS

- Heart team
- Preoperative: haematinics, erythropoietin, autologous transfusion
- Intraoperative: medication, CPB components, TEG/Rotem, surgery, perfusion
- Postoperative: protocols, transfusion triggers, massive transfusion protocol for bleeding patients

FINANCIAL IMPLICATIONS

- Prices extracted from the 2016 SANBS State Price List (<http://www.sanbs.org.za/images/PDF/2016-SANBS-State-Price-List.pdf>)
- Consideration of RCC (red cell concentrate) usage only
- This cost analysis only examines the blood usage for the pre-operative blood order, and units used from that order (typically the intraoperative and early postoperative periods)

COSTS

Pre-operative order (Full cross match x 4 RCC) R743,91 x 4

= R2975,64

Average of 2 RCC used per case:

+ R1671,84 x 2

= R 6319,32 per patient

Based on an approximation of 200 cardiac cases done annually

Annual cost of RCC (excluding other products) = R1 263 864,00

IF CHANGES IMPLEMENTED

Pre-operative order (Type and screen x 2 RCC) R333,11 x 2

= R666,22

If RCC cut down to average of **one** per case through the implementation of blood conservation strategies:

+ R1671,84 x 1

= 2 338,06 per patient

Based on an approximation of 200 cardiac cases done annually

Annual cost of RCC services only: = R467 612,00



THANK YOU