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Outcomes of audit on blood requisition and utilization in obstetrics and gynaecology setting: Aminu Kano Teaching Hospital, Kano, Nigeria

Fatima Ibrahim Kure[1], Saadiya Muhammad Sagagi[2], Ayyuba Rabiu[3]

[1]Department of Obstetrics and Gynaecology, Aminu Kano Teaching Hospital, P.M.B. 3452, Kano State.
[2]Department of Medicine, Aminu Kano Teaching Hospital, P.M.B. 3452, Kano State.
[3]Department of Obstetrics and Gynaecology, Bayero University Kano/Aminu Kano Teaching Hospital, P.M.B. 3011, Kano State.

Abstract

Background: Indications for transfusion in obstetrics may be emergent as well as non-emergent: the keystone of transfusion practice is that it should be appropriate, that is, not given when not required and not missed when required
Objectives: To identify key areas where there is a need to change policy so as to prevent unnecessary blood transfusion, to formulate strategies for appropriate preoperative blood requisition and to change clinicians' approach regarding blood component utilization.
Results: The mean age was 30.04 years (SD ± 8.08) and ranged from 16 to 70 years. The incidence of blood transfusion among all admissions was 418 out of 3078 (13.6%). The mean pre-transfusion PCV for patients who received blood transfusion was 23.06 ± 6.1% compared to 34.2 ± 4.54% obtained in the non-transfused patients. Only 59.8% of blood was utilized while 40.2% of blood was not needed.
Conclusion: Current practice at O&G department, AKTH appears to be generally inconsistent with the guidelines. This indicates inefficient transfusion practice when comparing with the standard.

Keywords: Audit, Blood Requisition, Utilization, Gynaecology, Obstetrics, Kano

Introduction

Blood transfusion is the process of transferring whole blood or blood components from one person (donor) to another (recipient). Indications for blood transfusion include: Acute blood loss, major surgery with significant blood loss, bleeding disorders (haemophilia), sickle cell anaemia, symptomatic anaemia, leukaemia, etc. The patient's haemoglobin (Hb) value, although important, should not be the sole deciding factor in the decision to transfuse blood. This decision should be supported by the need to relieve clinical signs and symptoms and to prevent significant morbidity or mortality.[1] The overall transfusion rate varies significantly worldwide as there are wide variations in the use of blood and its components.[2] Transfusion rate of 19.3%,[3] 38.7%,[4] 3.2%,[5] 12.1%[6] and 34.5%[7] have been found in studies done in India, Canada, South Africa, Lagos and Sokoto respectively.

While indications for transfusion in obstetrics may be emergent as well as non-emergent, the keystone of transfusion practice is that it should be appropriate, that is, not given when not required and not missed when required. Although blood transfusions are extremely important and often lifesaving in many cases of severe postpartum haemorrhage (PPH), awareness of the risks of blood transfusion, including those related to transfusion-transmitted infectious diseases, haemolytic

Corresponding Author: Dr Ayyuba Rabiu

Department of Obstetrics and Gynaecology,
Bayero University Kano/Aminu Kano Teaching Hospital,
P.M.B. 3011, Kano, Nigeria.
Email: ayyubarabiu@yahoo.com, Phone: +2348055559473

transfusion reactions, anaphylaxis, transfusion-related acute lung injury, and transfusion-associated cardiac overload, should also be kept in mind.[8]

The preoperative request of blood units, especially in elective surgery, is often based on the worst-case assumptions, demanding large quantities of blood or overestimating the anticipated blood loss, of which little is ultimately used. It has been reported that only 30% of cross matched blood is used in elective surgery.[9] Inappropriate reservation of blood results in its reduced availability for other patients in need and a greater tendency for it to pass its expiry date and be discarded.[10] Unnecessary ordering of blood for surgical patients can be reduced without having any detrimental effect on the quality of care.[9] Therefore, the practice of blood reservation and transfusion in surgical practice should be subject to regular evaluation in healthcare institutions.[10]

Clinicians should cautiously assess the appropriateness of indication before requesting various components, thereby preventing misuse and unnecessary exposure to various infectious and non-infectious complications.[11] It has been observed that there is a gross over and inappropriate ordering of blood and its products in many medical centres, and transfusions are being given in response to habit or availability and not for indications.[12] Statistics and studies by various agencies have revealed that there is an inclination on part of the treating doctors, to over-order blood components in surplus of utilization.[13] The judicious and appropriate use of blood and blood products refers to its safe transfusion only to manage a condition which can otherwise lead to significant morbidity or mortality and cannot be managed effectively by some other means.[12] Cross match of donor units, which are unlikely to be used for transfusions, is said to be an inefficient manner of utilization of blood bank services. Such over ordering also contributes to needless operating expenses for blood banks and may result in apparent blood scarcity especially in facilities where blood is in short supply. This then denies those patients who really need blood for life-saving interventions.[3] Timely availability of blood in healthcare facilities is essential for patients' survival; therefore, a very robust blood transfusion service with efficient strategies for blood procurement and mechanisms for reducing blood wastages is critical to the attainment of quality healthcare delivery.[14]

The National Institute for Health and Care Excellence (NICE) in 2015, published a guideline that contains recommendations about general principles of blood transfusion which applies to a range of conditions and different settings. The guideline covers the appropriate use of blood components, alternatives to transfusion for surgical patients and ensuring patient safety, including monitoring for transfusion reactions.[15] Adhering to such standardized guidelines may change clinicians' approach regarding appropriate blood component utilization, thus reducing unnecessary blood transfusion.

An audit of pattern of transfusion in hospital setup can be of help to identify key areas where there is need to change policies and thus help to formulate guidelines for improvement of transfusion services.[13] Evaluation of blood requisition and utilization is essential in assessing the present and future demands for blood and avoiding unnecessary requests and transfusions [16]. We therefore undertook an audit of blood reservation and transfusion practices in obstetrics and gynaecology at our facility with a view to recommending modifications wherever it is found to be suboptimal.

Aim

To ensure we are adhering to the guidelines issued by NICE (2015) on blood transfusion.

*Moderate blood loss is defined as >500mls in the NICE Blood Transfusion Guideline [Ng24])

**Major haemorrhage is loss of 50% of total blood volume (2.5L) in under 3 hours

*** Epistaxis, Purpura over 2.5cm in diameter, Joint bleeding, Melanotic stool, Haematemesis, Gross haematuria, Abnormal vaginal bleeding (more than spotting), Haemoptysis, Visible blood in body cavity fluid, Retinal bleeding without visual impairment, Bleeding at invasive sites.[15]

Objectives

1. To identify key areas where there is a need to change policy so as to prevent unnecessary blood transfusion.
2. To formulate strategies for appropriate preoperative blood requisition.
3. To change clinicians' approach regarding blood component utilization.

CRITERIA	*TARGET*	*SOURCE OF EVIDENCE*
*Offer tranexamic acid to adults undergoing surgery who are expected to have at least moderate blood loss**	80%	NICE Guideline
Use restrictive red blood cell transfusion threshold of 70 g/litre for patients who need red blood cell transfusions and who do not have major haemorrhage or need regular blood transfusions for chronic anaemia.*	100%	NICE Guideline
Use haemoglobin concentration target of 70-90 g/litre after transfusion.	100%	NICE Guideline
Consider setting individual thresholds and haemoglobin concentration targets for each patient who needs regular blood transfusions for chronic anaemia.	100%	NICE Guideline
Consider single-unit red blood cell transfusions for adults who do not have active bleeding.	100%	NICE Guideline
After each single-unit red blood cell transfusion, clinically reassess and check haemoglobin levels, and give further transfusions if needed.	100%	NICE Guideline
*Offer platelet transfusions to patients with thrombocytopenia who have clinically significant bleeding (World Health Organization grade 2) *** and a platelet count below 30×10^9 per litre.*	100%	NICE Guideline
Offer prophylactic platelet transfusions to patients with a platelet count below 10×10^9 per litre who are not bleeding or having invasive procedures or surgery.	100%	NICE Guideline
Consider prophylactic platelet transfusions to raise the platelet count above $50x10^9$ per litre in patients who are having invasive procedures or surgery.	100%	NICE Guideline
Do not routinely transfuse more than a single dose of platelets. Reassess the patient's clinical condition and check their platelet count after each platelet transfusion, and give further doses if needed	100%	NICE Guideline
Only consider fresh frozen plasma transfusion for patients with clinically significant bleeding but without major haemorrhage if they have abnormal coagulation test.*	100%	NICE Guideline
Consider prophylactic fresh frozen plasma transfusions for patients with abnormal coagulation who are having invasive procedures or surgery with a risk of clinically significant bleeding.	100%	NICE Guideline
Reassess the patient's clinical condition and repeat the coagulation tests after fresh frozen plasma transfusion to ensure that they are getting an adequate dose, and give further doses if needed.	100%	NICE Guideline

Methodology

Study design: It was a retrospective audit that was carried out in the department of Obstetrics and Gynaecology in Aminu Kano Teaching Hospital from July 1st 2019 to December 31st 2019, to determine the adherence to the guidelines issued by the National Institute for Health and Care Excellence (NICE 2015) on blood transfusion.

Study sample: Case files of all patients who had blood requested for during the study period were retrieved and reviewed (662 case files).

Study Instrument: Information was extracted from the requisition forms and the maternal case record and data collected using a structured proforma.

Statistical software: All collected data were entered into Microsoft excel sheet and transferred to SPSS statistics version 22 for data analysis.

Exclusion criteria: Patients in who only blood grouping was performed were excluded from the study.

All cross matched units not collected for transfusion from the blood bank were considered unutilized/wasted. All units issued out and not returned to the blood bank were considered utilized (transfused). Booked cases in this study were those that registered and were receiving antenatal care in the department of Obstetrics and Gynaecology, AKTH, while unbooked cases were those that were brought in as emergency, even though they might have received antenatal care elsewhere.

Results

The mean age was 30.04 years (SD ± 8.08) and ranged from 16 to 70 years. Majority of patients were within the age group of 25 to 29 years (27%), followed by 30 to 34 years (22.4%) with the least within the age group of 45 to 49 years (2%). Majority had secondary level of education (45.8%), were Hausa by tribe (82.6%), unemployed (67.4%) and Muslims by religion (86.9%). Most of the women were multiparous 34.3% (227) with a mean parity of 2.72. Table 1 shows the distribution socio-demographic characteristics among the patients.

There were a total number of 3078patients admitted in the O&G Department of AKTH during the study period. Nine hundred and thirty-four patients (30.3%) had blood requested and 418 patients received blood transfusion. The incidence of blood transfusion among all admissions was 418 out of 3078 (13.6%). Five hundred and sixteen requests did not subsequently receive blood transfusion. Among the 934 cases of blood request, 662 case files were retrieved from the medical records department giving a retrieval rate of 70.9%, these were the ones analysed.

Five hundred and seventy-three cases (86.6%) were obstetrics out of which 229 (40%) received blood transfusion. Eighty-nine cases (13.4%) reviewed were Gynaecological, out of which 67 (75.3%) received blood transfusion. Two hundred and nineteen (38.2%) of obstetric cases were booked while354 (61.8%) were unbooked. Among the patients transfused with obstetrics indication, 64 cases (27.9%) were booked while165 (72.1%) were unbooked. Most of the patients (89.2%) were within 27-41 weeks of gestation with a mean gestational age of 35.41 weeks.

"O" positive (50.6%) was the commonest blood group observed, followed by ''B'' positive (23.4%) and only 0.3% had ''AB'' negative blood group. There were no patients with ''A'' negative blood group in the cases reviewed. Whole blood (96.5%) was most commonly requested for, followed by packed red cell (3.5%). No request made for fresh frozen plasma and platelet concentrate.

The mean pre-transfusion PCV for patients who received blood transfusion was 23.06± 6.1% compared to 34.2 ± 4.54% obtained in the non-transfused patients. The pre-transfusion PCV revealed that 11.8% had mild anaemia, 36.2% moderate anaemia, 36.8% severe anaemia while 15.2% had blood transfused with PCV>=30%. Majority (68.9%) of those transfused with PCV>=30% were due to an ongoing active blood loss while 31.1% had no specified reason. Majority of the patients (97.1%) had no documented coagulation profile done, it was normal in 2% and prolonged in 0.9%.

Out of a total of 1181 blood units arranged for 662 patients, only 706 units were transfused in 296 patients. This means that only 59.8% of blood was utilized while 40.2% of blood was not needed. The mean EBL for the transfused patients was 931.3mls ± 657.53mls compared to 381.8mls ± 161.53mls in the non-transfused patients.

Table 2 shows the distribution of transfusion request with respect to individual diagnosis. The most

Table 1: Distribution of socio-demographic characteristics among patients

Variables	Frequency	Percentage
Age		
15-19	23	3.5
20-24	141	21.3
25-29	179	27.0
30-34	148	22.4
35-39	101	15.3
40-44	40	6.0
45-49	13	2.0
>50	17	2.6
Total	662	100.0
Education		
Primary	40	6.0
Secondary	303	45.8
Tertiary	265	40.0
Quranic	54	8.2
Total	662	100.0
Occupation		
Employed	116	17.5
Unemployed	446	67.4
Self-employed	100	15.1
Total	662	100.0
Ethnicity		
Hausa/Fulani	547	82.6
Yoruba	30	4.5
Igbo	31	4.7
Others	54	8.2
Total	662	100.0
Marital status		
Single	6	0.9
Married	644	97.3
Divorced	2	0.3
Widow	10	1.5
Total	662	100.0
Religion		
Islam	575	86.9
Christianity	87	13.1
Total	662	100.0

Table 2: Distribution of transfusion request with respect to individual diagnosis

Indication	Frequency	Percent
Surgery	375	56.6
Miscarriages	31	4.7
Postpartum hemorrhage	56	8.5
HELLP syndrome	7	1.1
DIC	2	0.3
Ectopic pregnancy	12	1.8
Malignancy	8	1.2
Antepartum hemorrhage	21	3.2
High risk patient in labour	44	6.6
Chronic anaemia	13	2.0
Others	93	14.0
Total	662	100.0

Table 3: Distribution of blood group and blood product request among patients

Variables	*Frequency*	*Percentage*
Blood group		
A+	122	18.4
B+	155	23.4
B-	8	1.2
O+	335	50.6
O-	16	2.4
AB+	24	3.6
AB-	2	0.3
Total	662	100.0
Blood product request		
Whole blood	639	96.5
Packed red cell	23	3.5
Total	662	100.0

common indication for blood request was surgery while the most common indication for transfusion was anaemia secondary to postpartum haemorrhage. Single unit transfusion was given to 20.6% while 79.4% had multiple unit transfusion. The mean number of blood units transfused for each patient was 2.39 ± 1.14 units. Among the 419 patients for whom a request was made as cover for labour or surgery, only 19.3% subsequently required transfusion.

Hospital mortality rates were higher in transfused than in non-transfused patients (3.0% vs. 0.5%).

Table 4: Measuring current transfusion practice against the audit standard

Criteria	*Target*	*Current Practice*	*Outcome*
Offer tranexamic acid to adults undergoing obstetrics or gynaecological surgery who are expected to have at least moderate blood loss	80%	16%	Not achieved
Use restrictive red blood cell transfusion threshold of 70 g/litre for patients who need red blood cell transfusions and who do not have major haemorrhage or need regular blood transfusions for chronic anaemia.*	100%	75%	Not achieved
Use haemoglobin concentration target of 70-90 g/litre after transfusion.	100%	77%	Not achieved
Consider setting individual thresholds and haemoglobin concentration targets for each patient who needs regular blood transfusions for chronic anaemia.	100%	100%	Achieved
Consider single-unit red blood cell transfusions for adults who need blood transfusion and do not have active bleeding.	100%	60%	Not achieved
After each single-unit red blood cell transfusion, clinically reassess and check haemoglobin levels, and give further transfusions if needed.	100%	29%	Not achieved
*Offer platelet transfusions to patients with thrombocytopenia who have clinically significant bleeding (World Health Organization grade 2) *** and a platelet count below 30×10^9 per litre.*	80%	0%	Not achieved
Offer prophylactic platelet transfusions to patients with a platelet count below 10×10^9 per litre who are not bleeding or having invasive procedures or surgery.	80%	0%	Not achieved
Consider prophylactic platelet transfusions to raise the platelet count above $50x10^9$ per litre in patients who are having invasive procedures or surgery.	80%	0%	Not achieved
Do not routinely transfuse more than a single dose of platelets. Reassess the patient's clinical condition and check their platelet count after each platelet transfusion, and give further doses if needed	80%	0%	Not achieved
Only consider fresh frozen plasma transfusion for patients with clinically significant bleeding but without major haemorrhage if they have abnormal coagulation test.*	80%	0%	Not achieved
Consider prophylactic fresh frozen plasma transfusions for patients with abnormal coagulation who are having invasive procedures or surgery with a risk of clinically significant bleeding.	80%	0%	Not achieved
Reassess the patient's clinical condition and repeat the coagulation tests after fresh frozen plasma transfusion to ensure that they are getting an adequate dose, and give further doses if needed.	80%	0%	Not achieved

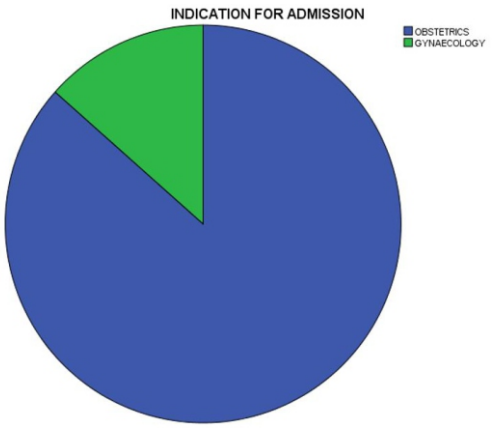

Figure 1: Indication for admission

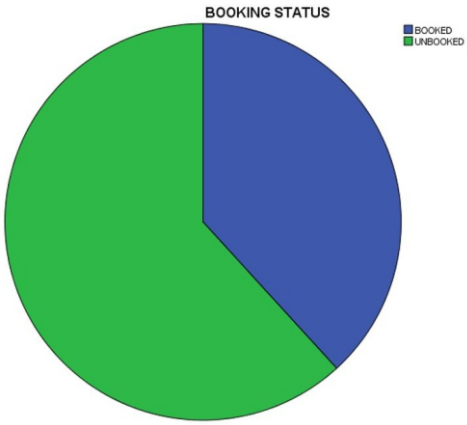

Figure 2: Booking status among obstetrics patients

Discussion

In the face of poor voluntary blood donor base and dearth of facilities for storage and blood component preparation typical of a developing country like Nigeria, the need for judicious utilization of the few available blood units cannot be over-emphasized. Formulating and adherence to transfusion guidelines have been shown to reduce unnecessary blood requisition.[7]

The incidence of blood transfusion (13.6%) in this study is similar to 19.3%[3] and 12.1%[6] reported in India and Lagos respectively but significantly lower than 34.5%[7] reported in Sokoto, Nigeria. The observed differences may be due to the varying levels of availability of blood and indications for blood transfusion as judged by the requesting physician.

Two hundred and nineteen (38.2%) of obstetric cases were booked while 354 (61.8%) were unbooked. This is similar to 72.9%[17] of unbooked cases found in a similar study done in UCH, Ibadan. An unbooked patient is six time more likely to receive blood transfusion than women who have regular antenatal care.[18] This population of patients often present to the hospital as difficult cases beyond the scope of peripheral hospitals. By the time they present to the hospital, they are usually critically ill and in desperate need of transfusion.

Majority of the transfusion recipients in this audit (96.5%%) received whole blood transfusion. This is consistent with earlier study in Calabar and Jigawa which reported 71.57% and 87.3% respectively.[15] This is a reflection of common practice of requesting for whole blood in resource limited settings owing to non-availability of facilities to practice component separation. In standard practice, whole blood is only issued for transfusion following cases of massive haemorrhages and exchange transfusion.

The audit found that only 16% of surgical patients that had at least moderate blood loss were offered tranexamic acid. Tranexamic acid prevents activation of plasminogen to plasmin, leading to inhibition of fibrinolysis. In obstetric settings, several small randomised trials have compared the use of tranexamic acid with placebo or no treatment. Apart from one study, all others were performed in women undergoing caesarean section. The overall conclusion was that tranexamic acid significantly reduces blood loss.[19]

Seventy five percent of red cell transfusions were appropriate as recommended by the NICE guidelines while 25% of transfusions violated the guideline. These inappropriate transfusions were seen majorly in preoperative or postoperative patients with PCV >21% who were asymptomatic with stable vital signs, merely to achieve a PCV of >30%.

Post transfusion HCT target of 21-27% as recommended by the guidelines was achieved in 77% of patients, however out of the 23% of patients that did not achieve this stated target, majority was due to over transfusion (83.1%) while 10.2% discharged against medical advice thus transfusion could not be completed nor post transfusion HCT level checked.

Amongst those that had blood transfusion for chronic anaemia, majority were due to Sickle cell

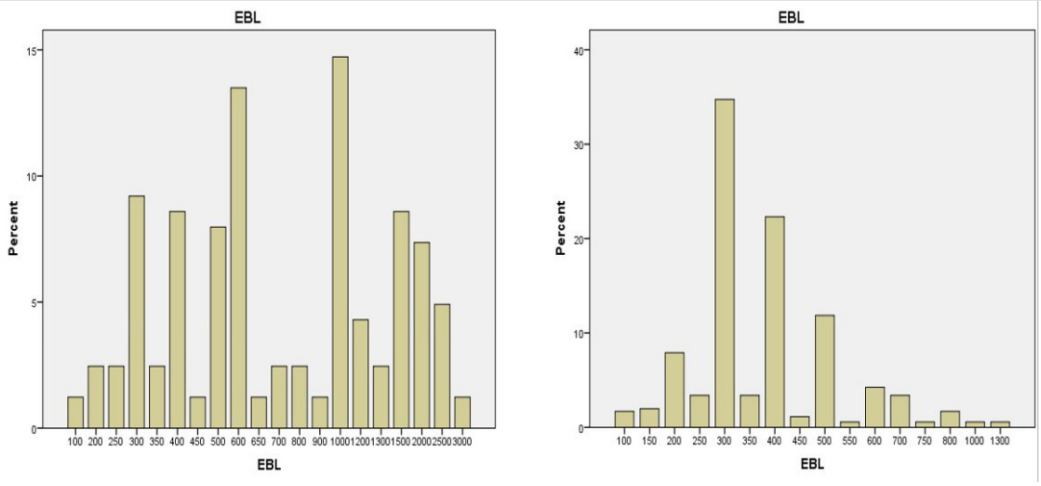

Figure 3: distribution of EBL among transfused vs non transfused patients

anaemia and anaemia in oncology patients and individual transfusion threshold and HCT concentration target was set in all of them. Steady state PCV for every patient with SCA was set as the target HCT concentration.

The guideline states that single-unit red cell transfusions for adults who do not have active bleeding should be considered. Many doctors believe that single unit transfusions are unjustified but there is no sound scientific basis for this hypothesis as a single unit of blood may be sufficient.[20] A single-unit transfusion may have been sufficient for patients who were asymptomatic and were not actively bleeding in several cases in which multiple units were ordered. Three hundred and sixty units were ordered as single units while 821 units were ordered in multiples of 2 or more out of which 645 units were transfused. Therefore, there was frequent ordering of potentially unnecessary multiple unit transfusions that were not subsequently utilized.

The audit found suboptimal reassessment of patients after each single unit of red blood cell transfusion. The guideline states that patients should be clinically reassessed and haemoglobin levels checked after each unit; however, this was achieved in only 29% of patients that received blood transfusion. Ninety eight percent were clinically reassessed after each unit however only 29% had their haemoglobin levels checked after each unit.

Whole blood was the most common form of transfusion requested followed by packed red cell. No requests were made for fresh frozen plasma and cryoprecipitate with non-availability or lack of knowledge on when request should be made being the probable explanation. There were 4 patients with a platelet count $<30\times10^9$/L out of which 2 had clinically significant bleeding however platelet transfusion was not requested or given to any of these patients. It was also not requested or transfused in 9 patients with platelet count of $<50\times10^9$/L who were being planned for surgery.

Nineteen patients had coagulation profile done out of which 6 had abnormal results. 4 had clinically significant bleeding while 2 were being planned for surgery however fresh frozen plasma transfusion was neither offered nor transfused in any of these patients. Non availability or lack of knowledge on when request should be made may be the probable explanation.

Conclusion

Current practice at O&G department, AKTH appears to be generally inconsistent with the guidelines. This indicates inefficient transfusion practice when comparing with the standard. Even though a large number of units of blood were reserved and made available in the theatre at the time of operation, majority of the patients did not need blood transfusion thereby leading to over ordering and underutilization of blood.

Limitations

Some of the challenges that were faced during this retrospective approach to reviewing transfusion practice include incomplete medical records as well as incomprehensive documentations. Appropriate recording of all the necessary information was often

lacking, such as the clinical status and haemoglobin level after transfusion.

Recommendations

Regular continuing medical education programs for the resident doctors and clinicians should be conducted regarding transfusion triggers, indications as well types of blood product and indication for their request.

Strict protocols to scrutinize each requisition for appropriateness of indication prior to cross match should also be developed.

Transfusion guidelines should be developed based on the nature of emergency & routine services offered and the subsequent implementation of such guidelines, through the institutional transfusion committee to ensure effective blood utilization and to reduce the wastage of the resources.

Implementation of a type and screen policy and designing and adhering to maximum surgical blood ordering schedule for each procedure can be rationale and save valuable time and resources.

Provision of a mini- blood bank within the obstetric unit will ensure timely availability of blood for surgery without necessarily tying down stock in the central blood bank.

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