BLOOD TRANSFUSION PRACTICES AT THE NEWBORN UNIT, MOI TEACHING AND REFERRAL HOSPITAL, ELDORET KENYA

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Operational definitions

- Appropriate transfusion : blood transfusion request conforming to the KNBTG criteria on **indication** and **volume** of component to be transfused.

BACKGROUND

- WHO: Safety & effectiveness of transfusion depend on[1]:

  - Safe and adequate supply of blood

  - Appropriate clinical use of blood products

1. WHO Blood Safety and availability Fact sheet: Department of blood transfusion safety and clinical technology. 2011.

- A survey in Kenya found 13/14 first referral level hospitals had inadequate blood supply for transfusion[2].

- A study looking at transfusion among newborn intensive care units(6) found these hospitals differed markedly on volume transfused and on the pre transfusion hematocrit [3].

2.English M, et al. Delivery of pediatric care at the first-referral level in Kenya. *The Lancet.* 2004;364(9445):1622-1629.

3. Bednarek FJ, et al. Variations in blood transfusions among newborn intensive care units. *The Journal of pediatrics.* 1998;133(5):601-607.

- Kenya Ministry of health has formulated guidelines for the appropriate use of blood and blood products

- KNBTG was compiled by transfusion experts and prescribers within Kenya as a review of guidelines found in published literature

- These guidelines were released in 2001 to all hospital transfusion committees to facilitate implementation
- Latest is the third edition revised in August 2009
- For neonates, it specifies the indication for PRBC, FFP and Platelet transfusion and volume to be given

RED CELL TRANSFUSION	**VOLUME**
Hb < 13g/dl & <24Hrs old	10-15ml/kg of PRBC 20 ml/kg of whole blood **OR** (Hb Deficit x weight x 3 for PRBC and Hb Deficit x weight x 6 for whole blood).
Hb < 13g/dl & on ventilation	
Hb < 11g/dl and chronic oxygen dependence, apnea, tachycardia (> 160), poor weight gain(<10g/kg/day) with adequate intake and a normal temp for 7 days, CCF(distress, hepatomegaly, edema)	
Acute blood loss & Hb<14g/dl	
Hb <7g/dl & stable	
Preoperative Hb <10g/dl	
PLATELET TRANSFUSION	Volume- 10-20mls/kg
Platelet count is $<50x10^9$/L with active bleeding	
Platelet below < 100 $\times 10^9$/L & for surgery	
FRESH FROZEN PLASMA	Volume -10-15ml/kg
Correction of micro vascular bleeding and DIC when prothrombin time and thromboplastin time are 1.5times the midrange normal value	

PROBLEM STATEMENT

- According to WHO, one of the challenges facing transfusion is Inappropriate use of blood & blood products [4]

- This often results from:

- lack of clinical transfusion guidelines
- variations in prescribing patterns amongst doctors.

4. WHO Blood Safety and availability Fact sheet: Department of blood transfusion safety and clinical technology. 2011.

- A study in Venezuela on appropriate use of blood products found that the prevalence of appropriate use was 55.4% among neonates[5].

- At KNH a study looking at appropriate use of blood products found a rate of 18.4% of appropriateness in the neonatal population[6]

- These studies indicate that adherence to guidelines is often less than optimal and this results in inappropriate use of blood components.

5. Martí-Carvajal AJ, et al Appropriate use of blood products in pediatric patients in a Venezuelan general university hospital: cross sectional study. *Salus.* 2005;9(1):11-15.

6. Gitakah R. Blood Transfusion Practices In Children Admitted At Kenyatta National Hospital, Kenya, University of Nairobi; 2006.

JUSTIFICATION

- Monitoring of transfusion practice ensures improved access and appropriate use of blood and blood components[7].

- The use of blood transfusion guidelines has been shown to ensure appropriate use of blood for transfusion

7. WHO Blood Safety and availability Fact sheet: Department of blood transfusion safety and clinical technology. 2011.

- A study done in United States comparing transfusion before implementing a program to improve compliance with transfusion guidelines and after implementing the program noted[8]:
- A reduction in transfusions administered with a significant increase in compliance of guideline use from 65% to 90%.
- The study found no change in neonatal intensive care unit demographics, major morbidities, length of stay or mortality rate.

8. Baer VL, et al. A pre-post analysis within a multihospital health care system. *Transfusion.* 2011;51(2):264-269.

- This study will generate data on adherence to these guidelines as a way of monitoring the transfusion practice at NBU

- This will be a step towards improving the safety and efficiency of blood transfusion therapy.

METHODOLOGY

- **Study design:** prospective observational study
- **Study area**: newborn unit, MTRH

Inclusion criteria:

- Neonates admitted during study period and whose parent/ guardian gave consent

Exclusion criteria:

- Well neonates admitted for accommodation /Observation

- **Outcome measures**

  The main outcome was proportion of neonates transfused and the proportion of blood transfusion done as per the KNBTG

- **Data collection:** A pretested structured data collection tool was used to collect data: demographic characteristics, relevant maternal factors, indication and volume of product and any reactions documented

STUDY PROCEDURE

- Data collected over 6 mo period. (1st Jan- 30th June 2015)

- We monitored participants daily until death/ discharge for any blood transfusion requisition made, and if any, informed the PI.

- For neonates who had BT requested, we collected their information from the file & assessed adherence to KNBTG.

- Each request was assessed separately for those who had multiple transfusion requests.

- For those who were transfused we got information on any reactions that had been documented by the clinicians at the unit

RESULTS

- 350 neonates recruited from 1st January to 30th June 2015.
- 206 (59.2%) males and 142 (40.8%) females (M: F 1.5: 1)
- 121 were transfused : proportion of 34.6%
- Median age at transfusion 6 days(3,13)
- Median LOS for those transfused was 13days (7,25)

Table 1: Demographic characteristics

Demographics	Transfused		p-value
	Yes	No	
	n =121	n =229	
Sex [n (%)]			0.048 [1]
Female	58 (40.8)	84 (59.2)	
Male	63 (30.6)	143 (69.4)	
Place of delivery [n (%)]			0.001 [2]
H/Facility	47(49.5)	48(50.5)	
Home	1(16.7)	5(83.3)	
MTRH	72(29)	176(71)	
Birth weight (g) [n (%)]			0.000 [1]
<2500	63 (47.73)	69 (52.27)	
>=2500	58 (26.61)	160 (73.39)	
APGAR score [n (%)]			0.006 [1]
<=7	35 (37.23)	59 (62.77)	
>7	57 (28.64)	142 (71.36)	
Not Indicated	29 (50.88)	28 (49.12)	

1 Chi square 2 Fishers Exact

Table 2: Hematologic characteristics of the study participants

Characteristic	Transfused		Kruskal Wallis p-value
	Yes Frequency N=121	No Frequency N=229	
	Median (IQR)	Median (IQR)	
Hb	7.7 (2.94,12.2)	14.7 (7.8,15.95)	0.0002
MCV	102 (96.2,107.7)	99.4 (95,106.9)	0.1330
MCH	34.9 (32.4,36.5)	35.3 (32.2,39.2)	0.0599
Platelets	240 (177,313)	244 (170,313)	0.6020

Table 3: Maternal factors

Maternal factors	Transfused		p-value
	Yes (n =121)	No (n= 229)	
ANC attendance			0.034
No	16 (51.6)	15 (48.4)	
Yes	104 (32.7)	214 (67.3)	
Iron supplementation			0.000
No	38 (55.1)	31 (44.9)	
Yes	71 (27)	192 (73)	
Folic supplementation			0.000
No	44 (55.7)	35 (44.3)	
Yes	74 (27.7)	193 (72.3)	
Ante-partum hemorrhage			
No			0.646
Yes	108 (34.3)	207 (65.7)	
	13 (38.2)	21 (61.8)	

FIGURE 1: PERCENTAGE OF BLOOD PRODUCT REQUESTED

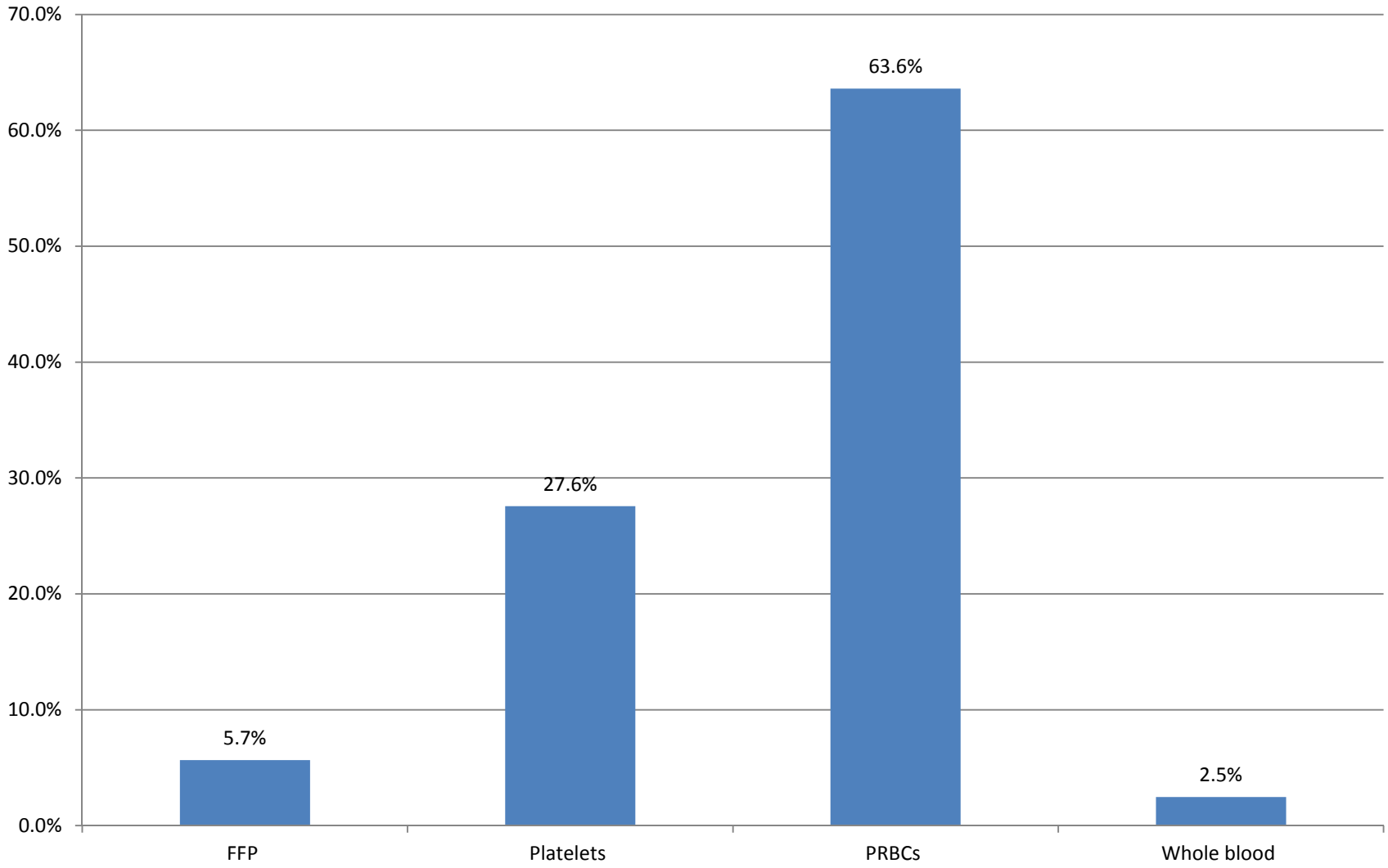


FIGURE 2:INDICATION FOR TRANSFUSION

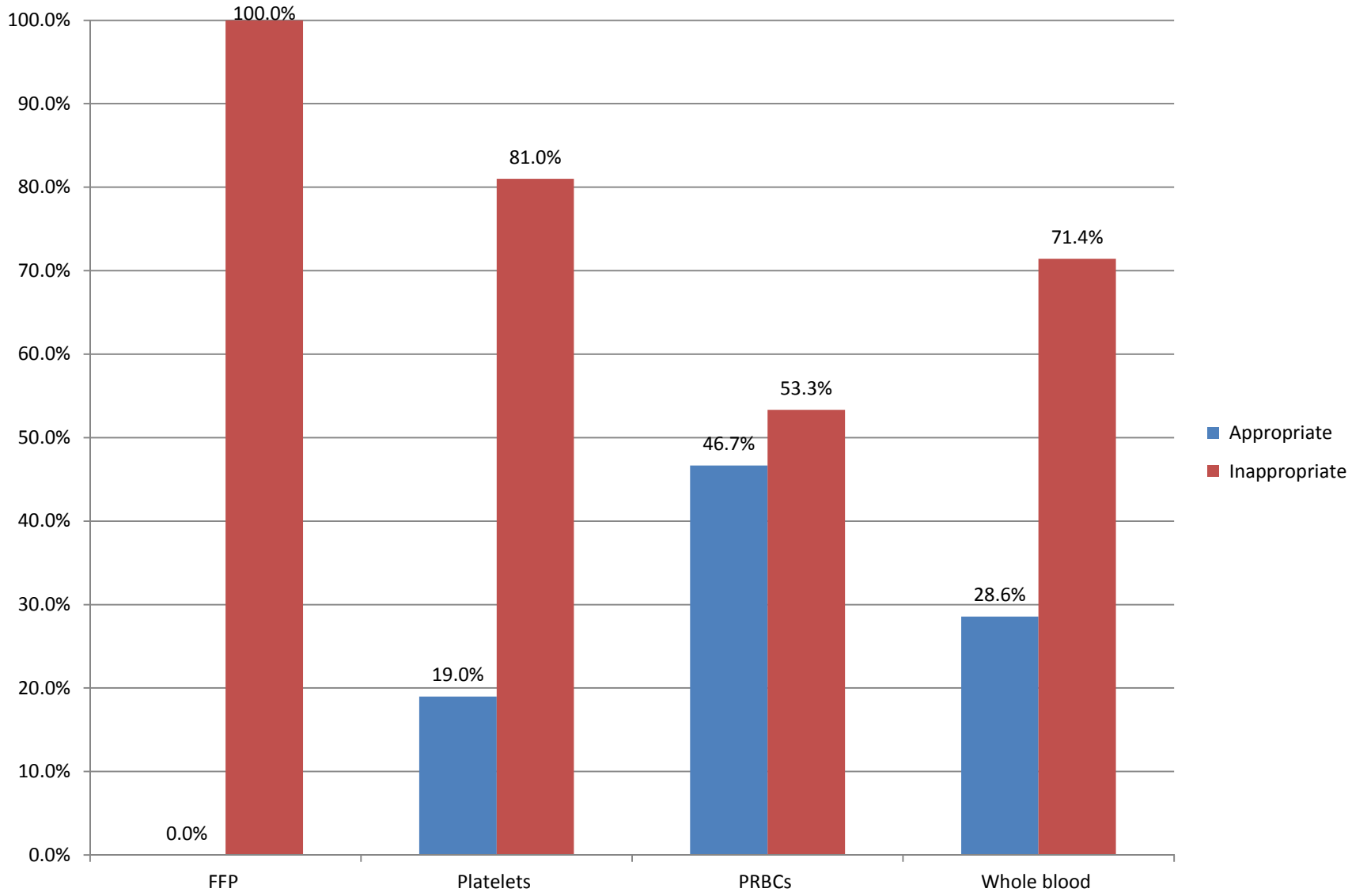


FIGURE 3:VOLUME TO BE TRANSFUSED

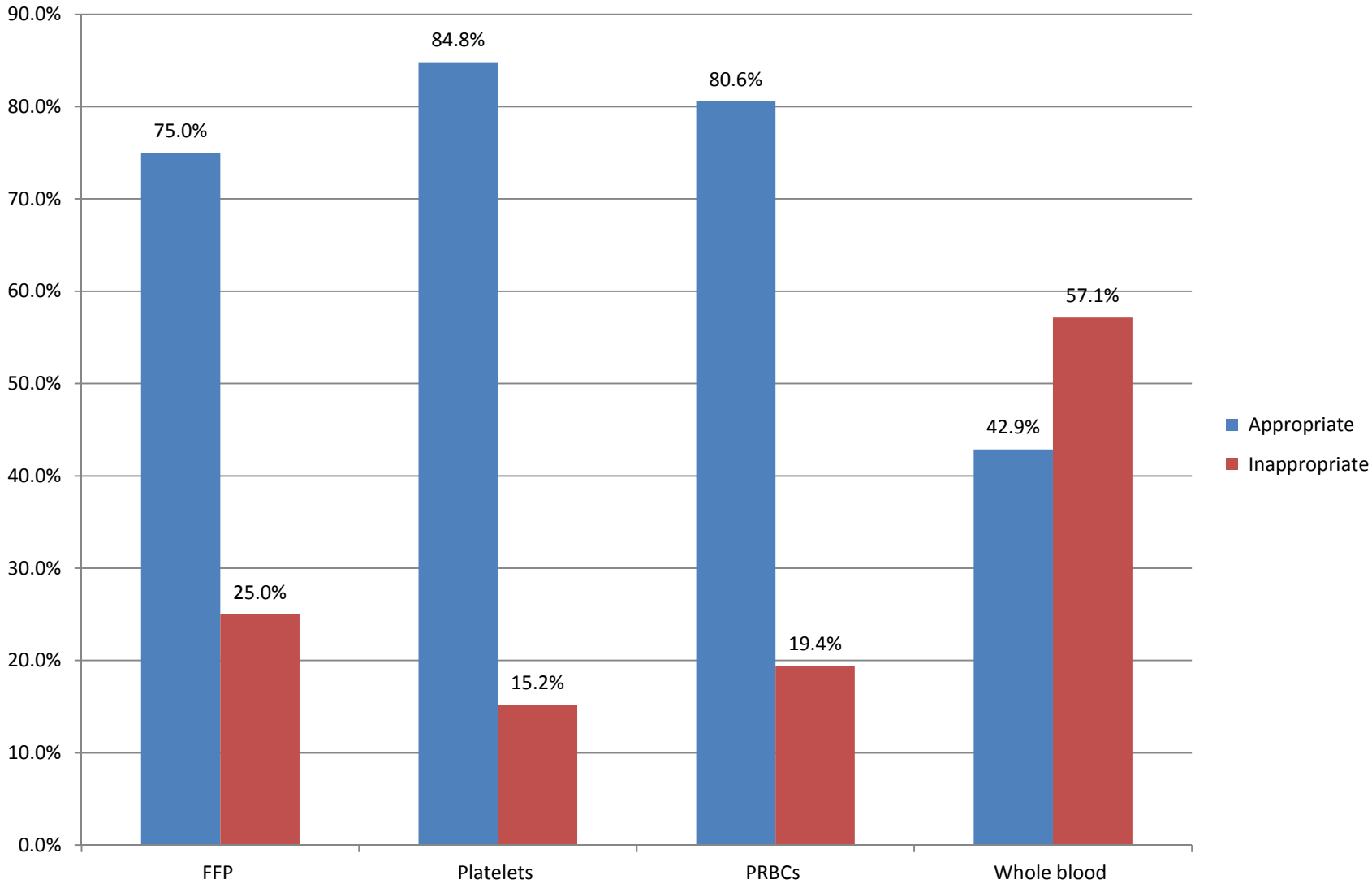
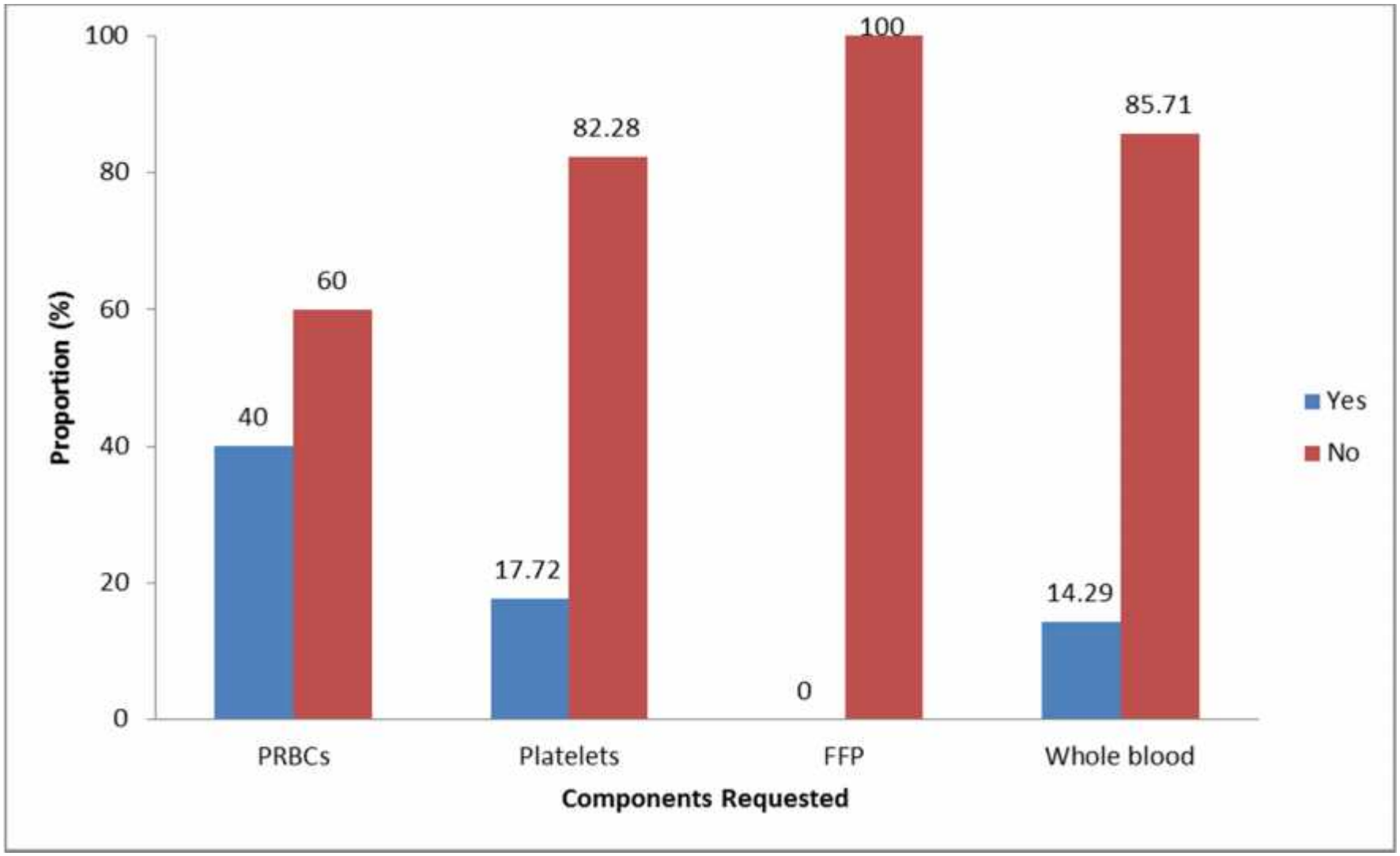


Figure 4: Appropriate transfusion (both indication and volume correct)



DISCUSSION

- Majority of the neonates with LBW received blood transfusion.
- Findings similar to a study in Nigeria(2010) by Ayede et al looking at indications of transfusion among neonates[9].
- A systematic review on maternal anemia found prenatal iron use is associated with a significant increase in birth weight[10].

9 Ayede A, et.al. Pattern, indications and review of complications of neonatal blood transfusion in Ibadan, southwest Nigeria. Annals of Ibadan Postgraduate Medicine. 2011;9(1):30-36

10 Haider BA, et.al. Anaemia, prenatal iron use, and risk of adverse pregnancy outcomes: systematic review and meta-analysis. *BMJ.* 2013-06-21 16:55:27 2013;346.

- The overall rate of appropriate blood product transfusion was 30.9%. This rate was higher than that a similar study done at KNH (18.4%)[11]

- Gitaka et al in KNH however only assessed PRBCs and whole blood

11. Gitakah R. Blood Transfusion Practices At Kenyatta National Hospital, Kenya, University of Nairobi; 2006.

- All FFP transfusions were not appropriate in our study.

- This is similar to a study done in India where transfusion in the new born unit, the maximum number of episodes judged inappropriate were found to be those of FFP (100%)[12]

12. Wade M et al, Rational use of blood components—an audit. Indian Journal of Hematology and Blood Transfusion. 2009;25(2):66-69.

CONCLUSION

- The rate of blood transfusion in the newborn unit at MTRH is high as about one third of neonates admitted to the unit are transfused.

- Most transfusions did not meet the criteria for appropriate transfusion with only a third being appropriate.

- FFP was the most inappropriately transfused factor, as no coagulation profile was done.

RECOMMENDATIONS

- We recommend a study to look at factors that may hinder adherence to blood transfusion guideline use at the newborn unit.

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THANK YOU