PROSPECTIVE OBSERVATIONAL STUDY OF BLOOD TRANSFUSION PRACTICES AND OUTCOME AT THE UNIVERSITY TEACHING HOSPITAL.

By

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DEDICATION

All the work and achievements resulting from this work, I dedicate to my daughter, Sandra and my son, Lawrence Siamuyoba Jr, who, during the preparation may have suffered in one way or another.

DECLARATION

I, ***Dr Lawrence S Siamuyoba***, hereby certify that this dissertation is the product of my own work and in submitting it for my masters of internal medicine degree, I further attest that it has not been previously submitted either wholly or in part for any degree at this or any other university.

Signature.....

Date.....06/07/07.....

CERTIFICATION OF COMPLETION

I, ***Dr Peter Mwaba,*** having supervised and read this dissertation, I am satisfied that this is the original work of the Author, Dr Lawrence S Siamuyoba

Signature.....

Date.....9/7/2007

CERTIFICATE OF APPROVAL

This dissertation of Dr Lawrence S Siamuyoba, has been approved as fulfilling the partial requirements for the award of the masters of medicine in internal medicine of the University Of Zambia

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ABSTRACT

Objective: To determine the incidence, common indications, appropriateness and outcome of blood transfusions and blood products among adult in-patients admitted to the University teaching Hospital, Lusaka, Zambia.

Study Design: Prospective observational study over a period of 90 days

Setting: The university Teaching Hospital and the Zambia National Blood Transfusion Services.

Main Outcome: Indications for blood transfusion, number of units prescribed and given, the age and sex of the transfusion recipients.

Participants: All adult patients who received blood transfusion during the period of the study. Data collected by research assistant.

Results: Of the 378 requests for blood transfusion we followed up 149 such patients. These received at total of 271 units of blood. 75[27.6%] of the units were given to medical patients, 87[32.1%] to surgical patients and 113[41.3%] to patients from the department of obstetrics and Gynaecology. Females got

twice as much blood as males, 67.3% compared to the male with only 32.7%. Most of the blood transfusions were given to patients between the ages of 23 and 42, receiving a total of 74% of the units of blood. 63% of these are less than 30 years of age. The most common indication for blood transfusion was indicated only as anemia. Up to 98% of patient receiving blood transfusion did not have hemoglobin done prior to transfusion.

Conclusion: In the university teaching hospital of Lusaka, Zambia, more blood is used mainly in the department of obstetric and gynecology. It can also be concluded that demand for blood products is higher younger patients. It was observed that the use of blood and blood products is inappropriate in most cases as blood was given based on the clinical presence of pallor as a measure of anaemia.

Recommendation: it is recommended that blood prescribers acquaint themselves with existing guidelines to avoid indiscriminate use of blood products. Careful evaluation of the risks and potential benefits of transfusion is required. All anemia, except in cases where it is life threatening, should be investigated adequately. Blood transfusion is no substitute for finding the cause of anaemia.

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LIST OF TABLES

LIST OF ACRONYMS

ABO: blood group system

AIDS: Acquired Immunodeficiency syndrome

CMV: Cytomegalovirus

DHTR: Delayed Hemolytic Transfusion Reaction

DNA: Deoxyribonucleic Acid

GVHD: Graft-vs-Host Disease

HIV: Human Immunodeficiency Virus

HBV: Hepatitis B Virus

HCV: Hepatitis C Virus

HTLV: Human T lymphotropic Virus

NHFTR: Non Hemolytic Febrile Transfusion Reaction

RBC: Red Blood Cells

TRALI: Transfusion Related Acute Lung Injury

UTH: University Teaching Hospital

WBC: White Blood Cells

ZNBTS: Zambia National Blood transfusion Services

CHAPTER 1

1.0 INTRODUCTION

The University Teaching Hospital is the largest and main referral hospital in Zambia. It acts as a specialist and referral center for all hospitals in all parts of the country. Although it has abed capacity of 1800, it admits more than that number. This probably due to the high disease burden, brought about by the high prevalence of HIV/AIDS. Like most hospital in the country, the government of the republic of Zambia, largely, funds the University teaching hospital and in most cases, the funding which is often inadequate.

The UTH is located in the capital city of Zambia, Lusaka. The UTH has four major departments with several subspecialties. The major departments include: medicine, surgery, pediatrics and the department of obstetrics and gynaecology. Subspecialties are mainly a component of the department of surgery. These include; ophthalmology, Ear Nose and Throat, cardiac surgery and cardiology, hematology and many others. These departments and subspecialties are all serviced by the Zambia National Blood Transfusion Services (ZNBTS), through the

UTH blood bank. The ZNBTS collects and screens all blood and blood products.

The decline in the general socioeconomic status of the country has had its impact on various sectors of the economy. But perhaps the greatest impact is seen in the health sector. This has been associated with an increased need for blood and blood products. Blood and blood products have now become scarce. The cost of producing the blood and blood products has also become astronomical, as the numbers of potential donor is going down. In Zambia, the estimated cost of producing one unit of red cells is around $42.

The discovery of AIDS in the 1980s and its rapid evolution as a major concern for physicians and their patients have led to many questions about the safety of the blood supply. The attention placed on AIDS has led to new discoveries and technologies to reduce the risk of other transfusion complications such as hepatitis, bacterial contamination, and transfusion-associated graft-vs-host disease. Concerns about blood safety have focused much attention on alternative blood transfusion strategies such as autologous blood, viral inactivation, and artificial blood substitutes

Blood collections and usage has declined since the mid-1980s. The AIDS epidemic made clinicians to use clinically appropriate indications for blood transfusion more effective. In recent times there has been an increase in the usage of blood and blood products because of a rise in cancer and cardiovascular procedures. In our setting, the increase in the demand for blood may be because of the increase in the incidence of anaemia associated with HIV/AIDS, opportunistic infections and its treatment.

Blood is now a scarce product because of the reduced numbers of people willing to donate blood for fear of knowing the HIV status. Emerging issues that affect blood safety and blood supply, such as pathogen inactivation and more stringent donor screening procedures. This has brought new pressures on the availability of an affordable blood supply. As a result of the scarcity of blood and blood products, there is now a re-evaluation of the clinical practice of blood transfusion and blood conservation. Imminent alternative for the management of anemia, such as oxygen carriers, hold great promise.

CHAPTER 2

2.0 LITERATURE REVIEW

Blood transfusion is a rational replacement therapy of proven clinical value and efficacy. To date, most of the problems surrounding blood transfusion medicine, in the early days, have been resolved. Now, transfusion practice is oriented towards giving the actual component of blood best suited for the patient's particular needs. This leads to better replacement therapy and more economical use of blood and blood products.

The evolution of blood transfusion medicine, as a clinically oriented discipline emphasizing on the patient care, has been accompanied by challenges that need to be faced as specialist look into the future.

2.1 History of Blood Transfusion

The practice of blood transfusion is an old science. From the time of Hippocrates through to the nineteenth century, blood letting was widely used for a variety of medical conditions. Blood transfusion, as a practice, only became a common therapeutic intervention less than 100 years ago. Experiments with blood transfusion proceeded in steps, initially involving animal to animal and then transfusion from animal to human. The first record of blood transfusion was conducted in 1492 on

Pope Innocent VIII in Rome as a therapeutic measure, although the methods used were crude[1, 2]. The first written experimental evidence of blood transfusion was done, in 1666, by Richard Lower, in Oxford. Richard Lower conducted experiments in which blood was transfused from one dog to another. This was to be followed up by transfusion of blood from calves or lambs into humans. These transfusions were however conducted for other indications other than loss of blood. An obstetrician with St Thomas Hospital, James Blundell, is credited with the first human to human transfusion. He transfused blood into a woman with postpartum hemorrhage. Her husband served as the donor. He performed a total of ten documented transfusions, five of which were beneficial.[2]

Despite the absence of the knowledge of blood groups, it is remarkable that blood transfusions were carried out with considerable success. Karl Landsteiner, an Austrian Physician, is the most important man in the field of Blood Transfusion[3]. He documented the first three blood groups which he termed A, B, and C. His findings were duplicated by several other investigators, who were working independently. They used different nomenclature. The confusion of nomenclature was

resolved in 1937, at a congress of the international society of blood transfusion, when the ABO system was adopted.[3]

2.3 Discovery of the Blood Groups

The work done by Landsteiner and others opened the door for the identification of specific blood groups. This in turn was the dawn of safer blood transfusion practices. Later Landsteiner discovered the Rhesus antigen in the serum of man. The identification of the Rh factor has been an important milestone in the blood transfusion industry, only next to the ABO. Several other blood groups of limited clinical significance have since been discovered by several different investigators. The first blood bank service was established in London by Oliver Percy, a civil servant in 1921

2.3 Risks of Blood Transfusion

Blood transfusion is not without risks. These range from transmission of various types infections to major transfusion related reactions, which are either acute or delayed, or immunological or non-immunological.

2.3.1 Transmission of infections

The first description of blood transfusion related HIV transmission was made in the late 1982 and early 1983, in the United States of America[3, 4]. Recent data indicate the aggregate

risk of transmission of Human Immunodeficiency Virus (HIV), Human T-Cell Lymphotropic Virus (HTLV), Hepatitis B and C Viruses is 1 in 34,000 units of blood transfused. Transmission of HBV and HCV accounts for 88 percent of the residual viral infections.

Hepatitis

Post-transfusion Hepatitis remains clinically sub-clinical in the majority of patients. The incidence of HCV infection is approximately 1 in 103,000[5]. It is estimated that up to 90 percent of infection with the HCV become chronic, but clinical liver disease develops in only 10 to 20 percent. Eighty-five percent of all HCV infection complicate with chronicity, while the remaining 20 percent lead to cirrhosis and or hepatocellular carcinoma. The incidence of HBV is itself estimated at 1 in 63,000[5]. Hepatitis B virus infection accounts for about 10 percent of all cases of post-tranfusional hepatitis. However, routine screening and possibly the widespread use of vaccinations is likely to contribute towards the reduction in rates of transmission. Hepatitis A is rarely seen in association with blood transfusion. It occurs at an incidence rate of 1 in one million units of blood transfused.

Human Immunodeficiency Syndrome

Antibody testing for HIV-1 and HIV-2 became clinically widespread in the USA in 1985 and 1992 respectively. Recently the estimated risk for acquiring HIV infection from transfusion range from 1 in 450,000 to 1 in 660,000[5,6]. To decrease the risk of transfusion transmitted HIV disease, blood banks began testing donor blood for p24 antigen in 1995. Prior to the wholesome testing for HIV-1 P24 antigen, it was estimated that 18 to 27 percent infectious blood transfusions yearly. The introduction of antigen testing has reduced the numbers by 25 percent. The risk for transmission is further expected to decline when donors are screened by DNA polymerase Chain Reaction (PCR) Assays.

Human T-lymphotropic Virus Types I and II

The transmission of human T-lymphotropic virus types I and II[HTLV I& II] by transfusion is limited to cellular blood components. The estimated incidence of transmission is 1 in 641,000[5]. There are two diseases that are associated with infection with HTLV-1/2. These include:

a) A **chronic degenerative neurologic disease** or a spastic paraparesis which is characterized by progressive lower

extremity weakness, spasticity, sensory deficits and urinary incontinence;

b) **Adult T-Cell Leukemia or Lymphoma**. The life time risk of developing overt neurologic or neoplastic disease is thought to be less than 4 percent.

Other infections

A variety of other infections can also be transmitted through blood transfusions. These include:

- cytomegalovirus,
- Parasitic infections like malaria, babesiosis, toxoplasmosis and chaga's disease.
- Transmission of syphilis is now rare because the treponema pallidum organism does not survive prolong exposure to temperatures below 4 degrees centigrade.
- Other potentially transmissible diseases are Epstein Barr, leishmaniasis, lyme's disease brucellosis, B-19 parvovirus. CMV infection can lead to severe life threatening multi-systemic disease in immunocompromised patients.

2.3.2 Transfusion reactions

Transfusion reactions can be

- ❖ acute or delayed,
- ❖ Immunologic or non-immunologic.

Immune mediated transfusion reactions include; acute haemolysis, febrile nonhaemolytic anaphylaxis Urticaria and non cardiogenic pulmonary edema. Transfusion reactions still continue to occur in the range of 1 in 250,000 to one million transfusion episodes[7,8]. Approximately one half of all deaths associated with acute hemolytic reactions are due to the ABO incompatibility. This is largely a direct result of administrative errors. These are error which in most cases occur outside the laboratory and are related to mismatching of the patient and the blood unit. Reported deaths have since declined as a result of increased vigilance in the identification of patient and blood transfusion.

Recipients of RBC can have ABO/Rh incompatibility. The reaction is more severe if the incompatible donors RBCs are hemolysed by antibodies in the recipient's plasma .ABO/Rh incompatibility is enhanced

- ❖ by fragility of the RBC,

- ❖ Over-warming of stored or
- ❖ Contact with inappropriate intravenous solution or giving set.

2.3.2.1 Delayed Hemolytic reactions

Delayed transfusion reactions occur in 1 in 1000 patients receiving blood transfusion.[9] Delayed hemolytic transfusion reaction (DHTR), is caused by sensitization of patient with RBC antigens. Such patients have a low level of antibodies. In such patients, following blood transfusion with RBCs with this antigen, an anamnestic response results one to two weeks. DHTR is characterized by a falling hematocrit, fever, and a slight rise in the bilirubin level. DHTR rarely manifest dramatically. It often goes unidentified and is self limiting.

2.3.2.2 Febrile reactions

A febrile reaction consists of a temperature rise of one degree or more and is associated with chills and sometimes headache and backache. Antibodies directed against WBC, HLA may appear in multi-transfused or multiparous persons. These antibodies may react with the WBCs in succeeding transfusions resulting in signs and symptoms.

2.3.2.3 Non Hemolytic Febrile Transfusion Reaction (NHFTR)

Previous transfusion and/or previous pregnancy can result in alloimmunization and the formation of leukocyte antibodies. This can subsequently react with the donor neutrophil or lymphocyte (HLA) antigen. This antigen/antibody reaction is believed to induce the secretion of pyrogenic cytokines[20]. Studies have shown that platelet storage age correlates with the occurrence of NHFTR[21]; and cytokine levels correlate with the leukocyte content and increase over time in stored platelets[22], and when platelets are separated into paired cellular and supernatant fractions. The supernatant fraction accounts for the majority of febrile responses.[23] Removal of contaminating leukocytes prior to storage has been show to prevent the cytokine accumulation.

2.3.2.4 Allergic Reactions

These occur as a result of hypersensitivity to plasma proteins. It is therefore not surprising that they are commonly seen in plasma proteins recipients. Among these patients the incidence is about 1% to 3%. Urticaria and pruritus are the commonest manifestations.[21]

2.3.2.5 Anaphylactic Reactions

These tend to be the most severe forms of whole blood transfusion reactions. Fortunately they are a rare complication of component transfusion therapy. It has been reported in one in 20,000 to one in 50,000 transfusions[8, 20]. Cases have been reported after transfusion of as little as a few milliliters of blood or plasma. This is particularly so in patients with immunoglobulin A (IgA) deficiency who have developed anti-IgA antibodies[22].

2.3.2.6 Citrate and Potassium toxicity

Even in massive blood transfusion the problem of citrate and potassium toxicity is not of concern. However, toxicity may be amplified in the presence of hypothermia. Mechanical haemolysis during transfusion may increase potassium levels.

2.3.2.7 Graft versus Host Disease (GVHD)

Graft-vs-Host disease is usually caused by engraftment of immunocompetent lymphocytes in the bone marrow of an immunosuppressed patient. A small number of viable lymphocyte in the blood or blood component transfusion can divide spontaneously and cause GVHD in an immunosuppressed patient. Transfusion associated GVHD is a

rare and highly fatal complication of transfusion in which passenger T-lymphocytes present in the donor blood or blood component proliferate and immunologically assault histo-incompatible tissues of the host. Patient at risk of transfusion associated GVHD are those who are immunosuppressed with respect to cellular immunity or those who are immunocompetent HLA heterozygous for one of the recipient haplotypes. This is more so if the donor and recipient are closely related.

2.3.3 Contamination of Red Blood Cells

Bacterial sepsis is the leading cause of transfusion related mortality in the world today. It accounts for approximately seventeen percent of all reported transfusion related deaths in the USA between the periods of 1990-1998[11]. Bacterial contamination is in most cases related to the length of storage of the blood. It occurs during collection of blood, processing or storage or may occur in association with a transient bacterium associated with an unrecognized infection in the donor[16]. Administration of contaminated blood/blood products results in high fever, tachycardia, hypotension, and may lead into septic shock. Contaminants like Yesinia enterocolitica and some

endotoxin producing gram negative bacteria that proliferate at temperature of 4 degrees have been isolated.

2.3.4 Contamination of platelets

The risk of platelet related sepsis is estimated to be 1 in 12,000, but it is greater with transfusion of pooled concentrates from multiple donors than from a single donor.[24] The storage temperature of platelets of about 20-40 degrees favors bacterial growth. Approximately 1 in every 1000 to 3000 platelets units may be contaminated with bactria[11,12,13]. Common organisms that are implicated in platelet contamination are staphylococcus aureus, klebsiella pneunoniae, serratia marcescens and staphylococcus epidermis.

2.3.4 Transfusion Related Acute Lung Injury(TRALI)

Transfusion-related acute lung injury is an acute respiratory distress syndrome that occurs within four hours after transfusion and is characterized by dyspnoea and hypoxia due to non-cardiogenic pulmonary oedema. It occurs at a rate of 1 in 5000 transfusions.[25] Transfusion related acute lung injury results from the rare presence of complement fixing donor leucocytes antibodies or HLA determinant. As a result complement

anaphylotoxin C5a is released. This cause changes in the vascular permeability in the lungs and causes interstitial edema. Marked severe respiratory distress occurs within 2 to 4 hours after transfusion. The picture is indistinguishable from that of adult respiratory distress syndrome. TRALI, by definition is characterized by:

- Pulmonary arterial pressure of 18mmHg or less or lack of clinical evidence of left atrial hypertension
- Bilateral infiltrates on an antero-posterior chest radiograph
- The oxygen saturation of 90% or less
- Onset of symptoms within four to six hours after a transfusion

Intensive respiratory care with mechanical ventilation is often required until resolution which occurs usually within 24 to 48 hours. Corticosteroids in high doses are indicated

2.4 Transfusion Guidelines

It is agreed by most authorities that blood transfusion increases the oxygen delivery and carrying capacity of blood by raising the hemoglobin concentration. However there is still no consensus on the precise indication for the use of blood and blood products despite

numerous previous attempts at consensus conferences. There is now renewed interest at the formulation of transfusion guidelines. The ever present risk of transfusion associated complication as high-lighted by the SHOT (Serious Hazards of Transfusion) study has added more impetus to the drive towards guidelines formulation.[27] Other reasons which have caused an increase in interest in this direction include: rising cost as a result of the new safety requirements such as leucocyte depletion of blood components and also nucleic acid testing.

The National Institute of Health consensus development has noted that a chronically anemic patient can tolerate hemoglobin concentration levels of less than 7gm/dl. As such the decision to transfuse should be based on the duration of anemia and the presence of co-morbid conditions.[28]

The American college of physicians, in a statement issued in 1992, suggested that transfusion can be administered on a case-by-case as the signs and symptoms of anemia occur[16]. It further suggests transfusion trigger hemoglobin of 7 to 10gm/dl. Several other authorities have suggested a transfusion trigger value of 7gm/dl, and

have found that adequate oxygen delivery can still be maintained at such hemoglobin concentration[15].

The Canadian Expert Working group reiterated that only few people would have signs and symptoms of anemia when the hemoglobin concentration is greater than7gm to 8gm/dl. They stated that weakness will occur when the hemoglobin concentration drops to 6gm/dl and dyspnoea when the concentration drops to 3gm/dl. Congestive heart failure occurs at hemoglobin concentration of 2.0gm to 2.5gm/dl.[29]
According to the Canadian working group, on-going transfusion needs can be met by:

- Assessing anemia related symptoms
- Determining whether the signs and symptoms of anemia are alleviated by the transfusion given.
- Specifying the minimal hemoglobin at which the patients function satisfactorily.
- Evaluating the risk/benefit ratio for transfusion, taking into account the patient's lifestyle, other medical conditions and prognosis.

In a 1997 survey of its member institutions, the University Health system Consortium, found that 59% of its members used hemoglobin

concentration of 8gm/dl in consideration with other clinical factors as a guide in the ordering of blood transfusion, 25% used hemoglobin of 7gm/dl and 16% used the hemoglobin of 9gm/dl.[28]

The Zambian government through the ministry of health developed guidelines on appropriate use of blood and blood products in 1993. The guidelines state that the majority of indications for transfusions could be prevented by exemplary public education and preventive medical practice. In Zambia the recommendation, are structured based on a trigger hemoglobin which is different according to the condition obtaining. For example patient with haemoglobinopathies may require blood transfusion if the hemoglobin falls by 2gm/dl or falls to below 5gm/dl from the steady state.[26]

2.5 Parameter used in blood transfusions

2.5.1 Clinical findings

Acute anemia is usually due to blood loss. Clinical experience has shown that blood loss of up to 30-40% can be treated with crystalloids only.

2.5.2 Hemoglobin concentration

It was traditional to attach a transfusion trigger hemoglobin concentration of 10gm/dl for all peri-operative and medical transfusion. In a review of 61 untransfused Jehovah's Witness patients with

hemoglobin concentration of less than 8gm/dl, it was found that mortality only occurred in those patients with concentration of less than 5gm/dl. Herbert et al, in a review of literature on red cell transfusion, found that there was insufficient evidence to justify the use of a single value of hemoglobin concentration as a threshold for blood transfusion in patients with acute or even chronic anemia.

2.5.3 Indications for blood transfusions

Red transfusions augment the oxygen carrying capacity of blood in a given patient. As seen earlier, since a transfusion can result in the transmission of infectious diseases, immunologic, allergic and other adverse events, clinicians must reserve red cell transfusion for patients at risk for inadequate oxygen tissue delivery related to the low hemoglobin concentration.

Acute Hemorrhage: in a study conducted in Canada, the most frequent reason for transfusion of red cells was Hemorrhage. This contributed up 35%, while the need to augment the oxygen delivery was about 25%. Blood stored for more than six days did not affect or improve oxygen delivery[11]. Transfusion during the acute loss phase must be balanced between the estimated lost circulatory volume and

the hemoglobin concentration and the anticipated risk of further bleeding.

Anemia: anemia per se may not be an indication for blood transfusion. A multi-institutional study demonstrated that critically ill patients with hemoglobin concentration of less than 7.0gm/dl had similar thirty-day mortality rate as critically ill patients with hemoglobin concentration of 10.0gm/dl. This indicates that the transfusion threshold of 7.0gm/dl is as safe as the threshold of 10.gm/dl[12]. On the contrary over-transfusion may actually increase the mortality rate in critically ill patients.

2.6 Blood transfusion Triggers

Blood transfusion plays an important role in the management of anemia of all types regardless of the cause. Current guidelines emphasize that blood transfusions should not be given based on a single "trigger" hemoglobin concentration but instead should be based on the patient's clinical presentation. In a survey in the west of Scotland, low hemoglobin concentration was cited as the reason for transfusion in 91 percent of the blood transfusion request. It is also the commonest trigger for transfusion world wide. Up to 48 percent of the transfusions were given to raise the hemoglobin to 10gm/dl.

2.6 Blood transfusion Audit: who uses the blood?

2.6.1 Age vs sex

A large proportion of studies conducted in patients in the western countries confirm that, transfused patients are generally elderly. Vamvaska and Taswell, found that 53.3% of all transfused red cell was given to patients over the age of 65years. In India, transfusion rates were higher in patients between the ages of 25 to 34 years with females accounting for 73%. There are differences between the age profile of patients receiving different blood components, with plasma and platelet recipients being younger than red cell recipient[22].

This reflects the different spectrum of disease for which the transfusion is required. Elderly patients require more transfusions because they have a high incidence of co-morbid conditions and therefore are less likely to tolerate anemia be it acute or chronic.

2.6.2 Transfusions by patient categories

Earlier assumptions, have related most transfusion to surgery and surgically related disciplines. Contrary to this assertion, there is now growing evidence that medical conditions are becoming an even more common indication for blood transfusion than surgical. Of a total 9774 units of blood transfused in north England, 51.6% were given to

medical patients. A French RECEPT study group found that 53% of transfusion recipients were on the medical wards as opposed to 45.9 in the surgical wards(excluding obstetrics and gynecology)[23,24]. A similar pattern is observed in India in which, over 50% of the blood transfusion units were given to medical patients. In this study, surprisingly, obstetrics and gynecology only accounted for 6.3% of all transfusion conducted. They low incidence of transfusion in surgery may perhaps be related to the blood sparing techniques that are now being used widely.

2.6.3 Blood transfusions by medical indications

Chronic anemia is the single most important reason for blood transfusion amongst patients in an Indian study. Iron deficiency anemia accounted for 27% of all blood transfusion. Among the subspecialties, hematological patients received more blood than other groups of patients: up to 16 percent. This has been attributed to hematological malignancies and the use of chemotherapy. In a retrospective study, in Zimbabwe, it was found that the department of gynecology was the largest consumer of red blood cells followed by the surgery and pediatrics respectively[23]. In Zambia, no such study has been done. But

the guidelines presuppose that surgery and surgically oriented indication constitutes the majority of the reason for transfusion.

Chapter 3

THE STUDY

3.1 STATEMENT OF THE PROBLEM

Blood is a scarce human resource, and worldwide, there is a persuasive argument against the overuse of blood. In Zambia, given the growing concern on the safety, cost and adequacy of blood supply, the Zambia National Blood Transfusion Services (ZNBTS), has in the past produced guidelines on the appropriate use of blood and blood products. It appears there is lack of knowledge on the availability of these guidelines among medical practitioners in the UTH.

Despite various guidelines for transfusion of blood, a number of blood transfusions continue to take place in most of our hospitals. It is possible, in the absence of guidelines, that most of these transfusions are unnecessary. They are a drain on the already scarce and limited resource. These transfusions expose patient of the risk of transfusion associated complications.

If such transfusions can be reduced, more blood would be made available to those patients who legitimately require blood and in whom the benefits outweigh the risks. In our setting, where the demand for blood is high and compounded with the serious scarcity of blood, due

to low volume of donors, it is important to establish how blood obtained in a given period of time is utilized and whether or not it is associated with favorable outcome.

The study focused on the utilization of blood and blood products. This has provided knowledge on the use of blood products and the common indications of blood and blood products.

3.2 HYPOTHESIS

Information on the use of red blood cells and other blood products and the characteristics of transfusion recipients is not known in Zambia.

1. As a result most blood transfusions done in the University teaching Hospital are inappropriate and are only a drain to the resources and these transfusions are not related with improved outcome both in the immediate post-transfusion period and in the long-term.
2. The department of medicine uses more blood and blood products than any other department in the university teaching hospital.

3.3 OBJECTIVES

3.3.1 General Objectives

To determine the incidence, common indications, appropriateness and outcome of blood transfusions and blood products among in-patients admitted to the University teaching Hospital, Lusaka, Zambia.

3.3.2 Specific Objectives

1. To identify which categories of patients receive blood and blood products in the University teaching hospital
2. To identify the common admitting diagnosis and indications for blood transfusion.
3. To look at the age and sex distribution of transfusion of blood and blood products among recipients at the UTH
4. To compare the usage of blood and blood products by individual department.

CHAPTER 4

METHODOLOGY

4 Study Designs

The study was a prospective cross-sectional observational study. Blood transfusion units issued to patients was followed up to the patient from the blood bank. The patient file was analyzed and relevant information and data extracted and entered in the pre-formed questionnaire.

4.1 Study population

The study included all adult patients admitted to the University Teaching Hospital who receive blood or blood products.

4.2 Inclusion criteria

1. all medical records and files of patients who are issued and eventually transfused with blood and/or blood products in the University teaching Hospital
2. Patients who received blood transfusion.

4.3 Setting

The setting was the Zambia National Blood transfusion services, The UTH Blood bank and the adult wards at the University Teaching Hospital.

4.4 Sample size and statistical analysis

The sample size was determined by the total number of records and blood transfusion conducted in a period of one month. Data analysis will be done by the Epi info statistical program.

4.5 Data Collection

Data was collected and entered in a pre-formed data collection form. Collected data include:

i. Amount of blood and blood products ordered and the proportion of blood collected in the given period of time.
ii. Age and sex ratios of the frequency of transfusion.
iii. Admitting Diagnosis and any cor-morbidities
iv. Requesting department
v. Types of blood transfusion product
vi. Hemoglobin level at admission
vii. Number of transfusion units requested.

viii. Outcome of the transfusion episode and other parameters.

4.5 Statistical Analysis

The epi info version 6 statistical program was used to analyze data obtained

4.6 Ethical considerations

Since the project does not involve physical human subjects and only the review of patient file and records, no ethical issues arise.

However consent to review the hospital records was sort from the managing director of the University teaching hospital and the director of the Zambia National Blood Transfusion Services

4.7 Funding and Budgeting

Funding for the project was expected to be met from my own personal resources and from the GRZ project grant. The table below shows the breakdown of the expenditure and budget during the course of the study.

ITEM		UNIT No	Unit Time	Total cost (ZMK)
Honorarium				
1	Principal Investigator	1,000,000.00	1	1,000,000.00
2	Assistant	300,000.00	1	300,000.00
3	Secretarial Services	300,000.00	1	200,000.00
4	Data entry Clerk	200,000.00	1	200,000.00
Stationery		500,000.00		500,000.00
Data Analysis		500,000.00		500,000.00
TOTAL				**2,700,000.00**

Chapter 5

RESULTS

During the study period which ran for 3 months, the blood bank received a total of 932 requests for blood transfusion from different departments of the University Teaching Hospital, including those from the private medical centres outside the boundaries of the UTH. Of these, only 378 requests were issued with blood or blood products, representing an issuance rate of about 40.6%.

Of these requests which were issued with blood, we followed up 150 adult patients for the duration of the study.

5.1 Demographics of blood transfusion recipients

Information regarding the age and sex of the recipients was available for 147 of the 150 patients, of which 67.3 % of those transfused were females.

Table 1.Sex distribution of blood transfusion recipients

Sex	Frequency	Percentage
Male	48	32.7
Female	99	67.3

The age of patients of the patients who received blood ranged from 3 years old at 82 years. Even though the study excluded all children less than 15years old, such were inadvertently recruited during the data collection. The frequency of blood transfusion was high during the age group 23 to 32 years of age accounting for 47.3% of all blood transfusion recipients. This is in sharp contrast to the frequency of transfusion in patients aged more than 50.

Table2. Frequency distribution of the blood transfusion recipients by age.

AGE	Frequency	Percent
1-20	19	12.7
23-32	71	47.3
33-42	40	26.7
43-52	9	6.0
53-62	6	4.0
63-72	3	2.0
73-82	2	1.0

When broken down according to the social economic status, those patients from medium cost areas and with at least secondary level of education were found to have a higher incidence of blood transfusions compared to the other groups of people [48 % and 37 % respectively].

It was found that patients from the low cost residential area and medium cost area are more likely to have a blood transfusion than those from high cost area {**table 3**}. The level of education does not seem to be a factor in the causation of anemia and hence on the incidence of transfusion as the frequency is the same in patients regardless of where they are coming from{**table 4**}.

Table 3: Frequency of blood transfusion in patients according to socioeconomic standing.

Residential Area	Frequency	Percentage
Low Cost	64	42.7%
Medium	72	48%
High	14	9.3%

Table 4: Table showing the frequency of transfusion based on the level of education of the patients.

Educational level	Frequency	Percentage
Primary	45	30.2%
Secondary	56	37.6%
Tertiary	40	26.8%
None	8	5.4%

5.2 Blood utilization by departments

The results show an interesting pattern in terms of blood use by individual departments. The department of obstetrics and gynecology sends a large number of requests for blood, and correspondingly received a large number of blood units constituting 41.1 % of the 271 units of blood supplied between the three departments. The department of medicine used only about 27.3%. This contrasts the 29.5% share of blood request received during the period of the study.

Table 5. Frequency distribution of blood transfusion request according to different departments

Department	Frequency	Percentage
Medicine	44	29.5%
Surgery	45	30.2%
OBG	59	39.6%

Table 7: Frequency of distribution for indications for transfusion in department of medicine.

Indication for transfusion	frequency	percentage
Anemia of undefined cause	23	52.2%
Congestive Cardiac Failure	5	11.3%
GIT Bleeding	4	9.1%
Tuberculosis	4	9.1%
Others	8	18.3%

This finding contrasts sharply with that obtaining in the department of obstetrics and gynaecology, where the frequent cause of transfusion seemed to be ectopic pregnancy. This constituted 26.2 % of all blood which were issued to the department during the study period.

Table 8: Frequency of distribution for indications of transfusions in the department of Obstetrics and Gynaecology.

Indications for Transfusions	frequency	Percentage [%]
Ectopic Pregnancy	11	18.6
Antepartum and Postpartum hemorrhage	10	16.9
Cervical Cancer	7	11.9
Abortions	6	10.2
Others	25	42.4

It can be observed from the results above that up to 35.5% of the transfusion the department are due hemorrhage occurring either during the antenatal or the post-natal periods. The 42 .4% category of other causes comprised of conditions like operation of elective operations, anemia in pregnancy. By implication it can be inferred that the causes of anemia to levels requiring blood transfusion is hemorrhage, although s significant proportion of patients received blood transfusion for anemia associated with cervical cancer.

The trend in the department of surgery is no different from that obtaining in the department of obstetrics and gynaecology. The

majority of blood transfusion recipients in the department of surgery were those with anemia due to hemorrhage. This hemorrhage was due to trauma arising from Road Traffic accidents [**Table 8**]. As a single indication road traffic accidents exceed other indications put together. The abdominal surgery constituted about 26.7% of all transfusions which took place in the department of surgery. It is possible that if the final diagnosis, the actual values for the indications will reduce.

Table 9: frequency of distribution of indications for transfusions in the department of surgery.

Indications for Transfusions	**frequency**	**Percentage [%]**
Road Traffic Accidents	11	24.4
Abdominal surgery	12	26.7
Tumours	6	13.4
Infection	5	11.1
Others	11	24.4

The blood bank has ability to produce different blood products. It is apparent from the results that, prescribers tend to ask and give whole blood more than any other blood product. It was noted that 94% of the blood products asked for were for whole blood.

Table 10: Frequency distribution of type of blood product asked

Type of Blood Product	Frequency	Percentage
Whole Blood	141	94%
Packed Cells	7	4.7%
Fresh Frozen plasma	1	0.7%
Platelets	1	0.7%

The study also looked at the blood prescribing habits of the doctors in the university teaching hospital. The most frequent asked number of units of blood asked for by doctors was 2 units, which constitutes about 58.6% of all. Request for more than 3 units of blood was rare constituting a composite percentage of 2.8 and 0.7% for 4 and 5 units.

This finding did not deviate greatly from the characteristic of blood actually issued. Therefore, likewise the blood bank issued with increased frequency 2 units of blood about 45.3%. It also observed that the blood bank issued with increased frequency one unit compared to the numbers of requests for one unit.

Table 11: Frequency distribution comparing the prescribing habits of attending doctors

Number of Units asked	Frequency	Percentage
1	18	12.4%
2	85	58.6%
3	37	25.5%
4	4	2.8%
5	1	0.7%

The attending medical officers have a tendency to prescribe 2 and three units of blood more frequently than any other figures. These prescribing habits were not followed up with ay clear guidelines. Further there was no clear indication stated put in the case records as to why the transfusion was necessary other than, indication broadly classified as, hemorrhage, anemia or surgery.

Table 12. Frequency distribution table showing the pattern of use of blood based on units of blood issued by the blood bank.

UNITS	Frequency	Percentage
1	56	37.3%
2	68	45.3
3	18	12.0
4	4	2.7
5	2	1.3
7	1	0.7

55.4% of the blood was issued for the diagnosis of anemia due to other causes other than hemorrhage {Table 9}. In most cases the causes of anemia was unknown.

Table 13: Frequency distribution of indications for blood transfusion

Indications	Frequency	Percentage
Anemia	82	55.4%
Hemorrhage	18	12.2%
Surgery	48	32.4%

The monitoring of pre-transfusion and post-transfusion hemoglobin is one area which there was great variation. In up to 76.7% of the blood transfusion recipients, the pre-transfusion hemoglobin was not known or indeed not done. The implication is that the transfusions were made solely based on clinical diagnosis of anemia. Of those who received blood and had pre-transfusion hemoglobin assessment, only 9.3% had hemoglobin level less than 5g/dl, 4.0% with hemoglobin between 5 and 7g/dl.

Table 14: Table showing the frequency distribution of pre-transfusion hemoglobin.

Pre-Transfusion Hb	Frequency	Percentage
<5mg	14	9.3%
5-7mg	6	4.0%
7-10mg	8	5.3%
>10mg	7	4.7%
Not Done	115	76.7%

During the post-transfusion period, the hemoglobin was only checked in 2% of the transfusion recipients **{Table 15}**. The implication is that in 98% of the recipients who did not have repeat hemoglobin post-transfusion, it is not possible to state whether or not the transfusion episode was useful. The outcome was also similar in that at point of

discharge from hospital; only 2% of the transfusion recipients knew their hemoglobin.

Table 15: Table showing the frequency of post-transfusion hemoglobin assessment in blood transfusion recipients.

Post-Transfusion Hemoglobin	Frequency	Percentage
>5mg/dl	1	0.7%
>10mg/dl	2	1.4%
Not Done	147	98%

CHAPTER 6

DISCUSSION

Blood is an expensive and scarce resource. This is probably the reason why the blood bank was only able to honour about 40.6% of all requests received. During the time of the study, the scarcity of blood the fact that, school children, who make the largest pool of donors were on school holidays. Because of the advent of HIV/AIDS the pool of blood donors has also declined over the years. The blood bank some times issues blood sparingly and preferentially to need areas like the department of obstetrics and gynaecology.

6.1 Demography of Blood transfusions

The distribution of blood transfusions favours more females than males. This could be explained with the finding that the department of obstetrics and gynaecology received more blood than any other department. In the University Teaching Hospital setting, 41.3% of blood was transfused for obstetrics and gynecological reasons, 32.1% for surgical reasons and 27.6% for medical indications.

The age related transfusion rates show a concentration of transfusions in the young and early middle age groups. Transfusion recipients are concentrated between the ages of 20 and 42 with the highest incidence in those between the ages of 30 and 42. These age groups coincide with the most sexually active age group. This also is the active reproductive ages. In Zambia and sub-Saharan Africa, the HIV/AIDS pandemic has ravaged this same age group. Therefore this distribution by age can be attributed to multiple factors. While, on one hand, hemorrhage secondary to trauma may explain the need for transfusion in the surgical department, in the young, on the other hand chronic illness is the predominant cause for transfusion and indirectly anemia in the young and middle-aged groups presenting in the department of medicine. This finding is in agreement with similar findings in Mwanza Tanzania. Transfusion recipients are mainly elderly patients for anemia of chronic illness, while the young folks receive blood for trauma related causes of anemia. However it contrasts sharply with what is obtaining in the western world.

6.2 Socioeconomic status vs transfusion

The broad nature of the socioeconomic status may play a role in the causation of anemia that may require blood transfusion. Anemias secondary to deficiency tend to predominate in the poor socioeconomic strata. This is perhaps the reason why the incidence of blood transfusion is high among patients coming from the middle and low income brackets. Anemia in these settings is multifactorial. The level of education does not seem to be a factor in the causation of anemia requiring blood transfusion. The low frequency of patient from high cost areas receiving may be because of the numbers of such patients attending the UTH. Most patients attend private hospital and medical centres.

6.3 Transfusions vs. Departments.

It is apparent from the study results that the department of obstetrics and gynaecology conducts a high proportion of blood transfusions in our hospital. This is evidenced by the high female ratios of blood transfusion recipients. The high incidence of ectopic pregnancy [18.6%] and abortion [10.2%], shows that the incidence of anemia is again mainly affecting those in the sexually active. On the other hand, in the department of medicine, we note that the recipients were those who had anemia in which the cause was not established [52.2%]. It is possible that the causes of anemia requiring blood transfusion in medicine are those that relate to chronic illness. The department receives and handles all patients with HIV and HIV related complications. Anemia is one of the common presentation and complication of HIV disease. Although this study did not delve into the

investigation of the anemia there is need to study the etiologic pattern of anemia requiring blood transfusion to this magnitude. In the western world, the incidence of anemia requiring blood transfusion is becoming high for reasons of anemia related to cancers and chemotherapy.

Surgery consumes sufficient amounts of blood. Most of this is used up by trauma victims. In fact road traffic accidents are the single most common cause for blood transfusion. This is because the department handles more trauma related conditions than any other.

6.4 Blood Prescribing Habits

The study inadvertently assessed the prescribing habits of the doctors whose responsibility is to prescribe blood. 94 percent of all blood request received by the blood bank are for whole blood. This could be either because of lack of knowledge on the part of the prescribers of other blood products or scarcity of blood component at the blood bank. The cost of producing component is relatively high. Globally the trends are moving towards transfusion of specific blood component that the patient may require in an effort to reduce on the incidence of blood transfusion complications.

The prescription of blood remains the responsibility of doctors who should specify the quantity required, duration for transfusion, and any other issues relating to the patient. Linden and Kaplan [1994] noted that several errors occurred with patients where indications for transfusion are questionable. In this study the indication and aim of transfusion was not often documented. In all those in whom the cause was not established no appropriate basic tests were done before

transfusion. The prescription of less than two unit of blood is probably bad practice as the rise in hemoglobin achieved by one unit can easily be attained by supplementation with hematinics. A dose of one unit of compatible red cell in a patient who is not bleeding and is not hemolyzing will increase the hemoglobin by 1g/dl. The most frequently requested number of units of blood is two units [58.6%]. The blood bank issued an equally high proportion of blood as a single unit [37.6%]. The discrepancy may reflect the shortage of blood available for use at the blood bank. The numbers of units prescribed should be based on the aim of the prescribing practioner. Unless the patient is bleeding or hemolyzing, and provided the transfused red cells are compatible, the post transfusion hemoglobin can be accurately predicted from the patient's estimated blood volume, baseline red cell mass and transfusion volume. This is critical information which was lacking in the patients under study. More than 70% of the patients in the study did not have hemoglobin assessment prior to transfusion. Of those who had hemoglobin assessment done, only 9.3% had hemoglobin less than 5g/dl. 4.7% received blood transfusion despite having the hemoglobin above 10g/dl. From the study it is difficult therefore to state the trigger factor for transfusion in the UTH. It can be said that most of the transfusion did not meet the requirement of the Zambian guidelines let alone the international guidelines for transfusion. Although the doctors did not indicate in most cases the reasons for transfusion, it can be inferred from the age related incidence that infection and general chronic illness are a factor in the causation of anemia requiring blood transfusion.

6.5 Strength and Weakness

Anemia as subcategory of medical indications for blood transfusion accounted for 55.4% of all use. It was not possible to classify the anemia according to etiology as information in the patient records was scanty. Because of the broad nature of the category of anemia it is possible that some surgical transfusion were included in the anemia category.

The study had several limitations:

1. The study dealt with the principal diagnosis of the patient in the study. It is possible that in certain cases factors other than the principal diagnosis may have influenced the need for transfusion.

2. This data may not reflect the true overall transfusion practice in the country because it comes from a single institution and excludes patients in the pediatric wards and some patients from the private medical centre.

3. The issuance blood could have been higher had the study taken place at the time the blood bank receive maximum donors when the school calendars are in session.

4. In most cases the blood request forms, case records and patient file had inadequate details about the reasons for transfusion.

6.6 Comparison with other studies

Compared with other studies it is not possible to state if the how much of the blood transfusion could have been deemed as appropriate. In Ghana at least 20% of all blood transfusion episodes in the hospitals were avoidable according to preset criteria. Surgical practices were associated, perhaps habitually, with many more avoidable blood transfusions than non-surgical medical practices. Vamvakas and Taswell reported that 51.6% of red cell was transfused to the surgical patients. In this study high us of blood is seen more in the department of obstetrics and gynaecology, because of bleeding. However it is worth noting that like in the western world, there is an increasing proportion of blood use in the medical department

Chapter 7

CONCLUSION

There is a shift generally in the use of blood from the surgical related disciplines to the medical patients because of the impact of HIV/AIDS. These transfusions can still be kept low by transfusing for the correct indications and reason. Errors do occur in blood transfusion processes and some of these are related to poor selection of patients. Implementation of good practice will require that prescribing doctors acquaint themselves with clinical guidelines for transfusion available for our local setting.

It has been established from the study that, most of the transfusion that take place at the university teaching hospital are inappropriate. The indications for blood transfusion are never stated by the prescribing practioner and in most cases the aim of transfusion is not known. It might appear that physicians prescribe numbers of units of blood arbitrarily with no specific guidelines how to request for blood.

Further, at the UTH, most recipients of blood and blood products are women and these are predominantly those within the young age group. Infection is the common underlying factor apart from the obstetric causes in patients in active reproductive age groups.

Chapter 8

RECOMMENDATIONS

This study has knowledge on the utilization of blood and blood products in the University Teaching Hospital, in Lusaka, Zambia. It has highlighted the deficiencies in the blood prescribing habits of medical officers and all those whose responsibility is to administer blood.

The following recommendations can be drawn form this study outcome:

1. Although the guidelines for transfusion, in this country have been available since 1993, medical practioner are unaware of their existence. To improve the prescribing habits the blood bank should make available the guidelines to all doctors and where necessary the same guidelines should be updated to much with the times.
2. It is further recommended that, prescribers of blood clearly indicate in the case records the reasons for transfusion and the aim of transfusion. This will help in reducing the rates of unnecessary transfusions.
3. 55% of the transfusions for reasons simply stated as anaemia. This implies that blood transfusions were given to people in whom the cause of anaemia had not been established.

Investigations for anaemia are often inadequate, thus, blood transfusion prescribers should endeavour to establish the cause of anaemia. This will in the long run reduce the usage of blood and blood products.

4. Red blood cells should not be used to treat anaemia that can be corrected with a non-transfusion therapy such as iron or recombinant erythropoietin. They also should not be used as a source of blood volume, oncotic pressure, coagulation factors or platelets. This will in the long run reduce inappropriate transfusions.
5. Transfusion is may not be indicated when the hemoglobin level is above 10 g/dl and is almost always indicated in patients when the hemoglobin level is below 6 g/dl. The determination of transfusion in patients whose hemoglobin level is 6-10 g/dl should be based on the patient's risk of complications due to inadequate oxygenation, not on the grade or severity of pallor.

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APPENDIX A: CONSENT FORMS

University teaching Hospital
Department of Medicine
P/B RW 1X
Lusaka

The Director
Zambia National blood transfusion services,
Lusaka.

Dear Sir,

RE:REQUEST FOR CONSENT TO CONDUCT STUDY

I am a fourth year postgraduate student in the department of medicine and currently, I am carrying out a research project study at the UTH. This is an essential preliquesite to the admission to the master of medicine of the University of Zambia. The major and general objective of the study is to conduct an audit to establish the appropriateness of blood transfusions in the UTH and find out the outcome of such transfusions over a period of one month.

The study involves the review of blood bank entries of blood issued and followed by review of medical files and case notes of blood transfusion recipients. These patients will be followed up only for the period of time that they will be in hospital for outcome determination.

While the study may involve Human subjects, it will not interfere with the treatment of the patients or the decisions made by the attending medical officer. The study will not involve administration of any substances to the patient other than the blood ordered by the attending physician or doctor.

The study has a lot of benefits some of which include improvement in the blood prescribing practice with consequent rational and appropriate utilization of blood at the UTH.

Thanking you in anticipation

Yours faithfully

Dr Lawrence S Siamuyoba

APPENDIX B: Questionnaire

UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE

A prospective observational study on the utilization of blood and blood products at the university Teaching Hospital, Lusaka and their out come

STUDY No_____

NAME_____

RESIDENTIAL ADDRESS

Low cost **medium cost** **high cost**

EDUCATIONAL BACKGROUND
Primary **Secondary** **College** **University** **None**

AGE_____

SEX ..... **Male** **Female**

DEPARTMENT. Medicine **Surgery**

Obstetrics and gynaecology **Pediatrics**

Current Diagnosis_____
_____
Cor-Morbidity_____
_____
Number of units asked **1** **2** **3** **4** **5** **6**

Indication for transfusion **anemia** **Haemorrhage** **surgery**

Transfusion Type Autologous **Allogenous**

Type of blood product asked

Whole blood packed red cells **Fresh Frozen Plasma**

Platelets cryoprecipitate

Units transfused
1 2 3 4 5 6

Pre-transfusion Haemoglobin
< 5gm/dl 5-7gm/dl 7-10gm/dl >10gm/dl Not Known
Post-transfusion haemoglobin
<5gm/dl 5-7gm/dl 7-10gm/dl >10gm/dl Not Known
Discharge Haemoglobin
<5gm/dl 5-7gm/dl 7-10gm/dl >10gm/dl Not Known
Length of stay in hospital post transfusion_____
Outcome death
Discharge
Transfusion reaction Hemolytic bacterial infection

Anaphylaxis Hyperpyrexia

Others_____

Other
comments_____
_____
_____
_____
_____
_____

APPENDIX C: Budget Outline

ITEM		UNIT No	Unit Time	Total cost (ZMK)
Honorarium				
1	Principal Investigator	1,000,000.00	1	1,000,000.00
2	Assistant	300,000.00	1	300,000.00
3	Secretarial Services	300,000.00	1	200,000.00
4	Data entry Clerk	200,000.00	1	200,000.00
Stationery		500,000.00		500,000.00
Data Analysis		500,000.00		500,000.00
TOTAL				**2,700,000.00**