BLOOD TRANSFUSION PRACTICES AND THE NEED ASSESSMENT FOR BLOOD COMPONENTS THERAPY IN JIMMA UNIVERSITY MEDICAL CENTER, JIMMA, SOUTH WEST ETHIOPIA

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Abstract

Background: Blood transfusion is a therapeutic admistration of blood or its therapeutic components , to be used only if no other reasonable means of replacing low blood and blood components are available.In a current medical practice in different corners of a world, whole blood is rarely given under emergency. In our context however; whole blood is the only component under all circumstances due to negligence and adherences to an older protocol both by the physician and the regional blood bank. However, in modern transfusion practices, donated blood should be fractionated into separate therapeutic components. Some of which, includes plasma, albumin, and clotting factor VIII can be frozen or lyophilized and kept for a very long time or even indefinitely. Others, like platelets, must be used within few days of preparation. The most commonly transfused component is the packed red cell, followed by platelet concentrate, plasma, immunoglobulins, and clotting factor VIII, whereas,white blood cells are rarely transfused. Blood component therapy also allows the judicious use of this scarce human resource and it starts right from assessing the need of transfusion, using the appropriate components, avoiding unnecessary transfusions, to reprimanding single unit blood transfusion. Expectedly, a wide gap exists between blood donation and utilization; hence in the interest of our community the right patient should get the right component at the right time.

Objective: To assess the usage of blood and its therapeutic components according to the clinical indication and reduce in appropriate usage.

Method: Cross sectional study was conducted on a 425 blood transfusion episodes consecutively from February to June 2018. Socio-demographic and clinical data was collected by structured checklists and questionnaires. Descriptive statistics were applied to describe the results. Frequency tables and descriptive summaries were used to describe variables.

Results: Overall 22.1% of the transfusion episodes were found to be inappropriate, contributed by various factors related to the practices, prescribers and recipients.

Conclusion: The overall prevalence of appropriate clinical utilization of blood products in this study indicated that there is a huge gap that should be minimized; seek great attention to stablish institutional blood transfusion committee and also guideline for appropriate clinical utilization of blood products for the people who need them most.

Recommendation: a medical center should have a committed institutional blood transfusion committee and guideline that is responsible to oversee a general transfusion processes of the medical center through regular audit.

Awerrnesses on autologous blood donation should also be inducted to the community in ordere to relief the continueing tension on blood bank's blood supply.

Blood should be utilized only when clinically sounding and alternatives are unavailable.

As much as possible , recipients should receive only that particular components of the blood that's deficient in.

In case transfusion is a mandatory patient's or recipients involvement in decision sharing should also be encouraged; hence blood should not administered to a patients without consent for blood transfusion.

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Abbreviation and Acronyms

FFP –fresh frozen plasma

HBsAg-Hepatitis B Surface Antigen

HBV - Hepatitis B Virus

HCT –hematocrit

HCV- Hepatitis C Virus

HDNB-Haemolytic Disease of the New Born

Hgb- haemoglobin

HLA-human leukocyte antigen

ICU- intensive care unit

INR- international normalized ratio

ITP-Idiopathic thrombocytopenic purpura

JUMC-jimma university medical center

JUSH-jimmauniversity specialized hospital

MGDTP – millennium growth and development transformation plan

MOH-Ministry of Health

PT – prothrombin time

PTT- partial thromboplastin time

RBC- Red Blood Cell

RDP- Random donor platelet

Rh- Rhesus

SPSS -statistical package for social sciences

TRALI- transfusion-related lung injury

TTI-Transfusion-Transmissible Infection

TTP-Thrombotic Thrombocytopenic Purpura

vWD -von Willebrand Disease

VWF – Von Willebrand factor

WBC-white blood cell

WHA-World Health Assembly

WHO-World health organization

CHAPTER ONE : INTRODUCTION

1.1 Background

Ever since the ancient times, it has been realized that blood is essential for life. Whole blood is a complex tissue comprising cellular and non-cellular components that serve diverse functions within the body (1). People usually donate whole blood. However, in modern medical practices whole blood is rarely given as a transfusion (1). Whole blood obtained from the donors consists of several therapeutic components and hence need to be separated in the donor processing area of the blood bank to its various therapeutic blood components. That is, after it is donated, whole blood is usually separated into those components having different physiological functions within the body. This has let physicians give patients only that part they need and allows for effective use of donated blood and lowers the exposure risks of the recipient. It also helps to get the most out of donated whole blood (1). These days, blood from the donor can be separated into its various types of therapeutic blood components. The central dogma of modern transfusion medicine also dictates that giving a patient only the blood components that the patient needs (2). Accordingly, a unit of whole blood can be used to prepare various forms of clinically useful therapeutic blood components including the red blood cell concentrate, platelet concentrate, fresh frozen plasma and more. Each of which can be given to three or more different patients, and therefore, a unit of whole blood when separated into its therapeutic blood components has the potential to save at least three lives (3).

The main reasons why blood component therapy is recommended include : The recipient may not require all that products present in a donated whole blood unit for which it can be treated with only those blood components that are lacking, reducing the occurrence of adverse transfusion reactions, more than one patient can be treated with blood components derived from a single donation, the therapeutic support for patients with special transfusion requirements can also be provided. Perhaps,the plasma components that often are not directly needed for transfusion can be used for the manufacturing of factor *VIII* concentrate for Hemophilia A patients, an improved quality and functional capability of each blood components can be maintained, when varied storage conditions and shelf lives are applied(5-6). For instances, the quality of plasma constituents is best maintained in the frozen state

while platelet storage should be maintained at room temperature with continuous agitation. Thus, it is only the red blood cells whose storage requirement is fulfilled when the whole blood is stored refrigerated with consequent loss of therapeutic effectiveness of most of the other constituents (7).

Components therapy also offers logistic, ethical and economic advantages. The majority of the patients requiring blood transfusion do not need the plasma in the whole blood unit and certainly not at 1:1 ratio. The production of plasma derived blood products can thus be facilitated by the use of red cells rather than the whole blood, where leukocyte depletion may further improve the quality of blood components (5, 7). To this end the standard practices and the implementation guidelines should be in place for standard transfusion practices at laboratory level for transfusion purposes.

1.2. Statement of the problem

The imbalance between the demand and supply of blood is a great problem to meet the needs of blood in our community's health system. It is common to see that our blood banks are running out of their stock and obliged to receive blood from family members of the recipients as a replacement or otherwise for immediate uses. This situation has created a great burden over the health care system of the country and has influenced the national blood transfusion service to undergo a process of development aiming to improve the efficiency of the blood supply system. Generally little attention has been given to the clinical safety component of the blood thereby minimizing the risks involved with blood transfusion practices and to improve the blood supply system within the health care facilities. Therefore, the purpose of this research is to assist the physicians, who are the prescribers for users of the blood, in making appropriate decisions during an emergency situation and also help to optimize the demand with its supply. In addition, there are no studies that indicate the current approach of blood transfusion practices and the need assessment for blood components therapy in Ethiopia in general and in the study area in particular. Hence, this research is planning to search out factors that are contributing for an inappropriate clinical utilizations of blood resources;to identify and to recommend on safe and appropriate blood transfusion to the people need them the most;toasses whether blood resources are ethically and appropriately used in a clinical practice; to asses whether clinicians admnister blood resources as per the clinical demands of a recipient;to recommend on mechanisms and techniques used to encourage an evidence-

based use of available blood and blood products in situations when transfusion is clearly indicated as medical interventions

1.3. Significance of the Study

The study will enable the blood donation management economically and understand the functions of blood type and diversity thereby enhancing the appropriate use of blood. It provide relevant information for government, non - government organizations, policy makers and researchers, which help them for appropriate decision making and designing appropriate intervention development strategies.

CHAPTER TWO: LITERATURE REVIEW

2.1. Blood transfusion

Blood transfusions worldwide currently attracted the attention of the scientific communities as it face challenges due to several factors. The most of which are transfusion transmissible infections, such as HIV (Human Immune Deficiency Viruses), HBV (Hepatitis B Viruses), HCV (Hepatitis C Vruses), syphilis, and malaria. These have provoked a greatly heightened emphasis on safety with inescapable implications for the complexity and cost of providing a transfusion service (16). The other biggest challenges to blood safety particularly in Sub-Saharan Africa are accessing safe and adequate quantities of blood and blood products (17). Moreover, communities in Africa still face several other enduring challenges such as chronic blood shortages, high prevalence of TTIs, lack of national blood transfusion services, recruitment and retention of voluntary non-remunerated donors, family replacement and commercial blood donation, and inadequate use of pharmacological and no pharmacological alternatives to allogeneic blood. Addressing these challenges should be a central priority for most blood transfusion services, particularly in Sub-Saharan African countries, to ensure the uninterrupted supply of safe blood and blood products (18). The need for blood is presently increasing due to the following reasons (19). : One it is needed for improved and accurate diagnosis of complex diseases and treatment modalities. The second by an increase number of ageing population with increased blood needs. The third is that there is shortage of active blood donors to meet increased demands of the blood in particular in our setting, where the blood banks stock is dependent on the replacement donors. Finally, it can be forecasted that, there will be a high demand for blood & blood components in this era of our MGDTP program at the country leve(l).

2.2. Challenges of recruitment of voluntary non-remunerated donors

Globally, approximately 80 million units of blood were donated each year (18), Of this total, only two million units are donated in Sub-Saharan Africa, where the need for blood transfusions is great because of maternal morbidity, malnutrition, and a heavy burden of infectious diseases such as malaria (18). Several factors have led to the World Health Assembly resolutions WHA28.723 and WHA58.134 urging member states to develop national blood transfusion services based on voluntary non-remunerated blood donation: the

chronic shortage of safe blood and blood products particularly in low-and medium-income countries; the need to prevent transmission of HIV and other blood-borne pathogens through unsafe blood and blood-product transfusions by collecting blood only from donors at the lowest risk of carrying such infectious agents; and the recognition that voluntary, non-remunerated blood donation is the cornerstone of a safe and adequate national blood supply that meets the transfusion requirements of all patients (20).

The collection of blood only from voluntary, non-remunerated blood donors is an important measure for ensuring the safety, quality, availability, and accessibility of blood transfusion. Innovative ways to recruit and retain voluntary donors in Sub-Saharan Africa include: celebration of the gift of blood donation; recognition of voluntary blood donors; increasing public awareness of voluntary non-remunerated blood donation; educating the public on the importance of regular, voluntary, non-remunerated blood donation; educating the public on the benefits of voluntary non-remunerated blood donation to recipients; promoting healthy living (nutrition, exercise, lifestyle); and provision of non-cash incentives to encourage people to donate blood (21).

Blood safety remains an issue of major concern in transfusion practice in most countries in Sub-Saharan Africa where national blood transfusion services and policies, appropriate infrastructure, trained personnel, and financial resources are inadequate to support the running of a voluntary, non-remunerated donor transfusion service. This is further aggravated by the predominance of family replacement and commercially remunerated blood donors, rather than regular, benevolent, non-remunerated donors who give blood through altruism. Despite recommendations that all blood donors should be voluntary and non-remunerated, replacement donors are common throughout Sub-Saharan Africa (22). The primary steps of setting up a national blood transfusion program include: the enactment of a national policy for the blood transfusion service with time-bound programs; a centrally coordinated, structured, and organized blood transfusion service under a defined authority for a country/state; a blood transfusion service based on an organized voluntary blood donor program; screening blood for TTIs appropriate to the region; appropriate and evidence-based use of available blood and blood products; and employment and retention of qualified personnel to lead and manage the blood transfusion services. In many countries in Sub-Saharan Africa, most of these steps are

in place, and sometimes there are none (23). There is lack of political will and open-mindedness to innovative ways to improve supply and safety of blood from voluntary donors. The effect of this failure in the stewardship of blood and blood products is that the incidence of TTIs is generally high. Blood transfusions are a substantial source of HIV in Sub-Saharan Africa especially among women with pregnancy-related complications and children with malaria and malnutrition-associated anemia. The maintenance of a high-quality blood supply depends on blood volunteers, government funding of blood services, adequate supervision of commercial blood supplies, and professionals who collect, test, and supply safe blood (24).

In a bid to making blood transfusion safe in African Countries, the US President's Emergency Plan for AIDS Relief (PEPFAR) in 2004 provided technical and financial support to strengthen national blood transfusion services in 14 countries in Africa and the Caribbean with high prevalence of HIV infection (24). PEPFAR has supported efforts to improve blood supply adequacy and safety by providing policy guidance, strengthening laboratory infrastructure, and enhancing blood donor recruitment and retention practices (25).

Assessment carried out on data collected by national blood transfusion services in these 14 countries during 2003 to 2007 found that national policies had been established in 12 of the 14 countries; the number of whole blood units collected had increased in all 14 countries, the percentage of collections from voluntary, non-remunerated donors had increased and the percentage of collected blood units reactive for HIV had decreased in 13 of the 14 countries. In most developed countries, safe, low-risk voluntary donated blood and blood products are supplied by the national blood transfusion service. Evidence of good practice from these countries is a clear indication that with political will and open mindedness to evidence-based practices, it is possible to run a safe national blood transfusion service involving a voluntary, low-risk, non-remunerated blood program in most countries in Sub-Saharan Africa(26). Some countries in Sub-Saharan Africa are already implementing best practices in blood transfusion. Burkina Faso is a continental West African country of approximately 16 million people whose transfusion needs are covered by 66,210 blood units collected mostly in 4 regional transfusion centers, which are part of a national network, and also from hospital-based smaller blood centers. The first group of blood centers relies almost exclusively on volunteer, non-remunerated, blood donors, only approximately 32.7% of whom are repeat donors (27).

The Kumasi Teaching Hospital Blood Centre in Ghana and a local FM radio station recently developed a partnership calling 3 times a year for donation at the radio station where music, entertainment, and token gifts are available is one of the donor motivation and best experiences that is based on the principles of volunteer, non- remunerated, blood donors motivation practices that needs to be developed and shared with other African countries where an availability of the donors blood is low. A total of 3801 donors attended the program and 92% of the potential FM donors were eligible to donate (28). The use of a culturally and socially adapted environment to make the gift of blood a pleasurable and festive experience can generate a new pool of blood donors and spontaneously repeating donations. Several countries in Africa can learn from good practice in other sister countries that are already implementing a national blood transfusion program based on voluntary non-remunerated donors (29). Voluntary non-remunerated blood donors are considered safer than family replacement donors and, in particular, commercial or professional donors. Establishing a panel of regular, voluntary, non-remunerated blood donors is therefore the most effective way of ensuring adequate ongoing supplies of safe blood. Education is an essential part of a donor recruitment strategy. A donor education motivation and recruitment campaign has 3 basic goals: to promote changes in the public's knowledge, attitudes, and beliefs so that they understand why blood donation is a vital, life-saving service to the community; to promote changes in people's behavior so that they become willing to donate blood on a regular, voluntary basis, without payment; and to ensure that potential donors understand the importance of safe blood so that they do not donate blood if they are in poor health or at risk of transmitting TTIs. Educational material such as leaflets, posters, films, and videos play an important part in donor recruitment campaigns (30).

Developing countries face considerable obstacles to ensuring a safe blood supply and safe blood transfusions. Because developing countries tend to have inadequate available blood supplies, they depend on family blood donors. A family replacement donor is one who gives blood when it is required by a member of the donor's family or community. One disadvantage of this method of blood donation is that patients or their relatives are under intense strain when the patient is admitted to hospital. Being expected to provide replacement donors puts additional responsibility and stress on relatives, and there is undue pressure on family members to give blood, even when they know that donating blood may affect their own health

or that they may be potentially at risk of transmitting TTIs. A country's transfusion needs cannot easily be met by relying solely on family replacement donations. The World Health Assembly recommended that reliance on replacement donations should be phased out due to their association with an increased risk of TTIs.(31,32) Meeting the transfusion needs of recipients is challenging because donated blood may not necessarily be replaced in type or quantity. This leaves relatives who cannot find suitable donors with no other option than to seek commercially remunerated, high-risk blood donors. Blood donated by certain relatives, particularly spouses of women of child-bearing age, can put their wives/partners potentially at risk of producing antibodies to clinically significant antigens that the husband and the developing fetus may have but which the wife lacks (33). There are increasing concerns about the sustainability of centralized voluntary donor systems and their compatibility with the suboptimal level of healthcare facilities existing in many Sub-Saharan African countries, yet burdening patients' families with the responsibility of finding replacement blood donors will exacerbate poverty and reduce the safety of the blood supply. Blood safety remains an issue of major concern in transfusion practice in most countries in Sub-Saharan Africa. This is further aggravated by the predominance of commercially remunerated blood donors, rather than regular, benevolent, non-remunerated donors who give blood as a result of altruism. Reports in most countries in Sub-Saharan Africa have indicated a high prevalence of TTIs among commercially remunerated blood donors. Commercially remunerated donors often come from the poorest sectors of the economy, may be poor in health, are more likely to give blood more often than recommended, and are also at a higher risk of being undernourished and having a TTI from high-risk behaviors such as maintenance of multiple sex partners, intravenous drug abuse, and unprotected sexual intercourse(34).

2.3 Challenge of transfusion transmissible infections

2.2.1 Syphilis

Over the years, much controversy has arisen over the need for syphilis testing of blood donors. Although the American Association of Blood Banks initially dropped its recommendation that donors be tested for syphilis in 1978, the US Food and Drug administration (FDA) has maintained this requirement. This FDA decision was reinforced by

the HIV epidemic. It is now recommended in most countries that surrogate testing including syphilis should be done to prevent those at risk from donating blood (35).

2.2.2 Malaria

Although rare, malaria is probably the most commonly recognized parasitic complication of transfusion. Malaria parasites survive for at least a week in components stored at room temperature or at 4^0c. Asymptomatic carriers are generally the sources of transfusion-transmissible malaria. Since healthy blood donors are selected for blood donation, the density of the parasite is usually very less, if present and hence may be missed. Thus, in endemic areas it is recommended that chemoprophylaxis should be given to all recipients. In non-endemic area, screening donors by travel history can exclude asymptomatic carriers. Malaria remains a rare but serious complication of transfusion because of the asymptomatic persistence of the parasite in some donors from an endemic area (35).

2.2.3 Viruses

2.3.1.1 Hepatitis viruses

Transfusion related hepatitis is almost exclusively caused by viruses. These viruses include hepatitis A through E (HAV, HBV, HCV, and HDV & HEV), cytomegalo-viruses (CMV), and Epstein barviruses (EBV). The incidence of HAV varies significantly with age. The highest incidence rates are seen in children in age group of 5-15 years accounting for 30% of all cases. (36).

2.3.2 Human immunodeficiency viruses

The transmission of human immunodeficiency viruses through blood transfusion and the consequent emergence of transfusion associated acquired immunodeficiency syndrome (AIDS) epidemic have arguably transformed the field of transfusion medicine over past several decades. The rate of confirmed positive infections detected among blood donors decline markedly due to notification & deferral of repeat donations from individuals who have tested positive, to exclude at risk donors (37).

Today, donor evaluation, laboratory screening tests and pathogen inactivation procedures are considered crucial tools to reduce the risk of TTI, but do not completely eliminate all risk. Although the risk of transfusion-transmitted infections today is, lower than ever, the supply of

safe blood products remains subject to contamination with known and yet to be identified human pathogens. Only continuous improvement and implementation of donor selection, sensitive screening tests and effective inactivation procedures can ensure the elimination, or at least reduction, of the risk of acquiring transfusion transmitted infections (38). In addition, ongoing education and up-to-date information regarding infectious agents that are potentially transmitted via blood components is necessary to promote the reporting of adverse events, an important component of transfusion transmitted disease surveillance. Thus, the collaboration of all parties involved in transfusion medicine, including national haemovigilance systems, is crucial for protecting a secure blood product supply from known and emerging blood-borne pathogens (39).

When the world did not have the correct understanding on how to prepare blood components the shortage of any of the blood components was treated by an administering the whole blood. This meant that the patient received a host of unwanted cells from someone else just to cater the shortage of specific cells/or factors. Nevertheless, as the science of transfusion Medicine evolved, the blood banks learnt how to separate and use the components of the blood as per their clinical indications (40). For instances; blood components can be appropriately utilized in a clinical practices as per indicated.

Today blood from the donor is separated in to its various different types of cells& plasma fractions that it is constituted of and now the patient is given only the blood component that is in shortage in his or her body. When we use blood components, only the required cells or components are transfused leading to the suppression of un-necessary reactions and problems for the recipient (patient). It also increases an optimum utilization of the donated whole blood. For example, Whole blood stored for more than 6hrs does not provide therapeutic platelet transfusion, nor does it contain therapeutic amounts of labile coagulation factor *V* and *VIII* (41, 42).

2.4. Advantages of blood components therapy

There are several advantages of blood components therapy (43)**.** These include the following.The first is that recipient can be treated with only those blood components that are lacking, reducing the occurrence of adverse transfusion reactions. The second is that more

than one patient can be treated with blood components derived from a single donation (one unit). Thirdly, the therapeutic support for patients with special transfusion requirements can be provided, for example plasma that often is not directly needed for transfusion can be used to manufacturing of factor ***VIII*** concentrate for hemophilia A patients. The fourth advantage is that improved quality and functional capacity of each component will be maintained when varied storage conditions and shelf lives were applied. Finally it avoids the risks of sensitizing the patients to other blood components, provides optimal therapeutic benefit, while, reducing risk of volume over load and increase availability of needed blood products to larger population (44).

Table 2.Summary of Blood Components, their Indications, and Applicable Precautions.

Blood Components	**Indications**	**Action**	**Not Indicated**	**Precautions**	**Associated Hazards**
1.packed red blood Cells	symptomatic anemia, Almost always for hemoglobin <6 g/dL Rarely for hemoglobin >10 g/dL	Restores o_2-carrying capacity, Improve oxygen-carrying,	Pharmacologicallytreatable anemia	must be ABO compatible	infectious disease; sepsis; allergic reactions; acute lung injury; circulatory overload; allo-immunization to the red cell antigens
2.fresh frozen plasma and 24hr plasma	deficit of labile and/or stable coagulation factors; severe deficit of proteins,Microvascular bleeding due to clotting factor (20-30 min) deficiency International normalized ratio >2 ×	Replaces labile and/or stable coagulation factors	simple volume replacement	should be ABO compatible	infectious disease; sepsis; allergic reactions; acute lung reactions; acute lung reactions; acute lung injury; circulatory Overload

	normal Activated partial thromboplastin time >1.5 × normal				
3.cryoprecipite	hypofibrinogenemia; Microvascular bleeding due to fibrinogen defici. Fibrinogen<80-100 mg/dL selected platelet dysfunctions, including renal failure and selected cases of vWD ; factor xiii deficiency; may be used as part of fibrin glue,	Provides Fibrinogen Factor xiii, and vWF	other coagulation abnormalities	for pooled cryoprecipitate, ABO compatibility Should be considered	infectious disease; sepsis; allergic reactions; acute lung injury

4.pooled platelets and platelets by Apheresis	bleeding due to thrombocyto penia or platelet dysfunction; prophylaxis in patients with < 30 - 50,000/ prior to an invasive procedure or with <5-10,000/ µl Microvascular bleeding with platelet counts <50,000 cells/µL	Provides Viable platelets with normal function; restores primary hemostasis	Thrombocyto penia due to platelet destruction (ITP,TTP) in the absence of severe bleeding	ABO compatibilit y should be considered	infectious disease; sepsis; allergic reactions; acute lung injury; circulatory overload; alloimmunization to HLA and platelet antigens
5.granulocy tes conc.	severe neutropenia (< 500 pmn/µl) with Sepsis	Provides Viable Granulocyt es	infections responsive to antibiotics alone	must be ABO compatible; do not use a leukoreducti on filter	infectious disease; sepsis ; acute lung injury ; circulatory Overload

(Source; available

at *www.wadsworth.org/labcert/blood_tissue/blood_services_guidelines.htm).*

2.5. Principles of Blood Transfusion Therapy

Several studies have been described the principles of blood transfusion therapy which can be summarized as listed next (46).

1. Whole blood generally indicated for patients who need both increased oxygen-carrying capacity and restoration of blood volume when there is no time to prepare or to obtain the specific blood component that is clinically indicated (45).

2. Packed RBCs Should be transfused over 2 – 3 hours, if a patient cannot tolerate volume over a maximum of 4 hours; it may be necessary to the blood banks divide a unit in to smaller volumes, providing proper refrigeration of remaining blood until needed. One unit of packed red cells should raise hemoglobin level approximately 1% and hematocrit by 3%.
3. Platelets: administer as rapidly as tolerated (usually 4 units every 30 – 60 minutes). Each unit of platelets should raise the recipient's platelet count by 6000 to 10,000 /mm3. However, poor incremental increases occur with alloimmunization from previous transfusions, bleeding, fever, infection, autoimmune destruction, and hypertension.
4. Granulocytes are: indicated for severely granulocytopenic patients (with a WBC count ≤500 /mm^3) that is not responding to antibiotic therapy and who are expected to experienced prolonged suppressed granulocyte production (47).
5. Plasma: since it carries a risk of hepatitis equal to that of whole blood, if only volume expansion is required, other colloids (such as Albumin) or electrolyte solutions (like ringer's lactate) are preferred. Fresh frozen plasma should be administered as rapidly as tolerated because the coagulation factors become unstable after thawing.
6. Albumin: a large protein molecule. It contributes to plasma oncotic pressure. Indicated to expand to blood volume of patients in hypovolemic shock in patients with hypo-alburainemia.
7. Cryoprecipitate: indicated for the treatment of hemophilia A, von will brand's disease, disseminated intravascular coagulation (DIC) and uremic bleeding.
8. Factor *IX* concentrate: indicated for the treatment of hemophilia B.
9. Factor *VIII* concentrate: indicated for treatment of hemophilia A.
10. Prothrombin complex: indicated in congenital or acquired deficiencies of these factors.

CHAPTER THREE: OBJECTIVES OF THE STUDY

3.1 General Objective

To assess a practices of blood transfusion at Jimma University Medical Center(JUMC) from February 1st to 30th June 2018.

3.2 Specific Objectives

- To assess the current transfusion practice of JUMC
- To identify the gap between the blood request verses its supply/delivery in a JUMC
- To assess whether the freely donated blood resources are ethically and appropriately used.
- To assess whether blood products are used correctly based on the clinical demands of of a recipient.

CHAPTER FOUR: METHODOLOGY

The study was carried out in JUMC, Jimma. The patients of all age groups admitted in various wards of the medical center for whom transfusion was indicated included into the study. Patient's clinical data were collected using checklist material prepared for the purpose of the study. The patients' data were then entered to statistical software for final analysis. The laboratory and clinical data collected included the age, sex, clinical department, clinical history, blood components indicated and administered, consent issues pretransfusionHb level of the patients were recorded and entered into statistical software. Data were collected in the blood bank laboratory of the medical center.

Checklists and questionnaires were used to collect patient's clinical data and other relevant information the recipients includes age, sex , pre transfusion HB value, wards of admission , clinical history , blood components indicated , blood component actually administered, the type of the source of the blood, prescribing physician, and an involvement of the patients in decision making process .

4.2 Study design and period

A facility based cross sectional study was done from February 1st to 30th June, 2019.The data collected coverd all aspects of a blood and blood components transfusion practices (i.e. indication for transfusion, blood components indicated and administered) during the study period and were compared with the clinical demands of a recipient.

4.3 Source population

All patients attending their medical care at JUMC during the study period was the source population.

4.3.1 Study Population

The study participants were patients who received a blood transfusion intervention during the study period.

4.3.1. Eligibility criteria

4.3.1.1 Inclusion criteria

- Anypatient for whom a blood transfusion intervention is clinically indicated and blood was requested during the study period was included in to the study. Since this study involves human subjects, it purely depends on the interest of the study participants. Whether take part in this study or not is entirely the choice of the participants.

4.3.1.2 Exclusion criteria

Physicians and the patients who are not fully volunteerly willing to participate in the study were excluded.

4.4 Sampling Technique and Sample Size

4.4.1. Sampling techniques

Consecutive sampling technique were applied in which all the study units that were available during the study were included to participate into the study.

4.4.2. Sample size determination

The source populations included all the community in a catchment area and physicians working at JUMC. The number of respondent (cases) to be included into the study werefour hundred twenty five as determined using single population proportion formula indicated below. The sample size calculation considers important assumptions such as 95% confidence of interval, 0.5% margin of error and 50% prevalence of relevance (appropriateness). The assumptions were taken in to account because there was no similar study or no piloting study conducted. Hence;

$$n = \frac{(Z\alpha/2)2\ p\ (1-p)}{d^2}$$

Where,

$(Z\alpha/2)$ = Reliability coefficient = 1.96

n = Sample size

p = 50% this is because similar studies were difficult to find and taking the assumption that only 50% of the transfusion given appropriately.

d = assumed marginal error (5%)

$$n = \frac{(1.96)^2 (0.50) (0.50)}{(0.05)^2} = 384$$

10 % non-response rate will be added to the final sample size.

Accordingly,

n = 384 + 10/100(384) = 384 + 38= 425

Therefore, the final sample size included into the study were four hundreds twenty fivetransfusion episode which were recruited from the various departments of the medical center consequently until the needed number of cases were obtained.

4.5. Data collection procedures

The data tool were prepared in English language and further modified after pretest was conducted. Personnel like BSc nurse assigned at the wards and the hospital's emergency department; the lab technician assigned at the blood bank and the principal investigator were involved in the data collection process. In addition, supervisions were made by the principal investigator and advisors during the process of data collection and entry.

4.6. Data quality assurance and monitoring

The following measures were undertaken in order to control the quality of the data that focuses on the purposes and procedures of the study, ensuring confidentiality of the study participants. All information related to the study was explained to the participants. Appropriately, designed and pre-tested data collection instruments were used. The collected data were being reviewed on daily bases and checked for completeness and consistency. Validity and completeness of the overall study were supervised by advisors.

4.7. Oprational definition

- **Appropriate blood transfusion** -The transfusion of safe blood or blood products to treat a condition leading to significant morbidity or mortality that cannot be prevented or managed effectively by other means.Things that should be considered to say a transfusion is appropriate; when an anemic patient is given a blood transfusion as per its clinical ndication, and only that component lacking is replaced for instance for anemic patient at hemoglobin level of $\leq$ 7 gdl and only PRBCs and so on, quantity, kind as per its clinical indications, and finally when there is an involvement (shared decisions) with a recipient (consented)(2).

- **Blood components**: a therapeutic portions of a blood that can be separated differently into specific therapeutic units from a donated unit of whole blood,.
- **Blood components therapy**: the therapeutic use of specific portions or components of blood to treat specific deficiency.
- **Fresh frozen plasma**: a fluid portion of a one unit human blood that has been centrifuged, separated and frozen solid at -18 ^{0}c.

- **Liberal transfusion trigger**: a blood transfusion strategy when a patient's hemoglobin level of 10 to 12 g/ dL [100 to 120 g per L]).

- **Massive transfusion** – This refers to the replacement of the entire blood volume within a 24-hour period.
- **Packed RBCs**: red blood cells that have been collected, processed, and stored in bags as blood product unit available for blood transfusion.

- **Paid or commercial donors:** are blood donors that give blood in return for payment or other benefits that satisfy a basic need or can be sold, converted into cash or transferred to another person. They often give blood regularly and may even have a contract with a blood bank to supply blood for an agreed fee. Alternatively, they may

sell their blood to more than one blood bank or approach patients' families and try to sell their services by posing as family/replacement donors.

- **Platelets concentrate**: platelet prepared from a single unit of whole blood or plasma and suspended in a specific volume of the original plasma.

- **Random donor platelet:** A platelet unit that is prepared from a single blood unit (350 ml/450 ml). It can be either in form of platelet-rich plasma-platelet concentrate (PRP-PC), buffy coat-reduced platelet concentrate (BC-PC) or platelet-rich plasma (PRP).
- **Restrictive transfusion triggers:** a blood transfusion strategy at patient'shemoglobin level of (7 to 9 g / dL [70 to 90 g per L])

- **Single donor apheresis platelet**: A platelet unit that is prepared from a single donor with the aid of automated cell separator having a platelet dose equivalent to 4-6 RDPs.
- **Transfusion episode:** Each transfusion event in which a patient was transfused.

- **Voluntary non-remunerated blood** donor gives blood, plasma or cellular components of his or her own free will and receives no payment, either in the form of cash or in kind which could be considered a substitute for money. This would include time off work other than that reasonably needed for the donation and travel. Small tokens, refreshments and reimbursements of direct travel costs are compatible with voluntary, non-remunerated donation.

- **Whole blood**: a unit of a donor's blood that has not been separated into its valuable therapeutic blood components.
- **Unit t of transfused material** - is the amount retrieved from a single donation. Thus, a unit of red cells, platelets, white cells, or plasma is the amount recovered from a donated "unit" (450 ml for adults and 350 ml for child) unit of blood.

4.10. Study Variables

Dependent Variables

Blood transfusion practices

Independent Variables

Age, Sex, departments(clinical ward)	Sources of the blood for transfusion
Experiences of the physician	Availability of the blood
Blood components indicated	Hospital transfusion committee
Blood component administered	Hospital blood transfusion guideline
Consent for blood transfusion	ABO blood group
PretransfusionHb.	Nature of surgical intervention

4.11. Data analysis and interpretation

After the collection of data, completeness and consistency of each of the check lists were checked, coded and organized. Then the collected data were entered in to SPSS version 20.0 software packages for analysis in order to determine the defined study objectives. Descriptive summaries were used to describe the study variables.

4.12. Ethical Consideration

Ethical clearance was obtained from Jimma University Research and Ethics Review committee and an informed consent was also obtained from all the participants and interviewed physicians.

4.13.Strength and limitations of the study

Strength: The study was prospectively under taken;so included all aspects of informations required;data ammendements were on spot.

Limitations: Type of study design

Sample size

Study perod and area

CHAPTER FIVE: RESULT

5.1 Patients demographic characteristics

This study included 425 patients who had blood transfusion during the defined study period from February 1st to 30th June,2018 in different clinical specialties of the medical center. A total of 425 transfusion episodes (one unit of blood product was considered as one transfusion episode) were evaluated. Among the patients for whom transfusion were requested and blood cross match was done, 63.4% (270) of the participants in this study were female patients.

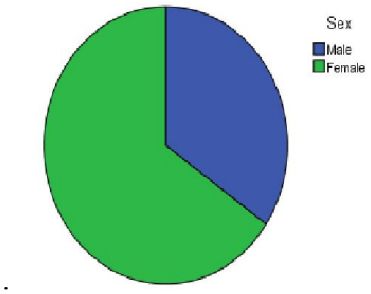

Figure 1 Sex -wise Distribution Of The Blood Transfusion Recipients JUMC, Southwest Ethiopia (February – June 2018).

In JMC blood and its teraputic components are used in different clinical wards. The frequency of usage of these biological resource vary among those clinical departments. The wards that use transfusion more frequebtly is medical ward with 46.9% (199) and minimum usage of blood transfusion in emergency OPD 0.7% (3) (Table 1).

Table 1**:** Distribution of blood consumption by ward of admission, JUMC, Southwest Ethiopia (February – June 2018).

Ward	Frequency	%
Medical	199	46.8
Surgical	92	21.6
maternity	76	17.9
pediatrics	55	12.9
Em*-OPD	3	0.7
Total	425	100

*emergency OPD

Of these 425 transfusions, 77.9% (331) were considered appropriate since the patients had a pretransfusionhemoglobin levels of 8gm/dl or lower. In 86 of the patients, although the hemoglobin was greater than 8gm/dl, the transfusion was deemed appropriate because of the clinical sign and symptoms, comorbidity or on spot bleeding of the patient. However, 94(22.1%) of the transfusion episodes were considered to beinappropriate (Table 6).

In this study, although there is no institutional guideline on blood transfusion practices, we took hemoglobin trigger of 7gm/dl. though few studies suggest a lower threshold. The assumption was to get an initial insight into the actual transfusion practices in the hospital before possible re-drawing of the thresholds.

The study showed that, high variability of ABO and Rh blood group distributions among the study population with predominances of an O blood group followed by A (table 2).

Table 2 Frequency distribution of ABO and RH blood groups among the study participants , JMC, Southwest Ethiopia (February – June 2018).

ABO & RH blood group	Sex		Total N (%)
	Male N (%)	Female N (%)	
A+	43(29.3)	94(33.8)	137(32.2)
A –	3(2)	14(5.0)	17(4)
B^+	27(18.4)	42(15.1)	69(16.2)
B^-	4(2.7)	0(0)	4(0.94)
AB+	6(4.1)	17(6.1)	23(5.4)
O+	61(41.5)	104(37.4)	165(38.8)
O-	3(2.0)	7(2.5)	10(2.3)
Total	147(100)	278(100)	425

Of total 412 whole blood, highest number of units 192 (46.6 %) were utilized in medical ward followed by surgical 90 (21.8%). Of total 8 PRBCs, highest number of units 4 (50 %) were utilised in medicine followed by surgery,GYN-OB,pediatrics and emergency OPD equally shared the rest amount of blood products 1(12.5%). Of the total three units of PCS, (66.7%) two units were utilised in medicine and 1 ((33.3 %)unit is used by surgical ward.

Table 2 Utilization of blood components as per different clinical departments , JUMC, Southwest Ethiopia (February – June 2018).

Specialty	Whole blood		PRBCs		FFP		PLTs conc.	
	N	%	N	%	N	%	N	%
Medicine	192	46.6	4	50	1	50	2	66.7
Surgery	90	21.8	1	12.5	0	0	1	33.3
GYN-OB	74	17.9	1	12.5	1	50	0	0
Pediatrics	54	13.1	1	12.5	0	0	0	0
Em-OPD	2	0.5	1	12.5	0	0	0	0
Total	412	100	8	100	2	100	3	100

*Em=emergency

Although the distribution of ABO & RH blood groups are proportional within the community ; there is a high tendency of clinical utilizations of an O blood group in a clinical practices (table 4).

Table 4 : Frequency distribution of ABO & RH blood group of an administered blood products , JMC, Southwest Ethiopia (February – June 2018).

Blood group	Frequency	Percent
A+	132	31.1
A-	13	3.1
B+	65	15.3
B-	4	0.9
O+	176	41.4
O-	14	3.3
AB+	21	4.9
Total	425	100

5.2 Consent Issues

Among the patients for whom a blood transfusion is planned ; though majorities are given an oral informed consents, still some of the cases are being transfused with blood components with out recipients full involvement (table 5).

Table 5 consent issues on blood transfusion practice by the patients , JMC, Southwest Ethiopia (February – June 2018

Consented	Frequency	Percent
Yes	357	84
No	68	16
Total	425	100

Of the total components issued 77.9% (331) were used appropriately and 94 (22.1%) were administered inappropriately. Out of 8 PRC units issued 7 (87.5%) were appropriate and 1 (12.5 %) were inappropriate. All the FFP were appropriately utilized as per the clinical indications for the recipient. Out of three PC units issued only one 33.3 %(None) were appropriate and two (66.7%) were inappropriate. There was no an inappropriate episode of cryoprecipitate transfusion and FFP (table 6).

Table 6 Distribution of appropriate and inappropriate use of blood components , JMC, Southwest Ethiopia (February – June 2018

Blood	**Appropriate**		**in appropriate**		**Total**	
component	**N**	**%**	**N**	**%**	N	%
Whole blood	321	77.9	91	22.1	412	96.9
PRBCs	7	87.5	1	12.5	8	1.9
FFP	2	100	0	0	2	0.5
PLT conc.	1	33.3	2	66.7	3	0.7
Total	331	77.8	94	22.1	425	100

Of total 425 blood requisitions the higest number of the cases diagnosed for anemia 368 (86.8%) followed by hematologic maliginancy 21(4.9%),haemolytic diseases of the new born 18(4.2%) ,other hematological disorders accounted for 12(2.8%) and lastly blood requisitions due to surgery and surgical procedure acounted only for 6(1.4%) of the total

blood consumption respectively(table 7).

Table 7 Distribution of clinical uses of blood components by diagnosis , JUMC, Southwest Ethiopia (February – June 2018).

Primary diagnosis	Components administered				Total
	Whole blood N %	PRBCs N %	FFP N %	Plt.conc N %	N %
Anemia	359 (87.1)	7(87.5)	0	2(66.7)	368(86.6)
Hematologic malignancy (ALL, AML)	20(4.9)	0	1(50)	0	21(4.9)
Surgery	5(1.2)	0	1(50)	0	6(1.4)
HDN	16(3.9)	1(12.5)	0	1(33.3)	18(4.2)
Other hematological disorders*	12(2.9)	0	0	0	12(2.8)
Total	412(100)	8(100)	2(100)	3(100)	425(100)

***hemophilia A, ITP, PVC, pediatric oncology, Bicytopenia.**

CHAPTER SIX-DISCUSSION

The transfusion of blood and its therapeutic components plays an imperative role in the management of various pathologies and is sometimes a life-saving treatment. Hence; it is indispensable that blood and its therapeutic components are used appropriately, and there is a mechanism to monitor the "appropriateness" of its use. It was in this context that a prospective study was conducted to evaluate the appropriate use of blood resources, with in a large medical center setting, JUMC. In this study, a 425 transfusion episodes across the various departments were evaluated regarding the general blood transfusion practices.

We used an algorithmic approach that encompasses the guidelines(national and international) and expert's opinion to decide upon the "appropriateness" of each transfusion episode in contrast to several other previous studieswhich have used only a hemoglobin trigger to decide on appropriateness or otherwise. Besides hemoglobin, clinical history , sign and symptom, comorbidity, nature of the surgical intervention undertaken , blood components indicated vs. administered, blood prescriber and imminent blood loss and an involvements of the patient in decision making (informed consent) and related criteria were also considered in the algorithmic decision-making approach [Table 2]. This approach was based on the guideline on appropriate clinical uses of blood by the WHO published in 2006 and expertise opinion.

The overall percentage of appropriate transfusion in this study was 77.9% (331/425). This is much higher than the other published reports, Richa and Chetna(2017)(5) showed that appropriate clinical use of red cell as 60.21%,while another study conducted by Wade et al(2017)showed appropriate red cell use as 64.5%.(12).This high range of differences might be due to some criteria differences used to evaluate the practice; since both of these studies used only hemoglobin trigger to decide upon "appropriateness." However; in our study we used an algorithmic approach as decteted by WHO guideline(2014) which encompasses different criteria on the basis of parameters other than hemoglobin trigger (including the patient's clinical sign & symptoms, indication for transfusion , blood components indicated vs transfused, consent issues, clinical status of the patient ,prescribing physician, comorbidity, and imminent bleeding were considered, evaluated and graded using checklists).

The survey of the patterns of the clinical uses of blood or its therapeutic components by clinical department showed that a majority of the transfusions about 199(47%) of a blood resources are utilized by medical department and blood resources are occasionally requested at emergency OPD which only accounted 3 (0.7%).(table 3) of all blood consumption by the clinical departments.

A total of 339 units (79.2%) were transfused in patients with a hemoglobin of lower than 8 g/dL and were deemed appropriate in this study. Further 164 units though transfused at hemoglobin of greater than 8 g/dL were deemed appropriate because the patients were symptomatic anemia with comorbidity and imminent blood loss 98.6% (419).

Appropriate use based on the various prerequisites including (low hemoglobin, symptomatic anemia, comorbidity, and impending blood loss, prescriber, informed consent and the like totaled 77.9% (331/425).This implicated, the rest 22.1% (94) of the blood resources were prescribed and clinically utilized inappropriately.

Recipients who are being treated with an inappropriate blood products, are prone to various risks of a blood transfusion including : transmission of infectious agents, psychological , physiological and pathological risks.

As transfusion is associated with various risks, clinician should weigh the risks of transfusion against risks of not transfusing. In developing countries there are also limited resources of blood and increasing demand, hence it is necessary to make an efficient use of blood when its clinically sounding(3).

The overall percentage of appropriate transfusion in this study was 77.9% (331/425). This is much higher than the other published reports;for inistance, Richa and Chetna(2017)(5)showed that appropriate clinical use of red cell as 60.21% , while another study conducted by Wade et al(2017) showed appropriate red cell use as 64.5%.(12); this high range of differences might be due to some criteria differences used to evaluate the practice; since both of these studies used only hemoglobin trigger to decide upon “appropriateness.” But ours used an algorithmic approach which encompasses different criteria on the basis of parameters other than hemoglobin trigger (including the patient’s clinical sign &symptoms, indication for transfusion , blood components indicated vs transfused, consent issues, clinical status of the

patient ,prescribing physician, comorbidity, and imminent bleeding were considered, evaluated and graded using checklists).

We also suggest that appropriate use may also be influenced by the type of hospital and training of prescribing physicians. Our hospital is a large tertiary care medical center in the southwestern region of the country with several ordering physicians from GP (General Practitionar) doctors up to specialists of various disciplines who trained at different levels of specialties and who were possibly better informed about "appropriate" use of blood resources. This study also indicated that about 16 % of the patients did n't get involved in shared decision making (being treated by the physician decision rule alone). This is quite possible since the medical center doesn't have institutional blood transfusion committee and blood transfusion guideline which are an important input for improving the practice.An appropriatnesses of a blood transfusion depends on several variables such as the pretransfusion hematological parameters of the recipients of the unit, age, ,ethical issues(consent for blood transfusion by the patients) and other clinical parameters. In this practical observations the most common blood group observed in the blood (blood components) recipients was O Rhesus Positive 38.8% (165/425) while the least was AB Rhesus Negative 0. 0 %.

Although almost all patients were being treated with group specific blood/blood components, but there were cases where recipients are given blood type O (table 4).

CHPATER SEVEN:CONCLUSION ANDECOMMONDATIONS

7.1 CONCLUSION

The clinical use of blood or therapeutic blood components in the medical center was largely appropriate (77.9%). These “appropriate uses” may further be enhanced by formulating hospital specific blood transfusion guidelines and committee and through steady awareness creations to the blood prescribing physicians. This large percent might be due to the evaluation criteria used for the evaluation of the practice. However, blood resources are still inappropriately administered in a clinical practices by 22.1%.

7.2 RECOMMENDATION

Results from the study revealed that high rate of inappropriate clinical utilization of the blood resources.Inorder to optimize a blood transfusion interventions , the blood center should review current blood transfusion practices and the medical center should prepare its institutional guideline and establishes a committee for blood transfusion that can play its indispensable role in safeguarding the practice and the hospital blood transfusion committee with other stackholders should play its role in safeguarding blood transfusion practices

This information may be useful for the physicians and the blood center to manage their patients and resources in real-life conditions. However, this information is based on sampling in around 425 patients only, and larger controlled trials are needed to confirm these initial findings.The study should be further undertaken including hospitals where a blood transfusion intervantions are undertaken in the region and also compared with similar institutions in the country.

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Annexes

ANNEX-1-Data collection tools for an actively ongoing transfusion:

INTRODUCTION

Dear respondent, I'm a post graduate student at the department of medical laboratory sciences, Jimma University. Currently I'm undertaking a research entitled "trends in a blood transfusion practices and the need assessment for blood components therapy". I confirm you that the information you provided will be kept confidential and only used for the research purpose and used by me, the investigator. Your genuine information will be considered as an essential input to improve the existing blood transfusion practices underway.

Instructions:

1. No need to write your name.
2. For an open ended clinical notes, write clearly and briefly.
3. For a closed ended questions indicate you comment by ticking (√) the alternatives that best matches the patient's clinical demand.

Thank you in advance**!**

Data collection instrument: Case Number----------

The following checklists will be used as a tool for collecting information on a blood transfusion episodes appropriateness of a blood transfusion to support* blood disorders *with the patient's requirements for blood.

1. Demographic data of the *Recipient*

Card number…… Age…….. Gender ……..

Weight …… ABO &RH blood group _____

Status: ambulatory _____, stable_____

Address: OPD_____, Ward_____

PretransfusionHb_____g/dL or Hct_____% for red blood cells

Platelets _____ 10^3 /µL for platelets concentrate

2. Clinical (pre operation) diagnosis----------

3. Intra-operation diagnosis----------

4. Estimated blood loss in mls.....

5. The primary trigger for transfusion in the patient(X):

☐ . Low hemoglobin

☐. Hypovolemia

☐ . Clinician choice

☐.Others:……

6. Donor's ABO & Rh blood group……

clinical diagnosis						
	Whole blood	**PRBCs**	**FFP**	**Cryo. Ppt.**	**Platelets conc.**	**Granu.con.**
7. Blood/ components clinically indicated						
8. No. of units requested						
9. Units cross-matched						
10. N0 of units cross-matched						
11.Units issued out						
12. Units transfused						
13. No of units transfused						
14. Units returned unutilized*						

*Write the reason (s) for non-utilization

15. Estimated duration of blood or blood component in anesthetic tray (Minutes) ----------

16. Any transfusion reactions `noted.....

17. Post transfusion Hb. level ..... g/dl or PCV.....%

18**. Prescriber:**(X one)

- ☐ Medical intern (Dr)
- ☐ Gp (Dr)
- ☐ Specialist (Dr)
- ☐ Others (if)_____

19. Does the request form was completely filled and contains relevant patient information including the recipient's :(X an answer)

Name	☐ yes	☐ No
Identity card number	☐ yes	☐ No
Age/sex	☐ yes	☐ No
Reason for transfusion	☐ yes	☐ No
Blood group (if known)	☐ yes	☐ No
Clinical status	☐ Yes	☐ No
Clinical address	☐ Yes	☐ No

20. Previous transfusion reaction and any other relevant information (if any): (X one)

- ☐ Yes
- ☐ No

21. Is there a CBC test result in the recipient's case note book? (X one)

- ☐ Yes
- ☐ No

22. Was a blood unit cross matched while its released from the hospital's blood bank lab.? (x one)

- ☐ Yes
- ☐ No

If no; justification ---------- and

23. If yes (22) the type of the cross match used during the procedure; which is supposed to be routinely performed in this lab?

☐ Major crossmatch

☐ Minor crossmatch

☐ Both

24. And its type? ☐ Simple slide tilt method ☐ Test tube method

25. Technical habit of adhering to package inserts and other job aid materials available for the typing sera and other critical materials usedin an immunohematological laboratory**.**

☐ Very good

☐ Good

☐ Fair

☐ Less adherence, since it's a routine

26. How frequent that the blood typing sera and other critical materials are used according to the

manufacturers'directions, validation records confirm that theyperform as intended?

☐ Always with every test procedure

☐ When a new batch of reagent is introduced only

☐ As per indicated (i.e. when there is a deviation of a test result)

27.Are there records of acceptable reactivity and specificity of typing sera and reagent cells on each day of use, including a check against known positive and negative cells or anti-sera, or manufacturer's directions for daily quality control are followed?

☐ Yes

☐ Not always

28.Is there someone responsible in the laboratory that specifically assigned in performing each significant step in receiving or collecting, identifying,processing, testing, storing, and distribution of blood and blood components that is responsible to the whole cycle of a blood transfusion processes including results, interpretation?

☐ Yes

☐ No; works are being done by anybody on duty. Hence; only basic info.will be registered

29. Are there an accessible written policy and procedural manual for ABO typing and cross

matching on the bench for the daily test procedures? (X one)

☐ .Usually available and adhered

☐ .Available and exist in a director's office, hence referred when necessary only

☐ Available but not usually referred; because of the routineness of the procedure.

30. Had the patient been informed that the transfusion of blood or components (i.e.: red cells, plasma or platelets) are part of the planned medical intervention, and information about the risks, benefits and available alternatives are discussed?

☐ Yes

☐ No; doctors can decide what is best for their patient's treatment

31. Had the consent been signed on agreement about an intervention?

☐ Yes

☐ No

32. If yes (31) by whom?

☐ The recipient itself

☐ The parents/guardian because the patient is a minor or is unconscious

☐ Not signed

33. Is there a record of the disposition of all blood components, derivatives, including the method
of destruction or transfer of units unsuitable fortransfusion in the hospitals system?

☐ Yes

☐ No

34. Had the blood been transfused to a recipient after a crossmatching?

☐ Yes

☐ No

35. If no to (34) the fate of this cross-matched unit of blood released from the blood bank after compatibility test. (X one)

☐ Stored in a blood bank refrigerator for latter use

☐ Stored in the ward at the patient's bedside for latter use incase transfusion is demanding.

☐ Returned to the hospital's blood bank's stock

36. Is there any immediate type of post transfusion reaction observed/reported from an intervention? (X one)

☐ Yes
☐ No

37. If did not transfused and returned to the hospital's blood bank; within how much minutes of first removal of from a blood bank's refrigerator? (X one).

☐ Within 1hr of removal from the refrigerator

☐ Within 30' of removal from the refrigerator

☐ Any time of that day after procedure was completed

38. Is there a trend of storing a blood in a ward in a domestic refrigerator? (X one)

☐ Yes

☐ No

☐ Some times; when there is a high probability of transfusion and stokes are depleted

39. Are there a hospital's administrative structures with established policies to oversee the hospital's transfusion chain or blood transfusion activities in a hospital? (X one)

☐ Yes

☐ Not at all

☐ Yes; but fragile

40. Any history of previous transfusion to this patient? (X one)

☐ .Yes

☐ .No

41. Does the hospital has a blood transfusion manual guideline that's adopted from the national / international guidelines? (X one)

☐ .Yes

☐ .No

42. Is there a hospital blood transfusion committee that supervises the blood bank adequately and will plan the future needs and oversee all aspects of the transfusion of blood /blood components, including its appropriateness?

☐ .Yes

☐ .No

43. Is there a hospital transfusion committee that monitors the safety, adequacy and reliability of the supply of blood and components?

☐. Yes

☐ . No

44.During last 12 months have a patient had received any of the therapeutic blood components?

☐. Yes

☐. No

45. If yes to question (45) which blood / blood components (X one)

☐ . Whole blood

☐ . PRBCs

☐ . FFP / Plasma

☐ . Cryoprecipitate

46. And which blood component is proposed appropriate for the up next transfusion? (X one)

☐ Whole blood

☐ PRBCs

☐ .FFP / Plasma

☐ . .Cryoprecipitate

47. Final summary/conclusion by an expert on this case scenario that evaluate a given intervention was :(√) ☐ .appropriate

☐ .inappropriate

Any remarking comment (if any)….....

.....

.....

ANNEX II. Information Sheet

Title: Blood transfusion practices and the need assessment for blood components therapy in Jimma University specialized hospital, Jimma south west Ethiopia

Investigator: Tufa Feyissa

The investigator will give detail information to the participant concerning

- Background information

- Objective of the study

- Methodology

- Risks and benefits associated

- Compensation

- The right to withdrawal

- Confidentiality

ANNEX III: Consent form

I, the above-named/parent/guardian/spouse/, have been informed of the need for a blood transfusion of the patient. The attending medical practitioner has explained to me the risk and benefits involved in the transfusion as well as answering all my inquiries satisfactorily. I understand that despite testing and screening on the blood/blood components for HIV, Hepatitis B, Hepatitis C and Syphilis according to established standard, there are still risks of developing the disease. I also understand that unavoidable complications of transfusion may also occur.

I fully understood the above and hereby agree to the blood/blood component transfusion.

…….. ……..

Signature of the patient/ Signature of Attending

Parent/guardian/spouse/ Medical Practitioner

My signature on this consent form means that:

- The objectives, methodology, the contribution of the participants in this research have been explained to me, I have been given the chance to discuss it and ask questions. All of my questions have been answered to my satisfaction,
- I am aware of the minimal risks and benefits to me of participating in this study,
- I agree to participate and give my patients health information and associated issues as explained in this form, and
- I voluntarily consent to take part in this study.

I have been given enough time to think over before I signed this informed consent. It is therefore, with full understanding of the aims of the study that I gave my informed consent and cooperates at my will in the course of the work of the study

Name of Participant	Signature	Date

Investigator obtaining consent:

My signature below signifies that I have explained the objectives of the study and the risks involved to the study participant, and I have answered all questions to the best of my ability.

Name of investigator	Signature	Date