

Evaluation of Blood Reservation and Use for Caesarean Sections in a tertiary maternity hospital in Pakistan

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ABSTRACT

Background: In developing countries, obstetrical hemorrhage is the most common cause of maternal mortality. This disaster is avoided by the urgent blood transfusion and other life saving measures. In countries like Pakistan many health care centers have very limited number of fresh and stored blood in their blood banks which causes lot of inconvenience to the management of bleeding patients. In obstetrical practice, blood transfusion is commonly done in caesarean section **Aim:** To order the optimal number of blood units to avoid unnecessary reservation so that blood stock do not get tie down and blood should be available to the deserving patients.

Methods: Records of 1468 patients who had emergency and elective caesarean at the Lady Willingdon Hospital Lahore affiliated with King Edward Medical University Lahore between 1st January and 30th June 2014 were reviewed data pertaining to age, parity, booking status, type and indication for caesarean section, pre-operative and post-operative packed cell volume, blood loss at surgery, units of blood reserved at blood bank, units of blood transfused and duration of hospital stay was extracted and data was analyzed.

Results: There were 3671 deliveries out of which 1468(40%) were by caesarean sections. During this study a total of 725 units of blood were reserved in the blood bank and later on these units of blood were made available to the operation theatre. Only 145(20%) units of blood were transfused to 132 patients amongst those transfused 75(57%) were booked and 99(75%) had primary caesarean section. About 85% of those patients having transfusion had their primary section the most common indication for the transfusion was found to be the placenta previa (39 patients with 95 units of blood) and cephalo-pelvic disproportion(35 patients with 55 units of blood).

Conclusion: Although a large number of units blood were reserved and made available to the operation theatre at the time of surgery, most the operated patients did not have any transfusion. Establishment of mini blood bank within the obstetrical unit will not only provide timely blood units supply but will also prevent unnecessary wastage of financial resources & blood in central blood bank.

Keywords: C-section, blood transfusion, blood loss, blood bank, blood transfusion

INTRODUCTION

Peripartum hemorrhage is the leading cause of maternal and fetal morbidity in developing countries¹. Despite advances in the prevention, diagnosis and treatment, massive blood loss during pregnancy and delivery remains a threat and therefore prevention of maternal mortality involves prompt blood transfusion among other life saving measures to attain fifth millennium developmental goal².

Caesarean section is often performed in young and healthy patients who are usually free of serious cardiovascular and pulmonary problems. This procedure is identified as a common indication for blood transfusion in obstetrical practice because it

involves risk of major intra operative blood loss³. Its performance is often delayed by non-availability of blood^{4,5}. The increased blood volume in normal pregnancy typically accommodates the obligatory blood loss occurring in vaginal or caesarean delivery⁶.

However, in some patients the blood loss overwhelms the compensatory mechanism and result in hypovolemia and shock with a significant threat to both mother and fetus⁷. In Lady Willingdon Hospital anesthesiologist usually requests for minimum of two units of blood for cases of caesarean section irrespective of pre-operative haematocrit. Most of these cross-matched units of blood are not used. The blood gets tied down and is not available for other patients. This unnecessary blood reservation practice leads to scarcity of blood in the centers which are already short of blood supply which results in unavailability of the blood to the patients who need blood for life saving interventions⁸.

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METHODS

After approval from the research and ethical committee of the institution this retrospective descriptive study was carried out in the obstetrical and gynecology unit of Lady Willingdon Hospital between 1st January and 30th June 2014. Case records of 1468 patients who underwent caesarean delivery during this period were reviewed. Their data pertaining to age, parity, booking status, type of indication for caesarean section, blood loss at surgery and duration of hospital stay were collected. Other information extracted include pre and post operative haematocrit, units of blood reserved at blood bank and units of blood transfused. The booked cases were those who were registered and got antenatal care and unbooked cases were those who were not booked and were brought to the hospital through emergency department.

The caesarean section was performed by experienced residents and consultants according to standard protocols⁹ and placenta was delivered by controlled cord traction except where this was difficult and manual removal was performed. The blood loss was estimated by counting the number of soaked packs, guazes, measurement of the blood volume in the vagina after caesarean section and visual estimation of blood staining of theater bedspread. The data was analyzed with SPSS version X. Variables were summarized using frequency, mean, and standard deviation. The Chi-square test and Students'-test were used to test association between variable as appropriate. P value of less than 0.05 was considered significant and confidence level was set at 95%.

RESULTS

A total of 1468 patients had caesarean delivery amongst 3671 parturients during the study period giving a caesarean section rate of 39.9%. 2170 units of blood were cross matched but only 434 were transfused giving cross-match: transfusion ratio of 5:1. 20(14%) of those that had Caesarean section were transfused. Table 1 shows the characteristics of the patients. 983 patients were booked out of which 115(11.7%) were transfused whereas 90(14%) amongst 485 unbooked patients were transfused. 367 patients had elective caesarean sections out of whom 40 patients were transfused compared to 165 that were transfused among those that had emergency cesarean section (p<0.05). 1042 patients had their primary caesarean section out of whom 163 were transfused compared to only 42(8.4%) patients that were transfused among 425 patients who had their repeat caesarian section. Table 2.shows

indication for caesarian section with reference to the frequency and blood transfusion practice.

Table 1: Characteristics of the patients having caesarian section and blood transfusion.

Parameters	Total C/S	Transfused pts	Units
Booking status (P value: 0.08)			
Booked	983	115(11.7%)	87
Unbooked	485	90(18.5%)	
Type of C-section (P value: P < 0.05)			
Elective	367	40(10.8%)	29
Emergency	1101	165(14.9%)	116
Primary*	1042	163(15.6%)	118(82%)
Repeat*	425	42(09.8%)	26(18%)

*P value: P < 0.05

Table 2: Indication for caesarian section and number of transfused.

Indication	Frequency	No. Transfused	Units available
Cephalopelvic disproportion	273	27	14
Cephalopelvic disproportion			
Previous scar	233	31	26
Fetal distress	152	13	8
Placenta previa	99	40	34
Breech	90	04	02
Preeclampcia/eclampcia	85	09	06
Obstructed labour	76	13	12
Failed induction	54	04	02
Bad obstetrical history	40	-	-
Abnormal CTG	40	-	-
Malpositioning	36	05	01
Multiple pregnancy	36	09	08
Cervical dystocia	36	-	06
Malpresentation	22	04	02
Abruptio placenta	13	09	12
Others	183	-	12

Table 3 compares some parameters between transfused and non- transfused patients. It is quite evident from the results that there is no statistical difference between their mean age (29.5, S/D 5.1) and (30, S/D 4.3). Table shows that there is also no statistical difference in the parity of those transfused (median 1) and those not transfused (median 1). However estimated blood loss (EBL) at surgery, pre-operative and post-operative hematocrits showed a statistical significant difference between these two groups. The mean EBL for the transfused patients was 750ml+690 ml compared to 460ml+240 ml in the non- transfused patients (p<0.01). Similarly the mean

pre-operative hematorict in those transfused was 26 ± 6 percent compared to 32 ± 4.9 percent in those not transfused with $p < 0.02$. In the same way, the mean post operative hematocrit in those transfused was 26.4 ± 5.4 percent compared to 30.9 ± 4.4 percent in those not transfused with $p < 0.001$.

Table 3: Comparison of the patients who had blood transfusion and those who had no blood transfusion.

Parameter	Transfused		Non transfused		P value
	Mean	SD	Mean	SD	
Age	29.5	5.1	30	4.3	0.15
Parity	1	1	1.1	1	0.12
Blood loss	750	690	460	240	<0.01
Preop PCV	26	6	32	4.9	<0.02
Postop PCV	26.4	5.4	30.9	4.4	<0.001
Hospital stay	08	3.8	6	2.9	<0.04
Unit transfused	2	1	-		

Table 4: Pattern of transfusion and frequency of usage.

Units of blood	n%	Units transfused
1	41(20%)	41
2	119(58%)	238
3	30(14.6%)	90
4	10(4.8%)	40
5	05(2.4%)	25
Total	205(100%)	434

Table 4, shows the units of blood transfused and frequency. It was observed that 41 patients (20%) had only 1 blood transfusion, 119 patients(58%) had 02 blood transfusion, 30 patients(14.6%) had 03 blood transfusion, 10 patients (4.8%) had 04 blood transfusion and 05 patients (02%) had 05 blood transfusion.

DISCUSSION

The increasing use of surgery for the childbirth and subsequent need for the blood transfusion together with patients' hesitation to receive autologous blood transfusion poses a significant challenge to both obstetricians and anesthesiologists¹⁰. Improvement in the surgical technique has reduced the use of homologous transfusion during caesarean section, but still there remains a significant chance of blood transfusion in high risk patients¹¹. If the patient is not willing to accept the blood transfusion due to transmission of blood born infectious diseases, surgeon accepts low level of haematocrit for surgery and parturients are of younger age group, then there is very little chance of blood transfusion during surgery¹².

In this study the caesarean section rate is 39.9% which is very high compared to 10 –15% in united states [13] and 5– 21.8% in Sub-Saharan Africa¹⁴. However, The World Health Organization suggested the caesarean section rate of 5 – 15% in any facility¹⁵. This high incidence of blood transfusion in this study is largely because most of the patients were obstetrical emergencies with genuine indications and so is because the Lady Willingdon Hospital is a tertiary care obstetrical hospital with a very wide area of drainage. In this study the transfusion rate in the patients who had caesarean delivery was 13.9% which is consistent with the transfusion rate of 1–14% as suggested by review of literature for blood transfusion following caesarean section¹¹. The blood transfusion rate in this study is higher than 4.9% and 5.4% reported by Duthie et al¹⁶ and Rouse et al¹⁷ but significantly lower than 23.5% and 25.2% reported byrainaldi et al¹⁰ and Ozumba et al¹⁸. Considering the demographic characteristics of the patients who had blood transfusion and who had no blood transfusion, the age, parity and booking status were not significantly associated with increased rate of blood transfusion. This is quite against the findings of Imarengiaye et al¹⁹ who reported asix fold risk of blood transfusion inunbooked patients and this could be due to some degree of antenatal care the patients receives at the clinics run by general practitioners. However there was a high rate of blood transfusion (14.9%) in emergency cases as compared to the elective cases (10.8%). This result is quite consistent with the results of the study conducted by Tolby and Scott. They found that there was a statistically significant risk of blood transfusion in patients undergoing emergency caesarean section.

In this study it was observed that there was a transfusion rate of 15.6% in the patients undergoing primary caesarean section as compared to the 9.8% in the patients who had their repeat caesarean section. This is quite significant statistically ($p < 0.05$). Surprisingly, this finding is contradictory to the finding of Imarengiaye who noticed a significant rate of blood transfusion in the patients who had repeat caesarean section¹⁹. In this study this difference could be due to the prolong labor secondary to cephalo-pelvic disproportion in primary gravida which resulted uterine atony due to muscle fatigue and uterine bleeding which subsequently required blood transfusion. In this study cephalo-pelvic disproportion was found to be the most common indication for emergency caesarean section^{18,21}. It was observed that the highest rate of transfusion was seen in the patients with placenta previa (40%) while in Ozumba study¹⁸ it was 59.1%. It is due to repeated antepartum haemorrhages associated with placenta previa which significantly reduces the pre-operative

haematocrit of the patients which in turn necessitates the blood transfusion. Similarly the low lying placenta also poses a great risk of intraoperative hemorrhage necessitating blood transfusion¹⁹. Other indication for caesarean section requiring blood transfusion include obstructed labor previous uterine scar, multiple pregnancies and eclampsia. These condition were also held responsible for blood transfusion in the studies conducted by other authors^{17,18,19,22,23}. A strong association of estimated blood loss and risk of blood transfusion was found in this study. In the patients transfused the mean estimated blood loss was found to be 750ml ± 690ml compared to 460ml±240ml in the patients who were not transfused (p<0.01). The study conducted by Imarengiaye et al [19] showed that the estimated blood loss in the patients transfused was 1310.8ml±991.8ml as compared to 592.5ml±181.7ml in the patients who were not transfused. This strong association between estimated blood loss and risk of transfusion was also seen in the studies conducted by other others as well^{3,11,17,19}.

In this study Pre and post operative hematocrit also showed a significant association with the risk of blood transfusion (p<0.01). Similar association was also observed in the other studies as well^{17,18,19}. Although a transfusion hematocrit threshold of 30% has been suggested as appropriate²⁴, the mean pre-transfusion hematocrit in this study was 26+6%. As the patients in this study who underwent caesarean section were of younger age group they might have tolerated the hematocrit as low as 20% without significant complications, transfusion of only red blood cells is usually appropriate when hematocrit is 20-30% in case there is cardiopulmonary compromise and ongoing blood losses²⁵. Many other workers suggested that the decision to transfuse a patient should take many other factors into due consideration apart from hematocrit^{26,27,28,29}. According to the American College of Physician only one unit of blood is sufficient even if the patient is symptomatic. British Committee for Standards in Hematology suggested that if the patient is stable two units of red blood cells are enough^{27,28,29}. Due to short duration and cross sectional nature this study showed a significant limitation as it might not reflect the long term transfusion practice and hence could not reflect long term effects of blood transfusion policy on the health of the patients after surgery³⁰. We can evaluate the efficiency of blood ordering exercise by cross-match transfusion ratio¹⁷ In this study this ratio stayed at 5:1 which indicates that only 20% of the cross-matched blood was transfused and rest of the 80% blood was either returned to the blood bank or it was disposed of or sold by the attendants of patients at some private blood bank

outside the hospital. This practice not only resulted in the wastage of hospital financial resources but also the loss of much needed blood units. A recent study suggested that type and screen are safe alternative to type and cross-match for the patients requiring less than one unit of blood³¹. So it has become quite necessary that we should reconsider our blood bank ordering practice in order to save our financial resources and much needed and valuable blood. In the absence of significant risk for the hemorrhage, routine pre-operative type and cross-match does not improve patients' care but also increase the cost and should be avoided³².

CONCLUSION

It is quite evident from the study that despite arranging a large number of blood units and making them available in the operation theater at the time of surgery, most of the operated patients went without blood transfusion resulting in the wastage of hospital financial resources and much needed blood. In developing countries like Pakistan with limited financial and blood bank resources, we should revise our blood ordering practice according to the patients' demographic, physical and clinical condition and establishment of blood banks at labor room level should be considered so that blood could be used effectively rather than being wasted.

REFERENCES

1. Gombowtz H: Blood sparing in obstetrics emergencies. [[http://www.Hdubl.hr/Predavanja/ombowtz%20ans.Oc.United Nations Development Program: Millennium Development Goals.Goal 5 Improving maternal Health](http://www.Hdubl.hr/Predavanja/ombowtz%20ans.Oc.United%20Nations%20Development%20Program%20Millennium%20Development%20Goals.Goal%205%20Improving%20maternal%20Health)]. [<http://www.undp.org/mdg/goal5.Shtml>].
2. Matot I, Einav S, Goodman S, Zeldin A, Weissman C, Elchalal U: A survey of Physician's attitude towards blood transfusion in patients undergoing Caesarean section. *Am J obstetgynecol*2004, 190:462-7.
3. Orji EO, Ojofeintimi EO, Esimai AO, Adejuyigbe E, Adeyemi AB, Owolabi OO:
4. Assessment of delays in receiving delivery care at a tertiary healthcare Delivery centre in Nigeria. *Journal of Obstetrics and Gynaecology*2006, 26(7):643-644.
5. Onah HE, Ibeziako N, Umezulike AC, Effetie ER, Ogbuokiri CM: Decision delivery Interval and perinatal outcome in emergency caesarean Sections. *Journal of Obstetrics and Gynaecology*2005, 25(4):342-346.
6. Waterstone M, Wolfe C, Hooper R, Bewley S: Postnatal morbidity after Childbirth and severe obstetric morbidity. *Br J obstetgynaecol*2003, 110:728-33.
7. Häger RM, Daltveit AK, Hofoss D, Nilsen ST, Kolaas T, Øian P, Henriksen T: Complications of caesarian deliveries: rates and risk factors. *Am J Obstet Gynecol*2004, 190:428-34.

8. Anorlu RI, Orakwe CO, Abudu OO, Akanmu AS: Use and misuse of blood Transfusion in Obstetrics in Lagos, Nigeria. *W Afr J Med* 2003, 22:124-127.
9. Simm A, Ramoutar P: Caesarian section: technique and complications. *Currobstetgynaecol*2005, 15:80-86.
10. Rainaldi MP, Tazzari PL, Scagliarini G, Borghi B, Conte R: Blood salvage During caesarean section. *Br J Anaesth*1998, 80:195-8.
11. Rebarber A, Lonser R, Jackson S, Copel JA, Sipes S: The safety of intraoperative autologous blood collection and auto transfusion during caesarean section. *Am J obstetgynecol*1998, 179:715-20.
12. Carmann WR, Datta S: Red cell use during caesarean delivery. *Transfusion* 1991, 31:12-15.
13. Ventura SJ, Martins JA, Curtin SC, Matthews TJ, Park MM: Births: Final data For 1998. National vital statistics report; volume 48, number 3 Hyattsville, MD: National Centre for Health and Statistics 2000.
14. Shah A, Fawole B, M'Imunya MJ, Amokrane F, Nafiu I, Wolomby JJ, Mugerwa K, Neves I, Nguti R, Kublickas M, Mathai M: Caesarean delivery Outcomes from the World Health Organisation global survey onmaternal and perinatal health in Africa. *Int'l J obstetgynaecol*2009, 107:191-197.
15. Chalmers B, Mangiaterra V, Porter R: World Health Organisation principles Of perinatal care: the essential antenatal, perinatal and postpartum care Course. *Birth* 2001, 28:202-7.
16. Duthie SJ, Ghosh A, Ng A, Ho PC: Intra-operative blood loss during Elective lower segment caesarian section. *Br J obstetgynaecol*1992, 99:364-367.
17. Rouse DJ, macpherson C, Landom M, Varver MW, Levono KJ, Moawad AH, Spong CY, Cavitis SN, Meis PJ, Wapner RJ, Sorokin Y, Miodornik M, Carpenter M, Peacemen AM, O'Sullivan MJ, Sibai BM, Langer O, Thorp Jm, Ramin SM, Mercer BM: Blood transfusion and caesarian delivery. *Br J Anaesth*1998, 80:195-8.
18. Ozumba BC, Ezegwui HU: Blood transfusion and caesarean section in a Country. *J obstetgynaecol*2006, 26:746-748.
19. Imarengiaye CO, Ande ABA: Risk factors for blood transfusion during Caesarian section in a tertiary hospital in Nigeria. *Med scimonit*2006, 12: CR269-272.
20. Tolby M, Scott DB: Blood loss during caesarean section under general Anaesthesia. *Br J Anaesth*1969, 41:868-73.
21. Swende TZ, Faagee TN: Caesarean morbidity in a Northern Nigeria Tertiary health centre. *Jos Journal of Medicine* 2008, 3:23-25.
22. Imberti R, Preseglio I, Trotta V, Filisetti P, Mapelli A: Blood transfusion During caesarean section: A 12 years' retrospective analysis. *Acta Anaesthesiolbelg*1990, 41(2):139-144.
23. Khan FA, Khan M, Ali A, Chohan U: Estimation of blood Loss during Caesarean section: an audit. *Journal of Pakistan Medical Association* 2006, 56:572-575.
24. Inglis S, Lidon-Rice I, Yun H, Chervenak FA: Is observation of severe acute Anaemia in women safe? *Am J obstetgynecol*1995, 172:290.
25. American College of Obstetricians and Gynaecologists: Blood component Therapy. ACOG technical bulletin No 199, Washington DC: American College Of Obstetricians and Gynaecologists1994.
26. American Society of Anaesthesiologists Task Force on Blood Component Therapy: Practice guidelines for blood component therapy. *Anaesthesiology*1996, 84:732-747.
27. American College of Physician: Practice strategies for elective red blood Cells transfusion. *Ann Intern Med* 1992, 116:403-406.
28. National Institute for Health: Consensus Conference. Perioperative red Blood cell transfusion. *JAMA* 1988, 26:2700-3.
29. British Committee for Standards in Haematology, Blood Transfusion Task Force: Guidelines for the clinical use of red cell transfusion. *Br J Haematol* 2001, 113:24-31.
30. Inoue Y, Wada Y, Motobashi Y, Koizumi A: History of blood transfusion Before 1990 is associated with increased risk for cancer mortality Independently of liver disease: a prospective long-term follow-up study. *Environmental Health and Preventive Medicine* 2010, 15(3):180-187.
31. Cousin LM, Teplick FB, Poeltler DM: Pre-caesarian blood bank orders: A Safe and less expensive approach. *Obstetgynaecol*1996, 87:912-916.
32. Ransom SB, Fundaro G, Dombrowski MP: Cost effectiveness of routine Blood type and screen testing for caesarian section. *J Reprod Med* 1999,