



A RETROSPECTIVE STUDY OF BLOOD TRANSFUSION PRACTICES IN A TERTIARY CARE HOSPITAL OF NORTH INDIA.

General Surgery

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ABSTRACT

INTRODUCTION: Blood transfusion is an important concern for the society, as it is life saving for patients with bleeding disorders, accidents, surgeries, inherited/acquired hematological diseases and malignancies. Generally, donors are classified into the following categories: voluntary, family replacement, remunerated or paid donors, and autologous donor.

AIMS & OBJECTIVES: To understand the importance of Blood & its safe Transfusion practice in a Teaching Hospital.

METHODOLOGY: An Observational study was conducted over a period of 12 months from January 2019 to December 2019 in a 750-bedded Tertiary Care Hospital of Jammu (UT).

OBSERVATIONS: In addition to providing Blood-Transfusion Services to the patients admitted in SMGS Hospital Jammu & Other Associated Hospitals of GMC Jammu, the Blood-Bank is also catering to the needs of Registered Private Nursing Homes & Hospitals of Jammu (UT). This Blood-Bank has exceptionally maintained a record of consuming the whole stock of Blood without wasting even a single pint of blood.

DISCUSSION: The Aim of Blood Transfusion Services is to supply good Quality of Blood & its Components to the Patients & avoid any risk to the Donors as well as Recipients. Hence it is extremely essential to institute strict Quality Control Measures

RECOMMENDATIONS: Recommended that Upgradation of Blood-Bank is essential to cater with the needs of Additional bed-strength that SMGS Hospital is going to acquire in the coming future.

KEYWORDS

Blood-Transfusion, Hematological, Components, Quality, Recipient.

INTRODUCTION:

Blood is a very specialized body fluid of humans which deliver necessary substances such as nutrients and oxygen to the cells and help in transportation of metabolic waste products away from the cells. Blood is manufactured by human beings and donation of blood by humans is the only way of acquiring blood to meet emergency requirements in cases of road traffic accidents, complications of pregnancy like ant partum and post partum hemorrhage, blood loss during childbirth, various anemic disorders and surgical emergencies.[1]

Normal amount of blood in a human body is 76 ml/kg body weight in case of males and 66 ml/kg body weight in case of females. Humans require only 50 ml/kg body weight of blood for daily work. Hence 26 ml blood per kg body weight is excess in males and 16 ml blood per kg body weight in females. A healthy person can easily give around 8 ml per kg body weight in blood donation.[2]

For donation minimum wt. is 45kg. A 45 kg person can thus give 45x8 ml = 360 ml blood which is in excess for such a person. Minimum blood taken in donation is 350 ml in India. An average human has 5 liters of blood, average blood volume is 4 to 6 liters. Blood is a type of liquid connective tissue. The various components of blood are red blood cells (erythrocytes), white blood cells (leukocytes), plasma and platelets (thrombocytes).[2]

The major function of blood is transport. There are about one billion red blood cells in two to three drops of blood. For every 600 red blood cells, there are about 40 platelets and one white cell.

The normal daily production of red blood cells (RBC) in a healthy adult is about 0.25 ml/kg and the average lifespan of the cells is about 120 days, whereas that of transfused RBCs is about 50–60 days and can be significantly shorter in the presence of factors reducing their survival. The storage of RCCs leads to a series of metabolic, biochemical and molecular changes, defined globally as the storage lesion; the extent of these changes is related to the duration of the period of storage/ Depletion of 2,3-diphosphoglycerate (2,3-DPG) occurs within a few days of the start of storage and is complete within 1 or 2 weeks. This alteration is reversible: 50% of the 2,3-DPG is restored by 8 hours after starting the transfusion, while 24–72 hours are necessary for complete recovery. This can be clinically relevant in patients who require massive transfusions.[4]

Blood transfusion is an important concern for the society, as it is life saving for patients with bleeding disorders, accidents, surgeries, inherited/acquired hematological diseases and malignancies. Donated blood can be lifesaving for individuals who have lost large volumes of blood from serious accidents, obstetric and gynecological hemorrhages, or surgery and stem cell transplant patients as well as for individuals who have symptomatic anemia from medical or hematologic conditions or cancers. Therefore, blood is an important concern to the society. The use of these lifesaving products may be complicated by infectious and immunological diseases some of which could be life threatening. Blood banks are obligated to provide adequate and safe blood to the community.[3]

Generally, donors are classified into the following categories: voluntary, family replacement, remunerated or paid donors, and autologous donor. The safest donors are found among people who donate their blood voluntarily purely out of altruism and are self-aware of their unsuitability to serve as blood donors where there might be a slightest risk of causing health damage for blood recipients. The risk of transfusion transmissible diseases is highest with the use of blood procured from remunerated donors. Voluntary, non-remunerated blood donors are the cornerstone of a safe adequate supply of blood and blood components. The task of recruiting voluntary blood donors remains one of the major challenges for any blood transfusion service. One of the objectives of the National Blood Policy is to encourage research and development in the field of Transfusion Medicine.[3]

Low hemoglobin is the number one cause for donor deferral, accounting for deferral in as many as one out of 10 attempted blood donations. The causes of low hemoglobin may vary, but one of the most common is low dietary iron consumption. A large amount of iron is lost each time a person donates blood. According to one source, 56 days is insufficient time to re-build iron stores lost from blood donation in the majority of the population, and this may contribute to low-hemoglobin deferrals in repeat blood donors. Therefore, repeat donors may benefit from iron supplementation to rebuild iron stores more quickly. The amount of iron-depleted by a single donation also varies from person to person and between males and females, and the ability to replenish iron stores also differs between individuals. Infrequent donors, especially men and post-menopausal women, who are deferred for low hemoglobin may have an underlying medical condition causing the low iron and should follow up with their primary care manager for evaluation.[5]

AIM & OBJECTIVE:

To understand the importance of Blood & its safe Transfusion practice in a Teaching Hospital setting.

METHODOLOGY:

An Observational study was conducted over a period of 12 months from January 2019 to December 2019 in a 750 –bedded Tertiary Care Hospital of Jammu(UT) popularly Known as Shri Maharaja Gulab Singh(SMGS) Hospital, Jammu.

Source of data was Blood Bank requisition forms & Blood Bank registers of Patients who underwent elective or emergency procedures in the Hospital for which blood was ordered. The number of units prepared, cross-matched & transfused as well as the number of patients for whom cross-matching & transfusion were done was collected from Blood Bank registers.

Ethical approval was taken from the Institutional Ethical Committee. Data were entered & analysed using SPSS version 20.

SMGS Hospital is a 750 bedded Referral Hospital established on 6th May 1940 by His Excellency Maharaja Hari Singh. It is a Tertiary Level Hospital comprising of Four(4) Clinical Specialties including Gynecology & Obstetrics, Pediatrics, ENT(Otolaryngology) & Dermatology .It is particularly providing Maternal & Child Health Services to all the 10 Districts of Jammu Province. The Entire Hospital is divided into 21 Wards labeled as Ward 1 to Ward 21 for the Inpatients admitted. The Critical patients are admitted in Intensive Care Units like Recovery ICU in Gynae/Obs. & NICU-A, NICU-B, NICU-C. & PICU in Pediatrics department. Besides, the Hospital is having well-developed Outpatient Departments(OPD's)of Gynae & Obs. Department with Radiological & Laboratory facilities; Pediatrics Department with proper Immunization facilities; ENT Department with Audiometric facilities & Dermatology Department with Minor OT for Electro cauterization, etc. procedures. The entire Hospital is following Eco-friendly Guidelines of Environmentalists with enough Greenery & green lush around its premises. The Huge Palm Trees planted in the Park adjoining Administrative Block carries Historical importance. All the small pockets & spaces in between the Wards & Departments have been beautified by Plantation of different Orchids & Trees providing fruits & colorful flowers spreading their scented fragrance in the surrounding environment thereby facilitating the speedy recovery of patients from illness/diseases.

Department-wise Bed Strength of SMGS Hospital Jammu.

S.No.	DEPARTMENT	TOTAL BEDS
1	Gynecology & Obstetrics	240
2	Pediatrics	400
3	ENT(Otolaryngology)	40
4	Dermatology	70
TOTAL		750

OBSERVATIONS & RESULTS:

Historically, Blood Bank in SMGS Hospital was inaugurated by, the then Chief Minister of J & K State on 21-03-1980 & later it was renovated by Hon'ble Health Minister H & ME on 23-10-2006.

Blood Bank of SMGS Hospital is a well-developed & Sophisticated Blood-Bank with the Latest Updated Machines installed in it like

*Cryofuge which separates 3 components from the Whole Blood including Fresh Frozen Plasma(FFP), Platelets & Packed cells.

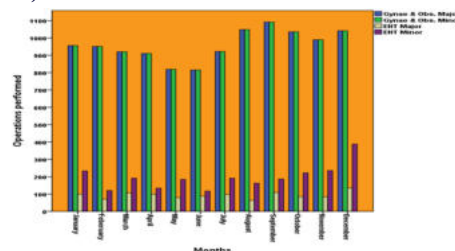
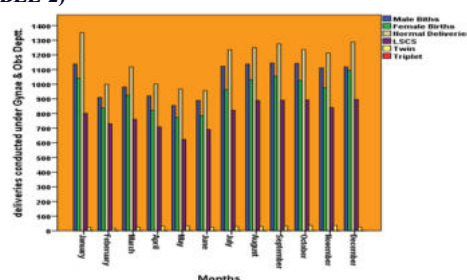
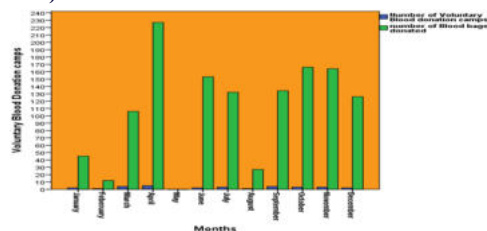
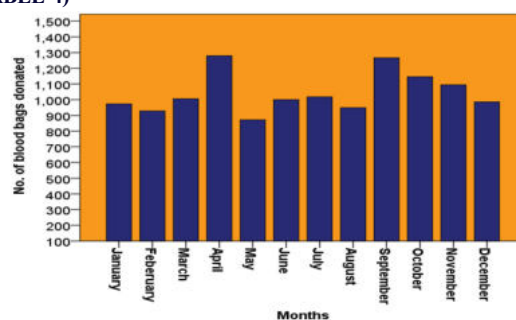
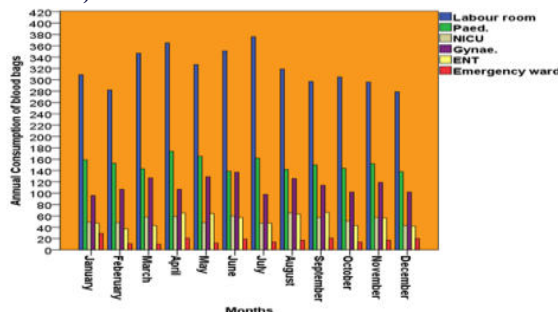
*Autoview machine for automatic Blood grouping, Cross- matching & Antibody screening.

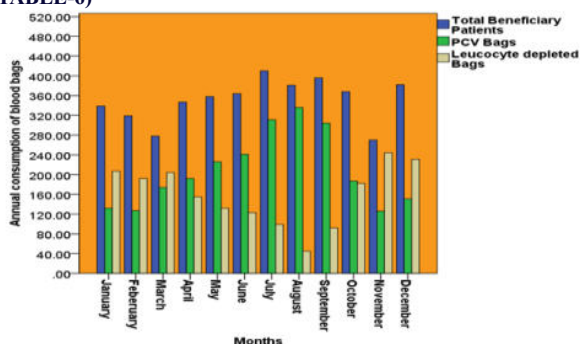
* Platelet agitator
* Leucocyte depletor machine
* Deep Freezers .

Moreover, e-RAKTAKOSH Digital facility is also installed in Blood-Bank of SMGS Hospital Jammu since 2019 which is an Internet connected service & daily, the whole data of Blood-Bank like Blood-grouping, Cross-matching & Antibody screening are displayed/ Transferred to its NHM Headquarter.

In addition to providing Blood-Transfusion Services to the patients admitted in SMGS Hospital Jammu & Other Associated Hospitals of

GMC Jammu, the Blood-Bank is also catering to the needs of Registered Private Nursing Homes & Hospitals of Jammu(UT).This Blood-Bank has exceptionally maintained a record of consuming the whole stock of Blood without wasting even a single pint of blood.

BARCHARTS RELATED TO BLOOD TRANSFUSION PRACTICE STUDY IN SMGS HOSPITAL JAMMU.**BARCHART-1(SCHEMATICAL REPRESENTATION OF TABLE-1)****BARCHART-2 (SCHEMATICAL REPRESENTATION OF TABLE-2)****BARCHART-3(SCHEMATICAL REPRESENTATION OF TABLE-3)****BARCHART-4 (SCHEMATICAL REPRESENTATION OF TABLE-4)****BARCHART-5 (SCHEMATICAL REPRESENTATION OF TABLE-5)**

BARChart-6.(SCHEMATICAL REPRESENTATION OF TABLE-6)**TABLES RELATED TO BLOOD-TRANSFUSION PRACTICE STUDY IN SMGS HOSPITAL JAMMU.****TABLE-1(SCHEMATICALLY REPRESENTED IN BARChart-1)**

Month-wise Details of Annual perations performed under Gynae & Obs Department and ENT Department of SMGS Hospital Jammu for the Year 2019 (w.e.f. 1st Jan 2019 to 31st Dec 2019)

Month	Gynae & Obs.			ENT		
	Major	Minor	G.Total	Major	Minor	G.Total
January	956	303	1259	99	233	332
February	951	293	1244	70	120	190
March	920	313	1233	106	191	297
April	910	280	1190	99	134	233
May	819	321	1140	79	184	263
June	815	315	1130	88	117	205
July	922	271	1193	97	191	288
August	1048	301	1349	63	162	225
September	1091	346	1437	109	186	295
October	1035	286	1321	85	222	307
November	989	242	1231	84	235	319
December	1041	270	1311	135	388	523
G.Total	11497	3541	15038	1114	2363	3477

TABLE-2(SCHEMATICALLY REPRESENTED IN BARChart-2)

Month-wise Details of Annual Deliveries Conducted under Gynae & Obs Department of SMGS Hospital Jammu (w.e.f. 1st Jan 2019 to 31st Dec.2019).

S. No.	Month	Total Births			Total Deliveries				Twin	Triplet
		Male	Female	G.Total	Normal Deliveries(ML)	LSCS	Total			
1	Jan	1138	1040	2178	1352	801	2153	23	1	
2	Feb	909	838	1747	999	730	1729	18	-	
3	Mar	981	925	1906	1118	761	1879	25	1	
4	Apr	921	821	1742	1002	709	1711	31	-	
5	May	855	773	1628	968	623	1591	33	2	
6	Jun	889	785	1674	956	691	1647	24	1	
7	Jul	1122	962	2084	1235	821	2056	29	-	
8	Aug	1138	1030	2168	1249	889	2138	30	-	
9	Sep	1144	1055	2199	1275	891	2166	31	1	
10	Oct	1142	1026	2168	1236	893	2129	37	1	
11	Nov	1112	977	2089	1213	840	2053	36	-	
12	Dec	1118	1094	2212	1287	896	2183	25	2	
G.Total		12469	11326	23795	13890	9545	23435	342	9	

TABLE-3(SCHEMATICALLY REPRESENTED IN BARChart-3)

Voluntary Blood-Donation Camps conducted in Blood-Bank of SMGS Hospital Jammu. (w.e.f. 1st Jan 2019 to 31st Dec.2019)

S.No.	Month	No. of Voluntary Blood donation Camps	No. of Blood-bags donated
1	January	02	45

2	February	01	12
3	March	04	106
4	April	05	227
5	May	00	00
6	June	02	153
7	July	03	132
8	August	01	27
9	September	04	134
10	October	03	166
11	November	03	164
12	December	02	126
	G.Total	30	1292

TABLE-4(SCHEMATICALLY REPRESENTED IN BARChart-4)

Month-wise details of Annual Blood-Donations in Blood-Bank of SMGS Hospital Jammu(w.e.f.1st January to 31st December 2019)

S.No.	MONTH	No. of Blood –bags Donated
1	January	973
2	February	928
3	March	1006
4	April	1280
5	May	872
6	June	1000
7	July	1018
8	August	949
9	September	1267
10	October	1146
11	November	1095
12	December	986
	G.TOTAL	12520

TABLE-5(SCHEMATICALLY REPRESENTED IN BARChart-5)

Specialty-wise Annual consumption of Blood-bags in different vital areas of SMGS Hospital Jammu on Monthly basis for the year 2019 (w.e.f.1st Jan to 31st Dec.2019)

S. No	Month	Labou Room	Paed	NIC U	Gyna	ENT	Emeg-Ward	Total
1	January	309	159	49	96	47	29	689
2	February	282	153	48	107	37	11	638
3	March	347	143	58	127	43	10	728
4	April	365	174	59	107	65	21	791
5	May	327	165	48	129	64	12	745
6	June	351	139	60	137	57	19	763
7	July	376	162	47	98	47	14	744
8	August	319	142	65	126	63	17	732
9	September	297	150	57	114	66	21	705
10	October	305	144	51	102	43	14	659
11	November	296	152	57	119	56	17	697
12	December	279	138	43	102	42	20	624
	G.Total	3853	1821	642	1364	630	205	8515

TABLE-6(SCHEMATICALLY REPRESENTED IN BARChart-6)

Month-wise Annual Consumption of Blood-Bags by Patients in Day-care Thallasaemia Ward working under Paediatrics Department during the Year 2019 (w.e.f. 1st Jan to 31st Dec)

S. No	Month	Total Beneficiary Patients	Packed Cell Volume(PCV) Bags	Leucocyte-depleted(KD) Bags
1	January	339	132	207
2	February	319	127	192
3	March	278	174	204
4	April	347	192	155
5	May	358	226	132
6	June	364	241	123
7	July	410	311	99
8	August	381	336	45
9	September	396	304	92

10	October	368	187	182
11	November	270	126	244
12	December	382	151	231
	G.Total	4412	2507	1905

DISCUSSION:

Blood Bank is a department that deals with Collection, Testing & Processing including Component separation, Storage & Preservation followed by the Issue of Blood & its products for safe Transfusion to the Patients as requisitioned by the Treating Doctor.

The Aim of Blood Transfusion Services is to supply good Quality of Blood & its Components to the Patients & avoid any risk to the Donors as well as Recipients. Hence it is extremely essential to institute strict Quality Control Measures.

Only an Authorized Hospital employee (Doctor, Nurse or Nursing Orderly) should receive the blood on behalf of patient. Person receiving the blood & Technician issuing the blood should properly Sign in the Issue-Register. Blood should be Transfused without delay. All empty bags should be returned to the Blood Bank within 24 hours. The Blood Bank Department should be Headed by a Pathologist trained in Blood Transfusion Medicine. The department should have adequate number of Technicians with Degree or Diploma in Medical Laboratory Technology (MLT) supplemented with adequate experience.

In order to protect the Donor as well as the Recipient, each Blood-Donor must be Screened prior to each Blood donation by Medical History & appropriate Physical Examination on the day of Donation. Under the directive of Supreme Court of India, it is Illegal to take Blood from any Professional Donor. Therefore, best is to take Blood from Non-remunerative Voluntary Donors.

SMGS Hospital Jammu is running a well-developed **Thalassaemia Day-Care Centre** since Year 1996 working under the Department of Pediatrics. It is being managed by Department of Paediatrics SMGS Hospital Jammu with the support of J & K Thalassaemia Welfare Society Jammu. About 250 Thallaemic Children are registered with the Society till date. All the registered Thallaemic Children are getting free Drugs & Medicines including free **Blood-Transfusions (Packed Cell Volume-PCV)** needed from time to time. Daily about 15-20 Patients are getting Blood-Transfusions & some patients need 2-3 transfusions in a month. Patients between the Age of 1-35 are getting Blood-transfusions here. There are some patients who get Blood-reactions on Transfusion and these patients are provided with exceptionally designed **Leucocyte-Depleted (LD) Blood-bags** in which the Leucocytes causing Blood-reactions are removed thereby facilitating the safe Blood-transfusion for the Thalassaemic patients.

Pre-requisites for Blood-Donor:

S.No.	PARAMETER	READINGS
1	Age	Between 18-65 years
2	Body-Weight	110 Lbs. or more (450ml)
3	Body-Temperature	<37.5°C or 99.5°F
4	Pulse-Rate	Between 50-100 beats/minute
5	Blood-Pressure	Systolic BP: 90-160mmHg. Diastolic BP: 50-100mmHg.
6	Hemoglobin-Estimation	Males-13.5gm/dl (Minimum Haematocrit:41%) Females-12.5gm/dl Minimum Haematocrit:38%)
7	Specific-Gravity	Males: >1.055 Females: >1.053

Reasons for Deferring Blood-Donation:

(1) Permanent Deferral: History of Viral Hepatitis, Jaundice, Malignant Diseases, Leukemia, Convulsions since Childhood, Fainting Spells, Abnormal Bleeding tendencies, Known Positive HbsAg (Australian Antigen) test, serious Cardiopulmonary disease, High-risk Behavior, Drug-addicts, etc.

(2) Temporary Deferral: Conditions requiring Rest or Medication--- Cold, Flu, Diabetes, Tuberculosis, Sexually Transmitted Diseases like Syphilis & Other infections, & Diseases of Heart, Lung, Kidney, Stomach or Liver.

The Period of Deferral may vary for many other Conditions like Various Vaccinations, Major surgery, Termination of Pregnancy or Delivery, Dental or Minor Surgery & Symptomatic Bronchial Asthma. A minimum of 72 Hours Deferral is made for a Donor who has consumed Aspirin.

It is very important to permanently Defer a Donor with an answer in affirmation regarding High-risk Behavior.

Categories of Blood-Banks:

CATEGORY	BLOOD CONSUMPTION (Units/Bed/Year)	BED STRENGTH	TYPE OF HOSPITAL
Category 1	3-7 units/bed/year	100-400 beds	District Hospitals
Category 2	8-15 units/bed/year	400-1000 beds	Teaching Hospitals
Category 3	>16 units/bed/year	>1000 beds	Apex/Superspecialized Hospitals

Levels of Organization & Functions of the National Blood Policy^[6]

Levels of organization	Functions of each level of organization
The National Blood Transfusion Services	Blood donor recruitment
The Zonal Blood Service Centers	Processing of blood
State and Local Government Areas Blood Service Centers	Appropriate use of blood
The Armed Forces Blood Service	Personnel and human resource development
Private and other nongovernmental health establishments	Technology and research
	Funding
	Quality assurance
	Records and data system
	Equipment and consumables
	Legislation

CONCLUSION & RECOMMENDATIONS:

Blood is an essential element of human life and there are no substitutes for it. World Health Organization (WHO) proposes countries to focus on young people to achieve 100% non-remunerated voluntary blood donation by 2020. Donated blood can be life saving for individuals who have lost large volumes of blood from serious accidents, obstetric and gynecological hemorrhages, or surgery and stem cell transplant patients as well as for individuals who have symptomatic anemia from medical or hematologic conditions or cancers. Therefore, blood is an important concern to the society. The use of these lifesaving products may be complicated by infectious and immunological diseases some of which could be life threatening.^[9]

The ultimate goal of transfusion should not be to achieve or maintain an arbitrary Hb level, but should be to avoid ischemia and improve outcomes. Before giving RBC, attempts should be made to optimize the hemodynamic status of the patient, and ensure that adequate oxygen therapy is supplied. Finally, when RBC transfusion is indicated, informed consent, following adequate discussion of the indication for blood and the potential risks and benefits, should be obtained from the patients. As mentioned earlier, single unit transfusions are preferred, particularly in the absence of active massive blood loss.

Another aspect of transfusion practice that is receiving ever more attention is the quality of the transfused RBC units. The removal of white blood cells from banked blood appears to provide some advantages in terms of reducing the risk of some complications and the use of leucoreduced RBC units is a reasonable approach. The more debated issue is the age of blood and negative effects of storage on banked blood which have been linked to unfavorable outcomes.

A "restrictive" strategy (transfusion when Hb <7 g/dL) is as effective as a "liberal" transfusion strategy (transfusion when Hb <10 g/dL) in haemodynamically stable patients, with the possible exception of patients with acute myocardial ischaemia. The use of Hb level alone as a "trigger" for transfusion should be avoided and transfusion decisions should be based on patient's intravascular volume status, evidence of shock, duration/extent of anemia, and cardiopulmonary physiological parameters^[10]

Blood banks have a duty to provide adequate and safe blood to the community. Generally, donors are classified as: voluntary, family replacement remunerated or paid donors, and autonomous donors. The risk of transfusion transmissible diseases is highest with the use of blood procured from remunerated donors. A person who is in need of money is more likely to hide his/her true state of health.^[9]

The blood donation is the only source of blood but the recruitment of voluntary, non-remunerated donors is the most important challenge throughout the world. Blood is the essence of life, and is one of the most precious donations. Blood services are facing shortage of blood all over the world. Demand for blood is rising alarmingly and current blood donation is insufficient to meet the demand. The only source of blood is by blood donation. Globally, 80 million units of blood are donated each year, but only two million units are donated in sub-Saharan Africa where the need is very high. In sub-Saharan Africa (SSA), out of the estimated need of 18 million units of safe blood per year, merely about 15% were collected.^[9]

Safe blood donor is a blood donor who donates blood voluntarily, without knowing the beneficiary, without any expectation and without being under pressure of a direct or indirect nature.^[2]

They are from low-risk populations and are the safer than paid, forced or replacement blood donor from family. Despite this notion, paid/family/ replacement donors still provide more than 45% of the blood donated in India. Blood from unsafe blood donors can cause transmission of dreaded diseases like human immunodeficiency virus-acquired immune deficiency syndrome (HIV-AIDS). Various studies indicate that professional blood donors have little knowledge about HIV-AIDS and represent a high-risk group. Such donors are supposed to be associated with a significantly high prevalence of transfusion-transmissible infections (TTIs) including HIV, hepatitis B, hepatitis C, syphilis, and malaria. HIV test-seekers may hide HIV risk behavior and complicate the problem.^[2]

Interventions to recruit and retain blood donors in the general population have been classified into five approaches: motivational, reminders/asking, measurement of cognitions, incentives, and preventing vasovagal reactions.

Safe blood is the blood that does not contain any viruses, parasites, drugs, alcohol, chemical substances, or other extraneous factors that might cause harm, danger or disease to the recipient. People who donate blood should be in sound health and should not be suffering from any serious illness. The recipient should not be harmed by receiving blood; the donor should not be put at risk by giving blood (WHO, 2000). Blood donation is life saving and useful in surgery, accidents, delivery cases, bleeding peptic ulcer, liver diseases, lung diseases, cancer, burn cases and blood diseases such as hemophilia, anemia, thalassemia.^[2]

Blood and its components are a very important resource and hence should be used in a justifiable manner. The pattern of utilization and wastage is different from other reports of monitoring of blood and its components, as the blood bank is attached to the hospital. This helps in minimizing wastage by case of reallocation of reserved but unutilized blood components. A proper inventory management system with accurate and timely database formation is necessary to minimize wastage. There is an increase in utilization of blood and blood components.^[8]

It is important to spread the awareness of voluntary blood donation but it is equally important to create opportunities regarding blood donation. Awareness/ knowledge can only change behavior if the facilities for adopting such practices are readily available. Opportunities can be created by organizing blood donation camps at places accessible to a large number of target people like colleges, universities preceded by workshops, seminars, conferences etc. Availability of "Blood Donor Diary" at every blood bank containing the details of prospective blood donors could also go a long way. Non-monetary incentives for blood donation like Appreciation certificates may lead to the achievement of goal of 100% non-remunerated voluntary blood donation.^[7]

Recommended that Up gradation of Blood-Bank is essential to cater with the needs of Additional bed-strength(275 Bedded New Labour-room Complex) that SMGS Hospital is going to acquire very soon in

the coming future.

(1) Extra Space(Area): Minimum area of approximately 3000 Sq.ft. is desirable to add additional facilities & up gradation of the existing ones. For this, additional structure over the existing Blood-Bank should be constructed.

(2)Equipments:

- (i) High-Propulsion(Performance)Liquid Chromatography(HPLC) for Thalassemic patients & those suffering from Hemoglobin abnormalities.
- (ii) Inline Filter Bags: required for Leuco-reduction Blood & Blood-components.
- (iii) Haematology Analyser: for Quality Control of Blood & Blood-products.
- (iv) Irradiator
- (v) Chemiluminescence for TTi.
- (vi) Automated Immuno haematology Analyser.

(3) Establishment of Cord-blood Banking.

(4) Blood-Bank Software: required for the proper Management of Information- related to record-keeping.

(5) Improvement of Voluntary-Blood Donation: WHO has recommended that Blood-banks should provide 100% Blood from Voluntary non-remunerated Blood-donors as this blood is considered to be safe. To increase the number of VBD camps, Donors retention & Donor motivation, the Blood-bank should be provided with Blood-collection vehicle, Adequate amount of Donor-refreshments, IEC materials. Donors must be Thanked for their Benevolent/Atruistic services by presenting them with Mementoes ,Gifts, etc.

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