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A descriptive study of utilization of blood and blood components in a tertiary care hospital, Gadag

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Abstract
Blood Transfusion Service (BTS) is an essential part of modern health care system without which medical care is impossible. The blood components implies separation of whole blood into various components like packed red cells (PRBC), platelets rich plasma, fresh frozen plasma (FFP), cryoprecipitate and leucocytes. Separating blood into its various components allows a single unit of blood to benefit several patients and provides a patient only the blood component which is needed. However, transfusions are not without risks, and they should be given only when true benefits are likely. With the easy availability of blood products and increased risks of transfusion transmitted diseases, proper monitoring of the transfusion practices is necessary. A retrospective cross sectional study was conducted at District Hospital, Mallasamudra, Gadag. The data was collected from issue and cross matching register of last 1 year duration, from June 2018 to May 2019. Total 3744 blood units utilization was assessed. 2 units of blood units were given to 94 patients, 3 units to 22 patients and more than three units were given to 9 patients. As compared to males, females utilized the multiple episodes of blood. Total multiple units given were 130 in which 125 patients received the same blood components and others received different blood components. Even though the number of blood units utilized were 3744 but the total beneficiaries were 3614 patients. Most of the blood units were requested by Medicine department followed by OBG department. 1666 blood and blood components utilized by Medicine department and 1463 were requested by OBG department only for females and in Medicine department male patients utilized higher blood transfusions compared to females. Least units were utilized by Orthopedics department. ENT, Ophthalmology, Dermatology departments not requested any blood units. One unit of blood was given to Microbiology department for the culture preparation.

Keywords: Blood transfusion service, platelets rich plasma, fresh frozen plasma

Introduction
Medical science has progressed tremendously over the years but, as yet, no substitute of blood has been discovered and thus, blood transfusion is an essential part of modern-day health care [1]. The first documented transfusion of human blood was done on 22nd December 1818 by James Bundell who was physician, physiologist and one of the outstanding obstetricians of his day. The procedure was published in 1819, under the title 'Some account of a case of obstinate vomiting in which an attempt was made to prolong life by the injection of blood into the veins' [2].

Blood transfusion saves lives and improves health, around 112.5 million units of donated blood are collected globally every year. About 50% of these are donated in lower and middle income countries where some 80% of the world's population lives. The average blood donation rate is more than 9 times greater in high income countries than in low income countries [1].

Blood Transfusion Service (BTS) is an essential part of modern health care system without which medical care is impossible [3]. The blood components implies separation of whole blood into various components like packed red cells (PRBC), platelets rich plasma, fresh frozen plasma (FFP), cryoprecipitate and leucocytes. Separating blood into its various components allows a single unit of blood to benefit several patients and provides a patient only the blood component which is needed [1]. However, transfusions are not without risks, and they should be given only when true benefits are likely [4, 5]. With the easy availability of blood products and increased risks of transfusion transmitted diseases, proper monitoring of the transfusion practices is necessary.

Periodic review of blood component usage is very important to assess the blood utilization patterns in any hospital. It acts as a management tool for the appraisal and justification of appropriateness and efficacy of transfusion therapy [6]. Thus the present study was carried out at the blood bank of a tertiary care hospital, District hospital, Gadag, aiming to analyze the pattern of utilization of blood and blood components from various departments of the hospital.

Materials and Methods

A retrospective cross sectional study was conducted at District Hospital, Mallasamudra, Gadag. The data was collected from issue and cross matching register of last 1 year duration, from June 2018 to May 2019. Total 3744 blood units utilization was assessed. The study was conducted after getting ethical clearance from college. Data was analyzed by using Epi-Info software. Frequencies and proportions were calculated.

Results

Table 1: Month wise distribution of blood and blood component units utilisation.

Month	Females	Males	Total blood units utilized	Percentage
June-18	56	42	98	2.6
July-18	206	96	303	8.1
August-18	203	97	300	8
September-18	247	94	341	9.1
October-18	337	100	437	11.7
November-18	205	123	328	8.8
December-18	169	74	243	6.5
January-19	269	58	327	8.7
February-19	172	129	301	8
March-19	204	79	283	7.6
April-19	229	127	356	9.8
May-19	299	128	427	11.4
Total	2596	1147	3744	100

In current district hospital the requirement has increased gradually and noticed some seasonal variations. July, August, February months had almost 8% blood transfusions. November and January months had almost same transfusions. The majority of the blood units were utilized in the month of October 2018 (11.7 %) followed by May 2019 (11.4%) and least were in the month of June 2018 (2.6%) followed by December (6.5%). The amount of blood transfused varied from as small as 15ml to maximum 466ml. Females were transfused more units of blood compared to males in all the months.

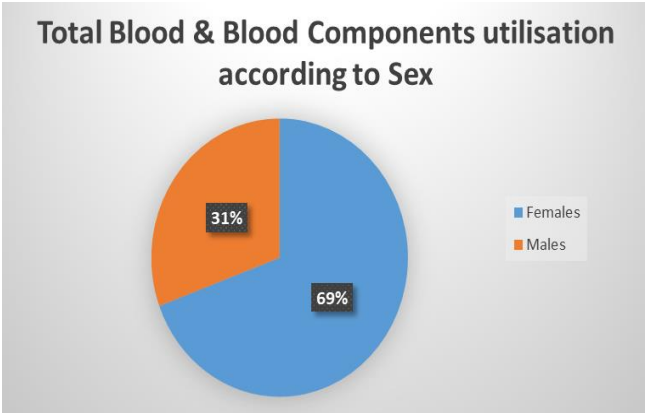

Fig 1: Sex wise distribution of blood and blood component units utilisation.

Females (69.4%) utilized most of the blood and blood component units and 30.6% were males. It was found that female patients were transfused blood more than double the number of male patients. One blood unit was given to microbiology department for culture preparation. Females were transfused Platelets, PRBC and Whole blood more except FLP.

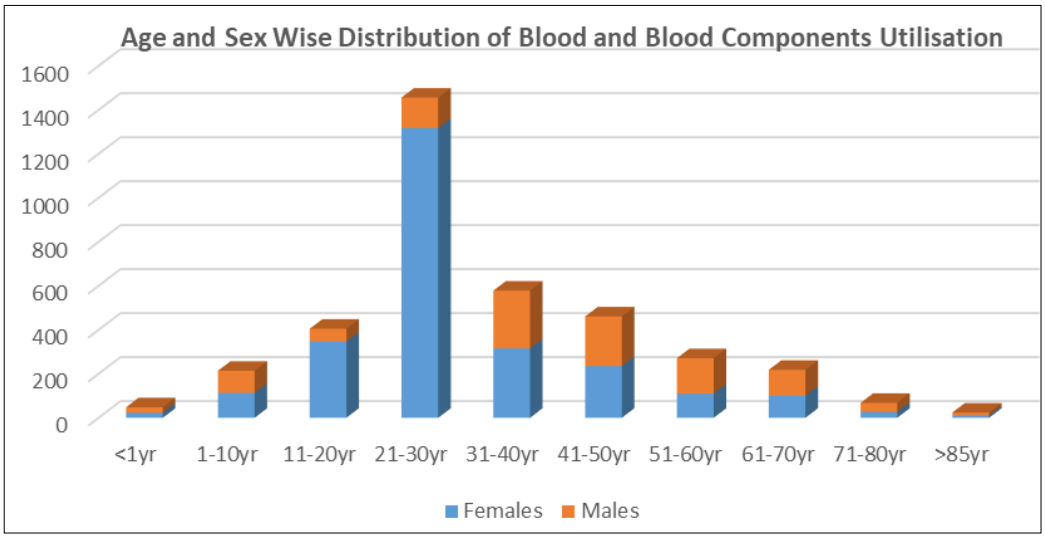

Fig 2: Age distribution of blood and blood component units utilisation according to sex.

According to age, majority of the blood units were utilized among 21-30years (38.9%) followed by 31-40yrs (15.4%) and least were by >85years (0.6%) followed by <1years (1.3%). Majority of the females were transfused blood of 21-30 years and for males it was 31-40 years (22.9%). Among 21-30 years, 1317 were females and 139 were males. There was a significant difference between males and females. Youngest recipient of the blood was 1 day old and oldest recipient was 89 year old.

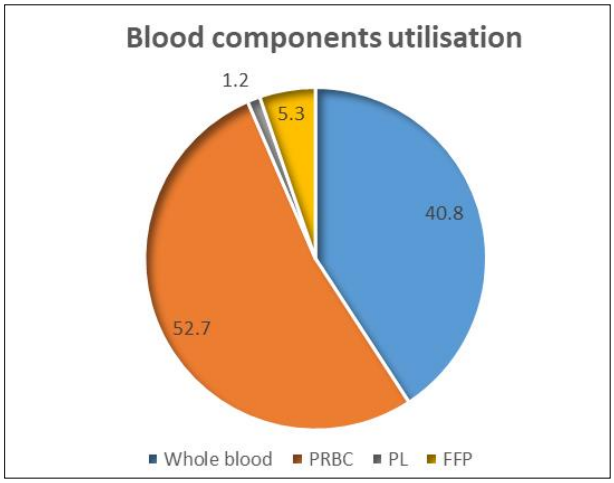

Fig 3: Distribution of blood and blood component utilisation according to sex.

The majority of the blood component utilized was PRBC (52.7%) followed by Whole Blood (40.8%) and FFP was 5.3% and last was platelet 1.2%.

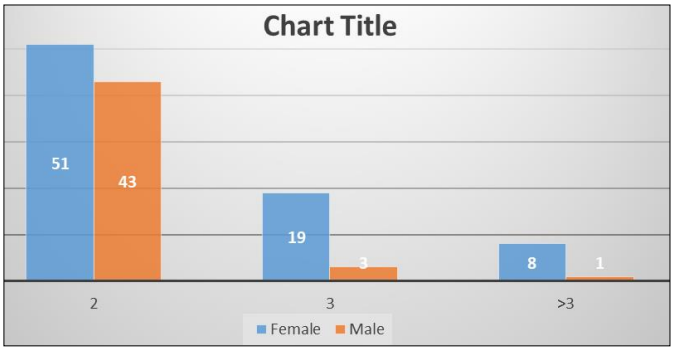

Fig 4: Distribution of multiple episodes of utilisation

2 units of blood units were given to 94 patients, 3 units to 22 patients and more than three units were given to 9 patients. As compared to males, females utilized the multiple episodes of blood. Total multiple units given were 130 in which 125 patients received the same blood components and others received different blood components. Even though the number of blood units utilized were 3744 but the total beneficiaries were 3614 patients.

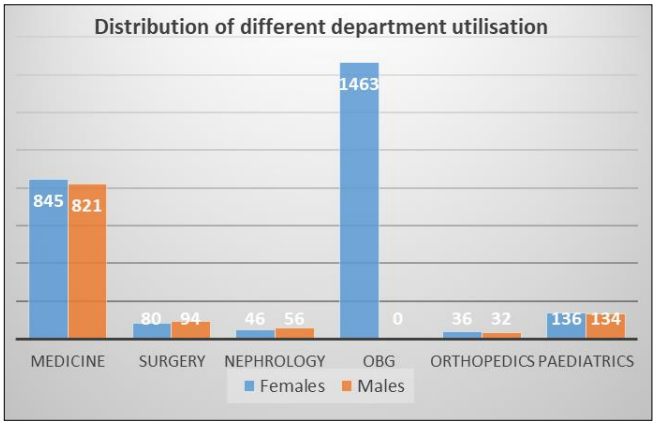

Fig 4: Distribution of blood and blood component to different departments according to sex.

Most of the blood units were requested by Medicine department followed by OBG department. 1666 blood and blood components utilized by Medicine department and 1463 were requested by OBG department only for females and in Medicine department male patients utilized higher blood transfusions compared to females. Least units were utilized by Orthopedics department. ENT, Ophthalmology, Dermatology departments not requested any blood units. One unit of blood was given to Microbiology department for the culture preparation

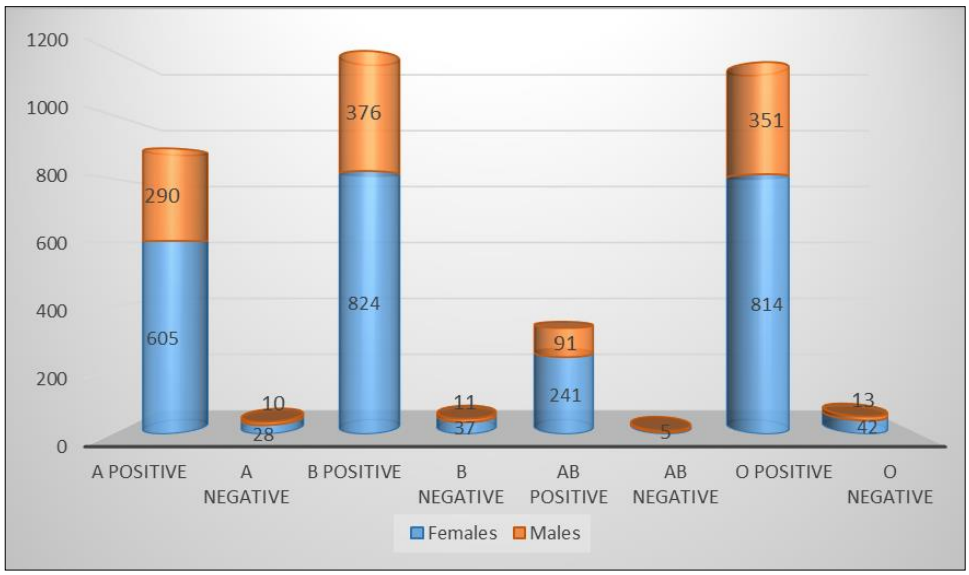

Fig 5: Distribution of blood and blood component to different departments according to sex.

B positive blood group (32.1%) was utilized by most of the patients followed by O positive (31.1%) and A positive (23.9%) and least was AB negative (0.3%), A negative (1 %), B Negative (1.3%) and O Negative (1.5%). Both sexes followed the same trend for transfusion of different blood group.

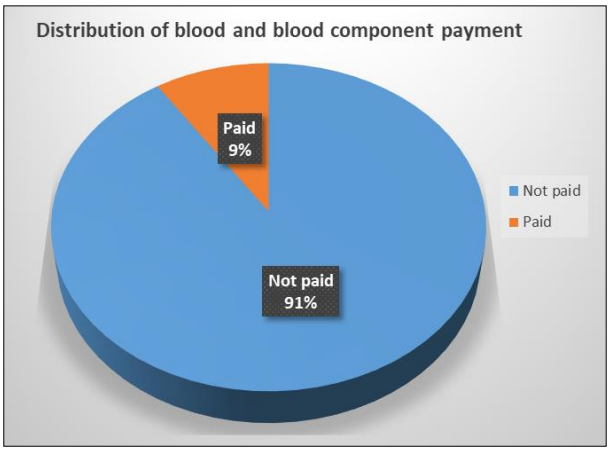

Fig 6: Distribution of blood and blood component according to payment

Majority of the patients (91%) got the blood and blood components for free of cost and only patients with above poverty line were charged.

Table 2: Distribution of most common indications for blood and blood components.

Blood component	FFP (%)	PL (%)	PRBC (%)	WB (%)	Total
Anemia	67 (33.5)	9 (21.4)	1370 (69.4)	1008 (66)	2454 (65.6)
Bleeding	13 (6.5)	2 (4.8)	54 (2.7)	73 (4.8)	142 (3.8)
Blood related disorders	5 (2.5)	18 (42.9)	79 (4.0)	60 (3.9)	162 (4.3)
Labour/ Child birth	7 (3.5)	-	28 (1.4)	13 (0.9)	48 (1.3)
Infections	10 (5.0)	7 (16.7)	87 (4.4)	81 (5.3)	184 (4.9)
Elective surgery	9 (4.5)	-	158 (8.0)	64 (4.2)	231 (6.2)
Gynaecological disorders	2 (1.0)	-	51 (2.6)	34 (2.2)	57 (1.5)
Obstretrical disorder	3 (1.5)	-	42 (2.1)	57 (3.7)	102 (2.7)
Renal disorders	2 (1.0)	-	51 (2.6)	60 (3.9)	113 (3.0)
Hepatic disorders	75 (37.5)	-	21 (1.1)	-	118 (3.2)
Malignancy	3 (1.5)	6 (14.3)	31 (1.6)	18 (1.2)	58 (1.5)
Trauma	1 (0.5)	-	26 (1.3)	36 (2.4)	63 (1.7)
Others	3 (1.5)	-	5 (0.3)	2 (0.1)	10 (0.3)
Total	200	42	1973	1528	3743

The most common indications for FFP were Hepatic disorders (37.5%), Anemia (33.5%), Bleeding (6.5%) and Infections (5%). Platelets were utilized by Blood related disorders (42.9%), Anemia (21.4%), Infections (16.7%) and Malignancy (14.3). 69.4% of PRBC and 66% of whole blood transfusion was done for Anemia patients.

Discussion

In our study we found the total blood units utilized were 3744 units in one year duration in which females (69%) were transfused almost double in number compared to males (31%). The majority of the blood component transfused was PRBC (52%) followed by whole blood (40.8%). The majority of the blood requested was B positive for both females (31.7%) and males (32.8%). Hardly few patients were charged for the blood components. The most common indication for FFP and PL was Hepatic disorders and Blood related disorders respectively. For PRBC as well as Whole blood most common indication was Anemia.

In studies conducted by Babita *et al.*, Subham *et al.*, Mathew et.al and Bansod *et al.* majority of females had transfused blood which is similar to our study. In a study conducted by Subham *et al.*, Dushyanth *et al.*, Girian S S *et al.* and Joshi *et al.* showed the majority of the blood transferred was whole blood followed by which was contrary to our study. In our study we found the majority of the blood component transferred was PRBC (52.7%) followed by whole blood (40.8%) and similar results were found in Kaur *et al.*, Singhal *et al.* and Chalapathy *et al.* The least number of transfused blood component was platelets followed by FFP which was similar to other studies [6, 7, 8].

The majority of the blood transfused was in the age group of 21-30 years and similar results were found in Subham *et al.* The youngest recipient in a study conducted by Venkatachalapathy *et al.* was 1 day old and the oldest was 89 years and it was similar to our study. The indication for 1 day old child was Septicemia and 4 oldest patients transfused blood for Anemia and Cellulitis. The pediatric patients were excluded in many studies but in our study we had included all subjects to know the pattern of utilization blood and blood component units.

In a study conducted by Alcantara *et al.*, Wallis *et al.* Medicine department requested majority of the blood and its components which was contrary to our study. In other studies conducted by Venkatachalapathy *et al.*, Subhashish *et al.*, Girian SS *et al.* showed that OBG department requested higher blood units which was similar to our result. In another study Dushyanth *et al.*, Babita *et al.* showed surgery department requested more blood units. In a study conducted by Subham *et al.*, the most common indication for whole blood and PRBC was Anemia which is similar to our studies. The most common indication for FFP was DIC

but in our study it was hepatic disorders and for Platelets it was thrombocytopenia which was similar to our study [9, 10].

In our study we have found the total units of blood collected was 3327 through various camps conducted by Blood bank through volunteers or replaced by relatives but the requested blood and its component units were 3744. Even though the each blood unit can be separated into 3 different components still the requirement of rare Rh negative blood group collection was less. The multiple units of blood utilized by 130 patients.

As it was found in other studies OBG and Surgery departments usual practice was to hold a ration of cross matched blood for operative cases to combat any unforeseen complications during or after operation and more often than not, this blood was not utilized whenever the anticipated complications did not occur. This practice could be the most leading reason for high wastage of blood. In situation where such holding is unavoidable perhaps a better option would be to keep a reserve of blood for the operative cases in the Blood bank itself and not in the ward, which can be supplied to the patient on demand and if not utilized, can be used for other patients on need.

Careful assessment and management prior to surgery could reduce the need for transfusion and peri-operative blood loss could be reduced significantly by meticulous surgical techniques, use of posture, torniquets vasoconstrictors and suitable anaesthetic techniques.

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