

HOSPITAL TRANSFUSION COMMITTEE- A STEP TOWARDS GOOD BLOOD TRANSFUSION PRACTICE: A STUDY FROM A HOSPITAL-BASED BLOOD CENTER OF WESTERN INDIA

Immunohematology

Dr. Utkarsh Agrawal*

Post Graduate Resident, Third Year, Department Of Pathology, GMERS Medical College and Hospital, Gotri, Vadodara, Gujarat. *Corresponding Author

Dr. Neena Doshi

Professor, Department Of Pathology, GMERS Medical College and Hospital, Gotri, Vadodara, Gujarat.

ABSTRACT

Background: Along with carrying out collection and issuing of blood/components, blood centers are also liable for ensuring quality and safe blood transfusion. Hospital-based blood centers should therefore have Hospital Transfusion Committee (HTC) which engages all stake holders involved in manufacturing, ordering and transfusing blood to ensure safety, efficacy and efficiency of its blood transfusion services. **Aims:** To monitor Blood Centre practices and audit blood utilization through HTC meetings. **Settings and Design:** This record based descriptive retrospective study was conducted at hospital based blood centre of Western India. **Methods and Material:** The minutes of HTC meetings held during the study period of 7 years from January 2012 to December 2018 were analyzed. **Results:** Blood unit wastage declined from 21.9% in 2012 to 2.5% in 2018. External Quality Assurance System (EQAS) results were graded from excellent to acceptable during the entire study period. 43.92% traceability forms were received back by the Blood Center. 'Blood transfusion requisition form' was not found in case files of 16.57% cases, 'Blood transfusion consent' was not taken in 42.63% cases, 'Blood transfusion monitoring form' was incompletely filled in 70.71% cases, 'Blood transfusion traceability form' was incompletely filled or not returned to the Blood Centre in 79.80% cases. Inappropriate transfusion was given in 2.9% cases. 58.84% transfusions were single unit transfusion. 16.10% units were transfused out of core hours. **Conclusions:** Each hospital-based Blood Center should establish Hospital Transfusion Committee to implement National Blood Policy, improve transfusion services, monitor blood usage and wastage and to audit blood utilization.

KEYWORDS

Hospital Transfusion Committee, out of core hours transfusion, single unit transfusion.

INTRODUCTION:

Transfusion medicine is a 'vein to vein' procedure, involving entire blood chain from 'donor to recipient'. Performance improvement activities should be focused around high-risk, high-volume and/or problem-areas in a hospital, and transfusion service is one such area [1]. Transfusion service is a multidisciplinary approach. Quality and safe blood transfusion can therefore be achieved through involvement of Blood Center medical and para-medical staff, and medical and para-medical staff of all departments of hospital who are engaged in prescribing and providing blood/components. Hospital-based peer review for appropriateness of blood transfusion was required for accreditation by the College of American Pathologists and Joint Commission on Accreditation of Hospitals since 1982 in the United States. In India, the need to establish Hospital Transfusion Committee (HTC) was considered by National Blood Policy in the year 2002 [2].

HTC is multidisciplinary team comprising of Medical Superintendent as the chairperson and representatives from Blood Center and all departments of the hospital who order blood including anesthesia, obstetrics and gynecology (OB/GYN), surgery, orthopedics, ear, nose, throat (ENT), medicine, tuberculosis and chest diseases (TB & Chest), and pediatrics. The convenor of the committee is the head of Department of Pathology/ Department of Immunohematology and Blood Transfusion (IHB). Representation also includes members from nursing services, administrative office and other support staff. HTC sets appropriate policies and procedures, reviews and revises them and monitor's blood transfusion practice. The committee thus plays a key role in promoting safety, efficacy and efficiency of blood transfusion services. The committee meets regularly. Australian Red Cross Blood Service renamed HTC as Patient Blood Management Committee (PBMC), recommends that the committee should meet at least quarterly. The HTC should have a structured agenda, which may include discussion of policies, procedures and guidelines, blood product use and wastage, audits, adverse transfusion reactions, incidents, errors and near misses, new or changes to existing blood products and equipment, education, blood management initiatives and quality improvement projects and contingency/emergency planning [3]. Minutes of HTC meetings are recorded.

This study aims to monitor Blood Centre practices through HTC meetings. The primary objective is to monitor blood collection, usage, and discard, performance in external proficiency testing of Blood Center, blood utilization review, and out of core hour transfusions. The secondary objective is to derive changes in blood transfusion policies and practices ensuring delivery of quality care in transfusion medicine within the hospital.

MATERIALS:

The study was conducted after obtaining approval from the Institutional Human Ethics Committee (IHEC). Confidentiality of the donors and the patients is maintained. Informed consent waiver was approved by the IHEC. This is a hospital-based study conducted in the Blood Centre, Department of Pathology of a tertiary care publicly funded teaching of Western India. Blood Bank with whole blood facility was established on February 24, 2011, functional between 9 am to 5 pm. 24-hour facility was extended from October 1, 2012. HTC was established on June 1, 2012, and first HTC meeting conducted on July 20, 2012. Component facility was started on July 21, 2017.

Thirteen HTC meetings were held during studied time period of 7 years between 2012 to 2018. The power point presentations and minutes of meetings were analyzed. Documentation in the Blood Centre and hospital is largely manual. Blood Centre and hospital records were reviewed in case of inadequacy or discrepancy, and records were considered as accurate. Red blood cell units issued outside hospital are not included in the study. Red cell units issued but returned to the Blood Centre are also not included.

The agenda of HTC meetings included discussion of blood collection, usage, and discard, results of External Quality Assurance System (EQAS), blood utilization review, review of receiving back traceability forms, single unit transfusion, out of core hours transfusion and adverse blood transfusion reactions. Units issued to different departments were randomly selected for blood utilization review. Appropriateness of documentation and transfusion were audited. The details of the blood utilization review and out of core transfusions are sent to the respective department at least a week before the scheduled date for HTC for their preparedness. Blood utilization review and out of core transfusions are then discussed in the meeting with the respective department representatives.

RESULTS:

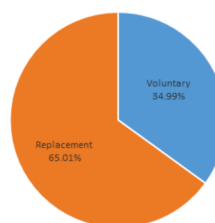


Figure 1: Voluntary and replacement blood collection

Blood collection:

Total collection over the period of 7 years was 8708. Out of this, 3047 units (34.99%) was from voluntary donors and 5661 units (65.01%) from replacement donors (Figure 1).

Blood collection increased from 385 units in the year 2012 to 3198 units in 2018. Average voluntary blood collection was 35%, ranging from 28-48% during the study period.

Blood Units Discarded:

Blood units discarded dropped from 21.9% of total collection in 2012 to 2.5% in 2018. The average discard rate over the period of 7 years was 5.2%. Amongst the units discarded, wastage due to non-usage of packed red cells accounted for 45.4%, transfusion transmitted infections (TTI) positive units accounted for 25.5%, quantity not sufficient (QNS) (14.98%), clot (1.76%), and lipemic (1.54%) and others. The blood groups to which expired units belonged were blood group O positive (32.3%), A positive (18.63%), AB positive (14.91%), B positive (13.66%), B negative (8.07%), O negative (5.59%), A negative (4.97%) and AB negative (1.86%). Amongst the 116 seropositive units during the study period, 68 (58.62%) were positive for hepatitis B virus (HBV), 12 (10.34%) for hepatitis C virus (HCV), 14 (12.07%) for human immunodeficiency virus (HIV), and 22 (18.97%) for syphilis.

Blood usage:

Total blood usage increased from 335 units of packed red cells in the year 2012 to 3192 units in 2018. OB/GYN consumed the maximum units (32.9%), followed by surgery (16.6%), medicine (21.5%), orthopedics (11.8%), pediatrics (6.9%), casualty (8.27%), TB & Chest (1.02%), others (0.48%), and ENT (0.31%).

EQAS: EQAS result was within 100% concordance (grade: excellent) in all the periodic cycles except in cycle 13 (January 2013) and cycle 15 (November 2013), where the grade obtained was acceptable.

Blood transfusion traceability forms:

43.9% traceability forms were received back by the Blood Center.

Blood utilization review:

Amongst cases of non-conformance in documentation, 'Blood transfusion requisition form' was not found in case files of 16.57% cases, 'Blood transfusion consent' was not taken in 42.63% cases, 'Blood transfusion monitoring form' was incompletely filled in 70.71% cases, 'Blood transfusion traceability form' was incompletely filled or not returned to the Blood Centre in 79.80% cases.

Single unit transfusion:

Single unit transfusion rate was highest for pediatrics (79.2%), orthopedics (62.52%), TB & Chest (59.65%), ENT (58.82%), OB/GYN (56.35%) surgery (56.26%), casualty (56.14%) and medicine (54.95%). The combined average single unit transfusions during study period were 58.84%.

Out of core hours transfusion:

Highest out of core hours transfusions (as illustrated in Figure 2) was carried out in casualty ward (29.94%), Pediatrics (29.71%), OB/GYN (23.72%) and was least for Orthopedics (2.44%). The combined average out of core hours transfusions during study period was 16.10% transfusions.

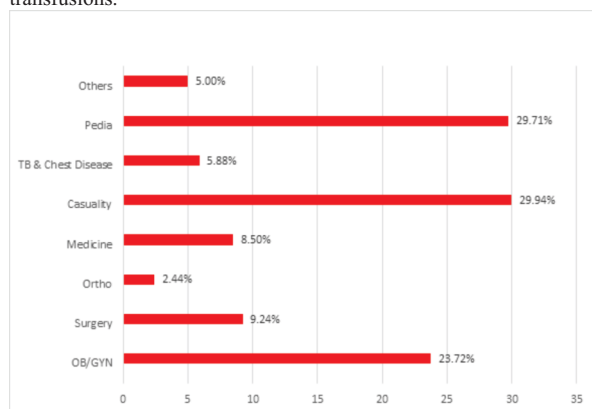


Figure 2: Department Wise Out Of Core Hours Blood Transfusion

Pedia: Pediatrics, TB & Chest Diseases: Tuberculosis and Chest Diseases, Ortho: Orthopedics, OB/GYN: Obstetrics and Gynecology

DISCUSSION:

Purpose of HTC meetings include but not limited to development of transfusion policy, quality improvement initiatives, review of blood utilization and wastage, blood utilization audit, adverse transfusion reactions, and training and education.

Hospital transfusion policy:

HTC members felt the need for developing hospital transfusion policy to reduce inappropriate transfusions. Hospital transfusion policy was made based on national policies and guidelines on the clinical use of blood. The policy requires to be updated regularly.

Blood collection:

Average voluntary blood collection in the present study from a hospital-based Blood Centre was only 35%. In India, voluntary blood donation increased from 54% in 2006-07 to 79% in 2015-16 [4]. The target for the country is to achieve more than 90% voluntary blood donation. There are marked regional variations, some states collect voluntary blood units more than the national average, others are far below in meeting targets. The VBD in almost 13 states of the country is less than 50%. Seasonal variations also account for fluctuations in blood collections. The voluntary blood donation is less during extremes of weather conditions like harsh summer or winter months [5]. World Health Organization (WHO) had adopted a policy of 100% voluntary blood donation by 2020. In India, National blood Policy focuses on phasing out replacement donation to achieve 100% voluntary blood donation [6,7]. Fear, pain related to needle prick, hesitation, anaemia, beliefs, custom and weakness after donation are some of the reasons for not donating as reported by Sharma RK et al [6]. Kurup A et al in their study from rural South India reported that only 44% of interviewed individuals were willing to donate voluntarily. 70.3% people believed that blood can be purchased [8].

Blood usage:

Blood utilization was maximum from OB/GYN department (32.9%), followed by medicine (21.5%), surgery (16.6%), orthopedics (11.8%), casualty (8.3%) and pediatrics (7.0%). A study of Karad, Maharashtra recorded department of medicine with highest utilization of blood (34.94%), surgery (24.3%), OB/GYN (15.12%), orthopedics (6.10%) and pediatrics (9.59%) [9]. Another study conducted in tertiary hospital of Karnataka saw maximum blood utilization from department of OB/GYN (34.4%), medicine (16.6%), surgery (16%), orthopedics (11.8%), pediatrics (11.5%), and ENT (0.7%) [10].

Blood units discarded:

A retrospective study on discarding of whole blood/red cell units in regional blood transfusion center in western India by Jariwala K et al carried out over 5-year period reported yearly average discard rate of 6.6%, comparable to our study (5.2%) [11]. A study of Odisha by Mahapatra et al reported whole blood discard percentage due to TTI positive as 55.11% of which poor quality of the blood and component carried major share (18.58%). The rate of discard for other reasons i.e., low volume collection, hemolyzed /clotted, breakage, shelf life expired, lipemic were 17.11%, 3.76%, 2.71%, 1.46% and 1.25% [12]. A prospective study conducted in central India by Kumar A et al reported 3.25% discard rate, of which 74.3% were discarded because of seropositivity for TTIs and expired bags due to non-utilization accounted for 11.84% [13].

Table 1 shows comparison of TTI positive results between our study and study by Kumar et al [13], Suresh et al [14], Mukherjee et al [15], Sharma N et al [16].

Table 1: Blood units discarded due to TTI positive

TTI Positive	Kumar et al [13]	Suresh B et al [14]	Mukherjee et al [15]	Sharma N et al [16]	Our study
HIV	51 (19.84%)	28 (19.2%)	155 (8.06%)	10 (7.63%)	14 (12.07%)
HBsAg	179 (69.64%)	94 (64.4%)	1103 (57.2%)	65 (49.6%)	68 (58.62%)
HCV	21 (8.18%)	21 (14.4%)	434 (22.5%)	39 (29.8%)	12 (10.34%)
Syphilis	6 (2.34%)	3 (2.0%)	236 (12.24%)	15 (11.45%)	22 (18.97%)

MP	0 (0.00%)	0 (0.00%)	0 (0.00%)	02 (1.52%)	0 (0.00%)
Total	257 (100%)	146 (100%)	1928 (100%)	131 (100%)	116 (100%)

TTI: Transfusion transmitted infections, HIV: Human immunodeficiency virus, HBV: Hepatitis B surface antigen, HCV: Hepatitis C virus, MP: Malarial parasite

Blood Centers use non-treponemal screening tests such as RPR or Venereal disease research laboratory (VDRL) test for diagnosis of syphilis. RPR may yield false positive result due to physiological conditions, and certain acute and chronic infections [17]. The screening algorithm for syphilis as for HbsAg, HCV and HIV should include testing by two different methods. Non-treponemal screening tests should not be considered as confirmatory and be followed by treponemal specific tests like *Treponema pallidum* hemagglutination assay (TPHA).

Simon et al study over period of 5 years reported highest discard of O positive blood group red cell units (18.35%) followed by O negative group (15.73%), and least AB negative (5.99%). Creating awareness about compatible blood transfusions among the clinicians will help reduce the wastage of O positive and O negative blood groups. O positive transfusion can be done to all positive blood groups. AB positive patient can be transfused with other positive blood groups. Similarly, transfusion of negative blood to corresponding ABO positive blood group individuals can also be done and O negative red cells can be used for universal transfusion. Expiry of the PRBC should be minimized by proper inventory management and recruitment of blood donors with required blood groups [18].

EQAS:

Blood Centre of our institute participates in Blood Bank External quality assessment scheme (BEQAS) with Blood Bank, Santokba Durlabhji Memorial Hospital, Jaipur. The discordance was due to hemoglobin value of test sample being reported out of acceptable range, HBsAg result of test sample reported as non-reactive, while acceptable value was reactive. HBsAg was performed using rapid card method instead of more sensitive ELISA method as the latter's kit was out of stock. Chaudhary, et al reported discordant results in detection of two sample sets, one each for HIV and HBsAg testing. In the first set an HIV nonreactive sample was reported as a 'gray zone' sample (concordance 93.8%) and in the other set, serum HBsAg could not be detected [19].

Blood utilization review:

Blood units issued are randomly selected for review. Appropriateness of transfusion are audited, and completeness of forms issued with every unit namely 'Blood transfusion requisition form', 'Blood transfusion informed consent form', 'Blood transfusion monitoring form', 'Blood transfusion traceability form' and 'Adverse blood transfusion reaction form' are reviewed.

Blood transfusion consent is a legal requirement and is crucial in the light of the known risks associated with blood transfusion. Blood transfusions should be monitored so that acute blood transfusion reactions (BTR) can be recognized early and treated, thereby reducing morbidity and mortality. Patients' vitals during transfusion must be recorded in 'Blood transfusion monitoring form', before starting transfusion, 15 minutes after transfusion, on completion of transfusion and 1-hour post-transfusion for delayed reactions [20]. The 'Blood group label' applied on the blood unit must be pasted or stapled on the 'Blood transfusion monitoring form' at the end of blood transfusion, before discarding the unit. Blood Centre should be able to trace all blood units from donor to recipient, for which duly filled 'Blood traceability form' should be sent back to the Blood Centre. The 'Compatibility label' applied on the blood unit must be pasted or stapled on the 'Blood transfusion traceability form' at the end of blood transfusion and before sending the form to the Blood Centre. Hemovigilance program linked to International Hemovigilance Network was first introduced in France in 1993. Hemovigilance program of India (HvPI) was launched on December 10, 2012 as an integral part of pharmacovigilance program of India. It monitors donor and recipient related adverse reactions [21,22]. Our Blood Centre participated in the program from July 4, 2016. Transfusion-related adverse patient event and its investigation is crucial in the development of safe transfusion practice. Such events are recorded in 'Adverse blood transfusion reaction form' and sent to the Blood Centre. A study

conducted at Oman reported that consent was obtained from 75% of adults and 91% of pediatric patients. Consent forms were correctly filled with all details provided in 51% and 52% of adult and pediatric patients, respectively. Among inadequately completed forms, the most common error was lack of witness details (20–25%) [23].

In the present study, we received back 54.6% traceability forms. In a similar study by Sawadogo S et al, complete traceability was returned for 83.5% of blood units delivered and incidence of adverse reactions was 2.1/1,000 blood units per annum [24].

Single unit transfusion:

In the current study, 58.84% transfusions were single unit transfusion. The actual percentage may be lower, since blood units received from other blood banks were not considered in the study. In a study by Das S et al from south India, single unit transfusion accounted for 24% transfusions [25]. In another similar study, J. H. Vachhani et al reported 55.1% single unit transfusion [26]. Concern regarding high rate of single unit transfusion were discussed in HTC meetings, since they were branded as 'wasteful'. The reason for this was less therapeutic benefit (only 1 gm% increment in haemoglobin levels) against inherent transfusion risk. However, transfusion of two units of PCV is no longer considered 'standard' dose for non-bleeding patients. 7 gm/dL is the standard haemoglobin threshold for blood transfusion in hospitalized adult who is non-bleeding and not on operation theatre table. The therapeutic dose is single unit PCV. Post-blood transfusion haemoglobin must be done before ordering second unit [27]. Therefore, to keep abreast with the current practice, we look forward to adopting single unit transfusion policy for hospitalized non-bleeding adult. Why give two when one can do [28,29]? Heyes J et al in their study documented increase in single unit transfusion from 30 to 53% and decrease in two-unit transfusion from 65% to 43% after implementing single unit transfusion policy [28]. In a study by Gupte S.C. et al single unit transfusions were received by 38.9% adults during surgery [30].

Out of core hours transfusion:

The concept of out of core hours transfusion was introduced from the year 2013 [31]. Transfusion at night is inherently unsafe because there are fewer medical and para-medical staff during after-hours and that they may not be able to detect complication timely and manage it efficiently. Serious hazards of transfusion (SHOT 2005) recommended that transfusions out of core hours should be avoided unless clinically essential. SHOT 2005 report has stated that 37% of transfusion errors occurred during 'out of core' hours [32]. In the current study, out of core hours transfusion accounted for 16.10% of transfusions. Most of these transfusions took place in casualty (29.94%), pediatric (29.71%), and OB/GYN (23.72%) department. Kandasamy D et al in their study reported that in 19.21% transfused patients out of core hour transfusion could have been avoided [31]. Das S S et al monitored errors to implement safe blood transfusion strategies. In their study they found that 65.2% transfusion errors in pretransfusion testing samples occurred in night shift [33].

Training sessions:

A need for educating medical and paramedical staff on inherent risks associated with blood transfusion was felt. In-house training sessions in transfusion medicine were held for nurses, interns, and doctors including junior and senior residents. Emphasis was laid on safe blood transfusion, blood stock inventory, and documentation and records. Kaur et al in their study assessed the knowledge and awareness of the clinician regarding blood transfusion practice and found significant differences in knowledge pertaining to storage temperature, shelf life of red cells and platelets, alternate group choice for fresh frozen plasma, and documentation of transfusion reaction [34].

LIMITATIONS:

1-10% of cases were reviewed. The number may not be representative of the sample size. Adverse blood transfusion reactions have not been discussed in HTC meetings extensively.

CONCLUSION:

HTC meetings that involve all stakeholders is a small but essential step towards quality improvement in transfusion practices. All the steps right from efforts involved in promoting voluntary blood collections, auditing blood utilization and documentation, and monitoring adverse transfusion reactions help in providing safe and efficient blood supply with periodic HTC meetings. Blood utilization review is not a fault-

finding exercise. The aim is to learn how to prevent these incidents from happening again. The whole idea of conducting an audit is to shift the focus away from the individuals to the system, to improve patient safety.

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