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Utilization, Manpower and Information Management of the Blood Transfusion Services in a Large New Rural Based Tertiary Care Centre.

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ABSTRACT

Background: We present our experience in utilization, manpower and information management with paucity of resources in a large academic medical centre, situated in a most backward, least literate, remote pocket of the Haryana state in India. **Methods:**1> Electronic and manual database with their analysis. 2> Previous literature.**Results:**Budget provided is very low, so cost containment is very significant in our BTS (Blood Transfusion Service). **Conclusion:**The combinations of therapeutic and diagnostic roles necessitate a multi-pronged approach to utilization management in the BTS. This study will be very helpful for organized approach in a newly stabilizing BTSes of remote areas of other developing countries.

Keywords:Blood Transfusion; utilization management; remote backward area, Coast containment.

INTRODUCTION

We present elements of our experience at a large academic government general hospital, ShaheedHasan Khan Mewati, Government Medical College, Nuh, Mewat (SHKM), Haryana of India as an example of this multi-faceted approach. The SHKM has acquired licence for Blood Bank at 13 august 2013; 4yr. Back [licence number: 717B (h)]. Balancing demand and supply is challenging for blood components because of short life span. As part of utilization management, we considered the landscape of hemotherapy presented as risk versus cost to prioritize areas of focus in a most backward, least literate, remote pocket. This study will be very helpful for newly stabilising BTSes of remote areas of other developing countries.

Blood usage by clinical services is easily identifiable by different locations of the hospital since most clinical services have there fixed location in the hospital; as patients may move from one clinical service to another.

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The scope of activity of the BTS makes it unique among the clinical laboratories;includes three activities: First activity devoted to collection and component separation (the Blood Donor Centre and Processing Laboratory), secondly component resource banking, allocation and third activity is therapeutic with a clinical diagnostics component (the Transfusion/ Infusion Service); as the primary activity of the BTS is therapeutic and not diagnostic, unlike other Pathology subspecialties. A large BTS requires a multi-facet approach to utilization management. Assessment and reassessment of BTS-service network for improvement is always needful to best utilization of present opportunities for enhancing clinical care, coupled with obvious cost savings. We make and provide here whole blood, pRBC, sRBC, BCPC (PC), FFP, CPP. Other blood products like albumin etc. patient should buy from outside after a advice of clinician.

Aim and Objectives

Primary

1. To stabilising smooth utilization management in a new remote rural government BTS with funds containment and Human touch not only to patients but also to BTS staffers.
2. To augment rational use of Blood Products and available resources.

Secondary

3. Analysis of coordination for needed further improvement with other departments who are depends on BTS.
4. Manpower utilization education and training analysis.
5. Analysis of Government provided electronic system utilization for their full strength use and improvement (in software and training).

MATERIAL AND METHODS

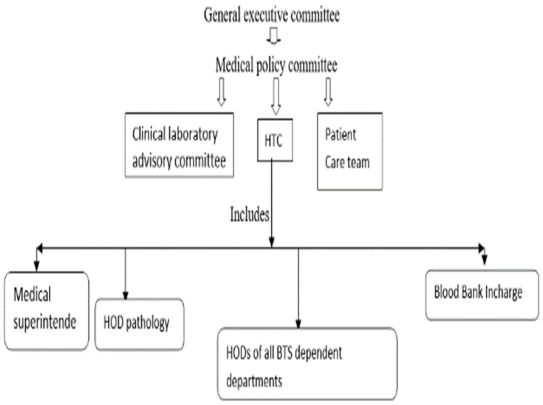
1. Electronic and manual database with their analysis.
2. Previous literature.

Funds and Other Sources For Blood Transfusion Service

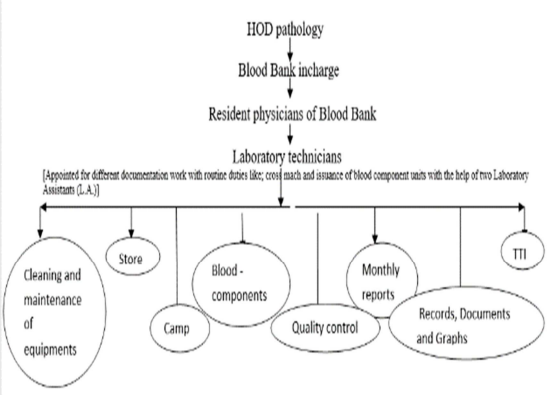
The SHKM is a large academic government funded general hospital (approximately 500+ beds) with an annual budget of about Rs. 88 crores ($ 1,35,38,462). Considering that the annual SHKM BTS budget is Rs. 78 lakhs ($ 1,20,000) including labour, this is approximately 01% of whole budget, among this operating budget of BTS is 13 lakhs ($ 2000) excluding labour salaries which is 17% of total BTS budget, this makes sense that cost containment strategies should consider for blood product usage.

Special thanks to NACO which supports us in the forms of BTS utility goods like TTI testing Kits, which shares annually approximately 2 to 5 % of total utilization by our BTS.

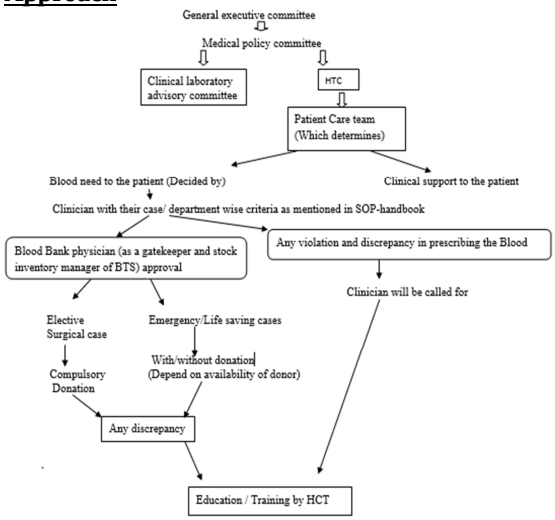
Functional Relation of Different Committees



Blood Bank Organizational Structure



Approach



Managing Supply and Demand for the Stock Inventory

Balancing supply and demand is challenging when products have a short life span and the demand varies from day-to-day as in the case with PCs; so must include an analysis to keep an eye on need and the available supply.

Overstocking of products with short life span is wasteful and reduces availability for patients. To reduce overstocking sometimes we send free of cast a few units (which are usually near-expiry dated) to the other blood banks, over stocking usually happened after a outdoor big camps; specially for blood group O+ and group AB+; as are rare in demand. On the other hand, it is probably worse to have an insufficient supply of blood products for life-saving therapy. For that we take blood from patients healthy relatives, organise intra hospital and outdoor camps with our BTS-Physicians, Technical and Nursing staffs, with spreading awareness and education for blood donation among common public. For indoor camps we particularly choose special days of particular departments like; world nurses day, doctor's day, establishment days of different departments and foundation days of different unions like; technician union, sweeper union, pharmacists union, ward boys union, guards union, clerks and accounting staff union etc. And outdoor camps organised on special days like; freedom and republic day, birthdays of great peoples, foundation days of social communities, companies, organisations, colleges etc.

Our entire annual pRBC inventory, PC and FFP units are produced by the SHKM-Donor Centre and processing laboratory activities. In case non availability of desired component we cross mach them when they are brought from other higher centres, In these cases there is limited opportunity to request non-leukoreduced units. LR is useful in reducing the risk of some adverse events associated with blood transfusion, including FNHTR transfusion reactions,[1] HLA

alloimmunization,[2] and transfusion-transmitted CMV infections.[3] However, there is no evidence of benefit of LR applied to every patient. For example, a RCT performed at MGH, showed that patients without FNHTR reactions and whose medical issues did not necessitate prevention of HLA alloimmunization or CMV infection, did not benefit from LR in terms of mortality, length of stay and cost of care.[4]

Coupled with a donor program come costs associated with infectious disease testing. In order to decrease such costs, pooling strategies have been shown to have some cost benefit in both HIV, HBV and HCV testing.[5,6]

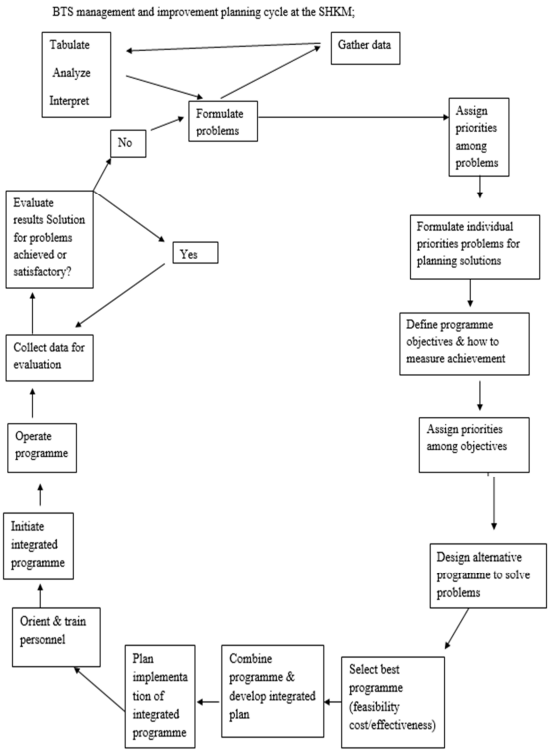
Management Program for Blood Components

Utilization management for Hemotherapy should focus on the development of a multipronged, multi-disciplinary blood management program. At SHKM transfusion guidelines are made by HTC. The HTC reviews available literature and develops algorithms to optimize positive patient outcomes while minimizing unnecessary blood transfusions. Both general and clinical service-specific or patient-specific guidelines are made available by posting key documents in an online handbook.[7]

The HTC is an interdisciplinary committee with representation from different clinical specialties including medicine, hematology, emergency medicine, pediatrics, nursing, surgery, anesthesiology and the BTS.[8] Obstetrics and gynaecology is very important integral member of HTC at the SHKM. We provides request form to be filled manually by clinician and also takes advantage of an electronic ordering system which is guided by a SOP manual handbook and for very needed transient modifications time to time additional official letters/orders/ suggestions are given to clinicians; manually, electronically and telephonically. When a blood transfusion is ordered, the clinical indications for transfusion are displayed on computer or written on request form, reminding the ordering clinician about the transfusion guidelines, similar to what has been previously described. We maintain department wise manual folder-files of received requisition forms with specific comments of Blood-component ordering clinician for future audit, complaints analysis and for education purpose of those particular clinicians who ever shown any lack/deficiencies during order of a component. Usually clinician education happens in presence and with the help of HTC and literature [Table 4].

Improving Communications

As noted earlier, the obstratics and ICU are major users of blood products. At the SHKM transfusion rate of whole blood was very high, after starting of component unit highly increasing demand of pRBC and PC and FFP demand is medium [Table 2].



A Framework for Salvation of Utilization Management Problems in Our BTS

	Low-Volume orders	High-Volume orders
Overutilization	Focused physician education and/or establishing group, Redesign paper practice standards (in conjunction with requisition forms, eliminate standing orders of the specialty group), Change to CPOE screen(s) design. Physician profiling, with utilization profiling. Addition of a gatekeeper (require approval before transfusion can be done)	Redesign paper practice standards (in conjunction with requisition forms, eliminate standing orders), Change to CPOE screen(s) design. Limit ordering privileges to specialists
Underutilization	Transfusion need interpretation services, with recommendation of additional blood component units, if necessary	Reflex testing using laboratory information system (eg. For Hb, PT, aPTT etc.) Use of disease- or syndrome-specific templates
Examples	PC, FFP,CPP	WB, PRBC

Low volume orders: usually less number of units ordered.
High volume orders: usually high number of units ordered.

In higher centres of developed countries like at The MGH transfusion rate for pRBC transfusions was near the median but above the median for both FFP and PC transfusions when compared to a national benchmarking study.[9] Finfer et al reported that the

use of saline versus albumin for volume resuscitation in an ICU setting resulted in no difference in 28-day mortality, length-of-stay, or organ failure.[10] Local changes in surgical transfusion practice resulted in elimination of albumin and PCCs in coronary bypass procedures and increased use of anti-fibrinolytics to control bleeding. The use of anti-fibrinolytics has been shown to decrease bleeding in cardiac surgery.[11,12]

In 2016, an electronic ordering system was implemented between the OTs and the Blood Bank. Blood requests are electronically transmitted to the Blood Bank. The anesthesiologist, in real-time, can see on the operating room computer at the bedside that the blood request was received and acknowledged by the blood bank. When the blood is issued by the laboratory, the component is scanned triggering automatic notification to the operating room computer that the blood has left the Blood Bank.

Benchmarking and Monitoring Of Stock

We use crossmatch to transfusion ratio (C: T ratio) as a benchmarking process to ensure transfusion of each unit and monitoring of overstocking. The C: T ratio for whole blood is 100% And C: T ratio of pRBC is also 100%, this means that every unit issued was transfused; therefore units would need to be returned to the blood bank and either placed back into inventory or discarded.

C: T ratio is approximately 100% in the SHKM because we are having double check on every units: First; after request receiving with mentioning of diagnosis and haematological details, we send blood group and cross mach details to the clinician (either electronically, telephonically or manually) and then instruct them that they should provide us a demand-slip immediately before there procedure or exact time of unit need. Secondly; we do audit on every month, by electronically or manually.

Audits and Gate Keeping of Selected Blood Products

For the operating theatres, ICUs and emergency departments, we have employed an audit and gatekeeper approach. Audits review blood transfusion patterns but do not prohibit a transfusion from occurring. Audits can occur prior to transfusion, immediately after transfusion, or retrospectively (i.e. once daily or weekly review). Haspel provided a description of audits in the BTS.[13] At the SHKM a sampling of high volume blood components are audited each day. We adopted a process used by the Blood Transfusion Service of the PGIMER (Post Graduate Institute of Medical And Research) Chandigarh in which all units that are investigated for suspected transfusion reactions are also audited for the appropriateness of blood usage. Transfusions not meeting hospital guidelines are flagged and the ordering physician is notified and offered followup educational material. This serves to educate physicians about decision making for transfusion in the more compelling context of a transfusion-related adverse event.

In contrast, at the SHKM as part of gatekeeper function the BTS requires approval of BTS duty physician before the blood component is released (see section 4.3), means Blood components may be requested by any physician but released for transfusion only after a BTS physician has reviewed the indication and dose requested. Not all requests are approved.

Point-of-care tests for transfusion decision support

Incorporation of POC testing as part of the blood management program this refines and assist in acute hemotherapy decisions. POC devices offer the potential advantage of a more rapid turn-around-time than centralized Laboratory testing.[14] The major drawback to POC testing is the challenges related to standardization and quality control.[14] In situations such as complex cardiac surgery were supported with the use of either routine coagulation tests or with (POC) platelet aggregometry and thromboelastometry.[15] Patients who were managed with POC testing used significantly less red cell, plasma and recombinant factor VIIa. However, the transfusion rates for PLT and PCCswere not affected.[15] Mortality was lower and control of hemostasis was superior in the POC-managed group as measured by chest-tube output in the immediate 24 h post-operative period. Finally, the average cost associatedwith blood product use in the POC-managed patients was half that of patients managed with routine laboratory coagulation tests.[15] In contrast, a Cochrane review showed that the use of TEG and ROTEM in the setting of massive transfusion to guide hemotherapy did not result in decreased morbidity or mortality but there was a suggestion of decreased bleeding.[16] After a review of the literature, an expert panel was convened as part of a Canadian consensus on massive transfusion. The panel could not recommend the use of such viscoelastic monitoring over routine central laboratory coagulation testing.[14]

Table 1: FNHTR (Febrile non haemolytic transfusion reaction) at SHKM in last two years

Component	2016	2017
Whole Blood	19	13
p RBC	00	05
PC	00	00
FFP	00	01(allergic reaction; immediate)
Total	19	18

Table 2: The number of transfused/issued components at SHKM in last two years

Component	2016	2017
Whole Blood	4242	3883
p RBC	120	1861
PC	31	445
FFP	10	1998

Table 3: Randomized control trials involving a variety of patient and clinical settings studying transfusion triggers.

Author	Name	Setting	Trigger *	N
Herbert, 1999	TRIC	Adult ICU	7 vs 9	838
Kirpalani, 2006	PINT	Infant <1kg	10 vs 12	457
Lacroix, 2007	----	Paediatric ICU	7 vs 9.5	637
Hajjar, 2010	TRAC	Cardiac surgery	8 vs 10	502
Cooper, 2011	CRIT	Acute MI	8 vs 10	45
Carson,2011	FOCUS	Hip surgery	8 vs 10	2,016
Villaneuva, 2013	----	UGI bleed	7 vs 9	921

Table 3 of Reffrence no.20.
* Trigger was hemoglobin level (g/dL).

Table 4: Transfusion protocol of SHKM BTS

Blood Component Utilization Protocol of SHKM -2017
Transfusion care should be individualized to the needs of each patient.
Indications and blood transfusion

1. Whole blood: - Trauma patient (if blood loss is >30%); up to 30% use crystalloid.
   - Patients for major surgery.
   - Exchange transfusion.
2. Packed RBCs should be considered for: - Hb< 6.0 gm/dl in absence of disease
   - Hb 8-10 gm/dl with disease
   Surgery – patient need urgent operation and Hb<10 gm/dl
   - Anticipated surgical blood loss >1000 ml
   Anaemia associated with incipient/ associated cardiac failure.
   Patient approaching delivery with Hb< 7gm/dl
3. Platelet:- platelet count
   <5000 /µL regardless of clinical condition
   5000-10,000 /µL – this increased risk of bleeding due to haematological challenges, sepsis, severe aplastic anaemia, patient undergoes BMT (Bone Marrow Therapy)
   10,000-20,000/µL- if thrombocytic bleeding present
   - CT (Chemo Therapy) for malignancy (decreased production)
   ≤50,000/µL- DIC (increased destruction)
   - Massive transfusion (platelet dilution)
   <70,000-80,000/µL- in major surgery
   Prophylactically ≤20,000- to prevent bleeding
   Do not transfuse platelets in the setting of HIT and TTP. Platelets may not be useful in ITP, PTP, DIC, or uremia.

Dose of PC:
1unit/10kg.body wt.
Or 1unit SDAP

4. FFP: - actively bleeding with multiple clotting factors deficiency, liver disease, DIC, TTP, coagulopathy in massive transfusion.
   - Factor-V deficiency
   - Factor 2, 7, 9, 10 deficiency
   - Antithrombin III deficiency
   - Congenital/acquired clotting factor deficiency
   - *FFP should be considered for:
   - 1. Bleeding in patients with INR ≥2
   - 2. Bedside invasive procedure and INR ≥2
   - 3. Prophylaxis (non bleeding) with INR ≥6
   - FFP is not indicated for patients with INR <1.5.

Dose of FFP:
10ml/kg body wt

5. Cryoprecipitate – haemophilia A
   - VBD (von billibrand disease)
   - Congenital/acquired fibrinogen deficiency
   - Acquired factor VIII deficiency (DIC, massive transfusion)
   - Factor 13 deficiency

Dose of CPP:
20 unit/kg body wt (1bag contains 80 units)

6. Granulocyte – septicaemia not responding to Anti-Biotics
   - Neutropenia <500/ µL
   - Temporary bone marrow depression for 1-2 week

DIC, disseminated intravascular coagulation; FFP, fresh frozen plasma; HIT, heparin induced thrombocytopenia; INR, international normalized ratio; ITP, idiopathic thrombocytopenic purpura; PTP, post transfusion purpura; TTP, thrombotic thrombocytopenic purpura.
*Table 2 of reffrence no. 8

If the decision is made to incorporate POC testing in acute hemotherapy decisions, the BTS will play an important role in selecting the appropriate POC device or method. The choice of methods has implications for the end-user, who must understand the limitations of each device. For instance, the use of different point-of-care devices for measuring hemoglobin was shown to have varying results.[17] Apart from the specific platform (i.e. central laboratory versus POC assay) the analyte to be

assayed should be considered. There is little quality evidence to suggest that coagulation abnormalities, as measured by routine PT/INR and/or PTT, are helpful in predicting bleeding risk.[18] Given this, one might recommend against the use of POC PT/INR devices as screening tools prior to invasive procedures. At the SHKM laboratory provides only PT/INR and APTT tests for POC, we are going to start ROTEM and TEG in near future, presently cannot do because of lack of funds and other resources. In short, the selection of the most accurate, reproducible, rapid and clinically meaningful test method and device should be identified. While offering promise, the use of POC devices for hemotherapy decision support requires further study.

Data Harvesting and Analysis

In all areas of utilization management, it is important to acquire multiple pieces of information and then analyze the data. Reviewing Blood Bank data allows for understanding costs and identifying potential areas of improvement in the transfusion service.[19]

At the SHKM we do data acquisition and analysis, including dedicated staffing for the BTS information system, to facilitate utilization management. Data are harvested within the blood bank electronic database (HMIS system) and manual reports. This allows us to monitor and characterize blood usage for any individual patient, in a particular time period or a category/type of blood/component or a combination there of.

An effective blood utilization program should be targeted at the highest yield areas. Two potential ways of identifying what might be high yield areas is to ask the questions: "Who is ordering the blood?" and "What blood products are being ordered?" Table 2 shows the number to components transfused at SHKM over a last two year period.

At the SHKM the obstetrics (of obstetrics and gynaecology department), ICUs (surgical, medical, and paediatric), OT units are some of the biggest users of blood products. Notably, ICU (both adult and paediatric) is major users of red cell and plasma units while the Emergency Service is a major user of PC. Obstetrics service is major user of whole blood.

In selecting which blood products to target, we select products used in large quantities and products with high adverse event profiles or a combination of both [Table 1 and 2]. For instance, we have specifically targeted FFP and PC as high-yield targets for blood utilization management (see sections 6.0 and 4.3: Blood Management Program and Approach). Both are used in relatively lower quantities than whole blood and pRBCs. However, both are less expensive and their adverse event profile is comparatively lower than other two blood products combined.

DISCUSSION

On exploring the utilization management in the BTS we got several prongs in it, coordination of each is very significant for smooth operation like; manpower and inventory management, data harvesting and it's analysis, implementation, education and training.

The SHKM is 500+ beds government hospital it is heavily loaded(3,88,654 patients per year) and situated at most difficult rural remote area of the state Haryana in India, having annual functioning budget of about Rs. 88 crores ($ 1,35,38,462) and annual Blood Bank (BB) budget is approximately 01% of whole budget, among this excluding labour salaries which is 17% of total BB budget, this makes sense that cost containment strategies should consider for blood product usage (see section 3.0 and 6.0) with human touch on top of prime both ours and government concern. We also supply LR blood and blood products for surrounding non government private blood transfusion services who are not able to make their own blood components, for that we charge government prescribed very subsidised rates like; for whole blood approximately Rs. 1050/ unit($ 16.15), pRBCRs. 1050/unit ($ 16.15), PC Rs. 300/unit($ 4.62), FFP Rs. 300/unit($ 4.62), CPP Rs. 200/unit($ 3.08)) which is a big social service for this area; meanwhile remotely placed urban private hospitals charges are whole blood Rs. 3500 ($ 54), pRBCRs. 3200 ($ 49.23), PC Rs.1950 ($30), FFP Rs. 1500 ($ 23.08), CPP Rs. 800 ($ 12.31) and affluent centres of other countries like MGH BTS is getting annual budget of approximately $ 30 million [20]. So, we need an appreciation and more support for coming up in much better way.

Time to time government provide up gradation training for free of cast to our BTS staffers at other old BTS-institutions. Sometimes we organize work shop and CMEs regarding latest updates and advancements in BTS and hemovigilance.

Transfusion practices vary from institution to institution. In coronary bypass procedures, for instance, transfusion rates of pRBC, plasma and PC are highly variable, an observation that has not changed in the last two decades.[21,9] More recently, this observation of variability in transfusion practice has been shown to occur in non-cardiac surgery.[22]

There is a relative paucity of randomized control trials to detail appropriate blood transfusions in specific patient settings, making it a challenge to develop and implement transfusion guidelines. At SHKM we fallow specific guideline based approach [Table 4] to define more specifically our need and its best possible management. A few studies have resulted in some harmonization of transfusion guidelines particularly in critical care and cardiac surgery.[23,24] Seven prospective RCTs [Table 3] have examined outcomes in cohorts of patients

randomly assigned to liberal or conservative triggers for red cell transfusion. These studies address a broad range of recipients—from premature infants to the elderly. Of particular note, no study has found any advantage to the more liberal use of blood. Despite the findings from these RCTs, some physicians who care for critically ill patients still utilize liberal transfusion triggers.[25]

Because red blood cells can be stored for up to 42 days following collection, inventory management would become far more complex till the expiration date as the red blood cells be substantially shortened.[26] Red blood cells can be stored for up to 35 days (with CPDA) and 42 days (with SAGM),[27] and at SHKM we store blood for 35 days only, so it is more difficult to manage than 42 days. Germane to inventory management, is the ongoing question of whether fresher blood is better than older blood. To date, the data are equivocal regarding the superiority of short-duration storage versus longer-duration storage of blood.[28] A number of RCTs are attempting to address this issue, including the ABLE,[29] RECESS and RECAP trials.[30] The MGH is a participant in the latter two trials and is leading another RCT in children with malaria (NCT01586923, Transfusion inMalaria).More recently, an RCT found no difference in outcomes among premature low birthweight infants who received 'fresh blood' versus standard storage-age blood.[31]

At the SHKM because of lack of resources and paucity of awareness for blood donation in this backward region (Demography: 79.2% Muslims and approximately 50% illiterate).[32] So, need of utilization of each unit without pilling. We control/manage this problem by telephonically, electronically and many times through manual approach by sending a blood bank staff at the bedside and later audits to ensure that the unit is not wasting. In affluent/developed countries/places/hospitals blood is transported and kept at the bedside in excessive amounts for ordered a specific location to ensure sufficient blood would be available at the bedside, if needed. This practice is known as stockpiling. Stockpiling reduces the supply of units available for other patients, requires an increase in inventory, and results in increased staff effort to issue and then later restock units which are unused and returned. Poor communication is common in settings where stockpiling occurs. Therefore, liaisons between the OTs and the BTS were set-up. Establishing better lines of communication decreased blood wastage, ensuring that other patients had access to the blood inventory.[20]

We use crossmatch-to-transfusion ratio (C: T ratio) as a benchmarking process to ensure transfusion of each unit and monitoring of overstocking. In affluent institutions/ countries/place/hospitals "issue to transfusion ratio" (I:T ratio) have been adopted to monitor stockpiling at bed side.[20] At the SHKM we don't use stockpiling method because of lack of resources and paucity of awareness for blood donation in this backward region, so need of utilization of each unit without pilling.

Concluded that at the SHKM we have FFP and PC as high-yield products. Both are used in relatively lower quantities than whole blood and pRBCs. In contrast on super speciality and affluent institutesIVIg and rVIIa are highyield products but both are used in relatively lower quantities than pRBCs, PLT or FFP.[20]

At the SHKM the obstratics and ICU are major users of blood products and transfusion rate of whole blood was very high earlier and there were very high transfusion reaction cases [Table 1], after starting of component unit highly increasing demand of pRBC and PC and FFP demand is medium and transfusion reaction cases gone down, so it is proved that components are better to save transfusion reactions with more utility management benefits. Blood transfusion guidelines targeted towards these units (of major user departments) are a high-yield area for utilization management (see sections 6.0 and 4.3: Blood Management Program and Approach). Meanwhile affluent and super-speciality hospitals consumes maximum amount of blood used in cardiac surgery service and cardiac ICU but obstetrics and gyenic department is a major user at SHKM with ICU. In higher centres of developed countries like at The MGH transfusion rate for pRBC transfusions was near the median but above the median for both FFP and PC transfusions when compared to a national benchmarking study.[9,20]Finfer et al reported that the use of saline versus albumin for volume resuscitation in an ICU setting resulted in no difference in 28-day mortality, length-of-stay, or organ failure.[10] Local changes in surgical transfusion practice resulted in elimination of albumin and PCCs in coronary bypass procedures and increased use of anti-fibrinolytics to control bleeding. The use of anti-fibrinolytics has been shown to decrease bleeding in cardiac surgery.[11,12]

At the SHKM we do data acquisition and analysis done by semielectronic method; data collection and maintenance done manually by staffers and harvested within the blood bank electronic database (HMIS system). A drawback of our current BTS database is taken the long time interface with the hospital/clinical data repository. Affluent centres use full electronic data collection and maintenance for analysis but it is costly comparatively.

To increase pool of donors it is proposed to decrease the age up to 16 years age,[33] currently in India it is illegal to take blood from less than 18 years of age.[34,35]

There are several new techniques are proposed to save and conservation of blood,[36] At SHKM also a few are in practice and many of those techniques are under trial so can take approvals in future.

At the SHKM laboratory provides only PT/INR and APTT tests for POC, because of lack of funds and other recourses. Affluent centres are able to do ROTEM and TEG.

Limitations

Main limitations of our BTS are lack of funds with this there is government order for blood components that all should be provided at zero casts to inside patients which is contrary to private and affluent centres.

Secondly comparatively short time study so less data and smaller sample size.

Recommendations

We should propose demand to government for more funds as patient load is increasing on our BTS and also government should energise the NGOs and media (e.g. Mass media) for more cooperation and coordination, more awareness and camps in this backward remote area.

CONCLUSION

Utilization, manpower and information management in the BTS requires a multi-pronged approach for practice of transfusion medicine. Continuous evaluating the sources, managing inventory and information management with coordination will lead to improved patient outcomes while reducing costs and well functioning of a BTS even situated in a most backward area with less funds and other resources.

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Abbreviations: BTS; Blood Transfusion service, p RBC: Packed Red Blood Cells, s RBC: SAGM Red Blood Cells, BCPC: Buffy Coat Derived Platelet Concentrate, PC: Platelet Concentrate, FFP: Fresh Frozen Plasma, CPP: Cryo Precipitate, NACO: National AIDS Control Organisation, HCT: Haemo Transfusion Committee, HOD: Head Of the Department, SOP: Standard Operating Procedures, SDAP: Single Donor Aphaeresis Platelets, FNHTR: Febrile Non Haemolytic Transfusion Reaction, RCT: randomized control trial, CPOE: Computerized Provider Order Entry, LR: Leucoreduction/Leucoreduced, PCC: Prothrombin Complex Concentrate, BBR: Blood Bank Refrigerator, POC: Point Of Care, ICU: Intensive Care Unit, OT: Operation Theatre, CPDA: Citrate Phosphate Dextrose Adenine, SAGM: Saline Adenine Glucose Manitol.

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