The strengths and weaknesses of blood services in Kumasi, Ghana

Thesis submitted in accordance with the requirements of the University of Liverpool for the degree of Doctor of Philosophy by

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Abstract

Limited research has been conducted in the area of blood transfusion policy in Africa. Prior to this study, it was unclear how many countries had a national blood policy in place, if they differed from other policies and if so to what extent. The aim of this study was, therefore, to better understand the Ghanaian national blood policy in an African context, identify its strengths and weaknesses and make appropriate policy recommendations.

Following a literature review, WHO policy documents and African national policies were obtained via a web search in French and English, and by contacting representatives of national blood services. Policy documents were analysed qualitatively, and a list of commonly accepted policies was generated and compared with the evidence. Guidelines relating to blood donation, blood screening, blood grouping and component usage were common to more than half of the national blood policies reviewed.

The common recommendations listed above were compared to current blood transfusion service practices at the Komfo Anokye Teaching Hospital, and areas of policy requiring further research, to improve policy implementation and better meet the local population's needs, were identified. As a result, the following sub-objectives were identified: 1) Determine the most common reasons for donor deferral 2) Determine what information donors are interested in receiving during pre and post-donation counselling to improve donor satisfaction and potentially increase blood supply; 3) Better understand component demand and usage and its influencing factors as well as determine whether current component production rates are appropriate; 4) Understand the patient experience in obtaining a blood transfusion and securing a replacement donor.

Results from this study showed that blood donors were most commonly deferred due to a low haemoglobin level or hepatitis B infection. Blood donors seek more information regarding their health and whether their blood is found to have any infections. In addition, they would like to know more about the blood donation process ahead of time, such as what

steps are involved, if donating will be painful and how long the entire process will take. Based on interviews with clinicians and data obtained from the blood bank, while component production was found to be increasing at KATH, there were still instances when demand of blood components exceeded supply. In spite of this, patients did not find it difficult to obtain blood for their transfusion, but some expressed interest in learning more about the risks and benefits of transfusion.

Clinicians and policy makers should therefore work together to determine whether certain biological criteria currently implemented can safely be adjusted to be more inclusive and maximise the number of blood units donated. Future donor counselling sessions should aim to better communicate with donors the blood donation process and reassure blood donors of their health status. Component production should continue to increase at KATH given its demand, but only providing the blood bank has the resources to maintain production without affecting supply and patient outcomes. Finally, clinicians should increase their efforts to maintain good communication with their patients regarding transfusions, their risks and benefits, and ensure consent is always sought.

Declaration

I certify that I am responsible for the thesis submitted and that it represents original work that is my own unless referenced or specified in the acknowledgements and footnotes. The original work presented in this thesis has not been submitted to this or any other institution for any other award or degree.

Dedication

This thesis is dedicated to the memory of my dear grandfather, one of the greatest influences in my life, M. C. Chandrasekariah.

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Glossary of Abbreviations

A&E	Accident and Emergency
AABB	American Association of Blood Banks
AfSBT	African Society for Blood Transfusion
BTS	Blood Transfusion Service
CHAG	Christian Health Association of Ghana
CFIR	Consolidated Framework for Implementation Research
DALY	Disability-Adjusted Life Year
FFP	Fresh Frozen Plasma
GHS	Ghana Health Service
GMC	General Medical Council (UK)
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
IBM SPSS	International Business Machines corporation's Statistical Package for the Social Sciences
KATH	Komfo Anokye Teaching Hospital
KBTH	Korle Bu Teaching Hospital
KNUST	Kwame Nkrumah University of Science and Technology
LMIC	Low and Middle-Income Countries
NBS	National Blood Service
NHIA	National Health Insurance Authority
NHIS	National Health Insurance Scheme
NHS	National Health Service (UK)
NNJ	Neo-natal jaundice
O&G	Obstetrics and Gynaecology
PC	Platelet Concentrate
PRBC	Packed Red Blood Cells
RD	Replacement Donors

RPR	Rapid Plasma Reagent
SSA	Sub-Saharan Africa
SSNIT	Social Security and National Insurance Trust
STI	Sexually Transmitted Infection
TTI	Transfusion Transmitted Infection
UK	United Kingdom
USA	United States of America
VNRD	Voluntary Non-Remunerated Donors
WB	Whole Blood
WFP	World Food Programme
WFWB	Warm Fresh Whole Blood
WHO	World Health Organization
WHO/AFRO	World Health Organization's African Region

Terms and Definitions

ABO Grouped – Blood tested to determine which antigens, if any, are on the surface of the red blood cell

Cross matched – A test performed prior to a blood transfusion to determine whether the patient's blood is compatible with the donated unit.

Donor counselling – Information and advice provided to blood donors prior to (pre-donation) or after (post-donation) blood donation.

Paid Donor – Blood donor who receives compensation for his/her donation that is of significant value (in this study a significant value was seen as anything more than return transport costs + the cost of a meal) and seen to be an incentive

Pre-Screening – Screening blood donors for transfusion transmitted infections (TTIs) prior to donating blood

Replacement Donor – Any blood donor who donates blood on behalf of a patient who has or will be receiving a blood transfusion and who receives no compensation.

Vein-to-vein process - Covers all aspects from when the donor enters the donor clinic to the completion of the patient's blood transfusion and, if applicable, management of any transfusion related complications

Voluntary Non-Remunerated Donors (VNRD) – Blood donors who donate for completely altruistic purposes and receive no compensation. Note, it can be argued that replacement donors are also VNRD as their donation can still be for altruistic purposes and they may receive no compensation, but for the purposes of this study they will be categorised separately

Chapter 1 - Introduction

1.1 Introduction

This study was developed as a result of the paucity of qualitative data and limited policy-based research regarding blood transfusions in Africa. To create a focused and in depth study, it was decided that it would be best to concentrate on one location. The Komfo Anokye Teaching Hospital (KATH) in Kumasi, Ghana was chosen as it not only collects and tests all of its own blood units, it also distributes some units to other hospitals in the Ashanti region. Thus, it is a hospital-based system with some of the qualities of a distributive centre. This is in contrast to other countries where blood is either collected by a national blood service and distributed nationally via regional centres or where individual hospitals collect and test blood for their individual needs.

The focus of this study was to evaluate current blood transfusion services in Ghana, identify common strengths, weaknesses and gaps in policy and address the gaps and weaknesses by observing current practice and conducting further research in Ghana. The project's aim was to review blood transfusion services vein-to-vein (i.e. from donation to transfusion), including previously untouched subjects like patient experience alongside well-known issues such as blood supply, and based on the results make appropriate policy recommendations.

1.2 Study background

Timely blood transfusions treat many critical injuries and illnesses such as anaemia, and haemorrhaging, and are necessary to maintain population health. Anaemia, in particular, places a heavy burden on blood services (Allain et al., 2004; Bugge et al., 2012 and Jacobs and Mercer, 1999) and is one of the most 'common cause of disability' in the world (Murray and Lopez, 1996). The non-availability of blood can have lethal effects. For example, the World Health Organization (WHO) estimates that lack of timely blood transfusions is responsible for 25% of maternal deaths and 15% of child mortality in southern Africa (WHO,

2003). These figures illustrate the importance of blood transfusions in health care and thus, the availability of blood, or lack thereof, is a major concern.

Blood donation and blood safety play an integral role in the success of transfusion services, but it can be difficult for low and middle-income countries (LMIC) to sustain their costs. Countries in Africa suffer from low blood donation rates (see Figure 1.1). Given the region's high prevalence of infectious diseases like HIV and Hepatitis B, ensuring blood safety, while critical, is challenging. Blood services need to identify high risk donors early on in the process given the wide window period infectious diseases carry. Additionally, the high number of haemorrhaging incidents and malaria-related anaemia cases amplifies the demand for blood in Africa. In fact, the WHO estimates that in Africa nearly half of all malaria related deaths in children are due to severe anaemia and that one third of maternal mortalities are a result of haemorrhaging (WHO 2005; WHO 2012). The latter statement is likely an underestimation given that many women do not have access to a health facility and consequently cases go unreported (Dolea et al., 2003). Efficient transfusion services are therefore crucial to public health in Africa.

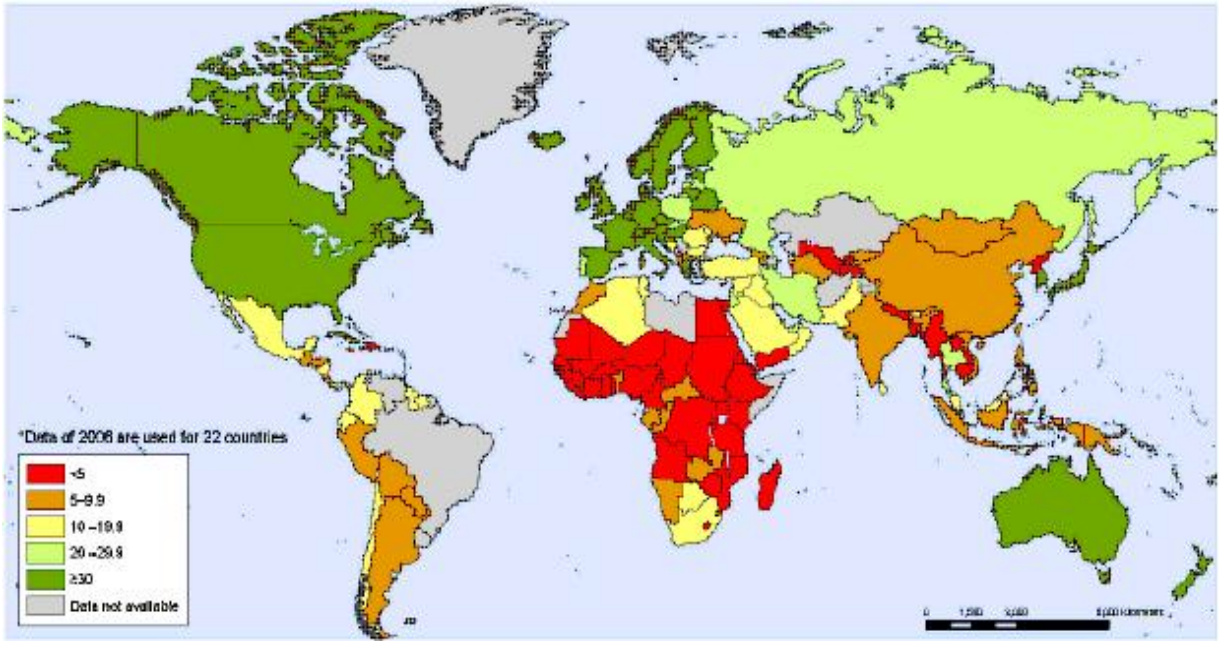


Figure 1.1: Blood donations per 1000 population in 2007. Image courtesy of WHO, 2009 (http://www.who.int/mediacentre/factsheets/donations_per1000_population_20091110.pdf)

1.3 Justification for the study

While there are studies reporting on blood donation and blood safety, there is a lack of research evaluating transfusion policy and services in Africa from a holistic point of view – i.e. from the different perspectives of the people involved, such as blood donors, patients, clinicians, laboratory staff and management. This study focused on addressing gaps in the current blood transfusion policies and conducting research aimed at strengthening policies and filling in the gaps. Using both quantitative and qualitative methods, the strengths and weaknesses of all aspects of transfusion services (including donation, blood testing and grouping, delivery of blood, transfusion etc.) from the perspectives of patients and their families, hospital staff and donors were explored. To ensure transfusion services are effective, it is essential that policy makers and health care providers understand the interactions between the various players involved. The purpose of the study was to use the results to make appropriate policy suggestions to improve blood services, with the ultimate aim of reducing the number of deaths due to lack of blood for transfusion.

To better understand blood transfusion services at KATH and develop appropriate study objectives that would best address the overall aim of the study, a six-week pilot study was conducted. Due to the limited information in the literature on the vein-to-vein process, this pilot study allowed me to witness it first-hand in Kumasi as well as pilot some questionnaires and semi-structured interview guides I had planned for the main study. Based on the results of the pilot study I could document the vein-to-vein process, compare it to existing policies and identify areas requiring further research, which would form the focus of my sub-objectives for objective 3 (see section 1.4). The methods for the follow up study, which formed the main portion of my fieldwork, were then adjusted to meet sub-objectives 1-4.

1.4 Aims and objectives

The overall aim of this study was to better understand local blood transfusion service

needs and provide context-specific guidelines for existing blood transfusion policies to improve blood transfusion practice in Kumasi, Ghana

Objective 1: Examine the Ghana national blood transfusion policy in an African context and identify the strengths, weaknesses and evidences gaps

Objective 2: Compare practice to policy in Kumasi and identify factors affecting policy implementation

Objective 3: Identify the areas of blood transfusion policy in Kumasi that require further research and generate local evidence to improve policy implementation and better address local population needs.

Areas identified (during the pilot study) :

- Sub-objective 1: Identify the most common reason(s) for donor deferrals and determine if current donor criteria should be re-evaluated to maximise blood supply.
- Sub-objective 2: Determine what information donors are interested in receiving during pre and post-donation counselling to improve donor satisfaction and potentially increase blood supply.
- Sub-objective 3: Quantify component usage and demand, understand its influencing factors and determine whether the appropriate amount of resources is being utilised.
- Sub-objective 4: Understand the patient experience in obtaining a blood transfusion and securing a replacement donor.

Objective 4: Generate a list of guidelines for each of the areas of policy identified in Objective 3, based on the local evidence, to improve the practice of current blood transfusion services in Kumasi.

1.5 Methodological approach

To examine blood transfusion services and policies from the vein-to-vein process (from blood donation to blood transfusion) with emphasis on the hospital, patient and donor perspectives, a single method alone would not have sufficed. A mixed-methods approach was, therefore, used. The collection of quantitative data provided an overview of the current situation while qualitative data provided rich details that may otherwise have been missed. In some cases, qualitative data was used to identify topics and areas for quantitative study.

Prior to starting this project, I did not have any haematological knowledge or experience. My previous research during my Master's in International Public Health had focused on health inequalities and health policy. It is my interest in using health policy to make population health changes that led me to my interest in this PhD project. Thus, in the initial stages of my PhD I focused heavily on developing my knowledge base around blood transfusion and its policies by reading literature published by national blood services and reviewing evidence based articles. Conducting the six-week pilot study was also key in helping me visualise and understand how transfusion services work at KATH. It provided me with the specific knowledge needed on of how KATH functions and aided me in further developing and fine-tuning the study design.

1.6 Project design

The project was completed in two phases. Phase 1 included a pilot study (for a period of six weeks), provided the foundation for the study allowing for a better understanding of current blood service practices at KATH and the opportunity to pilot questionnaires and semi-structured interviews based on previously identified objectives. The pilot study addressed objective 3 and provided insight as to what areas of the vein-to-vein process required further research. Based on these results, sub-objectives 1-4 were developed. The aim of Phase 2 was to collect the data required to address these sub-objectives. The fieldwork for Phase 2 took place over a period of eleven months, exclusively in Kumasi, Ghana. Data was initially

gathered through observation, hospital records, questionnaires and semi-structured interviews. Following analyses of the questionnaires, additional data was obtained via focus groups.

1.7 Thesis outline

Chapter 2 presents the literature review and provides background information about Ghana, its health care system and blood services; and places it in the context of blood transfusion services in sub-Saharan Africa. Objective 1 is addressed in Chapter 3, where a review of national blood policies in Africa, including Ghana, and WHO blood policy documents is presented and compared to blood services practice in Kumasi. Chapter 4 presents the methodology for the study, and provides context and the details of both the qualitative and quantitative data collection tools used. Chapter 5 presents the findings from the interviews with donors and donor clinic staff, focusing on donors' pre- and post-donation counselling experiences and the implications of these results. Chapter 6 presents the findings regarding reasons for donor deferrals at the KATH donor clinic and discusses whether donor criteria should be re-assessed. Chapter 7 describes and discusses blood component usage at KATH, relying on multiple sources of data such as physician interviews and hospital records. Chapter 8 presents and discusses the findings of patient interviews and incorporates some responses from physicians to better understand patients' experiences in obtaining a transfusion and, where relevant, securing replacement blood donors. Chapter 9 concludes this thesis with a summary of the study's findings and suggested guidelines aimed at complementing existing policy and improving the vein-to-vein process at KATH.

Chapter 2 – Description of Ghana and its health services and blood services in low and middle income countries, including Ghana.

2.1 Introduction

This chapter summarises the current Ghanaian health care system and blood services and presents a review of the literature surrounding blood services in Ghana and other low and middle income countries.

2.2 Ghana background

Ghana is a country of 238,535km^2 located in West Africa and shares borders with Burkina-Faso, Togo and Cote d'Ivoire (see Figure 2.1). A former British colony, it was the first country in sub-Saharan Africa to attain independence in 1957. It has a population of approximately 25 million {World Bank, 2011} and is considered a middle-income country. The country's economy relies primarily on natural resources such as gold, cocoa and oil. Ghana is a democracy that has been hailed internationally for its political stability. Accra is the capital city of Ghana. The country is divided in to 10 regions each served by a regional hospital (government run) and supported by other district hospitals and private health care facilities. In 2003, it established a national health insurance scheme, an initiative aimed at reducing inequalities in accessing health care.

Figure 2.1 - Map of Ghana (courtesy of lonelyplanet.com)

2.2.1 Demographics (StatsGhana, 2012)

According to the 2010 Ghana Population and Household Census, Ghana had a population of 24,658,823. The survey results show that the Ashanti region, where KATH is located, accounts for nearly 20% of the national population. The predominant religions in Ghana are Christianity, representing 71.2% of the population, and Islam representing 17.6%. 74.1% of those 11 years of age and older are literate, with an estimated 53.7% having attended middle or junior high school (JHS).

2.2.2 Health system

2.2.2.1 Ghana Health Service

The Ghana Health Service (GHS) was established in 1996 and is 'responsible for the implementation of national policies under the control of the Minister of Health' (GHS, 2015). The GHS is responsible for all district and regional hospitals. Teaching hospitals and private hospitals are run separately. The Christian Health Association of Ghana works alongside the GHS and consists of '183 health facilities and health training institutions' across the country (CHAG, 2015). Teaching hospitals are managed by their own teaching hospital board (GHS, 1996 – Act 525). At KATH, the board is made up of '4 Non-Executive members (government appointees), 6 Executive members and the Dean of the School of Medical Sciences' (KATH, 2015).

2.2.2.2 National Health Insurance Scheme (NHIS)

In 2003, the National Health Insurance Authority (NHIA) was established with the aim of attaining universal health care (NHIA, 2015). Ghanaians pay a premium based on their income to benefit from the National Health Insurance Scheme (NHIS). Those exempt from premium payments include children under the age of 18 years, elderly over the age of 70 years, 'indigents' and Social Security and National Insurance Trust (SSNIT) contributors and pensioners (ibid). Under the NHIS, all hospital and outpatient visits and some laboratory tests and medicines are covered (Drislane et al., 2014). In 2010, roughly half the national population was enrolled in the scheme, with poor patient education cited as a potential reason for lower enrolment rates (ibid).

The NHIS has improved the affordability and access to health care and prescription drugs (Barimah and Mensah, 2013) and a study in Accra found that adult women enrolled in the scheme were more likely to make use of health services (Blanchet, Fink and Osei-Akoto, 2012). However, in the Central and Eastern regions of Ghana enrolment rates are the lowest

among the poorest (Kotoh and Van der Geest, 2016), resulting in persisting health inequalities. Additionally, there is concern that corruption may affect the financial viability of the scheme (Barimah and Mensah, 2013).

2.2.2.3 Medical education in Ghana

Medical doctors are the only hospital staff permitted to prescribe blood transfusions. There are five public medical schools in Ghana: the University of Ghana, Accra; the Kwame Nkrumah University of Science and Technology (KNUST), in Kumasi; the University of Cape Coast in Cape Coast; the University of Health and Allied Services in Ho, and the School of Medicine and Health Studies at University of Development Studies in Tamale. There is also a private medical school – the Accra College of Medicine.

The majority of graduates come from the Accra and Kumasi institutions (Drislane et al., 2014). The traditional medical degree programme consists of 6 years of training. A graduate entry scheme for those with a Bachelor of Science also exists and consists of 4 years of training. Upon completion of medical school, doctors spend two years as house officers where they spend 6 months each in paediatrics, surgery, obstetrics and gynaecology (O&G), and internal medicine. Two of these rotations are completed in a teaching hospital while the remaining two take place in a district hospital. Following completion of their house jobs, doctors can move on to specialise in their field of interest. According to a student, up to 70% of his classmates had left to practice medicine abroad (ibid), though it is unclear how many of these individuals return to Ghana. Nevertheless, this suggests that the country is suffering from a considerable 'brain drain'.

2.2.3 Leading causes of death in Ghana

The average life expectancy in Ghana is 62 years for males and 64 years for females. This is higher than in most African countries. The under-five mortality rate is 78 per 1000 live births (WHO, 2015). Malaria, HIV and maternal mortality all contribute significantly to the

country's mortality rates. In fact, 9.0% of female deaths in Ghana are deemed to be pregnancy related (StatsGhana, 2015), with postpartum haemorrhage being the leading cause; and 8.3% of all deaths are malaria related (WHO, 2015). In addition, Ghana is experiencing an epidemiological transition resulting in an increase in the burden of chronic illnesses such as hypertension, obesity and diabetes, thus placing additional weight on the country's health services (de-Graft Aikins, 2007). In 2003, stroke and hypertension were the 4th and 7th leading cause of death among in-hospital patients across the country (ibid).

Of note, patients with sickle cell disease are particularly prone to strokes as sickle-shaped cells can block blood flow to the brain. Regular red blood cell transfusions in this group can reduce the risk of stroke (Wang and Dwan, 2013).

2.2.4 Blood group distribution in Ghana

In recent literature, there are no published figures regarding blood group distribution in Ghana, thus making it difficult to quantify the frequency of each blood group. The only national statistics that could be found were in a paper published by Yankah (1965) under the Ministry of Health in Ghana, which aimed to investigate a possible link between inheritance, blood group and leprosy. The blood group distribution among the controls, 400 blood donors without leprosy, are presented below in Table 2.1. The 400 participants were made up of 'various tribes' to provide 'a fair sample of all the tribes in Ghana' (ibid). The lack of more recent data highlights the potential need for a cross-sectional national study of blood group frequencies. This information could prove useful in the future for a national blood bank to target appropriate donors for donation, ensuring higher supplies of common blood groups and more consistent supplies of less common groups. However, currently, given the limited supply of blood, the main aim is to collect from as many donors as possible.

Blood Group	A	B	O	AB	Rh positive	Rh negative
% of Blood Donors	20.75	25.0	51.0	3.25	93.75	6.25

Table 2.1 – Blood group distribution based on percentage frequency among blood donors in Ghana in 1965 (Yankah, 1965)

2.3 Review of blood services in Ghana and other low- and middle-income countries

Currently, Ghana has a hybrid blood transfusion system that is supported by both national blood services and individual hospitals. However, based on discussions with the Korle Bu Teaching Hospital (KBTH), in Accra, and KATH blood services' staff, the ultimate goal is to consolidate these services under one national blood service (NBS) with specific blood collection sites. Currently, the NBS operates within the Ghana Health Service, is based at the KBTH in Accra and supplies the Greater Accra region.

2.3.1 Search strategy for literature review

The main database searched for reviewing literature on blood services in low and middle income countries was PubMed. The search terms used are presented below in alphabetical order:

- Africa
- Blood policy
- Blood safety
- Blood screening
- Blood services
- Blood supply
- Blood transfusion

- Developing countries
- Komfo Anokye Teaching Hospital
- Low and middle income countries
- National blood policies
- Paid donors
- Repeat donor
- Replacement donor
- Transfusion services
- Transfusion transmitted infections
- Volunteer donors

The first 100 search results were reviewed. Any papers not in English or French were excluded. Where applicable, the original sources for information presented in a paper were obtained. Relevant references in each of the papers were followed up and included in the literature review.

2.3.2 Central vs. hospital-based blood services

To better understand Ghana's hybrid blood transfusion system it is important to understand how centralised and hospital-based systems work and differ. In a centralised system, which represents a more vertical approach, the collection and testing of blood for a given region are overseen by a central organisation whereas in a hospital-based system, each hospital operates autonomously (Hensher & Jefferys 2000). Unlike most Western countries, not all African countries have a centralised system in place (Field & Allain 2007). While centralized services allow for better quality management and donor recruitment, hospital-based systems have fewer resources, tend to rely on replacement donors and therefore incur less cost. Thus, while centralized services present certain advantages, there are few cases in the developing world where they have survived without external funding (Bates & Hassall 2010; Field & Allain 2007) and consequently hospital-based systems remain widespread. In fact, given their sustainability, from a health care perspective, it has been suggested that hospital-

based systems may be the best option for most African countries (Jacobs & Mercer 1999). On the other hand, it can be argued that there is greater stress on patients and their families as they are forced to secure their own replacement donor (Bates & Manyasi 2007). Unfortunately, there is little information regarding the burden placed on families in search of a donor (Lara et al. 2007).

2.3.2.1 National Blood Service in Ghana

Run by the Ghanaian Ministry of Health, the National Blood Service (NBS), based at the Korle Bu Teaching Hospital in Accra, aims to 'ensure an effective and coordinated national approach to the provision of safe, adequate and efficacious, blood and blood products […]' (NBS, 2016). The NBS is responsible for blood collection at the Korle Bu Teaching Hospital and for the Greater Accra region. Blood collection in the other regions of Ghana remains hospital based.

The NBS has also, in collaboration with local and international blood service teams, developed a national blood policy document with specific guidelines and recommendations for blood transfusion in Ghana. The aim of this document is to ensure a basic standard of care is achieved throughout the country. While the policy document is freely available and hospitals across Ghana are encouraged to adopt its recommendations, it is not currently legally mandatory as it is yet to be approved by parliament. The eventual aim, however, is for blood services to be nationalised, with the national blood policy setting the standard for all blood services in Ghana.

2.3.2.2 Komfo Anokye Teaching Hospital blood supply

KATH is responsible for its own blood collection, grouping and screening. There is no automated stock checking available, thus the number of units grouped and cross-matched are hand-counted. However, the counting is not done at specified intervals and not officially recorded. The data are mostly used to identify any blood groups with low stock levels,

indicating a need for more donors. This is communicated to the transfusion management team who organise blood drives and with nurses and doctors in the wards who can encourage patients to find replacement donors (see section 2.3.2 for further details on replacement donors). In addition, it also helps supply local hospitals, mostly in Kumasi. Some of these hospitals do collect their own units of blood too, but as a larger hospital and with a strong transfusion management team who organise numerous mobile sessions, the hospital is able to collect a greater number of units.

Over the past 10 years KATH has increased the amount of blood it collects and has begun to focus on blood component production, though whole blood remains the most commonly transfused blood product. In 2008, a new Accident and Emergency (A&E) complex was constructed with a specific area dedicated to the blood bank providing place for the equipment needed for blood screening, grouping, cross-matching and storage. The inception of the A&E complex also increased demand for blood according to the KATH Annual Report (2011). In 2007, 14,997 blood donors were screened and 12,441 units were collected (ibid). By 2011, 18,065 donors were screened and 15,748 units of blood were collected (ibid). Though the report does not indicate the number of transfusions that took place during this time, it estimates that 18,849 in-patients' blood were grouped in 2007 compared to 23,936 in-patients in 2011. Patients' blood may be grouped as a precautionary measure to deliver blood faster should they need a transfusion, thus it cannot be said for certain that the number of transfusions increased during this time, but these numbers do suggest the demand for blood may have.

2.3.3 Volunteer vs. replacement blood donors

2.3.3.1 Types of blood donor

According to the WHO (2015), there are three types of blood donor: voluntary non-remunerated donors (VNRD), family/replacement donors and paid donors. Donors considered volunteers are those who receive no compensation and donate altruistically.

Family/replacement donors are those who donate blood to replace blood transfused to a friend or family member. Paid donors receive compensation for their donation.

For the purpose of this study, the above definitions will be used to characterize donors. However, it is important to highlight the gaps in these defined roles, which are presented below.

1. Missing from the above list is the **autologous donor** – donors who donate their blood for future personal use.
2. There is no clear definition of who should be considered a paid donor. Donors may receive a thank you gift from the patient receiving blood, be reimbursed for transport costs or receive a large lump sum. It is unclear at what point compensation is seen as motivating factor to donate.
3. The distinction between volunteers and replacement donors is that the latter are donating to save a known person's life. However, at the KATH in Ghana, some family replacement donors donate blood after the patient has received their transfusion, thus the given patient is not relying on the donor and the replacement donor's blood will be used for another patient. It can be argued that these replacement donors are donating for purely altruistic reasons, similar to VNRD. This varies compared to other regions, where a donor must first find someone to donate blood before they can receive their transfusion. For example, a story from India published online outlines the struggles a son faces to obtain blood for his mother. He visits numerous hospitals, and in spite of his mother needing blood urgently, he was refused at every hospital unless he was able to find a replacement donor (Roysam, 2015). In cases like these, patients and their families may become increasingly desperate for a replacement donor and may become willing to pay known people or strangers to donate, a practice which is documented to be unsafe (Allain, 2011). There is, however, no published evidence regarding the difference in impact on patients and their families if blood is provided before or after securing a replacement donor.

2.3.3.2 Review of blood safety differences between volunteers, paid donors and replacement donors

There is considerable debate regarding the safety of blood from volunteer donors vs. replacement donors. Currently, the WHO advocates the collection of blood from exclusively volunteer donors in order to maximize blood safety (WHO, 2010). Indeed, there is some research indicating that the prevalence of blood-borne diseases is lower among volunteer donors (Kimani et al. 2011). However, a study in Kumasi, Ghana revealed that there is no significant difference in blood safety between volunteer and replacement donors (Allain 2011). Moreover, according to a study in Guinea, the prevalence of HIV and HBsAg were significantly higher among first-time volunteer donors than in replacement donors (Loua & NzeNkoure 2010), thus raising the possibility that replacement donors may in fact be safer than first-time volunteers. It is unclear whether the Kimani (2011) study stratified their data by age which would considerably impact their results, as in not doing so volunteer donors would undoubtedly appear safer as they tend to be younger than replacement donors and have therefore been exposed to fewer risk factors.

There is strong evidence indicating that blood from repeat donors (regardless of whether they are volunteer or replacement donors) is safest (Allain 2011; Reddy 2012) whereas blood from paid donors is generally unsafe (Allain 2011). Similar results were uncovered in a study in Mali, where among volunteer donors, return donors were found to be safer than those donating for the first time (Diarra et al. 2009). These results, along with those from the study in Guinea (Loua & NzeNkoure 2010), suggest that replacement donors may only appear less safe as they generally consist of first-time donors. A similar thought has been echoed by Allain et al. (2011) who suggested that the results observed in the Kimani (2011) study may be due to the fact that no distinction was made between first time and repeat donors (Allain et al. 2010). Thus, if the group of volunteer donors consisted largely of repeat donors, it would give the false impression that blood from volunteers is safer (Allain et al. 2010; Kimani et al. 2011). Unfortunately, repeat donors are rare even among volunteers

(Tagny et al. 2009). Further efforts should therefore be made to encourage repeat donations among both volunteer and replacement donors. A similar conclusion was made in India, with researchers recommending that greater efforts should be directed towards encouraging replacement donors to become regular VNRD (Nair and Mammen, 2015).

2.3.4 Ensuring adequate blood supply

One of the main challenges facing transfusion services in developing countries is the limited supply of blood. Efforts have been made to increase the number of volunteer donors through education programs and the media (Allain et al. 2008). In addition to mobile sessions, mobile trucks have been used to help increase blood supply (Tazi-Mokha et al. 2012). For example, in Morocco, a six bed mobile truck, 'driven by a specialised driver to places of interest such as main streets, festivals, national events etc.' collects on average 6000 units of blood per year (ibid). Nevertheless, blood shortages persist. The amount of blood collected can also be influenced by donation guidelines, which vary by country. For example, some countries require longer periods of time between donations. While this can protect donors from developing anaemia, blood banks will not be able to capitalise on the available blood (Karp & King 2010).

2.3.4.1 Donation and education

Studies show people are often reluctant to donate due to limited education with regards to blood donation, cultural taboos and fear of HIV infection (Allain et al. 2004; Salaudeen & Odeh 2011; Lownik et al. 2012). In Sierra Leone, one of the main barriers preventing transfusions was the public's attitude towards blood donation (Sengeh et al. 1997). For example, people were under the false impression that blood from a stranger would negatively affect their mental or physical health (ibid). In addition, the high prevalence rates of HIV and hepatitis B as well as increased poverty and malnutrition rates reduce the number of eligible donors (Reddy, 2012). In fact, unsurprisingly, most volunteer donors are from urban areas and belong to high socioeconomic groups (Cunha et al. 2007). Moreover, studies

in Senegal and Cameroon have found a positive association between education and volunteer donation (Duboz et al. 2010; Nchinda et al. 2012). Similarly, a study in Iran found a positive association between education levels and knowledge and attitudes of blood transfusions (Javadzadeh et al., 2006). However, one study in Nigeria revealed that even many literate individuals have unfounded theories concerning blood transfusions (for example, transfused blood comes from animals), and some have never even heard of blood donation (Olaiya et al. 2004). While improving blood donation knowledge is certainly an important aspect of increasing blood supply it alone will likely not have much effect. Studies have shown that in spite of a relatively high proportion of individuals with good knowledge regarding blood donation, very few actually donate blood (Salaudeen & Odeh 2011; Agbovi et al. 2006; Lownik et al. 2012). It is therefore important to address any other issues preventing people from donating blood.

2.3.4.2 Blood donation and gender issues

Female blood donation rates have been traditionally low in Ghana and are estimated to be between 5.7-7.7% of all donations (Ampofo et al., 2002 and Walana et al., 2014). This is true for other low and middle-income countries and is in contrast to most European countries where blood donation rates for men and women are near equal (Bani and Guissani, 2010). Male dominance in blood donating is a trend commonly seen in West Africa with countries such as Togo, Burkina Faso, Morocco and Nigeria witnessing male donation rates of over 60%, and in some regions, up to 99% (Agbovi et al., 2006; Nebie et al., 2007; Erhabor et al., 2013; Tazi-Mokha et al. 2012). This may be due to myths related to menstruation and anaemia, pregnancy, breastfeeding, the perception that men are healthier; or the fact that since fewer women work they are less likely to come in contact with blood drives (Mbanya et al., 2003; Olaiya et al. 2004; Tagny et al. 2010; Tazi-Mokha et al. 2012). Further efforts should therefore be directed at recruiting female donors as this could result in a considerable increase in blood supply.

2.3.4.3 Donor incentives

Donor incentives may have some effect increasing the number of blood donors, but research shows that most donors donate for altruistic reasons (Kasraian & Maghsudlu 2012). Monetary compensation is usually banned given its association with unsafe blood (Allain 2011). However, the majority of donors who were interested in donation incentives suggested that free glucose/cholesterol tests would be an effective incentive (Kasraian & Maghsudlu 2012). This may be an initiative worth considering in recruiting or retaining donors.

2.3.4.4 The importance of replacement donors

The WHO recommends that all countries aim for a 100% volunteer based donor programme (WHO, 2010). However, in most resource poor settings, the majority of blood donors are replacement donors (Allain et al. 2004). Even in countries where blood is exclusively collected from volunteers, for example Zimbabwe, the amount collected remains below the suggested minimum (AfSBT, 2011). Replacement donors are particularly important in Africa due to strong family ties and the willingness of someone to donate for a loved one (Allain et al. 2010). Thus, rather than trying to reduce the number of replacement donors, more efforts should focus on converting them into repeat donors.

2.3.4.5 Repeat donors

Globally, there is limited research regarding the characteristics of repeat donors. However, recently, a study in Iran revealed that those who donated blood soon after the first donation were more likely to continue to return as donors (Kasraian & Tavassoli 2012). Moreover, they also found men and single individuals were more likely to become repeat donors. Interestingly, no association with age or education level was discovered, contrary to what is observed in Western countries (ibid). Lownik et al. (2012) emphasise the importance of first time experiences and suggest this is likely to influence a donor's decision to return.

In Iran, special efforts were made to retain donors by providing them with a 'reminder call' 3-6 months post donation (Maghsudlu et al. 2009). These efforts were somewhat rewarded with 35% of those receiving a call from a recruiter returning based on a survey of 3167 blood donors. However, of those receiving an automated phone call, only 15.7% returned. This study illustrates how simple retaining strategies can have a significant effect.

In Cote d'Ivoire, one issue involving repeat donors was that they were more common among deferred donors, usually as a result of low haemoglobin levels (Kouao et al. 2012). This suggests that repeat donors must be encouraged to maintain proper haemoglobin levels through education, diet and supplements. Not doing this can reduce the amount of available blood.

2.3.4.6 Other barriers

The fact that blood donation generally occurs during working hours can deter those who are not keen on taking leave. In fact, in Nigeria, proper facilities, trained staff, and the ability to donate during evenings and weekend coupled with adequate blood transfusion service (BTS) education was shown to increase the number of voluntary donors (Nwagbo et al. 1997).

2.3.4.7 Interventions aimed at increasing blood donor recruitment and retention

As outlined in the above sections, maintaining adequate blood supply and retaining donors are challenging yet vital to treating a variety of health conditions such as blood loss via trauma, post-partum haemorrhage and malaria related anaemia. A single blind randomised trial, in the United States, explored several interventions to identify which interventions were most successful in encouraging donors to return (Reich et al., 2006). Email recruitment was seen to be less effective than telephone (13.2% vs. 27.8%; RR, 0.48; 95% CI, 0.40-0.57). A complimentary t-shirt showed no increase in donor return rates compared to no incentive

(20.5% vs. 20.6%; RR, 0.99; 95% CI, 0.91-1.09) (ibid). The study also compared two recruitment message scripts delivered via telephone (Scripts A and B). Both thanked the donor for their previous donation and both requested a subsequent donation using a current patient's story whose blood type matched the donors (ibid). The difference between the scripts was that Script B also mentioned that a complimentary T-shirt would be provided. Interestingly, Script A proved more effective than Script B (22.2% vs. 18.9%; RR, 1.18; 95% CI, 1.07-1.29) (ibid).

While these results may not apply to other countries, similar studies should be conducted elsewhere to better identify which interventions work in a local context. For example, one might assume that a complimentary t-shirt would either have no effect or increase donation rates, but when comparing Scripts A and B, it seems the patient's story alone was more successful in recruiting past donors. This, however, may not be the case in a different local context.

2.3.5 Blood safety

Blood safety is a critical concern with regard to blood transfusion, particularly in Africa, where the prevalence of blood-borne diseases such as HIV, hepatitis B, hepatitis C and syphilis remain high. Donors between aged between 30-35 years represent the highest risk group (Allain et al. 2010; Tagny et al. 2008). There is evidence indicating that the prevalence of transfusion transmitted infections (TTI) is lower for blood processed by centralised blood services compared to hospital-based systems (Bates & Hassall 2010). However, the high costs associated with a centralised system make it unsustainable for most low-income countries (ibid).

2.3.5.1 Minimising the collection of infected blood

Pre-donation screening

Generally, to prevent collecting unsafe blood, blood collection services will conduct a risk assessment (usually via a questionnaire) prior to donation and high risk donors are deferred from donating. Donated blood is then tested for TTIs. This method can reduce the cost associated with blood testing. Note, however, a study in Cote d'Ivoire administered a risk assessment questionnaire prior to and post donation and revealed that certain risk behaviours, particularly those related to sexual habits, were under-reported prior to donation (Minga et al. 2010). Given the association between certain risk behaviours and sexually transmitted infections (STIs) this can result in higher collection rates of infected blood. While the authors acknowledged the possibility that the respondents' behaviours may have changed after donation, reporting bias should remain a concern when relying on self-assessment tools to evaluate risk.

At KATH, blood is tested with rapid screening tests prior to donation (Owusu-Ofori et al. 2005), which can be costly but reduces the expense of blood bags as less blood is collected and stored. Pre-screening also results in less blood wastage (Mbanya et al., 2003). Moreover, from a public health perspective, pre-donation screening is advantageous as people are informed of their test results earlier (ibid) thus preventing further transmission of infectious diseases. However, it does not eliminate the risk of TTIs as there is a window period during which infections are undetectable but still infectious. Moreover, donors deferred after pre-screening may feel uncomfortable or embarrassed in front of their peers.

2.3.5.2 Screening collected blood

At KATH, all prospective blood donors are tested for HIV, hepatitis B, hepatitis C and syphilis, but in countries where pre-donation testing does not occur, collected blood is tested most commonly for HIV and hepatitis B in order to prevent TTIs. HIV screening has been shown to be cost-effective as it reduces the number of disability adjusted life years (DALYS) and

overall costs simultaneously (van Hulst et al. 2008). There is, however, concern relating to the quality of screening. For example, in spite of screening, a study in Kenya estimated that 2% of blood transfusions resulted in HIV infection (Moore et al. 2001). It is possible that these TTIs occur during the 'window period' when the virus is present and undetectable, but was not the case in this study. However, one study found poor sensitivity for both HBV and HIV screening which, in the case of HBV, the authors attributed primarily to the use of rapid tests as the main form of screening (Laperche, 2012)

Note that there are many other infectious agents for which blood is not routinely screened for in Africa. Examples include malaria, syphilis and filariasis (Adjei et al. 2003; Tagny et al. 2010). However, given the high prevalence of some of these diseases, additional screening would further reduce the supply of blood (Adjei et al. 2003). Moreover, in some cases as with for example malaria, a considerable portion of the African population has some level of naturally acquired immunity (Osaro and Adias, 2011), and therefore the risk of infection through transfusion is low.

2.3.5.3 Addressing blood safety

Given the debate concerning the safety of blood from volunteer and replacement donors, it remains unclear how best to address blood safety. Reddy (2012) suggests that two key factors in ensuring blood safety are retaining low risk volunteer donors and a national coordinated blood service. Others, however, have suggested that increasing the number of return donors is an integral part of blood safety and that more efforts should be directed at retaining donors (Allain et al. 2010).

2.3.6 Barriers to adequate blood supplies

2.3.6.1 Recruiting donors

As mentioned above, ensuring adequate supply of blood is one of the major challenges facing blood transfusion services globally. Both education and gender issues appear to influence blood donation patterns. However, other reasons for not donating exist. For example, people may be unable to afford time off from work and thus be unwilling to become volunteer donors, as is believed to be the case in northern Nigeria (Ahmed et al. 2007). Financial problems and the fear of testing HIV positive also appear to deter replacement donors (ibid). In Iran, lack of time and difficulty in accessing blood drives were cited as major reasons for not donating (Javadzadeh Shahshahani, 2007). The same study revealed that nearly half the population did not donate due to perception of anaemia, fear or unawareness of the importance of blood (ibid). In some cases, even family members are unwilling to act as replacement donors (Bates & Manyasi 2007). All the above factors should be taken into consideration when developing recruiting schemes.

2.3.6.2 Financial barriers

The cost of donor recruitment, testing, equipment and staff all contribute to the cost of blood. The cost per unit of replacement blood ranges from $12 to $16 whereas that of volunteer blood is $26 to $60 (Allain 2011). As mentioned above, the main reasons for the difference in cost between replacement and volunteer blood are the costs associated with quality management and donor recruitment (Lara et al. 2007). Collecting user fees from all in patients has been suggested as a potential mode of funding and it is believed that the costs could be minimal and would therefore not affect health care access (Hensher and Jefferys 2000). However, it is not clear whether such costs would deter individuals from seeking medical care and potentially increase the health inequalities gap. Particularly, since from the patient perspective, inability to pay in advance remains a major obstacle (Bates & Hassall 2010). In some cases, countries like Rwanda, Burkina Faso and Cote d'Ivoire have reduced

the financial burden by obtaining support from international partners (Tagny et al. 2008). While external support can be useful in establishing a blood transfusion system, there is always the possibility that these funds will cease to exist and governments should therefore avoid relying on them long-term.

2.3.6.3 Unnecessary transfusions

It is believed that the future of the efficient use of blood relies on the ability of health workers to reduce the number of unnecessary transfusions (Allain 2011). Unnecessary transfusions remain a major problem and pose a considerable burden on the blood system. Research suggests that adherence to strict guidelines and protocol can help limit unnecessary transfusions by up to 75% (Bates & Manyasi 2007), which will consequently reduce the amount of blood required. Additionally, given that severe anaemia is one of the most common reasons for blood transfusion, it has been suggested that iron supplements at an earlier stage may be a cost-effective solution (Osaro and Adias, 2011).

2.3.6.4 Limited knowledge among staff

A study in the United Arab Emirates revealed that many of the nurses involved in transfusion lacked sufficient knowledge and training (Hijji et al. 2012). For example, only 19% of the study's participants were 'aware of basic ABO terminology' and less than half (43%) knew they should ensure the patient's identification details on the blood bag matched those on the blood request form (ibid). 90% were unsure as to how often they should record vital signs in a patient undergoing a blood transfusion (ibid). A similar problem was found among laboratory staff in Burkina Faso (Nébié et al. 2011). Limited knowledge among staff may result in errors, blood wastage (e.g. blood bag has spent too long at room temperature due to delays in transfusion and is therefore no longer viable) and TTIs and should be addressed by ensuring all staff members receive adequate training.

As blood transfusion protocols vary between hospitals, hospitals' blood services

departments should hold regular induction and refresher training sessions with all staff involved in blood transfusions (e.g. doctors, nurses, and laboratory staff) to ensure staff members are up-to-date with the hospital's blood transfusion protocol. This should include information about blood component storage, production, grouping and cross-matching (how grouping and cross-matching is performed and its significance), component usage (e.g. when to use each of the components), blood safety (e.g. needle stick injuries and ensuring proper patient identification) and transfusion monitoring (e.g. how often vitals should be recorded for patients undergoing a transfusion).

In addition to increased training, hospitals should regularly assess how well current blood transfusion protocols are being adhered to and in cases where they may not be followed the hospital should aim to identify the cause(s) for this and address it.

2.4 Blood component preparation and usage

The WHO and many of the African national blood policy documents reviewed (see Chapter 3) recommend the use of blood components. The process of separating blood into its components was first developed in 1960, allowing production of packed red blood cells (PRBC), fresh frozen plasma (FFP) and platelet concentrates (PC) using a heavy spin refrigerated centrifuge (Basu and Kulkarni, 2014). Preparing PRBC and FFP is a one step process, however, the preparation of PRBC, FFP and PC requires a two-step centrifugation (ibid).

2.4.1 Advantages of Blood Components

There are two main arguments supporting the use of blood components. The first is that patients can receive specifically what they need (NHS Blood and Transplant, 2016), which can have positive effects on their outcome. For example, in patients with cancer, the bone marrow can be affected thus reducing platelet production and increasing the risk of severe bleeding. These patients can benefit from an increase in platelets specifically, but do not

require an increase in blood volume or other components found in blood. The second advantage of blood component usage is that a single unit of collected blood may be used to treat several individuals (ibid) (for example, one patient may receive the PRBC and another the FFP). Therefore, one blood donation can benefit multiple people.

2.4.2 Disadvantages of Blood Components

The preparation of blood components is costly (for example, equipment maintenance) and energy demanding (e.g. electricity required by refrigerated centrifuge and freezers to store FFP) – two scarce resources, particularly in low and middle-income countries. The increase in cost may be justified given that components can be used to treat multiple patients. However, the more relevant factor when considering cost-efficiency is how many component units a blood bank is producing. For example, component production may cost considerably more per whole blood unit in a blood bank processing 100 units compared to one processing 10 000 units.

An additional factor to consider is the individual blood bank's needs. A cancer hospital, for example, may require more platelets, while a hospital whose blood usage is mainly for trauma injuries may benefit more from whole blood. In fact, U.S. Military hospitals in Afghanistan and Iraq have returned to using fresh whole blood. A study comparing component therapy and warm fresh whole blood (WFWB) treatments in military patients with trauma and haemorrhagic shock showed that the 30-day survival rate for patients was significantly higher in those receiving WFWB (Spinella et al., 2009). Thus, even in cases where components have been traditionally used as treatment, fresh whole blood may be just as or more effective. However, this is also dependent on having quick access to fresh whole blood.

2.4.3 Blood component production at KATH

According to blood bank laboratory staff members, the KATH blood bank aims to convert an estimated 30% of whole blood units into blood components. The main components produced are PRBC and FFP, though PC are also produced on demand. A double blood bag system is used for separation of whole blood into the two main components – an added cost to the blood bank. FFP units are stored at -40 degrees Celsius for up to one year. PRBC are stored under the same conditions as whole blood – up to 30 days at 4 degrees Celsius.

It is clear that the blood bank is moving towards greater component production. The blood bank's aim is to increase the proportion of whole blood units converted into components each year, as according to blood bank staff there is high demand for components and also, a unit of blood can serve more purposes. However, it is unclear how projected component production goals are determined. According to the KATH's 2013 transfusion medicine review, 16,247 units of blood were collected and 2131 units of FFP were produced. As shown below in Figure 2.2, there has been a consistent increase in FFP production. In four years, FFP production has increased approximately 400%., with the Obstetrics and Gynaecology (O&G) unit responsible for approximately 45% of FFP usage in 2013 Interestingly, the review made no mention of PRBC production and usage.

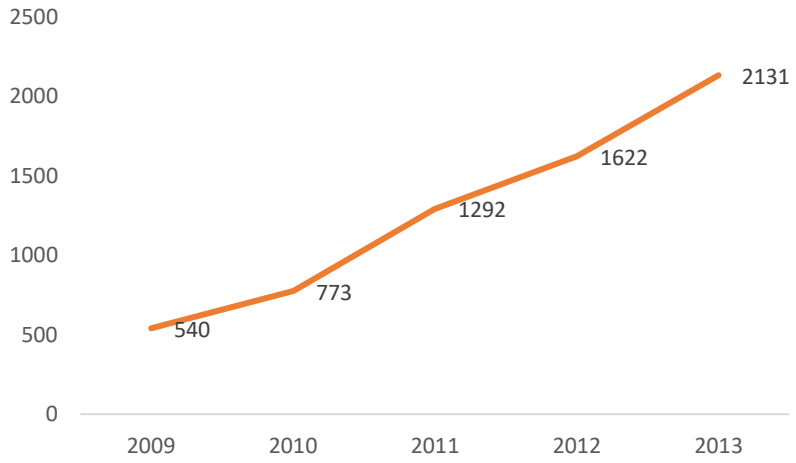


Figure 2.2 – Fresh frozen plasma production at KATH between 2009-2013

2.5 Conclusion

There are unique challenges that blood services in low and middle-income countries face, and these vary by region. It is important to identify these challenges in local areas and develop and implement policies aimed at addressing them. In addition, it is equally important to observe the successful aspects of different blood service departments and determine whether similar strategies can encounter be successful elsewhere.

Chapter 3 – Comparing policy and practice and identifying discrepancies between the two

3.1 Introduction

As mentioned in the introduction, this study was divided into two phases. Phase 1 consisted of preliminary mapping via a pilot study, which took place over a period of 6 weeks, and included obtaining and reviewing African national blood policies, WHO documents and other literature. Questionnaires and semi-structured interview tools which were used in Phase two to collected qualitative information from donors and patients were also piloted during this period. Areas where participants' responses were too vague were adjusted to include specific follow up questions in order to obtain more information (see Appendix 8).

Further objectives and sub-objectives were developed based on the results of Phase 1 and were addressed in Phase 2. This chapter focuses on the first phase of the study and the methodology used to address Objectives 1 and 2:

Objective 1: Examine the Ghana national blood transfusion policy in an African context and identify the strengths, weaknesses and evidences gaps

Objective 2: Compare practice to policy in Kumasi and identify factors affecting policy implementation

This chapter will firstly outline the recommended vein-to-vein blood transfusion process based on current African national policies, literature and WHO policy documents. Secondly, this chapter will summarise Ghana vein-to-vein policies, current KATH practices and discrepancies with the two and will detail how the findings influenced the next phase of the study.

3.2 Vein-to-vein policies in Africa

3.2.1 Identifying and generating a list of generic vein-to-vein policies in Africa

This review focused on the WHO's African Region (WHO/AFRO). In total, 15/48 African national blood policies were obtained. Five countries, where neither English nor French are one of the official languages, were excluded for linguistic reasons[1]. A web search, using the search engine Google, was conducted in French and in English for each country using the following key search terms along with each country's name (for example, 'Malawi national blood policy):

- 'blood transfusion policy' AND [country name]
- 'national blood policy' AND [country name]
- 'politique nationale transfusion' AND [country name]
- 'politique nationale sanguine' AND [country name]
- 'blood services' AND [country name]

Google was chosen as the search engine over other databases such as PubMed as I wanted to ensure I covered the relevant grey literature, which would not be easily identified in a database such as PubMed, which favours peer-reviewed studies. National policy documents, therefore, are rarely identified in a PubMed of MEDLINE search. It also allowed us to cast a wider net to ensure no other relevant sources of information went amiss.

The first one hundred results for each search were reviewed. Any national blood policy documents and national blood transfusion related recommendations or guidelines were included in the review. Where possible, national blood service websites, found while searching '[country name] blood services', were also searched for available policies. Personal requests for national policies were sent by email to known blood bank directors. The initial

[1] Countries excluded for linguistic reasons: Angola, Cape Verde, Guinea-Bissau, Mozambique and Sao Tome and Principe

request was sent to a contact in Cameroon who then kindly forwarded a list of further contacts in blood services departments in 13 different African countries. In a couple of cases, blood service departments were contacted via the email on their website. Emails were sent to all relevant contacts to determine whether their country currently had a national blood policy. If so, they were requested to provide a copy. Follow up emails were sent within the next few months. In March 2014, a final request letter was sent to all those who had not responded.

In total, nine countries responded, each with their own national policy document. One, however, was a draft version and was excluded from the study as I would be unable to share its contents. One policy sent had also been identified via the Google search. An additional 7 policies were identified through the Google search. A summary of the national blood policy search strategy and results is presented in Figure 3.1

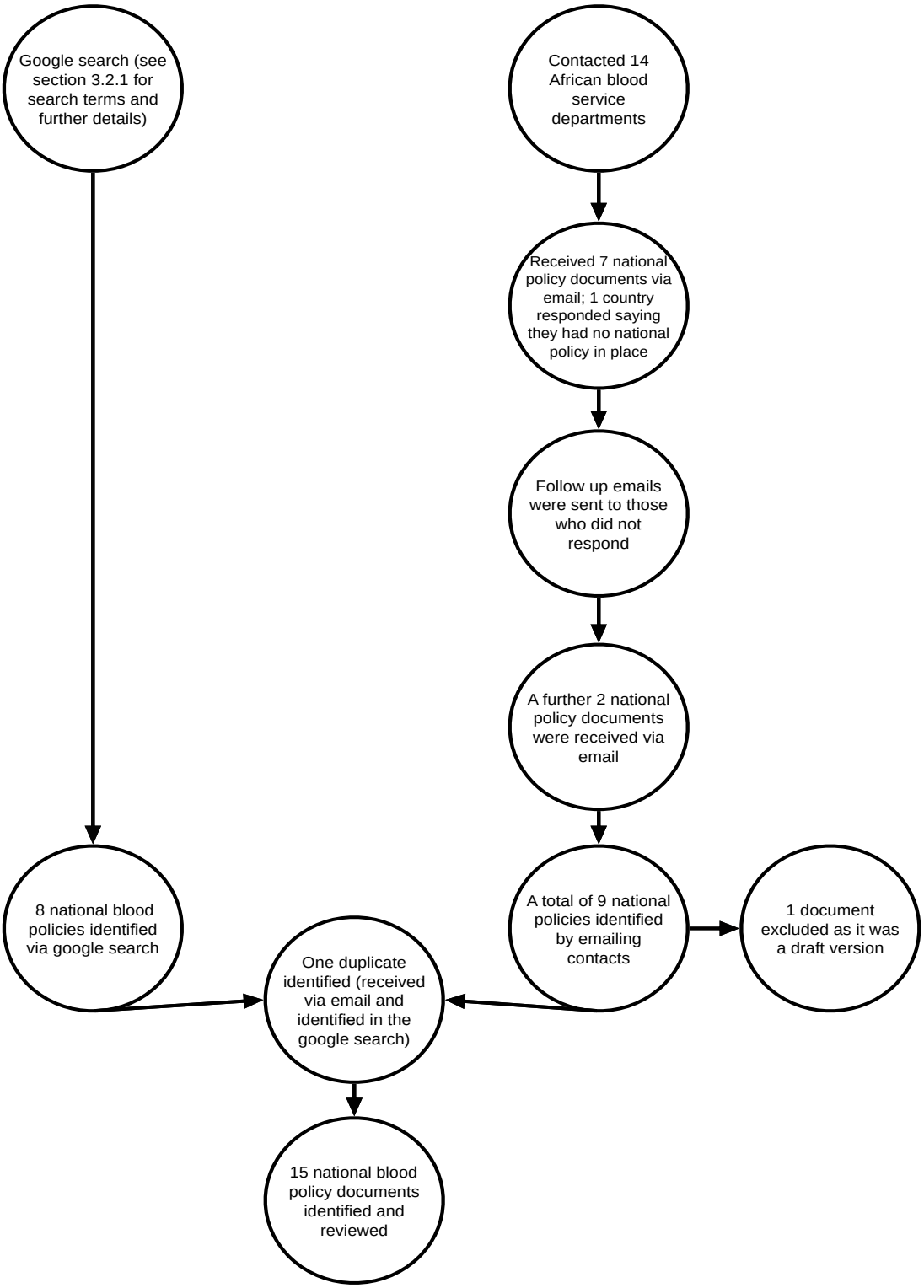


Figure 3.1 – A summary of the search strategy and results for African national blood policies

Three WHO policy documents were also reviewed[2], as they informed many of the current national blood policies in SSA. These policies were found on the WHO website. Below is a list of countries included in the WHO/AFRO region, the national blood policies collected and reviewed and the WHO documents reviewed:

WHO/AFRO countries

- Angola
- Benin
- Botswana
- Burkina Faso
- Burundi
- Cameroon
- Cape Verde
- Central African Republic
- Chad
- Comoros
- Cote d'Ivoire
- Democratic Republic of Congo
- Djibouti
- Equatorial Guinea
- Eritrea
- Ethiopia
- Gabon
- Gambia, The
- Ghana
- Guinea
- Guinea-Bissau
- Kenya
- Lesotho
- Liberia
- Madagascar
- Malawi
- Mali
- Mauritania
- Mauritius
- Namibia
- Niger
- Nigeria
- Republic of the Congo
- Rwanda
- Sao Tome and Principe
- Senegal
- Seychelles
- Sierra-Leone
- Somalia
- South Africa
- South Sudan
- Sudan
- Swaziland
- Tanzania
- Togo
- Uganda
- Zambia
- Zimbabwe

[2] World Health Organization, (2001). *Developing a National Policy and Guidelines on the Clinical Use of Blood*. [online] Available at: http://www.who.int/bloodsafety/clinical_use/en/who_bct_bts_01_3.pdf [Accessed 15 Aug, 2012]
-World Health Organization. (2009). *Screening Donated Blood for Transfusion Transmissible Infections Recommendations*. [online] Available at: http://www.who.int/bloodsafety/ScreeningTTI.pdf [Accessed 15 Aug. 2012].
-World Health Organization, (2001). *The Clinical Use of Blood*. [online] Available at: http://www.who.int/bloodsafety/clinical_use/en/Handbook_EN.pdf [Accessed 18 Aug, 2012]

National SSA Blood Policies Collected and Reviewed

- Algeria
- Benin
- Cameroun
- Ghana
- Lesotho
- Madagascar
- Malawi
- Namibia
- Nigeria
- Senegal
- South Africa
- Tanzania
- Togo
- Uganda
- Zimbabwe

WHO Documents Reviewed

- Screening Donated Blood for Transfusion Transmissible Infections Recommendations (2009)
- The Clinical Use of Blood (2001)
- Developing a National Policy and Guidelines on the Clinical Use of Blood (2001)

3.2.1.1 Reviewing Policies

All national blood policy and blood transfusion clinical guideline documents were reviewed, however only information pertaining to the vein-to-vein process (i.e. from blood donation to blood transfusion) of blood supply was included in this study. Details regarding clinical guidelines and organisational structures were excluded since that was not the focus of this study. Policies were made anonymous for analyses purposes, as the aim was to generally assess blood transfusion policies in Africa and we wanted to avoid highlighting strengths and weaknesses for individual countries in an effort to maintain good relations with the national blood services.

During the review, all policies pertaining to the vein-to-vein process of blood supply were initially grouped under the following themes: blood stock, blood donation, blood storage, blood grouping, blood requests, withdrawing blood for sampling, processing blood requests and blood transfusion. These themes were pre-determined, based on previous knowledge acquired via the literature review (see section 2.3). Some policies, however, did not fit with any of the themes but were still relevant to the review. Thus, three more themes were added: blood bank facility requirements, preparation of blood components and collection of whole blood and blood components. It became clear that some of the themes were too broad, therefore policies were further organised into sub-themes.

Policies common to 50%≥ of national blood policy documents and discrepancies between policies were identified and compared with existing evidence. A literature review was conducted for each of the common policies via PubMed to determine what evidence, if any, there was concerning the given policy. As with the previous literature view (see section 2.3), the first 100 results were reviewed. The key search terms used for each policy are noted below in section 3.2.1.2 underneath each policy listed.

3.2.1.2 Blood policy categories and sub-categories generated through policy review

- Blood Stock
- Blood Donation
    - Donor Recruitment
    - Location
    - Pre-Donation Counselling
    - Collecting Blood from the Donor
    - Blood Screening
    - Adverse Reactions
    - Post Donation
    - Donor Records
- Blood Bank Facility Requirements

    - Location
    - Laboratory Records
- Blood Storage
- Blood Grouping
- Preparation of Blood Components
- Blood Requests
- Withdrawing Blood for Sampling
- Process Blood Requests
    - Receiving Blood Samples
    - Cross-matching for compatibility
- Collection of whole blood and blood components from the blood bank
- Blood Transfusion
- Transfusion Monitoring
- Blood Disposal

3.2.2 Common vein-to-vein policies present in the majority of African national blood policies

Below is a list of common vein-to-vein policies present in more than 50% (8+/15) of the national blood policies reviewed. Those with an asterisk also appeared in the WHO literature. It was important to maintain anonymity when presenting these results so as not to discourage countries from sharing their policies in the future. Thus, the summary table at the end of this section (Table 3.1) is organised by region and each national policy is assigned a random letter from A-O in no particular order, with the exception for Ghana which is clearly identified. Looking at this table, there are no clear regional patterns in terms of common policies included. The common vein-to-vein policies do vary between countries, but there is no case where a single one of these policies is only present or missing from a given region. However, it is interesting to note that I was unable to obtain any policy documents from East Africa, with the exception of the document that was still in its draft version and excluded from the study.

Blood Donation

1. Donors should be selected using rigorous criteria (13/15) *
    a. Key search terms: “Blood donation criteria”; “Donor recruitment”; “Donor selection”
2. Blood should be collected from volunteer non-remunerated donors (14/15) *
    a. Key search terms: “Volunteer blood donors”; “VNRD”; “Blood safety” AND “Volunteer donors”
3. Paid donors are prohibited (13/15) *
    a. Key search terms: “Paid donors”; “Paid blood donors”; “Remunerated donors”; “Paid donors” AND “Blood safety”
4. Donor confidentiality must be maintained (11/15) *
    a. Key search terms: “Blood donation confidentiality”; “Donor confidentiality”
5. Pre-Donation counselling for *all* donors (9/15)
    a. Key search term: “Blood donor counselling”
6. Donors should be informed about the risks of donating blood prior to donation (9/15)
    a. Key search terms: “Blood donation risks”; “Blood donor information”; “Blood donation protocol”

Screening Blood

7. All blood should be traceable (9/15)
    a. Key search term: “Blood traceability”
8. All blood should be screened for transfusion-transmitted infections (12/15) *
    b. Key search terms: “Blood screening”; “Blood donor screening”; “Blood testing”; “Transfusion transmitted infections”;

Blood Grouping

9. All blood should be grouped for ABO and Rh and labelled (12/15) *
    a. Key search term: “Blood grouping”

Blood Components

10. Preparation and Availability of blood components (9/15) *

a. Key search terms: “Blood components”; “Blood component production”; “Blood component usage”

Clinical Use of Blood

11. Doctors are accountable for appropriate clinical use of blood and alternatives to transfusions (12/15) *
    a. Key search term: “Blood transfusion prescription”;

Blood Requests

12. Blood request forms must be completed prior to transfusion. The minimum criteria across all policies are patient identity and quantity requested (9/15)
    a. Key search terms: “Transfusion errors”; “Blood request forms”

* policies that were also recommended by the WHO

Note: the number in parentheses represents the number of national blood policy documents where the given policy was recommended.

Region	Country	1	2	3	4	5	6	7	8	9	10	11	12
West Africa	A	X	X	X	X	X			X	X		X	
	B	X	X	X	X		X	X	X	X		X	X
	C	X	X		X		X	X		X		X	X
	D	X	X		X	X			X	X	X		
	E		X	X	X	X			X		X		
	F	X	X	X		X	X	X	X	X		X	X
	Ghana	X	X	X	X			X	X	X	X	X	X
Southern Africa	H	X	X	X	X		X					X	X
	I	X	X	X	X		X	X	X	X	X	X	X
	J	X	X	X	X	X	X	X	X	X	X	X	
	K	X	X	X	X	X	X	X	X	X	X	X	X
	L	X	X	X		X	X	X	X	X	X	X	X
	M	X	X	X		X	X	X	X	X	X	X	X
	N		X	X					X	X	X		
	O	X		X	X	X						X	

Table 3.1 – Summary of common vein-to-vein policies found in the African national blood policies reviewed (the policy numbers in the top row correspond to those presented above)

3.3 Methods used to identify current practices at KATH

In 2013, a pilot study was conducted over a period of six weeks to identify current vein-to-vein transfusion practices at KATH. The pilot study was included in the initial submission to both the LSTM and CHRPE ethics committees. The methods used are presented in this section.

3.3.1 Blood donation and screening

Information about current blood donation practices was obtained using the following methods:

- Direct Observation
- Semi-structured interview with donor clinic head nurse (see Appendix 12 for a rough guide)
- Semi-structured interviews with donors (see Appendix 8 for a rough guide)
- Reviewing hospital documents/forms

The pilot study began with my supervisor Dr. Owusu-Ofori giving me an overview and tour of KATH and its departments. Next, we met with the director of blood services who introduced me to the blood bank staff members which included the laboratory staff, who were responsible for screening, grouping, cross-matching and general day to day functions of the blood bank, as well as the administrative staff in charge of handling blood requests and record keeping. Next, my supervisor introduced me to the donor clinic's head nurse and the donor recruitment team lead. Together these two introduced me to the other donor clinic and transfusion recruitment team staff members. In each of the introductions, I explained who I was, where I was from, the aim of my research project and the overarching plan for my fieldwork. I emphasised that I would value their opinions and wanted the research to be relevant and useful to their work and would therefore interview some of them during the pilot to help guide my study. They were all incredibly kind and helpful and with their help I arranged to spend time in the donor clinic and attend a blood drive, known as a mobile session, in order to pilot my questions with donors.

Through Dr. Owusu-Ofori, I was also introduced to Maxwell Owusu, a scientist in one laboratories in the hospital, who would also voluntarily aid me in translating interviews from Twi to English. Maxwell and I went through the semi-structured interview guides together which gave him an idea of the aim of the interviews and the opportunity to clarify any points. I suggested he translate my questions and the participants' responses as we conducted the

interview. While this can disrupt the flow of the interview, it allowed me to immediately follow up on some of the points made by the participants, which was important given that it was unlikely we'd be able to make contact with the participant again.

To begin, an interview with the donor clinic's head nurse was conducted to determine the general structure of the donation process both at the donor clinic and at mobile sessions. The aim was to learn more about the current practice. The interview consisted mainly of broad and open-ended questions, with more specific follow-up questions posed when needed. Donor clinic record books (where basic donor information such as name, age, sex, pre-screening results, and where applicable, date donated and the corresponding ID number on the blood bag were recorded) and donor clinical forms were reviewed.

Direct observation was used to develop a detailed outline of the donation process starting with when the donor first arrived at the clinic to when the donor left the clinic. The same method of direct observation was used at the mobile sessions. The direct observation took place over the course of two weeks to ensure that no steps in the process went amiss. During this period, I also spent some time in the pre-screening area to learn about current screening practices. Following this, 10 semi-structured interviews were conducted with donors attending either the donor clinic or mobile session (see Appendix 8). Eight of the donors were from mobile sessions and two from the donor clinic. Seven of the donors interviewed were female. The reason for this high proportion is due to the fact that the mobile session I attended during the pilot study was at a nursing college, where the vast majority of students were female.

The aim was to identify areas of the process that may not have been previously captured and to obtain a better idea of current strengths and weaknesses of the donation process. The questionnaire included in Appendix 9 was also piloted and but at the beginning of the pilot study I realised a large proportion of the donors could not read or write and therefore the questionnaire had to be administered orally. Thus, the questionnaire became incorporated into the semi-structured interviews.

3.3.2 Blood storage and grouping

Blood storage, grouping and processing practices were identified through direct observation and through two semi-structured interviews conducted with laboratory staff at the blood bank (see Appendix 13). Staff members walked me through the process on how blood is stored, for how long and how it is grouped.

3.3.3 Prescribing blood transfusions

I conducted 3 semi-structured interviews with doctors in the Child Health and Medicine units to learn more about how physicians make blood requests for their patients, what they must consider prior to transfusion, the challenges they face in obtaining blood and the improvements they have seen in blood services at KATH.

3.3.4 Handling blood requests and cross-matching

The blood bank staff members guided me through current practices on how incoming blood requests are processed, prioritised and cross-matched. I also spent 2 days independently observing the process to limit any bias from staff members. Additionally, I looked through the blood request forms submitted to the hospital to identify the parts of the form that were consistently filled out and those that were often left blank. I later approached blood bank and laboratory staff members to determine how forms with blank fields were processed.

3.3.5 Transfusing and monitoring patients

To gain a better understanding of how blood is transfused to patients in the ward, I spent two weeks in the Medicine and Child Health hospital specialities where I informally spoke with five nursing staff to learn the steps they take before, during and post transfusion. One limitation was that many nurses were unwilling to provide written consent or be audio-recorded as they feared it could result in negative feedback from their superiors. It is due to

this, that informal interviews were used to gather data, as nursing staff seemed more willing. By informal, I mean information was gathered through multiple short 'chats' with ward staff members involved in blood transfusions, sometimes over the course of multiple days. These were not audio-recorded. Signed consent forms, however, were still required, but they were left with staff members for a few days and collected two or three at a time so it was unclear which form belonged to whom. Additionally, I spent time observing transfusions to identify which aspects were consistent and which were not with the information obtained through the semi-structured interviews.

3.3.6 Summary of methods used in pilot study

	Direct Observation	Semi-Structured Interview	Reviewing hospital forms and documents	Informal communication
Blood donation and Screening	Yes – I visited the donor clinic and observed donors coming in, undergoing the health and risk assessment, donating blood and waiting 15 minutes post-donation in case they encountered side effects. I also visited the screening room where prior to donation, a sample of donors' blood is tested for HIV, hepatitis B and hepatitis C.	Yes - I interviewed 10 donors and the donor clinic's head nurse. A questionnaire was piloted (see Appendix 9), but due to the literacy issues was administered orally and was then incorporated into the semi-structured interview	Yes – I looked at the health and risk assessment questionnaire, the blood bag labels, the donor clinical forms and the donor clinic record books	During slower periods at the donor clinic I often chatted with the health care assistants and nurses who would sometimes discuss aspects of how blood services works at KATH. This was not in a structured setting, but they provided useful background information which helped with my understanding of the donation process.
Blood storage and grouping	Yes – I spent time in the blood bank with a member of staff guiding me on how blood is stored, at what temperature the various components are stored and how donated blood is grouped.	Yes, two semi structured interviews were conducted with laboratory staff at the blood bank	No	No
Prescription of blood transfusions	No	Yes - I conducted 3 interviews with doctors prescribing blood transfusions in the Child Health and Medicine units	No	No
Handling of blood requests and cross-matching	Yes – while spending time in the blood bank I observed how blood requests are handled and processed, the cross-matching process and how blood is transported to the patient.	Yes, two semi structured interviews were conducted with laboratory staff at the blood bank	Yes – I looked at the blood request forms, specifically looking at what fields were left blank	No
Transfusion and monitoring patients	Yes, I returned to the ward with health care assistants picking up units of blood at the blood bank and observed how the patient was identified and transfused.	No	Yes, I had a look at the transfusion monitoring form and how it was completed	Yes – I spoke with 5 nurses on the wards

Table 3.2 – Summary of methods used in pilot study

In total, ten semi-structured interviews with donors were conducted, one with the donor clinic head nurse, three with blood transfusion prescribing doctors and two with blood bank

staff members. An additional five informal 'chats' were held with nurses as they were less receptive to the idea of a semi-structured interview with signed consent forms and audio-recording.

3.4 Current Blood Services Practice at KATH

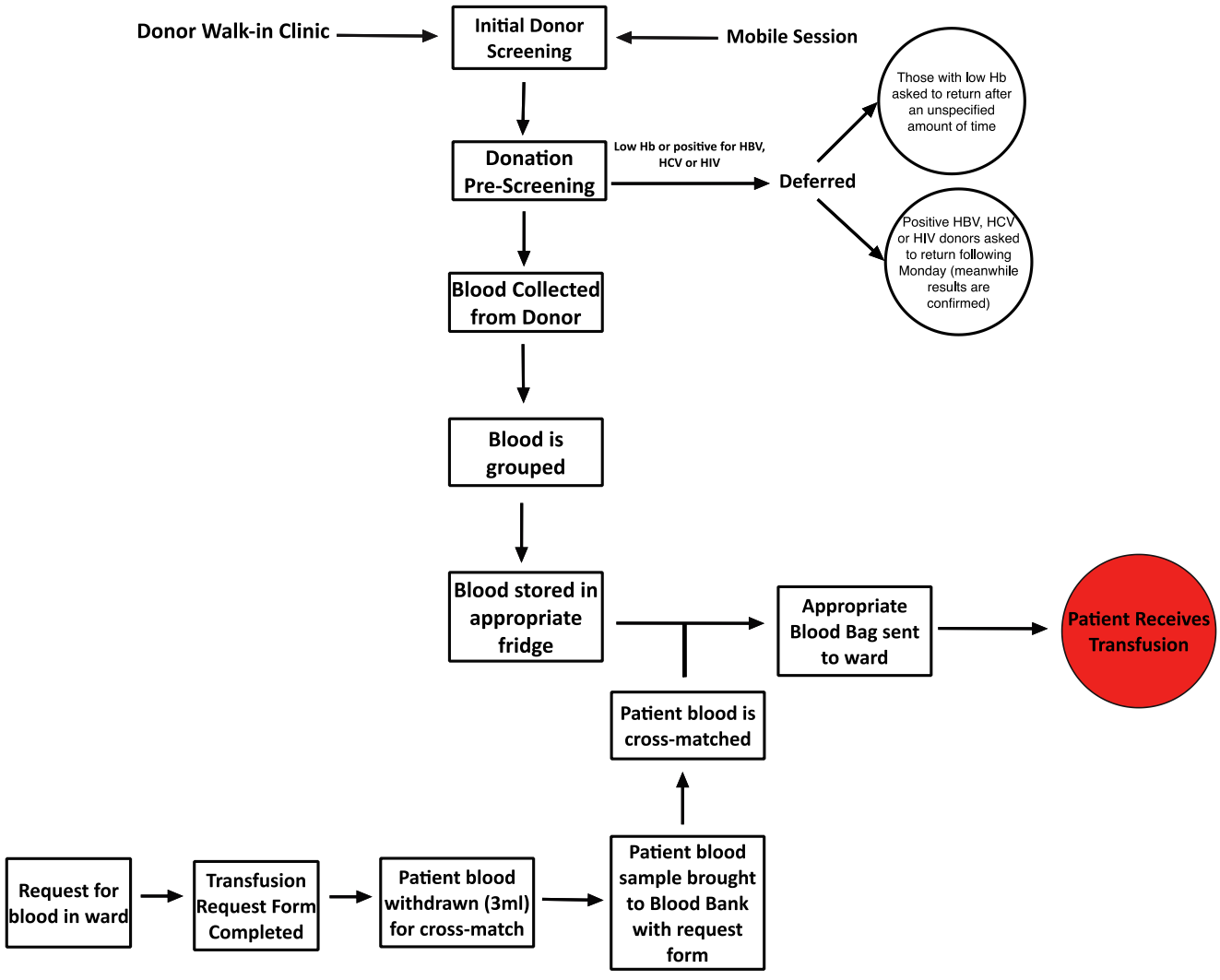


Figure 3.2: Summary of Transfusion Services at KATH

3.4.1 Blood Collection at KATH

Blood is collected from donors at the hospital's donor walk-in clinic, at mobile sites and public drives. Both volunteer and replacement donors visit the walk-in clinic, which is open twenty-four hours a day, seven days a week. Donors at the mobile sites and public drives, however, are volunteers, some of whom are repeat donors. Two teams of staff at the blood bank organise the mobile site visits. Each team is responsible for a given geographical area. Examples of mobile sites include schools, churches and mosques. Both teams work together to organise public drives, which are usually sponsored by FM stations and corporations.

3.4.2 The Blood Donation Process

3.4.2.1 Initial Screening/Health Assessment

To donate blood, prospective donors must undergo an initial screening/health assessment and pre-screening. During the health assessment, donors are asked a series of questions by a nurse, health assistant or phlebotomist regarding personal information, health and lifestyle (see Appendix 7). In addition, their weight and blood pressure are measured. Using this information, a clinical record from is completed on behalf of the donor (see Appendix 4). Only prospective donors who satisfy the criteria listed below are sent for pre-screening. Anyone who meets one or more of the disqualification criteria is prohibited from ever donating blood. Those who meet one or more of the exclusion criteria listed below are deferred.

Initial screening donor criteria:

Inclusion Criteria

- Must weigh a minimum of 50kg
- Must have 'normal' blood pressure. While there are no explicit guidelines defining 'normal blood pressure', interviews with staff members suggest that this means a systolic pressure of 100 - <140 mmHg and a diastolic pressure of 60-90 mmHg.

Exclusion Criteria

- Anyone who has had acupuncture, ear or nose piercing in the last six months
- Those on antibiotics or who have taken antibiotics in the last one week
- Anyone having received blood transfusion or blood components within the last six months
- Anyone who has had chicken pox or shingles in the last three months
- Anyone with a dirty sore or boil
- Anyone who has shared facilities or nursed somebody with jaundice (hepatitis) or AIDS
- Those who have been hospitalised in the last six months
- Anyone who in the last year has had an injection in a place which is not a hospital or clinic or who has had skin scarring or cutting by a traditional healer.
- Anyone who has had a major surgical operation in the last year
- Anyone who has had a tooth extraction in the last three days
- Anyone who immediately after donation will be driving a crane, bus, heavy machinery, or go up a scaffolding or swimming
- Anyone who has been inoculated in the last three weeks for yellow fever, tetanus, rubella, rabies, polio, typhoid or diphtheria
- Anyone who has a fever, chest or throat infection, or feels unwell
- Those who are pregnant or who have had a child or miscarriage in the last six months
- Anyone whose work entails being away from home for more than three months in a year
- Anyone who has had sex with someone who is not their wife (spouse) or regular partner, or someone they are unsure about

- Females who are breastfeeding or menstruating **(Note: This is not listed in the pamphlet but according to the donor staff this is part of the exclusion criteria. I have seen one donor deferred because she was breastfeeding)

Disqualification Criteria

- Taking drugs for high blood pressure or heart failure
- Anyone who has ever tested positive for AIDS
- Anyone who has had jaundice, liver disease, hepatitis or a positive blood test for hepatitis
- Those with epilepsy, diabetes, duodenal or gastric ulcer and hypertension
- Drug addicts or anyone who has ever taken self-injected drugs
- Anyone with sickle cell anaemia (e.g. SS, SC, SBthal)
- Anyone with asthma
- Prostitutes
- Homosexuals

3.4.2.2 Pre-Screening

If the prospective donor passes the initial screening, he/she is sent with his/her clinical record form for pre-screening. To donate blood, the potential donor must pass the pre-screening tests. This means they must meet the following criteria:

- The donor's Hb level must be at least 12g/dl (for females) or 13g/dl (for males).
- The donor must test negative for HBV, HCV and HIV

Roughly 3ml of blood is drawn from the donor for the pre-screening tests and placed in a test tube, which is labelled with an identification number. Copper (II) sulphate is used to test whether the prospective donor's Hb level is sufficient. The specific gravity for the copper (II) sulphate solution for men is 1.053 and for women 1.052.

Donors with low Hb - If the donor's Hb level is found to be too low the pre-screening team records the result along with the prospective donor's name in their record book as well as on the donor's clinical record form. The donor is then sent back to where he/she was initially screened, is informed that he/she cannot donate on that day and is provided with counselling as to how they may increase their Hb through diet. The donor clinic staff records the date, the deferred donor's name and sex in a record book titled "Low Hb".

Pre-screening for HBV, HCV and HIV- If the prospective donor's Hb level is sufficient, their blood is tested for HBV, HCV and HIV using rapid tests. The hospital will soon start screening for syphilis. The staff must wait 15 minutes before interpreting the results. The results of the test are recorded on the clinical record form and in the pre-screening books along with the date, the prospective donor's name, sex and the test tube identification number. The potential donor must then provide the donor clinic staff with their clinical record form.

If one of the prospective donor's tests is positive, the pre-screening team keeps the remaining blood in the test tube aside for confirmation testing by ELISA. The donor clinic staff informs the potential donor that he/she may not donate and the donor is asked to make an appointment for the following week. The prospective donor is not informed about the test results. The following week, based on the results from the ELISA, the deferred donor is advised about their results and referred to an appropriate doctor or clinic within the hospital.

3.4.2.3 Donation

If the donor successfully completes the pre-screening tests, he/she proceeds to donate. A blood bag containing 63ml of citrate phosphate dextrose adenine solution as the anticoagulant is used for collection. The blood bag is labelled with a batch number, donation date and expiry date (35 days after donation). A phlebotomist locates the donor's vein and collects the blood with the patient in a supine position. During this time, the donor is asked

to repeatedly make a fist until a maximum of 450 mls of blood has been obtained. In rare cases, if the phlebotomist cannot find the vein within two tries, he/she requests another staff member to try and locate the vein. If they are still unable to find the vein, the donor is asked to come back on a different day.

3.4.2.4 Post-Donation

Immediately after blood collection, the phlebotomist, nurse or health care assistant transfers an aliquot of blood (~3ml) into a test tube labelled with the batch number and set aside for grouping. After donation the donor is asked to relax for 15 minutes and is provided with a soft drink and crackers. During the donation period the donor is provided with "post-counselling", where he/she is advised to rest, drink fluids etc. In addition, the staff members use this time to enquire about the donor's experience and encourage them to become repeat donors.

3.4.2.5 Adverse Reactions

Donors who experience adverse events during or after transfusion are attended to and managed according to the presentation. Examples of adverse events include but are not limited to headache, nausea, sweating, weakness and syncope. In case of adverse reaction during or after donation the donor is asked to lie down and rest for an additional 15-30 minutes. His/her blood pressure may be taken during this time. In rare cases, the donor may be transported to the emergency unit.

3.4.3 Blood Grouping and Storage

Following donation, blood is stored in a coolbox until it is transported to the blood bank. At the donor clinic, blood bags remain in the coolbox up to two hours. However, at mobile sites, the blood remains in the coolbox till the end of the mobile session, after which it is brought to the blood bank. This coolbox is not temperature monitored. It is unclear if and how this is

having an impacting on the units transfused into patients.

At the blood bank, the blood is stored in a 4°C refrigerator labelled "ungrouped blood". The refrigerators are all temperature monitored. An alarm goes off if the temperature is outside its set range. Generators are in place to ensure the refrigerators remain working even when the electricity is out, as can be frequently the case in Ghana. Using the blood from the test tubes, lab technicians at the blood bank group blood for ABO and Rh. They record this information, label the blood bags appropriately and sort them into the appropriate fridges (there are four fridges for O, A, B and AB blood). The grouping results are sent to the donor clinic where they record each donor's blood group. As mentioned above, blood is stored for a maximum of 35 days after donation.

The blood bank also stores blood in a refrigerator in the lab. This fridge holds blood that has already been cross-matched and is waiting to be collected, blood bags that are not full and a few bags of whole blood from each blood type. The latter is done to save time.

3.4.4 Blood Components

During mobile sessions, a proportion of the blood bags are 'double bags'. Blood collected in these bags are separated into components. Commonly prepared components include packed red cells and fresh frozen plasma. Platelets and cryoprecipitate may be prepared upon request. There is no specific policy as to how often this should be done. See Chapter 7 for more information on component production, prescription and usage at KATH.

3.4.5 Blood Requests

Only doctors can make requests for whole blood or blood components. To request blood, a 'Transfusion Request Form" must be completed (see Appendix 5) and sent to the blood bank along with a test tube with ~3ml of the patient's blood. This sample is valid for up to seven days. Any additional requests after the seven-day period is over, must include a new sample

from the patient. Note that often, many of the fields are left blank on the request form and the request is still processed. Most commonly, the amount of blood requested and the blood component required are not mentioned. If the amount of blood is not provided, the blood bank assumes the doctor is requesting one unit. Similarly, if the type of blood is not indicated, it is assumed that the request is for whole blood. However, request forms that do not indicate the patient's name or ward will not be processed.

For scheduled surgeries, there is a blood ordering schedule where blood bank group and cross-match the patient's blood and put aside the requested number of units. This, however, depends on blood stock levels and whether the given blood component for that blood group is available.

3.4.6 Cross-matching

A health care assistant, doctor, nurse, national service year student or even a family member may bring the transfusion request form along with the patient's blood and a coolbox to the blood bank. Note that it is unusual for family members to transport blood and is against policy, but has occasionally been observed. In urgent cases, doctors will remain at the blood bank until they have collected the blood. The blood bank records the patient's name, ward and request time in a book. The patient's blood and transfusion request form are given to the lab technicians who then group and cross match the blood. In urgent situations (as marked on the transfusion request form), where blood is needed within the hour, the cells are not washed for cross-match. If blood is needed immediately, it is not cross-matched. The test tube containing the patient's blood is then stored for 7 days so that a) if an adverse reaction occurs the blood bank staff can verify their work and b) the blood can be used for any additional cross-matching that must be done in the next week.

Once cross-matched, a compatibility report is placed on the blood bag. This report includes the patient's name and lists the blood's grouping results as well as the patient's blood group. If the blood is to be collected at a later time, it is stored in the lab fridge. The blood is then

given to a staff member at the front desk who passes it on to the person collecting the blood. If the person is a health professional, he/she must verify that the information on the cross-match sheet (i.e. the lower half of the request form) and the compatibility report match and then sign his/her name and write the time of collection in one of the record keeping books. The blood is then placed in the coolbox and brought to the ward. In cases where FFP is requested, the blood bank staff thaws it for 30 minutes, but the staff in the wards must ensure it reaches room temperature prior to transfusion. The blood bank also provides the ward with a transfusion monitoring form (see Appendix 6).

3.4.7 Blood Transfusion

Once the blood reaches the ward, it is either a nurse or phlebotomist who transfuses the patient. If conscious, the patient is asked to confirm his/her identity by repeating his full name and date of birth. If the patient is unconscious, then his/her name in the notes is compared to that printed on the blood bag. Note, unlike in many higher income countries, patients do not have a hospital bracelet with a unique number, thus the process of patient confirmation may still leave room for human error. The risk of error may be even higher in Kumasi, where people's names often correspond to the day of the week they were born, thus many people have the same given name.

The nurse or phelbotomist must also verify that the compatibility report and cross-match form match. It is important for them to keep the cross-match form so if more blood is required, it may be sent back with the patient's blood group information. Since the blood bank stores the patient's blood for 7 days, there is no need to retake their blood if the following transfusion is within that time period.

3.4.8 Transfusion Monitoring

Although a structured monitoring form exists, it is often not completed, and according to doctors, some transfusions may go unmonitored for long periods of time. It has been

suggested that this may be due to lack of time or in the interest of avoiding duplicate work (some details regarding transfusion must also be entered in the patients' charts). This suggests that the monitoring form may need to be simplified or reworked in such a way that more staff members will complete it. However, further qualitative research is necessary to better understand the culture behind completing monitoring forms and how it can be optimised.

3.4.9 Adverse Reactions

The transfusion monitoring form provided by the blood bank also lists signs of adverse reactions due to transfusion. If an adverse reaction occurs, the nurse or doctor in the ward must complete an "Adverse Reaction Investigation Form". The blood bank will then investigate to see whether the reaction was due to an error on their end or due to some other complication or factor out of their control (e.g. patient allergic reaction). It is unclear whether this form is always completed.

3.5 Identifying discrepancies between policy and practice

The list of common, generic vein-to-vein polices derived from the review of national blood policies and WHO documents were directly compared to practice in Kumasi. First, I looked at whether each policy was in some way being practiced at KATH, and if so, what were the common aspects and what were the differences between the policies and practice.

3.5.1 Policies not practiced

The main policies that were not practiced or consistently enforced at KATH, but were common to most national blood policies are:

1. Blood should be collected from volunteer non-remunerated donors (14) *

2. Donors should be informed about the risks of donating blood prior to donation (9)

At the time of this study, there were periods of time where the hospital was struggling to meet blood needs even when receiving donations from both volunteers and replacement. It was, therefore, not sustainable or practical to rely solely on VNRD.

Semi-structured interviews with donors along with results obtained from direct observation during the pilot study showed that not all donors were made aware of the risks of donating. Examples of risks for blood donors include adverse events such as nausea, headache and syncope. However, there is much debate globally as to what information should be given to patients to obtain their consent (which can apply to donors), and how to determine what information will be important to whom. For example, a study in the Netherlands with 37 doctors found that "Doctors have doubts about disclosing or withholding information on complication risk, especially in a risk range of 1 in 200 to 1 in 10 000" (Palmboon et al., 2007). The main reasons for this were that doctors felt disclosing rare risks served no purpose and that patients were more likely to remember that one piece of information and forget the rest (ibid). There is some evidence for this from a study in the USA, which found that donors understood 73.5% of the donor eligibility and risk information provided to them (Alaishuski et al., 2008). In the United Kingdom (UK), the General Medical Council (GMC) suggests that side effects and complications of an intervention be discussed with the patient, but that "the amount of information about risk that you should share with patients will depend on the individual patient and what they want or need to know. Your discussions with patients should focus on their individual situation and the risk to them" (GMC, 2017). Thus, one approach to addressing this may be to assess each donor's understanding of the blood donation process and determine what concerns he/she may have about giving blood.

While the donor clinic's policy at KATH was to prohibit paid donors, it is not always possible to identify paid donors, and thus some paid donation may still occur. In this study, it was apparent that a couple of donors received some type of compensation, though as mentioned earlier, paid donation is a grey area and it is difficult to assess whether the compensation can be seen as an incentive or not. To KATH's credit, by ensuring that at most times patients in

desperate need of blood receive it regardless of whether they are able to find a replacement donor, the hospital has limited the demand for paid donors.

3.5.2 Common aspects and differences between policy and practice

Below is a summary of the similarities and differences between the common generic vein-to-vein policies and how they are practiced at KATH.

Blood Donation

1. Donors should be selected using rigorous criteria

    a. Donors are clearly selected using a specific set of criteria. These criteria do, however, vary by country. It is unclear why this variation exists, but it is likely due to meet the local population's needs.

    For example, the minimum age for donation varied between policies from 16 to 18 years (in Ghana it is 16 years). Recommended frequency of blood donation varied from 2 to 4 times a year, whereas in Ghana men are recommended to donate no more than 4 times a year and women 3 times a year. The minimum weight for donors varied considerably between policies. In Ghana, donors must weigh at least 50kg. However, one national policy suggested donors weighing less than 50kg should be permitted to donate between 60-80ml per kg of body weight. Another policy document recommended that donors weigh at least 42kg and that only 250ml be collected from donors weighing 42-44kg and 450ml from donors 45+kg. The minimum blood pressure set by various African national blood policies ranged between 90/50 mmHg-100/60mmHg. High blood pressure deferral was ranged from 140-180mmHg systolic. At KATH the minimum blood pressure requirement was 100/60mmHg and hypertension was considered to be a systolic pressure of 140mmHg OR a diastolic pressure of 100mmHg.

2. Donor confidentiality must be maintained

    a. Confidentiality is maintained throughout at KATH

3. Pre-Donation counselling for all donors

    a. Pre-Donation counselling is practiced at KATH, but much of it revolves around obtaining the relevant health and risk assessment information from the donor. Post donation, donors are educated about post-donation care. In the Ghana policy, counselling is recommended for those donors testing positive for a transfusion transmitted infection (TTI).

       There is, however, no standardised outline of what information should be provided to donors pre and post donation. Counselling may also include information about the donation process, more information on how blood is grouped and cross-matched or discussing any concerns or fears a donor may have. There is no information in the literature outlining any minimum criteria for donor counselling. It is important to remember that a donor may have very little face time with staff members and that this may be the only opportunity staff have to ensure a positive experience which might encourage the donor to return. It is therefore important to develop and test various counselling tools (pre and post) to determine which donors find the most favourable, how it impacts their donation experience and whether it affects their likelihood to return.

       Counselling may also be a useful opportunity to outline the donation process and illustrate that the blood transfused to patients is safe. One donor interviewed at a mobile site stated:

"Particularly the pre-screening to rule out hepatitis B, hepatitis C and HIV, and they make sure that if you are reactive to any of those tests that you are taken out and not allowed to give blood in the first place. There is some assurance that the blood donated is good for transfusion." (VNRD, Nursing student, female, unknown age).

This donor was a nursing student and therefore understood the pre-screening process and the implication of safe blood. However, this may not be true for everyone. At the same time, we must be careful not to prevent those who are scared of finding out their HIV status from donating. Thus, counselling needs to be tailored to the individual needs of the donor

<u>Screening Blood</u>

1. All blood should be traceable

    a. All blood is traceable at KATH. Each blood bag is assigned a unique ID number, which is recorded on the donor's health and risk assessment forms. As everything is handwritten, human error is possible, but based on direct observations, rarely occurs. Later, the blood group is also written on the blood bag. Once a patient's blood transfusion begins, the unique ID number of the blood bag is written in that patient's notes. This ensures that the blood is traceable from donor to patient transfused.

2. All blood should be screened for transfusion-transmitted infections

    a. Different policy documents recommend different infections for which blood should be screened. All recommend HIV and Hepatitis B while some others recommend screening for malaria, syphilis and Hepatitis C. At the time of the pilot study, KATH screened for HIV, Hepatitis B and Hepatitis C. However, towards the end of 2013, the hospital began screening for syphilis as well.

Blood Grouping

1. All blood should be grouped for ABO and Rh and labelled

    a. All blood is grouped for ABO and Rh and organised in the fridge by blood group.

Blood Components

1. Preparation and Availability of blood components

    a. Blood components are prepared and available at KATH. However, there is no clear policy or practice regarding what proportion of blood collected should be prepared into components. Additionally, doctors may not be aware of all the components available. Greater communication between blood prescribing clinicians and blood services is needed.

Clinical Use of Blood

1. Doctors are accountable for appropriate clinical use of blood and alternatives to transfusions

Blood Requests

1. Blood request forms must be completed prior to transfusion. The minimum criteria across all policies is patient identity and quantity requested

    a. This policy is well practiced at KATH. Additional information that is sometimes not included is the volume of blood required, whether whole blood or a component is specifically required and how urgently the blood is needed. If

the volume and type of blood required is not listed, the blood bank assumes the doctor requires one unit of whole blood.

3.6 Conclusion

The identified discrepancies between the common vein-to-vein policies and practice at KATH formed the basis of the following objectives of this study. Many of the discrepancies are due to limited local evidence to inform how some of the general policies should be implemented. This guided me as to what aspects of the blood services require more evidence in order to develop and implement policies that meet the hospital's needs.

The common vein-to-vein policies lacking sufficient evidence or presented in a manner that was too vague to be implemented properly were prioritised and formed the basis of sub-objectives 1-3. My aim was to try and collect more data for these policies, with the hope that the information would aid in implementing them in a more systematic way. I looked at all 12 policies and based on my review of the national blood policies and the literature reviews I conducted for each of the 12 policies, I found that donor criteria, donor counselling and blood component production were heavily emphasised in the literature, but that there were no details or gold standard on how to implement these policies effectively. In addition, I felt that my data collecting tools (semi-structured interviews, donor and hospital records and direct observation) would permit me to obtain rich data that would address the paucity of evidence in the above noted areas. These three themes, therefore, informed sub-objectives 1-3.

Sub-objective 4 was created based on my observation of a complete lack of information regarding the patient's experience in obtaining a blood transfusion and their experiences in finding replacement donors. To my mind, securing a replacement donor while ill and in hospital sounded like it could pose a significant burden and I was interested in learning more about this to see if this in fact was the case or not.

Chapter 4 – Study methodology

4.1 Introduction

Phase 2 of this study consisted of eleven months of fieldwork where Objective 3 (and its corresponding four sub-objectives) were addressed. Due to wide ranging topics covered in this study, a mixed methods approach was used.

Objective 3: Identify the areas of blood transfusion policy in Kumasi that require further research and generate local evidence to improve policy implementation and better address local population needs.

Areas Identified:

- Sub-objective 1: Identify the most common reason(s) for donor deferrals and determine if current donor criteria should be re-evaluated to maximise blood supply.
- Sub-objective 2: Determine what information donors are interested in receiving during pre and post-donation counselling to improve donor satisfaction and potentially increase blood supply.
- Sub-objective 3: Quantify component usage and demand, understand its influencing factors and determine whether the appropriate amount of resources is being utilised.
- Sub-objective 4: Understand the patient experience in obtaining a blood transfusion and securing a replacement donor.

4.2 Philosophical and methodological considerations

One of the novel components of this study was examining blood transfusion services from a holistic point of view. This allowed me to identify bottlenecks in the system and explore

aspects of blood services that have not been researched. There are, however, complexities associated with this type of comprehensive research. From donation to transfusion, transfusion services consist of a series of steps, each with a unique purpose. To evaluate these services it was important to examine each individual step in-depth as well as to step back and study the process as a whole. Moreover, data had to be collected from the various groups of people involved to ensure that all the necessary information was gathered and that all viewpoints were included. This required a multidisciplinary approach where different information, methods and perspectives can be integrated (CFIR, 2009). I, therefore, relied on mixed methods to address the central questions of this study.

4.3 Research Design

The purpose of the mixed methods approach is to compensate for the limitations of quantitative and qualitative research (Creswell, 2009). In this case, the aim of the study could not be addressed by relying solely on quantitative or qualitative data. Collecting quantitative data provided a broad overview of the observed trends (Cresswell, 2009) and allowed me to identify general strengths and weaknesses of the services. One of the advantages of quantitative research is that the researcher can manipulate the analyses and determine the statistical impact of each independent value as well as identify possible confounding factors. However, quantitative analyses provide insufficient information about the reason for the observed results. The quantitative data was therefore useful in identifying the areas that required further research and was supplemented with qualitative data to better understand the quantitative results as well as to gain insight into other issues not captured through quantitative research.

The aim of the qualitative portion of the study was to identify the various pathways used by patients to access the services as well as to understand staff members' experiences in providing them. Thus, the qualitative part of this study was grounded in the phenomenological approach, which aims is to explore how an individual experiences a given event or phenomenon (Creswell 2003).

4.4 Study Population and Sampling

To fully understand the strengths and weaknesses of blood transfusion services at the Komfo Anokye Teaching Hospital (KATH), it is important to gain insight from multiple perspectives. Transfusion services are provided and accessed by a multitude of people, each with a unique perception of the transfusion process based on his/her experiences, values and beliefs. All these viewpoints must be documented to limit bias and provide a complete description of blood services at KATH. Providing efficient blood transfusion services is challenging and depends on multiple departments and their ability to work together as a team. Due to the multiple steps in the transfusion process, it can be difficult to isolate the bottlenecks in the system. In some cases, staff members may be unaware that delays are occurring in their department. I, therefore, collected information from the different groups of staff members involved in transfusion services (i.e. laboratory and clinical staff) from different hospital units. Blood donors were recruited, as they are an essential component of blood services. Additionally, it is important to explore how easily transfusions are accessed by patients, as this allows us to evaluate transfusion services from an alternative perspective. Thus, patients requiring a blood transfusion and their family members/caregivers were invited to participate in the study and share their experience in obtaining a transfusion.

Given the study's phenomenological approach, purposeful sampling was used to identify participants. To ensure that multiple perspectives were considered and to limit bias, a multiple variation sampling strategy, a form of purposeful sampling, was employed (Palinkas et al., 2015). In other words, individuals with different roles in transfusion services were recruited from multiple units within the hospital. To ensure an even spread of patient participants across the wards, patients who had received and completed a transfusion within the past 24 hours were identified via transfusion records. Donor participants were identified and approached in the donor clinic and mobile sessions, and were interviewed post-donation. Staff members at the donor clinic and in the laboratory were identified with the help of the head of transfusion services. Transfusion prescribing doctors were identified and

approached in the wards. Below is a list of the inclusion and exclusion criteria for participant sampling.

4.4.1. Sampling Criteria

Inclusion

-Patients who required a blood transfusion
-Family members or caregivers of patients requiring transfusion.
-Staff members involved in transfusion services
-Staff members involved in collecting blood, testing blood or grouping blood.
-Blood donors

Exclusion

-Those who fit the inclusion criteria but do not wish to participate in the study
-Anyone below the age of 16
-Anyone who was unable to answer questions (e.g. impaired consciousness)
-Those who could not speak English, French or Twi

4.5 Quantitative methods

Quantitative data were primarily collected to address sub-objective 3:

'Quantify component usage and demand, understand its influencing factors and determine whether the appropriate amount of resources is being utilised.'

The aim of the quantitative data collection was to record trends in transfusion services and identify the strengths and weakness. To achieve this, a 'descriptive study' approach where "no attempt is made to change behaviour or conditions" was used (Hopkins, 1998). This

allowed me to report on multiple variables. The quantitative data collected also shed light on issues that needed to be further explored using qualitative methods.

4.6 Quantitative Outcomes

The aim of the quantitative data collection was to describe transfusion services at KATH as well as determine the rate of mortality among patients requiring a blood transfusion. To obtain a basic understanding of transfusion services in the different units at KATH quantitative data pertaining to clinical care, transfusion human resources and transfusion access were recorded. Additionally, data regarding blood donation and testing were also recorded to better understand issues of blood supply. Below is a list of the outcomes explored:

Blood Donation

- Number of potential donors
- Number of actual donors following screening
- Ratio of volunteer and replacement donors
- Number of units of blood collected

Blood Testing

- Time required to test and group blood

Clinical Care (per Unit)

- Number of units requested (for each blood component)
- Number of units issued (for each blood component)

Patient Profile

- Average age of patients
- Sex ratio
- Number of transfusions received in the past

4.7 Quantitative Data Collection

To address the outcomes listed above, the following forms of data collection were used to obtain quantitative data:

- Hospital Records
- Donor Health and Risk Assessment prepared by the Blood Bank (see Appendix 7)

Additionally, previous in-hospital studies, presentations and reports were reviewed for quantitative data that were useful for this study.

Hospital Records

Blood bank records were reviewed to obtain the following information of patients interviewed

a) Sex
b) Date of Birth
c) Blood component requested for patient
e) Unit/Ward
f) Date/time of first request
g) Date(s) and time(s) blood component(s) issued
h) Patient blood group

The benefits of collecting these data from hospital records were that a) data were more objective and b) the patient questionnaire's length was reduced. Collecting data regarding the sex and age of the patient was important for socio-demographic analysis and standardising data. Data pertaining to admission, diagnosis and transfusion put the patient's experience in perspective and was one way of evaluating possible delays in services.

4.8 Qualitative Data Collection

The aim of pursuing qualitative data collection was to allow participants to provide detailed descriptions of their experiences providing or accessing blood transfusions at KATH. This approach permitted me to uncover information that may not be revealed through quantitative data collection. It also allowed for greater flexibility as I was able to draw on the participants' responses and redirect the focus of the qualitative data collection.

Qualitative data was collected using the following methods:

- Direct observation
- Semi-structured Interviews
- Focus Groups

While some qualitative data was collected through the questionnaires, the bulk of it was obtained from individual semi-structured interviews, focus groups and through direct observation.

Direct observation

To develop a better understanding of the various donation and transfusion process in blood services at the KATH, I relied on direct observation. As I, the researcher, was not actively involved in the process, I was able to observe the process in a less biased manner than a

participant. As a direct observer, the aim was to be as unobtrusive as possible. By acting as a direct observer, I was able to record aspects or events that may otherwise have gone unreported by participants. My observations were, however, supplemented by qualitative data obtained through semi-structured interviews.

Semi-structured Interviews

To gain a deep understanding of the underlying issues regarding accessing and providing transfusion services, patients, family members, caregivers, donors and clinical staff were interviewed. The interviews provided respondents with a confidential space where they could discuss the positives and negatives of their experience. It also allowed me to further probe areas of interest that may not have been adequately captured by the questionnaires. The interviews took place following the completion of the questionnaires so that I could review the questionnaire responses and obtain a better idea of which topics to pursue in the interview.

The qualitative results obtained from the semi-structured interviews are presented in the following manner. Each sub-heading represents responses that were common amongst the majority of participants and are ordered from most common to least common. Additional topics arising from the data that were mentioned by fewer participants are listed under "Other".

Interviews were conducted in English when possible. If not, as I do not speak the local language Twi, the interviews were conducted in Twi with the help of an interpreter, Maxwell Owusu, who worked in the hospital's laboratory department. Maxwell translated my questions and the participants' responses on the spot, which allowed me to ask follow up questions based on their responses. Prior to conducting the interviews, Maxwell and I had gone over the brief structure of the semi-structured interview guide so it was clear what information we were looking to elicit.

The interview templates provided me with a guide to follow. Refer to Appendices 8, 11, 12,

13 and 14 to view interview templates. Below is a brief description of the general topics covered in the various interviews.

Patient interviews

The purpose of these interviews was to obtain information about the patient's journey in accessing blood transfusions. Thus, patients were asked to recount their experiences in accessing care following the appearance of initial symptoms. In addition, during the interview I tried to investigate whether receiving a blood transfusion had influenced the participant's attitudes towards blood donation and whether he/she would consider donating blood in the future.

Family/caregiver interviews

Interviews with family members and caregivers were conducted to obtain a better understanding of the difficulties faced by caregivers ensuring the patient has access to blood transfusion; as well as to verify the data provided by patients regarding transfusion access so as to increase the validity of the data (a method known as triangulation).

Blood donors

Interviews with blood donors were conducted to follow-up on donors' experiences when donating blood and whether their experience had influenced their willingness to donate blood in the future. The interviews also aimed to determine how many donors would be willing to or were acting as paid donors, but this was difficult given its taboo nature.

Clinical staff

The purpose of the clinical staff interviews was to gain a better understanding of their role in providing blood transfusion services, blood component usage on the wards, as well as to obtain their thoughts on current transfusion guidelines and how transfusion services could

be improved.

Focus groups

Donors were invited to participate in focus groups to better understand donor expectations and priorities. Focus groups were designed based on the results from donor semi-structured interviews.

4.9 Data Entry and Management

Quantitative data were initially collected using an iPad and entering the data into Microsoft's Excel. The data were then transferred to a computer. Numerical values were assigned to different responses for each question and the transformed data were moved to IBM SPSS (International Business Machines Corporation's Statistical Package for the Social Sciences). Interviews and focus groups were audio recorded and saved as Audio Interchange Files (AIF). Qualitative data were translated (when necessary), transcribed, coded and grouped into categories Throughout this process new categories and themes emerged and potential relationships between the categories were identified.

Participants' confidentiality was maintained by ensuring that all data files were password protected. Consent forms and questionnaires were kept in a locked filing cabinet at KATH and will be destroyed in five years. To prevent loss of data, all data were stored on my computer's hard drive, an external hard drive and the University of Liverpool server. Data will remain available to my supervisors and me for up to seven years following the study's completion.

4.9.1 Ethical Considerations

Ethical approval was obtained from the LSTM Ethics Committee as well as the Committee on Human Research Publication and Ethic (CHRPE) in Kumasi (see Appendices 1 and 2).

4.9.2 Consent

All study participants were asked to read an information leaflet outlining the study and the risks and benefits to participants (see Appendix 3). Informed, written consent was obtained from participants. The information leaflet and consent form was available in English and verbally translated to Twi when necessary. In cases where the participant was not literate, the information was provided orally and the participant's thumbprint was used in place of a signature. If the participant was a minor (i.e. below 18 years of age), a parent was also required to provide consent.

In cases where the participant was incapable of providing consent, a relative was asked to act as a proxy and provide consent on their behalf. If during the course of the study the participant was in a position to provide consent, informed written consent was sought.

4.9.3 Risk of Participation

There were no known physical risks of participation. From a psychological standpoint, some of the questions could have made participants uncomfortable. However, participants were not compelled to answer any of the questions and were free to withdraw from the study at any point.

4.9.4 Confidentiality

All participant information was kept confidential. Participants were provided with unique project identification numbers to avoid the use of names. In addition, data were stored in password protected files and were only available to myself and my supervisors.

Chapter 5 - Blood donation counselling and donor experiences

5.1 Introduction

The majority of blood policy documents reviewed recommend donor counselling, but there are few details regarding what it should entail. Few policies differentiate between pre-donation and post-donation counselling. For the purpose of this study and based on the counselling process at KATH, donor counselling includes pre-donation counselling, deferral counselling and post-donation counselling. The following working definitions of pre-donation, post-donation and deferral counselling were used:

> *Pre-donation counselling: Period during which donor clinic staff members perform a health and risk assessment of the donor (and based on the responses, may provide appropriate health and lifestyle advice) and provide information about the donation process.*
>
> *Post-donation counselling: This includes counselling given to donors regarding post-donation care (e.g. liquid intake, food intake, limited physical activity etc.) and appealing to donors to return and encourage their friends to donate. At KATH, this type of counselling takes place during and post-donation.*
>
> *Deferral counselling: Counselling given to temporary or permanently deferred donors*

The above definitions were formulated around current practices at KATH observed during the pilot study and information relevant to the donor (based on donor response in the pilot study). For example, the health and risk assessment is always conducted prior to donation at KATH and is required to determine whether the donor is a suitable candidate. Information about post-donation care and speaking to donors about returning or encouraging friends or

family to donate is done during or after donation. As it may vary whether this is done during or post-donation based on how busy the clinic is these two time periods were grouped together and termed 'post-donation counselling'. More information about the donation process was a point raised by donors during the pilot study and then again during phase 2. As this information is most useful at the start of the donation process it was included in the 'pre-donation counselling' definition.

A positive donation experience is important to help retain donors, and counselling can help improve the experience. This chapter presents the results from five semi-structured interviews with donor clinic staff, thirty semi-structured donor interviews and two donor focus groups, focusing on donor experiences and with the aim of developing a framework for donor counselling at KATH to meet donor needs and improve the donation experience. The interviews were transcribed, and a list of responses for each question was generated. Responses were grouped into common themes. The transcripts were re-reviewed and quotes that could be used to illustrate specific examples were highlighted.

5.2 Current donation counselling practice based on direct observations and according to donor clinic staff

While donor counselling is recommended, there are currently no existing donor counselling guidelines in Ghana. As mentioned in Chapter 3, this is the case in many other African and WHO blood transfusion policy documents. Though no formal policy document regarding donor counselling exists at KATH, donor clinic staff are trained to assess donors' health and risk of infection and to counsel donors appropriately. Below is a description of current counselling practice based on direct observations and the results obtained from semi-structured interviews with five donor clinic staff members. Donor clinic staff was defined as anyone who worked in the donor clinic, was involved in blood donation and had direct contact with donors donating blood.

5.2.1 Pre-Donation Counselling

Potential donors are posed a series of health and risk assessment questions (see Appendix 7) prior to donating, usually by a phlebotomist or nurse. All pre-donation counselling is given orally. In mobile sessions, particular those in post-secondary institutions, donors may be asked to complete the questionnaires themselves. Note that the time spent on pre-donation counselling varies and is influenced by the donors' needs and the time and human resources available.

At the time of my study the assessment questionnaire was being piloted and donors were allowed to proceed to pre-screening* regardless of their responses. However, in the future, certain responses may result in temporary or permanent donor deferrals. Currently, donors exhibiting high risk behaviours are counselled by staff on how to limit the risks. For example, potential donors who admit to engaging in sexual activities with multiple partners are counselled on the risks of acquiring sexually transmitted infections (STIs) and the prophylactic measures available.

* Note, pre-screening in this study refers to the rapid testing of prospective donors for HIV, Hepatitis B, Hepatitis C and Syphilis.

5.2.2 Deferral Counselling

Potential donors deferred due to low haemoglobin level are counselled on diet (e.g. to incorporate iron-rich foods) and advised to have their haemoglobin level tested after a few months of incorporating the dietary changes. Donors deferred due to a positive HIV, hepatitis or syphilis test are told they are unable to donate that day and requested to return the following Monday. Meanwhile, tests are run to confirm the diagnosis. Upon return, donors are informed about their pre-screening results and counselled at the donor clinic. They are also provided with referrals to other counselling services and medical care.

5.2.3 Counselling during and post-donation

During donation, donor clinic staff (usually a nurse or phlebotomist, sometimes a health care assistant) engage donors in conversation and informally educate donors on the benefits of blood donation and encourage them to become regular donors, donating every four months, and make their friends, family and colleagues aware. Post-donation, donors are given advice on how to care for themselves through diet and fluid intake and advised to take 'adequate rest'.

5.2.4 Results from donor clinic staff interviews

Eight donor clinic staff members were approached to participate in this study and ultimately five donor clinic staff members were interviewed during the work day: The head of the donor care unit (a trained nurse), two phlebotomists and two nurses. The three staff members who did not wish to participate were health care assistants (HCAs). 4/5 of the participants were female. Length of time working at the donor clinic at KATH varied between 3-8 years. Though interviews were conducted in a separate area of the donor clinic, due to limited space, other staff members were present at times.

Participants described the donation process and this was in line with direct observations. All donor clinic staff members received counselling training from the head of the blood bank. According to staff members, donors are counselled based on their responses to the health and risk assessment questionnaire and their pre-screening results and are also provided with post-donation care advice, such as "*Don't do hard work*" or "*Abstain from drinking alcohol today*". Donors are encouraged to increase their fluid intake (ideally water). There is no specific information staff are prohibited from sharing with donors.

Prior to donation, donors are told not to be fearful and reassured that the procedure will not be very painful. Donors with high blood pressure are advised to consult a doctor and are temporarily deferred. Those with low haemoglobin level are provided with dietary advice

and advised to return after 'some time'. Very rarely are donors under 50kg (see section 5.3.1.1). There is no maximum weight criteria and overweight donors are not counselled about diet or exercise.

During donation, staff members explained they emphasise the simplicity of the donation process and encourage donors to return in four months and bring their friends. This is incorporated into friendly conversation with the donor, thus making it seem less like a formal request or demand.

When asked what additional information donors should be provided with, most staff were satisfied that the information provided was accurate and complete. They felt that they had received adequate training on donor counselling and felt that they were able to provide thorough counselling to donors. One staff member suggested that donors be educated on and encouraged to obtain a Hepatitis B vaccination.

5.3 Donor Experiences: Results from Donor Interviews

5.3.1 Donor Participant Profile

Thirty donor interviews were successfully completed. The semi-structured interview template was based on the one piloted with some slight modifications (see the text in red in Appendix 8). As these were semi-structured, parts of the interview varied between donors depending on their responses.

Eleven interviews were conducted in the hospital's donor clinic and nineteen at two mobile sessions. One mobile session took place at the local university, the Kwame Nkrumah University of Science and Technology, and the other at the Kumasi Polytechnic. Three potential participants were excluded: one could not speak either English, French or Twi (the local language), one did not have time to complete the interview and one was excluded

because there were no translators available. The average participant age was 25.4 years, with donors ranging in age from 19 to 45 years. Of the thirty participants, 83.3% (25/30) were male, 70% (21/30) were voluntary non-remunerated donors, and 53.3.% (16/30) were first time donors. Among repeat donors, total number of donations in lifetime ranged from 2-6 with an average number of donations of 3.36. 7/9 of replacement donors donated blood for an immediate family member (i.e. parent, sibling, spouse or child). One replacement donor donated for his neighbour and another for his manager's son.

5.3.2 Factors that Motivate Donors

In countries where blood donations are low, blood donor motivations are of particular interest as they provide greater insight into donor perceptions and may be helpful in designing and implementing schemes aimed at recruiting and retaining donors.

While this study was not designed with the aim of exploring donor motivations in depth, the topic was included in the interviews to better understand the donor participants and provide contextual background. Donor counselling can be used to encourage donors to return and a good understanding of donor motivations would be helpful in developing and implementing retention strategies.

In the individual semi-structured interviews, donors were asked "Why did you come to donate today?". Every donor had at least one reason; some had multiple. All responses were collated into one document. Donor interview transcripts were reviewed in case other motivating factors were mentioned at some other point in the interview. The responses collated were reviewed and grouped into common themes. Factors not common to the majority of donors are listed under 'Other factors'. Transcripts were re-reviewed to find appropriate quotes that supported the different themes. Data were stratified based on VNRD/RD, gender and first time/repeat. Clear differences in motivations were seen between voluntary and replacement donors, whereas there were no observed differences due to gender or between first time and repeat donors. The results are presented below.

5.3.2.1 Factors that Motivate VNRD Donors

"To save lives"

Among volunteer donors, both in mobile sessions and in the donor clinic, the primary motivations for donating blood were 'to save lives' and 'to help people'. This was commonly coupled by donors expressing their knowledge about the need for blood in nearby hospitals. Both first time and repeat VNRD made the connection between the need for blood and their willingness to donate. For example, one donor stated "Many people need blood. At times blood is not available, so I have to donate blood to save lives". Another donor responded

> *"Actually I heard people in the hospital need blood, and most people die not because of anything but blood, so I just came to donate to save lives at the hospital. That is my reason for donating.".*

Information regarding limited blood supply appears to come from a variety of sources including, school, families, friends and media announcements (some of which are posted in schools).

Community Influences

At mobile sessions in post-secondary institutions (e.g. polytechnics and universities), some students donated as part of a group or social activity. The mobile sessions were organised by smaller groups within the school (ex: the choir), and thus donating blood was seen as a social event with peers or as a new experience. For example one university student stated:

> *"I [donated blood] because the university choir, we are donating blood and I haven't done so before, this is my first time".*

Note the respondent said 'we', further emphasising the social experience tied to blood donation. However, when volunteer donors were asked whether they felt pressured by their peers to donate, they unanimously answered "No".

Other Factors

"Because I feel like it"

Three donors donated because they "felt like it". When probed further, one donor explained that he had not previously donated because "*I didn't feel like it*". He further elaborated by explaining how he had lacked knowledge about blood donation and had not heard much about it.

"I have blood to donate"

According to two volunteers, they donated because they have the available blood and other people may not. One donor explained:

> *"I feel that there are a lot of people at the hospital that need blood and if I'm strong and healthy and I'm having blood in my body and I can donate and it's safe why shouldn't I go?".*

To these participants, it made sense to share something they had if it resulted in improved outcomes for others.

Personal Gratification

One volunteer donor highlighted the personal gratification he felt as motivation to donate. The donor stated"

> *"I feel like if I'm donating…somehow I feel like I'm trying to save lives somehow. It makes me feel OK. I feel happy when I do that".*

This donor was a repeat donor, having previously donated twice, once as a volunteer and once as a replacement donor, and had therefore experienced donation under different circumstances.

5.3.2.2 Factors that Motivate Replacement Donors

Donating for a known person

The most common motivating factor among replacement donors was to donate blood for someone else, whether it be for a family member, friend or colleague. One donor donated blood for his manger's son and was asked whether he felt any pressure as it was his employer's request, to which he responded no. For most replacement donors, donating for someone else was the sole motivating factor. In fact, some replacement donors openly stated they would not consider donating blood for an unknown person. One donor, when asked whether he would consider donating blood again, responded:

> *"If it's not a close relative I don't see the need for it. I'll only donate to a relative if the person is in need".*

Gifts and Compensation

None of the replacement donors interviewed claimed to receive any form of compensation whether in monetary or gift form and among this study's participants it did not appear to be a motivating factor. This may be true in most cases, but patient interviews did indicate that some replacement donors are provided with a monetary incentive. It is possible that some did not feel comfortable disclosing this information as paid donation is prohibited, meaning that if donor clinic staff discover that a donor is receiving monetary compensation for donating, he/she will not be permitted to donate blood. One donor, however, who was donating for his manager's son thought his manager may provide him with a gift as a thank

you, though he could not speculate as to what it might include.

When asked whether they knew anyone who had received gifts or compensation for donating blood, a couple of donors admitted to knowing people who had received gifts for donating blood such as mobile phones, textbooks or clothes, thus indicating that some form of compensation for replacement donors still exists in some cases. Nearly every donor interviewed, however, said that they would not accept money for donation, with the most common reason being that '*blood should not be sold, it should be donated freely*'. Two donors, however, said they would consider it, depending on the amount offered, though they were unsure what the threshold would be.

Interestingly, when patients were asked whether their family members who donated blood received any gifts or compensation, many referred to the refreshments provided by the donor clinic. The key factor, however, is whether these are seen as motivating factors, for which there is no supporting evidence based on the results from the donor interviews.

5.3.2.3 Repeat donors vs. first time donors

Repeat donors appear to donate for the same reasons as first time donors - to save lives or to replace blood for someone they know. This leads to the question, why do some donors return, while others do not and is addressed in section 5.3.6.

5.3.3 Donor Expectations

Expectations prior to an event may shape post-event experiences. For example, in a study on childbirth experiences, women with low expectations were less likely to find the experience fulfilling (Green, Coupland and Kitzinger, 1990). It is therefore important to better understand donors' expectations so that they can be met and the donation experience improved. While a satisfactory or pleasant donation experience may result in the donor returning, an unpleasant experience will contribute to a donor not returning. As mentioned

earlier, repeat donors are seen as the safest donor type, and it is therefore important to find ways to increase a donor's willingness to return and promote donor retention.

5.3.3.1 First Time Donors' Expectations

Donation Associated Pain

Many donors, when first asked about their expectations of the donation process, stated that they had not had any expectations. When further probed, however, the most common donor expectation for first time donors was that blood donation would be painful. One donor even voiced his concerns prior to donation, asking one of the donor clinic staff members whether donation would be painful. However, all donors who expressed this expectation also stated that the donation, was in fact, not as painful as they had predicted. According to one donor:

> *"I thought it would be painful, but after the first prick everything seems normal".*

Another donor stated:

> *"When they were putting the needle in the starting I was feeling pain, but after the needle enter my body I felt nothing".*

Other expectations

Blood grouping

A couple of replacement donors expected to learn their blood group during that donation visit, one of whom wanted to ensure it was compatible with the patient they were replacing for. One donor said:

"[…] but for the first time I was thinking the blood group – were they going to be the same? That is what I was thinking about. Because I don't know my blood group".

Another donor was under the impression that the patient for whom he was replacing for would be receiving his blood and stated:

"I was thinking that when you get here they just check it and after that they have to communicate your blood group and the person's blood group but I didn't get such information – whether my blood group is the same as [the patient's], I didn't get that information".

Refreshments

Some donors expected to receive food prior to donation, particularly since donors were asked whether they had eaten prior to donation as part of the initial donor screening process (If a donor has not eaten within the last two hours they are asked to have a meal and return). Currently, donors are provided with crackers and a malt drink post donation.

A first-time volunteer donor at a mobile session at the local university stated:

"Actually, I was thinking, they would give us something to take in. Maybe we didn't eat before coming and I thought they would give food before we go for donation".

The same donor further commented:

"And I expect them to give some milo after donation […] to regain my energy".

Milo is a malt and chocolate Nestle beverage. One donor specifically mentioned having to go out and obtain food before donating. A first time replacement donor, when asked whether he would attend a mobile session, stated:

"Yes […], but I will see to it that they give me something that will recover me from my donation. You know all those things – food, vegetables, drinks. You cannot release my blood without giving me a little milk and those things".

In this case, refreshments were not only expected by the donor, but seen as something that was necessary to recover from blood donation. It did not appear that it was seen as a form of compensation, but rather was 'required' medically to aid in their recovery.

Difficult or Long Process

One replacement donor expected the process to be more complicated, but was pleasantly surprised that this was untrue and post-donation said:

"Actually, I was very anxious. I thought it was a very huge process but it was very simple".

A second replacement donor responded:

"Because I have not donated before, I thought it would be difficult".

On the other hand, a volunteer attending the donor clinic was disappointed with the length of the process saying:

"I thought it would be a little bit quicker, but it was slow".

Adverse Events

There was one donor, a female first-time VNRD at a mobile session, who expected a possible adverse reaction and stated:

"Ok well, maybe I expected to be a little dizzy but I feel ok. I don't feel terrible".

At this particular mobile session, there was a female student who collapsed post-donation which may have contributed to the respondent's expectations.

No expectations stated

A couple donors did not mention any expectations, even when probed. According to one replacement donor:

"Everything was normal. No different than expectations".

Another replacement donor further explained their lack of expectations by saying:

"This is my first time, so I didn't even know what the whole process was about it".

5.3.3.2 Repeat Donors' Expectations

Expectations derived from past experiences

Similar to the first-time donors, there were repeat donors who did not express any expectations regarding the donation process. However, the reason for this differed compared to those mentioned by first-time donors. Repeat donors claimed to already know what the process would be like, with one volunteer, who was donating at the donor clinic and had previously donated blood five times (twice at KATH), saying:

"I've gone through the process so many times so I'm used to it. I know the general process".

Thus, though these donors did not describe any expectations, their responses suggest that their expectations are based on their past donation experiences.

Other Expectations

Time required to donate blood

A student volunteer at a mobile session had expectations concerning the time necessary to donate blood. According to the student: "

> *At times it will take 3 or 4 hours before you are able to donate. I think if it could take a shorter time…Today I've spent almost 2 hours so it was shorter than last time I came".*

Again, the donor's expectations were based on his past experiences.

5.3.4 Donor Experiences

5.3.4.1 Positive aspects

Most donors were keen to express their appreciation towards the donor clinic staff for their friendly demeanour. Repeat donors who had donated elsewhere stated that the staff at KATH were particularly friendly compared with other hospitals. The fact that most donors mentioned this when asked about the positive aspects of the donation process illustrates that the donor clinic staff are consistently friendly and make an effort to make donors feel welcome. It also shows how important donors perceive staff behaviour when reflecting on their donation experience, suggesting it could play a significant role in their decision to return.

5.3.4.2 Negative aspects

Few negative issues were raised by donors.

Of the items mentioned, the most common was the length of time the donation process took. Based on direct observations there was considerable variation in process times during these interviews (approximately 30 minutes to 150 minutes). Longer times were due to increased number of donors, thus more blood to pre-screen, and limited staff to withdraw blood. In support of this, longer wait times were usually mentioned when there was a big influx of donors and the donor staff were busier than usual.

5.3.4.5 Donors' experience with the Health and Risk Assessment Questionnaire

As the donor health and risk assessment questionnaire was being trialled, it was important to explore donors' views on the new screening tool. The responses varied between donors. Only a few donors thought the questions were long and a couple thought they were a little difficult to answer and would have liked more explanation with the questions. For example, when asked if any of the questions were difficult to answer, one donor responded:

> *"No - One question about taking painkillers – at times if you don't educate the person maybe what a painkiller and malaria is, at times they might find it difficult to answer such questions. At times you will be attacked by malaria and you will not even be aware".*

One donor said:

> *"[The questionnaire is] okay, it actually captures the – how do I put it? They want to ensure that the person donating is in good health, in sound health".*

Some donors found some of the questions uncomfortable to answer, particularly those relating to sexual behaviours, with one donor answering:

> *"Yes [some questions made me uncomfortable]. They asked me I'm a married person. I said no. I'm not married. Then you have to have someone dating you and I said yes".*

Another donor, however responded:

> *"When you are with a medical practitioner you shouldn't feel uncomfortable when they ask you certain questions".*

Overall, however, donors felt that this was a 'normal' part of the process and some donors even expressed appreciation for the questionnaire, noting their importance as the nurses and phlebotomists posed health related questions. For example, according to one donor:

> *"For the questions, I think it's perfect. Because it's blood, they should – maybe you have some problem in your blood, so once they are asking you the questions that one will necessitate them to get the right information".*

In two cases, according to donors, they did not have to respond to any health or risk assessment questionnaires. These were donors attending mobile sessions and donated at peak hours. It is possible, that to process all the donors in time, little to no time may have been spent on the questionnaires.

5.3.5 Information blood donors recall receiving from donor clinic staff

As mentioned in section 5.2, current donor counselling focuses on counselling those with potential risky lifestyle behaviours on how to minimise these risks and providing donors with post-donation care such as dietary and fluid intake information and what type of activities to engage in the next 24 hours. This section, however, will focus on the information donors recall receiving. Note that donor interviews were conducted approximately 2-10 minutes post-donation. The data below were collected during the semi-structured interviews. Donors may or may not have been given additional information, but any points omitted mean that they did not mention it in the interviews and illustrates what information donors recall.

5.3.5.1 Personal Health

Most of the information or questions donors recalled hearing were associated with their personal health. Donors most commonly remembered donor clinic staff ensuring they had eaten prior to donating. For many donors this was the only information they recalled receiving. A first time replacement (female) donor stated:

> *"They asked me whether I have eaten and that I should eat before, but I had eaten before coming.".*

A repeat volunteer donor further explained why this was important, saying:

> *"The first advice they give you is 'have you eaten' because if you have not eaten you will faint or collapse".*

Donor clinic staff ensuring donors had eaten seemed to provide donors with reassurance that the staff prioritised their health and well-being.

Donors remembered receiving post donation care advice such as to rest and ensure they drank adequate fluid throughout the day. A repeat volunteer donor remembered:

> *"[…] after [donation] I should rest, not do anything stressful".*

Another volunteer, first time donor, was told:

> *"To take enough fluid and take enough rest,", but was not told specifically how much fluid to take in or what was considered "enough rest".*

Some donors discussed points raised in the health and risk assessment questionnaires, all of which concerned personal health and well-being. One first time replacement donor recalled:

> *" […] they also asked me some health related issues – whether I have some problem, maybe I drank something and other issues".*

Other donors discussed learning about donation frequency, which reflects staff members' efforts aimed at encouraging donors to return.

5.3.5.2 Lack of information

According to some donors, they did not receive any information about blood donation prior to or post donation. One donor expressed his dissatisfaction with the limited information provided, noting "*it is a problem*", suggesting that donors may appreciate added counselling. Donors may not have felt any the information received was pertinent to recollect or share, or in some cases this may be an accurate reflection as through personal observation at one of the mobile events, I noticed staff were busy and unable to spend long with donors.

5.3.6 Additional information blood donors would have liked to receive

When probed about wanting to receive additional information, nearly all donors replied yes. Few stated that they were satisfied with the information received and did not require any additional information. Interestingly, the majority of donors said they did not ask staff members any questions and when further probed as to why donors responded that they did not have any questions.

5.3.6.1 Providing information prior to the donation process

At the mobile sessions, one donor suggested that it should advertised in advance that donors should consume some food prior to donation, so that they do not faint or collapse.

5.3.6.2 Donation Process

Many donors felt that it was important to reassure donors prior to donation that the process is simple. According to one donor:

> *"when I went I was discussing about [blood donation] with those first donors and people were thinking, those who haven't donated before, were thinking it's very serious so you need to inform the person that it's not anything – it's a normal thing".*

Another donor stated:

> *"Before donating [donor clinic staff] should encourage the people what they are going to do is risk free and that they are helping others".*

Donors also wanted additional details about the donation process. For example, the time it would take, the different steps involved, and how the blood donated would help save lives.

Time was particularly important as donors had other commitments such as work or school later in the day. One repeat student volunteer came to the donor clinic during a break between classes and discussed how he had limited time to spare, thus if the process took too long he would have to leave.

5.3.6.3 Blood Screening Results

ABO Rh Grouping

Some donors expressed interest in learning their blood group during their donation visit. Blood, however, is grouped post donation at the blood bank - though not all donors are aware of this. Donors requesting their blood group information, according to them, were given the telephone number at the blood bank as well as the batch number associated with their blood bag and asked to call at a later date. This was deemed a satisfactory response by participants.

Pre-Screening Results

Another request for additional information was to learn the results of the pre-screening tests. One donor responded:

> *"I think after [donors] donate [staff] should let [donors] have a look at their test. Whether [donors] have certain diseases or they don't have them. [Staff] should let [donors] check their status".*

Not disclosing pre-screening results immediately, however, intentional on the part of the blood bank at KATH, so as not to stigmatise those who do test positive and to confirm test results.

5.3.6.4 Post-Donation Care

Post-donation care advice was a common request from donors, particularly relating to diet

and activity. As stated in the previous section, this information is usually provided to donors by donor clinic staff. However, donors may either have forgotten receiving this information, or during busier times, staff may not have had the time to counsel donors appropriately on post-donation care. One specific issue raised by multiple donors was to learn the number of days it would require them to '*regain their blood*'. Although this will vary between people, donors can be provided with an estimated time frame. It is possible, however, that the time period may seem lengthy to some and may deter some donors

5.3.6.5 Donation Risks

One donor mentioned the importance of educating donors about the risks involved in blood donation:

"Yes, time and the risks involved. Maybe the donor like I just feel like donating but they don't know the consequences of it. They should be educating us – maybe these are the risks involved in donation but there's nothing like that".

5.3.7 Donors' willingness to return

Donors were asked about their willingness to return. Also, donors were asked under what circumstances they would return (ex: as a volunteer, for a family member or friend, in response to a television or radio advert or as a paid donor). Every donor interviewed was willing to return. Yet many donors do not return. This may be explained by some of the added stipulations made by donors. For example, donors stated the would return:

> *'[…]if [they] have the opportunity", or if they have the money for transport or adequate time.*

Overall, most donors said they would return as a volunteer and all said they would if a family or friend required blood. Some were only willing to come as a replacement donor, which highlights the importance of the close family and community relationships within the

country. Many also said they would return if they heard a call for blood, but some added that it would depend on whether they had the time and money for transport. These issues also arose when discussing whether donors would return to the KATH donor clinic as 'walk in' VNRD. One donor, unwilling to donate at media related events, explained:

"[I'm] not sure where blood is going. Are they going to sell my blood?".

5.4 Counselling information priorities - donors' responses

The decision to introduce focus groups was made following a brief analysis of the results from the semi-structured interviews with donors. These interviews revealed a number of points donors considered important to donor counselling, but it was unclear, if given the choice, which of these points were greater priorities. This was deemed important as in some cases, as mentioned above, the staff to donor ratio is low and staff members may not have adequate time to provide in-depth counselling,

The aim of the focus groups was to generate a discussion regarding donor priorities regarding information given during donor counselling. Using the results from the semi-structured interviews, the three main types of information donors seek information about blood donation and the process, information about their blood and blood status, and post donation care advice.

5.4.1 Participant Profiles

Two focus groups were conducted. One took place at a secondary school and consisted of ten students aged 17-19. Three were female and two had donated before. The second focus group took place at a mobile session at a mosque, however there were limited donors that attended that day (total of 13) and 6 did not want to participate in the focus group. Two smaller discussions (one with 4 people and one with 3 people) were held instead. All were men, aged 17 to 50 years and three had previously donated blood.

Participants were asked "Of the following three, which information is the most important for you to receive as a donor?" and further probed for specific issues, such as risks and benefits of blood donation, STD status and dietary advice (see Appendix 10 for a complete list).

5.4.1.1 Student Focus Group Discussions

The participants were enthusiastic and eager to partake in the discussions. As classmates, they interacted easily with one another. This was beneficial as it led to a livelier discussion, but also affected students' responses. Students sometimes changed their responses after hearing those of their peers. It appeared that this generally occurred because a peer had raised a point the student had previously not thought of, but may have also been partially driven by peer pressure.

None of the students discussed post-donation care advice as a priority, and were evenly divided as to whether information about blood and the donation process or information about their health and blood status were of higher priority. Those who felt that information about blood donation and the process was the most important to receive highlighted risks and benefits, donation process steps and time required and the maximum blood one could donate as specific pieces of information they would like provided during counselling. Donors who were keen to receive more information about their blood and health status were looking for more details as to whether their blood was "healthy" and if their general health was good.

5.4.1.2 Focus Group Discussions held in Mosque

Compared with the student focus group, there was less discussion among respondents at the focus groups held at the mosque. 6/7 respondents were most interested in receiving more information regarding their general health and blood status. The donors discussed the importance of receiving advice on how they could contract various diseases and how they could maintain their health. One donor felt that post-donation care tips was of higher priority

than information regarding his general health. None of the participants prioritised information regarding the blood donation process over health and post-donation care advice.

5.5 Discussion

5.5.1 Recruiting Donors

5.5.1.1 The link between knowledge and motivation

Knowledge and attitudes regarding blood and blood donation play a defining role in motivations and many studies exploring donor motivations have also examined knowledge and attitudes. In a study looking at 542 blood donors in Lagos, Nigeria, 196 donors (36.1%) had a university degree and 284 (52.4%) of blood donors believed they could contract HIV or hepatitis C by donating blood (Olaiya et al., 2003). Such a misconception may prevent many from coming forward to donate. A study in Iran found that 432/1394 (31.2%) of study participants in the urban population of Yazd were unaware of the location where they could donate blood (Shahshahani et al., 2006), which suggests that there is limited knowledge regarding the basic logistics of blood donation amongst the population. In Saudi Arabia, only 49% of study participants were aware that blood is screened for HIV, hepatitis B and hepatitis C (Baig et al., 2013). All of these misconceptions can deter people from donating blood and highlights the importance of knowledge and education in donor recruitment.

The results from the semi-structured interviews with donors illustrated the importance of knowledge and donor motivation. Similar results have been documented in Dakar, Senegal where 43% of participants in a study stated 'altruism' as the main motivation for blood donation and 20.33% 'awareness of blood shortage' (Duboz, Macia and Cuneo, 2010). 24.1 % of donor participants from a tertiary educational institution in Nigeria were found to not donate blood due to limited knowledge about the donation process and 'the importance of blood donation' (Salaudeen and Odeh, 2011). This suggests that an important factor in

motivating volunteers to donate blood is their knowledge regarding limited blood supply and that one of the possible reasons others do not donate blood is because they are unaware of the need for it.

Since 2002, the KATH blood bank has made considerable efforts in community education on blood donation, primarily through motivational speeches (Owusu-Ofori, S. et al., 2009). The results from the interviews with volunteers reflects these efforts as knowledge was an important motivating factor among this group of donors.

5.5.1.2 Social Inclusion

Donating as part of a group or club was one of the motivating factors for VNRD participants at mobile sessions. Watching their peers donate blood influenced their decision, but none felt pressured by anyone to donate. This suggests that social inclusion, without peer pressure, can be an important factor in motivating blood donors. This is supported by research in Australia that found that African migrants were more likely to become blood donors if they felt "included in their […] host society" (Polonsky, Brijnath and Renzaho, 2011). This is similar to the response seen at FM radio hosted mobile sessions in Kumasi, which led to an increase in repeat volunteer donors by creating an atmosphere that was socially acceptable for blood donation (Allain et al., 2008).

5.5.1.3 Donating for a known person

One of the most common motivating factors among replacement donors was donating for a known person, with one donor admitting he would only donate for a close relative. This sentiment is not unique to Ghana. In a study in Lagos, Nigeria, 93% of donors stated personal or family benefits as their motivation for donating blood (Olaiya et al., 2004). Similar results have also been seen in China, Chile and Trinidad (Lownik et al., 2012). 47.2% of donors in a study in India said the first time they donated was for a friend or family member (yet 99.2%

stated VNRD was the best form of donation compared to other forms) (Uma, Arun and Arumugam, 2013). This is an important finding as it illustrates the importance of replacement donors, explains why they continue to play a significant role in blood collection in Africa and supports similar reasoning by other authors that it 'fits well with the African culture of extended family support' (Tagny et al., 2010).

WHO policy documents and the majority of African national blood policies reviewed recommend that blood should be collected from voluntary donors. However, there are seasons when the KATH struggles to meet the demand for blood even with a constant flow of replacement donors. This is often during the school holidays when malaria related anaemia cases are at their peak and student volunteers are limited. However, replacing blood for someone you know is a powerful motivator for some, and should not be dismissed as a donor recruitment tool if the blood obtained is safe and the supply is limited.

Some responses from donors suggested that they were under the impression their blood would be directly transfused into the patient they were donating for. This was echoed by a patient who said:

> *"Yes. I have B+ and their blood is not B+. If they had B+ I could take their blood." (Male, 50 years, A&E, Primary)*

The blood bank, however, avoids transfusing patients with blood from their relatives to prevent transfusion associated graft vs. host disease. It is unclear whether this belief contributes to donor motivation and whether some donors would refuse to donate if they learned that their blood would be given to a stranger. In KATH, ideally patients are asked to find replacement donors after they have received blood, thus preventing the belief that the patient will receive the donor's blood. However, patients who require multiple transfusions are generally transfused until stable and asked to secure replacement donors prior to being transfused again. Also, at times there is insufficient blood in the blood bank and patients requiring transfusions are urged to find replacement donors even before they receive their transfusion.

Further research in this area is required in Ghana. Studies in other countries in the region suggest that donating blood that will be transfused into a family member might be a motivating factor. Focus group discussions in a study in Sierra Leone revealed that many donors were not comfortable with receiving blood from a stranger, but were willing to receive blood from relatives (Sengeh et al., 1997). Similar results were seen in Cameroon (Koster and Hassall, 2011). If this is a strong motivating factor among replacement donors, it poses an ethical dilemma on how much information donors should receive. It can be argued that donors are entitled to be fully aware of the donation process and transfusion process and guidelines, however, if this results in a considerable decrease in replacement donors and increased morbidity and mortality among patients, it may be argued that it is more important to focus on patient outcomes.

5.5.1.4 Gifts and Compensation

Some donors admitted to knowing other replacement donors who had received gifts from family for donating blood. Further research in Ghana is needed to determine whether this type of compensation is seen as a motivating factor or as a gesture of gratitude. For example, in Cameroon, replacement donors expected some form of compensation from family (ex: food, transport money, traditional remedies), but donors still saw themselves as 'voluntary' donors (Koster and Hassall, 2011). These results vary between populations. 92.33% of participants in a study in Lome (where only 95/277 were donors), believed that blood 'should be donated without remuneration'. (Agbovi et al., 2006), whereas 11.5 % of respondents in a study in Nigeria said they would be motivated by monetary compensation to donate blood (Salaudeen and Odeh, 2011).

While nearly every donor said they would not donate for money and felt strongly that their blood should not be sold, a couple of donors, however, said it would depend on the amount of money offered. This suggests that paid donation may be socially unacceptable to some, but that for others it is influenced by the size of the incentive and their financial circumstances.

Further research is required in this area to determine: a) if this is felt by a larger proportion or donors or a very minute minority and b) among those who would consider donating for money, at what threshold an incentive's value must cross before donors consider donating for money.

5.5.2 Importance of donor counselling

Nearly all the donors interviewed stated they would have liked to have received additional information at the donor clinic. This included topics like process times, more information about their pre-screening results and post-donation care advice. This implies that there are gaps in donor counselling that need to be addressed. Few, however, were willing to obtain this information by asking staff members, claiming they had no questions to ask. This highlights the importance of providing donors with thorough counselling given that donors are looking for information, though they may not pro-actively search for it. It is also necessary to understand and address why donors are unwilling to ask staff members questions as even the most thorough donor counselling may not satisfy a donor's needs.

5.5.2.1 Blood donation counselling priorities according to donors

Donation Process

Results from the semi-structured interviews and focus groups showed that donors were interested in learning about the steps involved in the donation process and would like to be provided with an estimated time frame for how long the process will last. Note that some of the responses regarding process times came from participants attending a mobile session where set-up was delayed or there was difficulty obtaining fuel (for the van that transports the mobile session staff and supplies) and some of the prompter donors were forced to wait for staff to arrive and organise the session. This suggests that the actual process is not long for donors unless wait times are increased.

Process times varied considerably (approximately 30 minutes to 2.5 hours) and as uncovered by the interviews, repeat donors based their expectations on their previous donation experiences. Thus, repeat donors may under or overestimate the time required to donate blood, potentially interfering with their work or school schedules. Despite donors commenting on the time donation took, with some saying the process was quick and others saying it was long, few donors left once they had started the donation process. In a one-month period, February-March 2014, only 5/302 donors who visited the clinic left after undergoing the initial clinical screening. Thus, while donors seek shorter donation visits, once they have commenced the donation process, they are unlikely to leave.

Nevertheless, the responses from donors illustrates the importance of staff being transparent with donors regarding the donation process. Donors should be made aware of what the process entails and also provided with an estimated time frame. During known busy periods (e.g. when there is limited blood available and more replacement donors are asked to come), increased staff numbers may help, however, logistics may remain an issue as there are currently six donation beds available. Further research is required to determine whether increasing the number of staff and hospital beds (i.e. increasing the donor clinic's capacity to attend to more donors at a given moment of time. In the time being, simply keeping donors up to date about the process and wait times and encouraging them to be patient may help improve the donor experience.

Personal Health

The majority of the information that donors would like to receive is related to their personal health. The most important aspect of donor counselling that donors recalled was being asked whether they had eaten. Also, donors were interested in learning about the 'status of their blood' (i.e. is it safe or not?) and showed appreciation for the post-donation advice given regarding nutrition and exercise.

Adverse reactions

One donor participant discussed the importance of advising donors on the risks involved in donating blood. Currently, there are no guidelines regarding informing donors of the risks of donation. In fact, one donor stated that clinic staff should encourage donors "that what they are about to do is risk free", suggesting that some donors are unaware of the risks involved. During the pilot study one donor was asked whether he/she would donate again if they experienced an adverse event and they responded, "No, I would be afraid the same thing would happen next time", Others discussed fear or possibility of fainting and collapsing suggesting that these are the most common risks perceived by donors, possibly due to the fact that they most often occur shortly after donation and are witnessed by other donors. While this was only mentioned once, some people may expect or fear averse post-donation reactions and this may be what deters other potential donors from donating. This is important to keep in mind when looking at ways to improve donor recruitment.

A study in neighbouring Togo showed that risk aversion (e.g. fear of health problems related to blood donation) was one of the main factors deterring potential donors (Alinon et al., 2013). This represents an ethical dilemma. So long as sterile equipment is used, the risks of donating blood are low for donors meeting the donor requirements (MayoClinic, 2016) and mentioning risks may scare donors and prevent them from donating. From a Kant perspective, one should not use others as a 'means to an end' and donors should therefore be made aware of the risks. However, from a utilitarian point of view, the aim should be to maximise benefits for the general population and in a region where blood stock levels and donation rates are low, while blood demand is high, too much information about risks could potentially deter people from donating and results in lower blood stocks and greater mortality. However, a study at Ohio University found people were more likely to volunteer to donate blood following information regarding the risks and coping mechanisms to prevent vasovagal reactions (France et al., 2010).

STI status

Some donors, all of whom donated blood that day, suggested that they would like to be made aware of the 'status of their blood' (i.e. is it safe? Are they healthy?) or HIV status. This suggests that some donors may not have had a clear understanding of the pre-screening process, and were unaware that the fact that they were able to donate means they were tested negative for HIV, hepatitis B, hepatitis C and syphilis. This is not true for everyone, as other donors mentioned knowing their blood was free from disease was a benefit of blood donation, suggesting that information about pre-screening results may be communicated with donors, but not consistently. Since staff members did not mention making donors aware that they tested negative for HIV, hepatitis and syphilis as part of the information given to donors, it is likely not part of their counselling routine. This may be intentional to limit the stigma associated with testing positive. By sharing negative results with donors, they may suspect that those deferred post pre-screening are deferred due to a positive test (in reality they may also have been deferred for a low haemoglobin level). Unlike with ABO and Rh grouping, pre-screening results are considered too sensitive to deliver over the telephone, thus, limiting the ways donor can learn their results. A possible solution is to invite donors to learn their test results post donation.

Post-donation care

Results from the donor interviews and focus groups reveal that donors would appreciate advice on post-donation care, such as dietary, fluid intake and rest recommendations. According to donor clinic staff this information is consistently provided to donors. Indeed, some donors recalled receiving post-donation care advice, but others did not, suggesting that this information may be not consistently included in donor counselling. Additionally, based on the responses from donors and staff members, the advice is unspecific. For example, donors are to take in '*sufficient fluid, preferable water*', yet there is no indication as to what constitutes sufficient. Similarly, donors are recommended to get 'adequate' rest, with no further details.

Donors are concerned for their health and efforts should be directed at consistently counselling them with detailed post-donation care advice to aid in their post-donation recovery and improve their satisfaction with the donor counselling received.

Following donation, donors are normally provided with a malt drink and crackers, but some of the donor interview responses suggest that donors associated certain refreshments (e.g. Milo) with being more effective at regaining their strength post-donation. Greater education on post-donation can help dispel such myths. Since donors look to the post-donation snack as an opportunity to recover from donating blood, a beverage or snack high in iron may be a suitable alternative, with an explanation to donors as to how this may help them recover.

5.5.3 Encouraging donors to return

Most donors were willing to return to donate blood and donors genuinely seemed interested in returning and many expressed their surprise that their fear of pain was not validated. This is an important finding as an estimated 55% (292/530) of study participants in Tamil Nadu, India stated that fear of pain was the main reason why people hesitated to become donors (S., Uma, et al., 2013). Word of mouth and reassuring words from staff members and other blood donors is therefore important in providing potential donors with a more accurate expectation of pain levels and to minimise their fears. Donors also stressed the lack of opportunity to donate, financial resources and transport as preventative factors. These are common problems worldwide. It is worth noting, however, that it is possible that participants feel compelled to provide certain responses to please the interviewer, but in this case it is unlikely given the enthusiasm expressed by donors.

A study in India also revealed that opportunity to donate was major motivating factor (S., Uma, et al., 2013). Similarly, 45.5% of donor participants from a tertiary educational institution in Nigeria stated 'lack of opportunity' as one of the main reasons they did not donate blood (Salaudeen and Odeh, 2011). The main reason for not donating among participants in a study in Dakar, Senegal was not having been contacted directly to donate

blood (Duboz, Macia and Cuneo, 2010). The results from these studies and the data from respondents at KATH indicate that blood donation needs to be made more easily accessible. As the donor clinic is open 24 hours a day, 7 days a week, the main issue is travelling to a donation site. Mobile sessions hosted and advertised by FM radio stations have been successful in recruiting large numbers of volunteer donors. Additional sessions held near prominent junctions may also improve accessibility.

One donor was hesitant to donate at a mobile session hosted by a media related organisation and he was concerned that his blood may be sold. A similar concern was voiced in Togo where volunteer donors suggested that others may not be donating due to "concern about the use of blood" (Alinon et al., 2013). The hospital should ensure, when advertising or encouraging blood donation, that donors are reassured that their blood will not be sold and explained how their blood will be used in the hospital.

5.5.4 Suggested recommendations for future donor counselling

Below is a list of suggested guidelines for donor counselling. To ensure consistency, staff members may be provided with a checklist to ensure all necessary points are discussed.

-**Provide donors with information prior to their donation visit.** For donors donating at mobile sessions this is partially in place as motivational speeches are given in schools, mosques and churches prior to mobile sessions. Additional information on how to prepare for donation (e.g. informing potential donors to eat before donating) should be provided.

-Explain the donation process. Donors should be explained the donation process, the different steps involved, the reasons for each step and the estimated time required.

-Reassure donors. Donor should be encouraged that the donation process is safe and reassured that the process is not as painful as one might expect. At the same time, donors should be made aware of the potential adverse effects.

-Encourage donors to ask questions. Staff members should encourage donors to ask questions or share any fears or concerns. They should also make it a point to ask donors if there is any additional information regarding the donation process donors would like to receive.

-**Inform donors how they can access their blood grouping information**. First time donors should be explained why they are unable to receive their blood group information the same day and informed on whom to call and when to access this information. They should also be reassured that this information will be included in their blood donor booklet, which they will receive a few weeks post-donation.

-Provide donors with detailed health and post-donation care advice. Donor should continue to be given personal health related information (such as food intake prior to and post donation, fluid intake post-donation and rest post donation). However, counselling sessions may benefit from slightly greater detail - ex: amount of fluid, what type of fluid, definition of rest etc. Information on how to regenerate blood quicker through diet should be provided, a concern mentioned by participants, with specific nutrition suggestions. Deferred donors should continue to receive tailored counselling on how to improve their health or minimise health related lifestyle risks. In spite being eligible to donate, donors considered overweight should also be counselled on diet and exercise, and the health risks associated with obesity.

-Continue to encourage donors to return. Donor clinic staff should continue to make use of counselling sessions to encourage first time donors to become repeat donors and should take into account the responses from this study when implementing retaining strategies. For example, the need for blood in the community should be impressed upon and the impact blood transfusions have on patient morbidity and mortality rates should be emphasised.

5.5.5 Implementing suggested recommendations and potential challenges

The motivational speeches given in schools and religious institutions prior to mobile sessions are a good tool through which future donors can be educated on the donation process. Posters and pamphlets with information on how to prepare for donation (e.g. recommend that donors eat prior to donating) and frequently asked donor questions and concerns can be distributed prior to mobile sessions. These can also be provided to replacement donors prior to their donation visit. However, given that nearly 30% of the Ghanaian population is not literate (UNICEF, 2013), this method of delivering information may not be appropriate for everyone. An alternative would be to provide patients, when possible, with the necessary information and request them to pass it on to any replacement donors they secure, though this is not ideal given the burden it places on patients. Additionally, a video, in Twi, on the blood donation process could be played on the TV in the donor clinic on loop, which would provide donors with information while they wait without adding to staff workload.

Special efforts should be directed at minimising donor fears (e.g. fear of pain), particularly for first time donors. Staff should ask donors prior to pre-screening whether there is any additional information they would like to be given and donors should be reminded and encouraged throughout the process to ask questions.

Pamphlets, with explanatory illustrations (to address the needs of the non-literate population) on the donation process and post-donation care should be distributed to donors. Pamphlets should be specific and include details regarding each step of the donation process, information on how the blood is processed, which foods donors should consume, what types of liquids and what amount, the amount of rest required post-donation, potential signs of an adverse event and where to seek care should they experience any symptoms. These pamphlets could serve dual purpose as they provide donors with information and may also aid in donor recruitment as current donors may share the pamphlets with friends, colleagues

and family which may motivate non-donors to donate blood.

When appropriate, successful and deferred donors should be given personal written advice regarding their personal health and lifestyle habits, reassuring donors that their health is staff's primary concern.

5.5.5.1 Potential challenges

There may be insufficient human resources to consistently provide donors with such detailed information, particularly during peak donation periods. Pamphlets may help reduce staff workload, but may also prove costly. However, it important to maintain donor satisfaction and efforts should be made to secure the necessary resources to ensure donors receive adequate counselling and their needs are met.

5.6 Limitations

During the study period, there were few mobile sessions in religious institutions (e.g. church and mosque), thus I was unable to conduct interviews there and have a limited perspective from those donating at a faith based event (except for a focus group at mosque), and may not have a complete list of factors that motivate donors.

Lack of HCA participants

In some cases, there were logistical issues and donors were interviewed in close proximity with donor clinic staff - this may have had an impact on the results as donors may have been unable to speak freely. It is also possible that some information was lost or misinterpreted in translation - follow up questions, however, were useful in detecting this and limiting such problems.

A major limitation was the implementation of focus groups. Two attempts were made to hold

a focus group with replacement donors, with refreshments as a motivator. The aim was to hold discussions with 5-10 replacement donors. After attempting to recruit fifteen participants, only one returned. This was likely due to the fact that it is difficult for many donors to find time off work to attend and there is the added financial cost of transport. In fact, some of the participants approached declined stating work or school commitments. Weekends were considered, however, Ghanaians generally have many engagements during the weekends (e.g. funerals, church, family visits) and according to local staff would not be convenient.

The student focus group was much more dynamic than the discussions held in mosque, largely I believe because the students knew each other and had a comfortable rapport with one another, something that was lacking in the focus groups held at mosque, where despite attending the same mosque, it did not appear as if everyone knew each other. This limited the discussions between participants.

5.7 Conclusion

Donor counselling is a commonly recommended policy, but there are limited details on how it should be implemented. Increased research at local levels is required to better understand donor needs so that donor counselling can be appropriately tailored to the donor population and improve donors' experiences. Based on the qualitative data collected in this study, donors are overall satisfied with their donation experience and most are willing to return again under any circumstance provided they have the time and resources. However, quicker processing times and more information, particularly relating to donors' health, are still desired. Donor counselling can be used to provide donors with this information, and perhaps a better understanding of the donation process will help donors appreciate longer processing times.

Chapter 6 – Donor Deferrals

6.1 Introduction

Donors are deferred for many reasons and can be *temporarily* or *permanently* deferred. At KATH, donors who test positive for HIV, Hepatitis B and Hepatitis C during pre-donation screening are permanently deferred. In Ghana, the infections for which donors are screened for may vary between regions. Temporary deferrals occur when the donor's bio-measurements (e.g. weight, blood pressure and haemoglobin (Hb) level) do not meet the criteria - the KATH's criteria are presented in Chapter 3 (these criteria are in line with Ghana's national blood policy). As highlighted in the review of national blood policies (see Chapter 3), these criteria vary between countries and as a result increase or decrease the potential donor population size. This chapter presents the results of donor deferrals at the donor clinic in KATH and aims to estimate whether changes in bio-measurement criteria could have a worthwhile impact on reducing donor deferrals.

Information from all prospective donors attending the donor clinic from March-April 2014 was recorded. This included socio-economic information (e.g. age, gender, occupation and residence), donor type (e.g. volunteer, replacement or autologous), bio-measurements (weight, blood pressure and Hb screening results) and when applicable donors' pre-donation screening results. If one or more bio-measurements did not meet the criteria, donors were not sent for pre-screening - i.e. donors were deferred prior to their haemoglobin level being assessed and prior to undergoing screening for HIV, Hepatitis B, Hepatitis C and syphilis. The data were initially recorded in Microsoft Excel and then transferred to SPSS for descriptive statistical analyses to better understand donor deferral patterns at KATH and to investigate whether small changes in donor bio-measurement criteria will have an impact on the number of successful donations. The results and discussion are presented in this chapter.

6.2 Types of Donor Deferrals

6.2.1 Permanent Deferrals

A permanent deferral is defined as a donor who is deferred from donating blood for his/her entire life. Donors were permanently deferred at KATH if they tested positive for one or more of the following infectious diseases during pre-donation screening: HIV, Hepatitis B or Hepatitis C. Donors were not initially permanently deferred. Instead, they were told they could not donate that day and asked to return the following Monday. During this time, the laboratory staff at the blood bank would do confirmatory tests and if and when the donor returned, he/she would be informed of the tests results' and offered counselling regarding the medical care they might consider. Though these donors were told they were permanently deferred, as donor records were not yet electronically stored, permanent deferrals may have tried and returned or donated elsewhere where screening may not have been as stringent.

Donors were also screened for syphilis. The donated blood was then tested by Rapid Plasma Reagent (RPR). If the rapid tests were positive, they were still permitted to donate.. A positive RPR test implies an active infection and blood determined to have active infections were discarded. At the time of this study, syphilis testing had newly been introduced and there was no specific process in place for informing donors about their infection.

6.2.2 Temporary Deferrals

Temporary deferrals refer to donors who are deferred from giving blood for a period of time. This may be a set period of time or may be contingent on meeting a specific criterion. The list of reasons for temporary deferrals is presented in Chapter 3, though many of these deferrals are not recorded at the donor clinic. For example, breastfeeding mothers may be told they cannot donate prior to them completing a donor health and risk assessment. Donors who fail to meet the bio-measurement criteria can return once the criteria are met.

For example, a prospective donor weighing under 50kg would be temporarily deferred, but would qualify once his/her weight reached 50kg. During their visit to the donor clinic, donors were encouraged to re-visit the clinic and re-attempt donation in 3-4 months. However, unless the donor was a regular donor, there was no follow up to recall the donors and it is unclear what effect deferring donors has on their willingness to return.

6.3 Donor Deferrals at the Donor Clinic at KATH

6.3.1 Introduction

To determine the common reasons for donor deferrals at the Donor Clinic at KATH, data from all donor records from the donor clinic over the course of two months were recorded and analysed. The focus was on the donor clinic as both volunteer and replacement donors attend the clinic, compared to only volunteers at the mobile sessions

The following donor information was recorded and used in the analyses in this chapter: sex, age, marital status, religion, donor type (VNRD or RD), weight, blood pressure, Hb pass/fail test results, pre-screening results for syphilis, HIV, hepatitis B and hepatitis C and whether the donation was completed and retained (i.e. was not discarded due to syphilis RPR test results). For replacement donors, information about which hospital the patient for whom the donor was donating for was also recorded. As mentioned earlier, the KATH supplies blood to other hospitals in the region and at times replacement donors may be requested to attend the KATH donor clinic. For RD donating on behalf of KATH patients, the hospital unit in which the patients were admitted was recorded.

6.3.2 Sample size

Sample size was determined based on a confidence level of 95%, a standard deviation of 0.5 and a confidence interval of +/- 5%. Based on these figures and using the below formula, the

estimated sample size was 385. In this study, the actual sample size was 392 as we wanted to include all donors who attended the clinic on the last day of sampling to limit any bias associated with time required for donation or deferral. Thus, data from all 392 donor visits during the two-month period at the donor clinic were analysed. Note, this two-month period occurred between March and April. During March, school was still in session, when donation rates tend to be higher, whereas in April, school holidays occur resulting in fewer donations (as many of the mobile sessions occur in secondary schools) and the rainy season begins, meaning there tend to be higher malaria related anaemia cases and therefore increased demand for blood.

$$\text{Sample size} = \frac{(\text{Z-score})\ 2\ \text{X Standard Deviation (1-Standard Deviation)}}{(\text{Margin of Error})2}$$

6.3.3 Donor profile – Descriptive Statistics

Table 6.1, see below, provides basic descriptive statistics on the sampled donor population, where the total percent for each section is equal to 100%. At the donor clinic, the vast majority of donors were replacement donors (87.8%), male (87.0%) and Christian (79.1%). There was a fairly even representation of married and single donors.

		Frequency	Percentage (%)
Gender	Male	341	87.0
	Female	51	13.0
Marital Status	Not specified	61	15.3
	Single	169	43.3
	Married	162	41.2
Religion	Not specified	14	3.6
	Christianity	310	79.1
	Islam	62	15.8
	Other	3	0.8
	None	3	0.8
Donor Type	Not specified	6	1.5
	Replacement Donor	344	87.8
	Volunteer Donor	42	10.7

Table 6.1 – Descriptive statistics on the donor population at the donor clinic (n=392)

6.3.4 Temporary Deferrals

Temporary deferrals were defined as those deferred for reasons associated with bio-measurements such as weight, blood pressure and haemoglobin (Hb) level. Though the hospital does have a more extensive list of deferral criteria, in the data collected bio-measurement criteria were the only reasons recorded for temporary deferral.

Low Weight

Of the 392 entries recorded, two (0.5%) donors were deferred due to low weight. However, of those 392 entries, three prospective donors' weights are not specified, and one was not measured as his blood pressure did not meet the required criteria and was therefore temporarily deferred before his weight was measured. This does not significantly alter the percentage of donors deferred due to low weight, and it remains 0.5%.

A summary of these donors' profiles is presented in Tables 6.2. The two who did not meet the weight criteria were students, female, aged 16 and 22 years and weighed 44kg each.

	Sex	Age (years)	Marital Status	Religion	Occupation	Weight(kg)	Donor Type	Relationship to Patient (in relation to the donor)
Donor 1	Female	20	Single	Christian	Student	44	Replacement	Not specified
Donor 2	Female	16	Single	Christian	Student	44	Replacement	Parent

Table 6.2 – Profiles of donors temporarily deferred due to low bodyweight (<50kg)

Blood Pressure

At KATH, donors with a systolic blood pressure of 140 mmHg or higher or a diastolic pressure of 100 mmHg or higher were temporarily deferred. Similarly, donors with a systolic blood pressure of below 100 mmHg or a diastolic pressure below 60 mmHg were also temporarily deferred. In both cases, these deferred donors would receive some type of counselling and may be encouraged to visit their doctor.

Five prospective donors (1.3%) of the 390 donors whose blood pressure were measured were deferred due to high blood pressure and 0 due to low blood pressure. Of those with high blood pressure, none of these donors presented with a blood pressure slightly over the cut off. All had a reading of at least 20 mmHg over either the systolic or diastolic upper limit, or both. All five potential donors who presented with high blood pressure were male replacement donors, ranging from 34-57 years old. Their professions included driver, farmer, sales worker, teacher and electrician.

	Sex	Age (years)	Marital Status	Religion	Occupation	Blood Pressure (mmHg)	Donor Type	Relationship to Patient (in relation to the donor)
Donor 1	Male	45	Married	Islam	Driver	**170/100**	Replacement	Spouse
Donor 2	Male	57	Married	Christian	Farmer	**170**/80	Replacement	Niece/Nephew
Donor 3	Male	34	Married	Christian	Sales Worker	**180/100**	Replacement	Grandparent
Donor 4	Male	35	Single	Christian	Teacher	**150/110**	Replacement	Sibling
Donor t 5	Male	47	Married	Christian	Electrician	**160**/90	Replacement	Child

Table 6.3 – Profiles of donors temporarily deferred due to high blood pressure (> 140/100mmHg)

Haemoglobin Level

As mentioned in Chapter 3, female donors must have a haemoglobin level of at least 12g/dl and males 13g/dl. This is assessed using the specific gravity of copper (II) sulphate. Of the 392 entries recorded, 8 prospective donors' haemoglobin levels were not measured. Seven of these were due to the donor being underweight or having a high blood pressure (thus these donors were temporarily deferred prior to haemoglobin testing) and one donor left before his haemoglobin level could be measured.

Of the 384 donors' whose haemoglobin levels were tested, 11 (2.9%) presented with a haemoglobin level below the requirement. The majority of these donors were 30 years old or younger (72.7%), female (54.5%), single (81.8%) and replacement donors (90.9%). Most worked in the trades or were unemployed. A summary of these donors' profiles is presented in Table 6.4.

	Sex	Age (years)	Marital Status	Religion	Occupation	Donor Type	Relationship to Patient *
Donor 1	Male	29	Single	Christian	Banker	Replacement	Sibling
Donor 2	Female	30	Married	Christian	Trader	Replacement	Hidden
Donor 3	Female	36	Single	Islam	Seamstress	Replacement	Not specified
Donor 4	Female	42	Single	Christian	Trader	Replacement	Other
Donor 5	Male	22	Single	Islam	Unemployed	Volunteer	NA
Donor 6	Female	26	Single	Christian	Trader	Replacement	Sibling
Donor 7	Female	25	Single	Christian	Student	Replacement	Parent
Donor 8	Female	26	Single	Christian	Trader	Replacement	Sibling
Donor 9	Male	19	Single	Islam	Not specified	Replacement	Sibling
Donor 10	Male	30	Single	Christian	Carpenter	Replacement	Friend
Donor 11	Male	42	Married	Christian	Driver	Replacement	Parent

*As patient is to donor

Table 6.4 – Profiles of donors temporarily deferred due to low haemoglobin level (< 12.0g/dl for females and 13.0g/dl for males)

6.3.5 Permanent Deferrals

Donors were permanently deferred if they tested positive for HIV, HBV or HCV during pre-donation screening. These results were confirmed by ELISA prior to informing the donor of his/her infection and deferral status. In some cases, donors may be infected with more than one virus. Also, note that donors temporarily deferred due to low weight, high blood pressure, during the health and risk assessment or due to low Hb were excluded from pre-screening of the above-mentioned viruses. Donors, however, screened for HIV, HBV and HCV were also simultaneously screened for syphilis, something that had been newly implemented at KATH during the course of this study.

One donor left the donation process prior to undergoing pre-screening. An additional 5 donors left the process following pre-screening,

Of the 392 donors who presented to the donor clinic for donation, 19 did not undergo pre-screening. One donor left the process prior to pre-donation screening, 5 were temporarily deferred due to low blood pressure, 2 due to low weight and 11 due to their low haemoglobin level. Of the 373 donors who were pre-screened, 40 (10.7%) were permanently deferred. A further breakdown of these permanent deferrals is presented below.

HIV

5/373 (1.3%) of donors undergoing pre-screening tested positive for HIV. A summary of these donors' profiles is presented in Table 6.5. All were replacement donors, three were married males and two were single females. The average age was ~40 years old. Only one was donating blood for a patient in a hospital other than KATH. A summary of these donors' profiles is presented in Table 6.5.

	Sex	Age (years)	Marital Status	Religion	Occupation	HCV or HBV +ve?	Donor Type	Donating for KATH?	Relationship to Patient (in relation to the donor)
Donor 1	Male	43	Married	Christian	Businessman	No	RD	Yes	Hidden
Donor 2	Male	28	Married	Islam	Mechanic	No	RD	Yes	Spouse
Donor 3	Male	43	Married	Christian	Carpenter	No	RD	Yes	Hidden
Donor 4	Female	47	Single	Not specified	Hidden	No	RD	No	Parent
Donor 5	Female	37	Single	Islam	Hidden	No	RD	Yes	Hidden

Table 6.5 – Profiles of donors permanently deferred due to an HIV positive test

HBV

28/373 (7.4%) of donors screened for infectious diseases tested positive for HBV. All were male, the majority were single and worked in the trades, one was a volunteer donor and another was donating for a patient outside of KATH. A summary of these donors' profiles is presented in Table 6.6.

	Sex	Age (years)	Marital Status	Religion	Occupation	HCV or HIV +ve?	Donor Type	Donating for KATH?	Relationship to Patient (in relation to the donor)
Donor 1	Male	28	Single	Christian	Hidden	No	RD	Yes	Friend
Donor 2	Male	19	Single	Christian	Not specified	No	RD	Yes	Sibling
Donor 3	Male	33	Married	Islam	Mechanic	No	RD	Yes	Child
Donor 4	Male	28	Not specified	Christian	Driver	No	RD	No	Parent
Donor 5	Male	24	Single	Christian	Student	No	RD	Yes	Sibling
Donor 6	Male	21	Single	Christian	Driver	No	RD	Yes	Sibling
Donor 7	Male	34	Not specified	Not specified	Not specified	No	RD	Yes	Parent
Donor 8	Male	21	Single	Christian	Hidden	No	RD	Yes	Parent
Donor 9	Male	37	Married	Christian	Police Officer	No	RD	Yes	Spouse
Donor 10	Male	25	Not specified	Christian	Hidden	No	RD	Yes	Not specified
Donor 11	Male	31	Married	Christian	Hidden	No	RD	Yes	Not specified
Donor 12	Male	27	Single	Christian	Not specified	No	RD	Yes	Hidden
Donor 13	Male	23	Single	Christian	Not specified	No	RD	Yes	Not specified
Donor 14	Male	24	Single	Islam	Driver	No	RD	Yes	Hidden
Donor 15	Male	35	Married	Islam	Trader	No	RD	No	Child
Donor 16	Male	24	Single	Christian	Student	No	RD	Yes	Other
Donor 17	Male	30	Married	Islam	Contractor	No	RD	Yes	Child
Donor 18	Male	29	Single	Christian	Driver	No	RD	Yes	Parent
Donor 19	Male	26	Single	Christian	Student	No	VNRD	NA	NA
Donor 20	Male	28	Single	Christian	Mechanic	No	RD	Yes	Hidden
Donor 21	Male	25	Not specified	Christian	Shoemaker	No	RD	Yes	Hidden
Donor 22	Male	35	Married	Christian	Auto Electrician	No	RD	Yes	Parent
Donor 23	Male	25	Single	Islam	Mechanic	No	RD	Yes	Parent
Donor 24	Male	23	Single	Not specified	Not specified	No	RD	Yes	Aunt/Uncle
Donor 25	Male	27	Not specified	Christian	Not specified	No	RD	Yes	Sibling
Donor 26	Male	23	Single	Christian	Electronics	No	RD	No	Sibling
Donor 27	Male	33	Married	Christian	Farmer	No	RD	Yes	Sibling
Donor 28	Male	22	Single	Christian	Driver	No	RD	Yes	Sibling

Table 6.6 – Profiles of donors permanently deferred due to HBV positive test

HCV

7/373 (2.4%) screened for infectious diseases tested positive for HCV. Note, however, upon a more detailed look at the donor data, it was discovered that donors 1, 2 and 3 are the same person who visited the donor clinic three times within four days, and was deferred all three times. All 392 donor visits were included for analyses and thus this donor's information was included all three times. Of the 7 potential donors deferred for HCV, all were male replacement donors; two were married, most worked in the trades and their ages ranged from 25-49 years. A summary of these donors' profiles is presented in Table 6.7.

	Sex	Age (years)	Marital Status	Religion	Occupation	HIV or HBV +ve?	Donor Type	Donating for KATH?	Relationship to Patient (in relation to the donor)
Donor 1	Male	27	Single	Christian	Mason	No	RD	Yes	Church Member
Donor 2**	Male	27	Single	Christian	Mason	No	RD	Yes	Church Member
Donor 3**	Male	27	Single	Christian	Mason	No	RD	Yes	Church Member
Donor 4	Male	28	Single	Christian	Not specified	No	RD	Yes	Not specified
Donor 5	Male	25	Single	Christian	Service personnel	No	RD	Yes	Not specified
Donor 6	Male	49	Married	Single	Mechanic	No	RD	No	NA
Donor 7	Male	48	Married	Islam	Hidden	No	RD	Yes	Child

** Same as Donor 1

Table 6.7 – Profiles of donors permanently deferred due to a HCV positive test

Syphilis testing

Syphilis testing had newly begun when these data were collected, and at the time, donors testing positive for syphilis were still permitted to donate (provided they tested negative for HIV, HBV and HCV), but the donated blood was then additionally tested for syphilis through RPR. If the syphilis infection was deemed active the donated blood was discarded. 15/328

(4.0%) donated units were discarded due to syphilis.

6.3.6 Summary statistics for donor deferrals

392 donor visits were recorded and analysed. Overall, 56 donors were deferred, 15 units were discarded due to syphilis and 313 units passed all screening levels and were made available for blood transfusion.

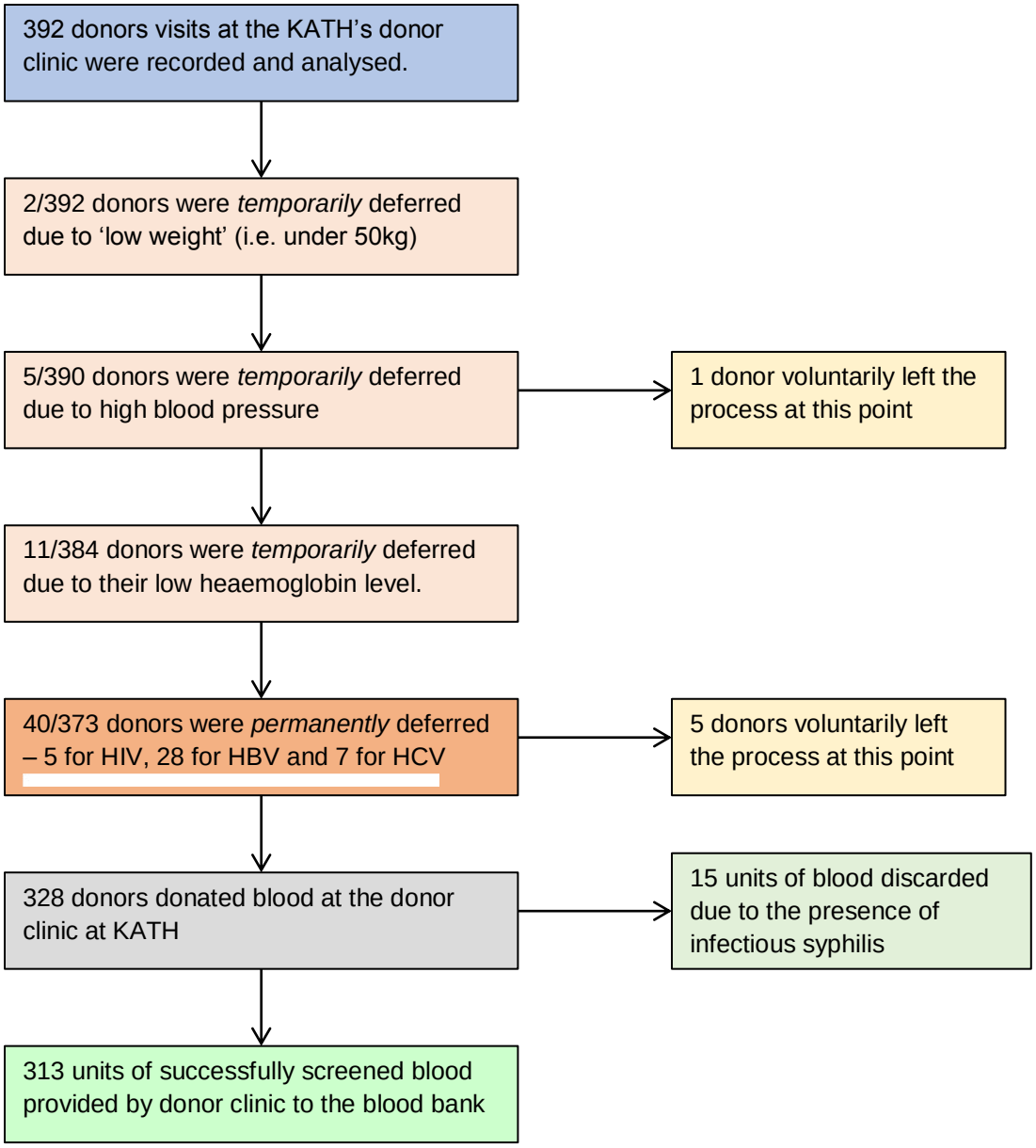


Figure 6.1 – Flow chart summarising the donor deferrals at KATH between March-April 2014.

6.4 Discussion

Based on the results presented above, an estimated 1/5 donors are lost. 50% of those lost are permanently deferred due to HIV, HBV or HCV positive tests. This illustrates the challenge Kumasi faces with regards to securing safe donors and preventing TTIs, given that in total, ~10% of blood donors are infected with at least one of the three viruses. The remaining 50% are temporarily deferred, left before donating or tested positive for active syphilis infection, but can donate once they are no longer actively infected. In spite of it being a small number, the most avoidable loss in donors are those who leave without completing the donation process and thus more efforts should be made to understand why they do not complete the process and based on these results implement strategies to prevent or limit this in the future.

The aims of analysing donor deferral data were to a) explore any existing trends and patterns in current deferrals and b) determine whether modifying any of the existing criteria relating to bio-measurements would significantly impact the number of successful donations (and thus amount of blood collected). Identifying trends in deferrals and potential high-risk donors is useful primarily in donor recruitment, as efforts can be better focused at low risk groups.

As identified in the policy review, there are slight variations in bio-measurement criteria for blood donors across Africa and there is no evidence indicating that these criteria are unsafe. Adjusting these criteria without compromising the safety of donors could mean an increased available donor population size and an increase in units of blood donated.

6.4.1 Trends in donor deferrals at KATH

6.4.1.1 Temporary Deferrals

Low weight deferrals

The two donors deferred for low weight were both 44kg, female student replacement donors. The low number of deferrals for low weight makes it difficult to draw conclusions regarding patterns of deferral among those temporarily deferred for low weight. However, it suggests that young females are more likely to be under 50kg. It can be argued that this is due to the fact that men tend to be larger than women, but an exploratory study in Accra found that the prevalence of overweight students between the ages of 15-19 was higher for females (15.6%) compared to males (4.5%) (Nyawornota et al., 2013). In general, while many children remain malnourished, according to the World Food Programme (WFP, 2016) 5% of Ghanaians lack 'adequate access to food', where food access was defined by the World Food Summit in 1996 as "having sufficient resources to obtain appropriate foods for a nutritious diet" (Lal and Stewart, 2012). These data along with results from this study suggest that low weight is not a major limiting factor when it comes to blood donation in Ghana.

The reason why crude weight is used as a measurement, rather than BMI, is due to the fact that according to the American Association of Blood Banks (AABB) and Pan American Health Organization (PAHO) no more than 10.5 ml of blood per kg of body weight should be collected (PAHO, 2009). However, it is important to keep in mind that other body measurements such as height and BMI are not recorded, thus it may be that the donors deferred were of 'normal' BMI. In Ghana, 8.6% of females between the ages of 15-49 are considered underweight (i.e. have a BMI below 18.5), while in Ashanti this figure is 9.6% (WHO, 2008)

High blood pressure deferral trends

All those deferred due to their high blood pressure were male replacement donors aged between 34-57 years. All five were employed and among them covered a range of sectors such as agriculture, trades, education and business. There is, however, no evidence suggesting a negative link between hypertension and blood donation. In 1999, Trouern-Trend et al. found no significant association between pre-donation blood pressure and vasovagal reactions. In fact, the American Red Cross (2016) cites broader criteria for donors' blood pressure, recommending that it be below 180/100 mmHg. Had these criteria been in place at the time of this study, an additional two units of could have potentially been collected. Widening the criteria for donors' blood pressure could have considerable impact on the donor population size given that a review of population based studies in Ghana from 1970-2009 found the prevalence of hypertension (i.e. >140/90 mmHg) to vary between 19.3%-54.6% (Addo et al., 2012). This range dropped to 4.5%-16.2% when considering the prevalence of those with blood pressure >160/95mmHg (ibid). Based on these data, an additional 14.8%-38.4% people who may normally be temporarily deferred, could potentially donate blood successfully, provided they meet the remaining criteria.

Low haemoglobin deferral trends

Of the 11 deferred, 10/11 were replacement donors; 6 were females and 5 were males aged between 19-42 years. This is contrary to evidence from other studies, which indicates considerably higher rates of low haemoglobin deferrals among women. Studies in Turkey and India have found the most common reason for donor deferral among females to be low haemoglobin level (Arslan, 2007; Bahadur et al., 2009) One study in the neighbouring country of Cote d'Ivoire recorded a total of 2618/24643 (10.8%) donors deferred for low haemoglobin, the majority of whom were women (Kouao et al., 2012). In this study the minimum haemoglobin level required to donate was 11 g/dl for both women and men - this is lower than the minimum level set at KATH, where the minimum is 12.5 g/dl for women and 13.5 g/dl for men.

The results in this study may be due to a bias whereby only females with a certain nutritional status attend the donor clinic. For example, only women who consider themselves 'well-nourished' and 'healthy' may choose to donate blood. It may also occur as a result of the lower threshold set for haemoglobin level for women, which was not the case in the study in Cote d'Ivoire (Kouao et al., 2012).

A major discussion point has been whether haemoglobin reference values should be ethnicity specific, as not doing so may be contributing to a greater number of deferrals for certain ethnic groups. In the United States, it has been found that African-Americans have on average a significantly lower haemoglobin level than Caucasians, in spite of higher serum ferritin levels (Beutler and West, 2005). The average haemoglobin level for African-American women was 12.70 +/- 0.04 g/dl compared to 13.49 +/- 0.01 in Caucasian women. Similarly, the average haemoglobin level in African-American men was 14.45 +/- 0.04 g/dl compared to 14.93 +/- 0.01 g/dl in Caucasian males (ibid). The reason for this is unclear, but was not explained by educational differences and has been hypothesised to be genetic (ibid). This suggests that current reference ranges for 'normal' haemoglobin levels may only be relevant to the Caucasian population and may result in a higher proportion of temporary deferrals due to low Hb levels in Africa, where donated blood is scarce. However, ensuring donor safety is of utmost importance, and further research looking at the impact of lower reference ranges on adverse donation related events is necessary before any changes to donor criteria are made.

Counselling and retaining temporary deferrals

Currently, temporarily deferred donors are counselled on how to, for example, lower their blood pressure or increase their haemoglobin level through diet, medications etc. They may also be advised to make an appointment with a doctor. Donors are also encouraged during counselling to return in 3-4 months and attempt donation again. Generally, for all return donors, a 3 month interval is suggested for males and 4 months for females – the lower suggested donation frequency for women is based on the assumption that they have a lower

baseline haemoglobin levels than men and that blood loss during menstruation will mean it takes longer for them to return to their baseline levels. However, temporarily deferred donors are not actively followed up to limit loss of donors. This can impact donation rates, with the extent of the impact dependent on temporary deferral rates. Past studies have shown that temporary deferrals are unlikely to return within the next 1-4 years (Custer et al., 2007; Custer et al., 2011; Zou et al., 2008). Low return rates were higher for different deferral reasons - something that may vary culturally (Custer et al., 2011). It is not well understood why these donors do not return, and thus more research is needed in this field to limit this challenge in the future and to determine the effect, if any, follow up will have on these temporarily deferred donors.

As a general principle in resource limited countries, effort should be put in where returns will be maximal. Follow up efforts in my view should be maximised in successful donors rather than in following up temporarily deferred donors. When one succeeds in getting donors to become repeat donors then those strategies can be used to bring back temporarily deferred donors.

6.4.1.2 Permanent Deferrals

HIV deferrals patterns

There were no clear trends among those deferred for HIV. All were replacement donors. 3 were males and married and 2 were females and single. They ranged in age between 28-47 years. The HIV prevalence among donors screened for HIV (1.3%) was similar to the national prevalence rate published by the of HIV in Ghana in 2013 (1.47%) (Ghana AIDS Commission, 2014).

HBV deferrals trends

All 28 were males ranging in age from 19-37 years. 27/28 were replacement donors and one was a volunteer. 16 were single, 7 married and 5 did not specify their relationship status.

Hepatitis B rates are generally higher in Africa and it is estimated that 8% are chronically infected (Bloch et al., 2012). Currently, Ghana has implemented a vaccination programme against hepatitis B for children, which will hopeful curb the rates in the future.

HCV deferrals trends

The prevalence of hepatitis C in Ghana is not well quantified. In 2012, the WHO submitted an initial baseline survey to member states globally aimed at assessing prevention and control strategies of viral hepatitis, but many countries did not respond, including Ghana (WHO, 2013). A review of studies found only one from Ghana regarding HCV prevalence (Messina, et al., 2015). The study, conducted in a district hospital in the Ashanti region, found the prevalence of HCV, based on a sample size of 2773 blood donors, to be 9.4% (Nkrumah et al., 2011). All 7 'donors' deferred due to testing positive for HCV were males and replacement donors. 5 were young unmarried men ranging from 25-28 years of age. The other two were married men aged 48 and 49 years old. Of the men whose employment information was available, all were involved in a specific trade. However, when looking carefully at the donor data, it appears that the same donor re-visited the donor clinic two additional times within one week. Since the donor clinic staff on duty changes during different shifts and there are no electronic records, it would be easy to miss. Thus, in reality, while there were 7 deferrals due to HCV in the two-month period, only 5 actual donors were deferred, with one being deferred three times.

6.4.2 Effects of modifying bio-measurement criteria

It is important to note that due to the limited number of deferrals in some areas (e.g. weight), it is difficult to conclude the impact changes in bio-measurement criteria may have on the number of units donated. In the future, sample size should be calculated keeping in mind the low deferral rate - this would likely require a much longer study.

6.4.2.1 Modifying weight criteria

Currently at KATH, the minimum weight requirement for a donor is 50kg. In some hospitals, those below a certain weight (e.g. 45kg) are able to donate a smaller amount, but this is not the case at KATH. This may be due to the increased cost associated with smaller blood bags, which does not make them a cost effective option. However, weight requirements vary between countries in Africa. Given that there is limited evidence at exactly what weight adverse events are more highly associated with blood transfusions, these broader criteria may be useful in countries with low blood stocks and/or low weight populations, provided there is no increase in adverse events. There is no current evidence examining the impact of these broader criteria on adverse events. Thus, these should not be altered dramatically given the insufficient evidence in this area.

In this analysis, we looked at what would occur if we used the broadest criteria identified in African policies at KATH (see Chapter 3). In this case, that would mean deferring anyone with a bodyweight of under 45kg. Since both low weight deferrals weighed 44kg, this would not change the outcome of successful donations, and the deferral rate for low weight would remain at 2/393. Thus, based on the data collected, there would be no statistical difference if the weight criteria were broadened.

6.4.2.2 Modifying blood pressure criteria

At the time this study was conducted, a donor would be deferred due to high blood pressure if either a) their systolic blood pressure was 140+ mmHg or b) their diastolic blood pressure was 100+ mmHg. Based on discussion with the donor clinic staff, the minimum blood pressure at KATH was considered to be 100/60 mmHg. The minimum blood pressure set by various African national blood policies ranged between 90/50 mmHg-100/60mmHg. High blood pressure deferral was ranged from 140-180mmHg systolic (with less information provided about the diastolic threshold). In the data analysed, no donors were deferred due to low blood pressure,

Assuming the KATH changed its systolic, maximum blood pressure cut-off to the highest referenced in an African national blood policy, 180 mmHg, none of the 5 donors would be deferred, thus resulting in an overall decreased deferral rate prior to screening for infectious diseases of 1.2% and potentially adding 5 units of blood to the blood bank. Moreover, as mentioned earlier in this chapter, up to half the Ghanaian population has hypertension and thus modifying this criterion could increase the available donor population pool considerably. It is unclear, however, given the high prevalence of hypertension in Ghana why only 5 donors were deferred for this reason in this study. One possible explanation for this may be selection bias, where mostly 'healthy' or young donors present for donation. Only donors between the ages of 16-65 are eligible to donate and in this study the average age was 30.69 years, with only 7/393 donors aged over 50 years.

6.4.2.3 Modifying haemoglobin criteria

There are varying thresholds across Africa for minimum haemoglobin levels for blood donors. One of the lowest thresholds documented is in Cote d'Ivoire, where the minimum Hb level required was 11.0 g/dl. It was, however, difficult to assess how these lower thresholds could have impacted deferral rate at KATH as donors' haemoglobin level is tested on a 'pass/fail' scale rather than a precise measurement being obtained. However, the evidence from the United States showing the lower haemoglobin levels in African-Americans compared to Caucasians even when adjusted for education suggest that further research is required to determine what the 'normal' ranges of Hb levels are in the African population and that future criteria in terms of blood donation should take this into account.

6.4.3 Implications of donor deferral patterns

Given the limited evidence regarding donor safety at higher blood pressure levels and given that many countries have a higher maximum systolic blood pressure cut off point (ranging from 160mmHg in the Americas to 180mmHg in Africa), modifying the blood pressure

criteria for donors may be a simple way to decrease the number of donor deferrals and increase blood stocks.

The results from this study suggest that further research should be done to determine whether donor criteria ought to be modified to increase blood stock, while maintaining blood safety. It is difficult to ascertain whether changing the minimum haemoglobin requirements will have any impact on donor deferral rates as haemoglobin level is currently assessed on a pass/fail basis. If most donors are considerably below the minimum threshold, altering these criteria may have no effect, but if many are near the threshold, it is important to re-evaluate a safe haemoglobin level for donation and re-evaluate the criteria.

6.4.4 The case of repeat visits from a deferred donor

As highlighted earlier in this chapter, one donor who tested positive for Hepatitis C returned to the donor clinic and attempted to donate blood two additional times within a period of one week. Generally, if donors tested positive for one or more of the viruses tested for they were told they were unable to donate that day and asked to return the following week. During that time, the hospital would confirm the results through ELISA and if and when the donor returned he/she would be told their infectious status and counselled appropriately.

As a result of the above practice, it may have been unclear to the donor that he was unable to donate and he may have assumed that he would be able to donate the following day. Moreover, staff members change throughout the day and it would be easy to go unnoticed that the same donor was returning. Lack of electronic records makes it additionally difficult to identify returning donors, unless donors themselves admit to returning.

It is understandable why the donor clinic waits for confirmation before disclosing the donor's positive test result to them and it limits the stigma a donor might feel when receiving this information as the counselling is done is more private area. However, donors returning before they are recommended to results in increased usage of resources such as donor clinic

staff time, donors' time (i.e. other donors must wait longer to be seen), laboratory staff time and materials required for testing. This would be minimised by an electronic system – something the hospital is in the midst of designing and implementing.

6.5 Limitations

The study focused on donors attending the donor clinic at KATH, which mostly receives replacement donations. Data from mobile sessions were not included due to time constraints and the sheer volume of paper records for each potential donor. Moreover, it would not have been possible to randomly sample these data as the donor records are organized in file folders based on their deferral status. The results presented in this chapter, therefore, are more reflective of the replacement donor population despite the fact that some volunteers do attend the donor clinic.

Additionally, when attaching the strips from the rapid tests for HIV, HBV and HCV onto the donor's clinical record form, plasters are often used instead of transparent tape. As a result, some of the data are covered by the plaster. For example, 21/393 'donor to patient relationship' could not be recorded as I was unable to make out the information. In some cases, I was able to gently peel the plaster back to record the data, but in other cases I was not as it risked damaging the form. Thus, this limited the amount of information I was able to record.

Finally, as all the data are currently handwritten, there were at times difficulties making out certain figures or words. However, when this occurred, the script in question was verified with at least two members of the donor clinic before recording it electronically.

6.6 Conclusion

Overall, the results from this study suggest that though temporary donor deferral rates due to bio-measurements is relatively low, re-evaluating and modifying current criteria may lead

to a decrease in temporary deferrals, and thus increase in blood donated, without compromising donor and patient safety. Though further research is needed in this area to confirm this. In some cases, larger studies with finer quantitative measurements may be needed as part of the re-evaluation. In other cases, such as blood pressure, looking at temporary deferral evidence in other countries whose criteria are broader may be sufficient to pilot a change in criteria. Of course, any change in criteria should be followed up carefully to ensure that donor safety is not compromised.

Chapter 7 - Blood component production, demand and usage at KATH

7.1 Introduction

The WHO and many of the African national blood policy documents reviewed (see Chapter 3) recommend the use of blood components. The process of separating blood into its components was first developed in 1960, allowing production of packed red blood cells (PRBC), fresh frozen plasma (FFP) and platelet concentrates(PC) using a heavy spin refrigerated centrifuge (Basu and Kulkarni, 2014). Preparing PRBC and FFP is a one step process, however, the preparation of PRBC, FFP and platelets requires a two-step centrifugation (ibid).

There has been some debate as to whether components should be produced, particularly in resource poor settings, as there are several advantages and disadvantages, outlined in the literature review in Chapter 2. In this study, blood component stocks and requests were recorded to quantitatively determine the demand of blood components at KATH and if there were any blood component shortages. To gain qualitative insight into component usage at the hospital, prescribing doctors from different hospital specialties were interviewed. This chapter will use this data to explore current component demand and usage at KATH and make corresponding recommendations to improve blood services at KATH.

7.2 Blood component production at KATH

In 2014, according to the blood bank staff, the aim was to convert 30% of collected blood units to components. When asked how this number was calculated, a staff member explained that currently, the blood bank's goal is to slowly increase the proportion of blood units converted to components year by year, as there is demand for them, but they do not want to risk overproducing and they must also consider the cost of production. I further probed for

the calculation details and the staff member attempted to locate the minutes of the meeting at which this was discussed, but to no avail.

The main components produced were PRBC and FFP, though other components such as PC and cyroprecipitate were also produced on demand. A double blood bag system was used for separation of whole blood into the two main components – an added cost to the blood bank. FFP units were stored at -40 degrees Celsius for up to one year and PRBC were stored under the same conditions as whole blood – up to 30 days at 4 degrees Celsius. Note, production of blood components may be limited by the number of donations and the storage space available.

It is clear that the blood bank is moving towards greater component production. The blood bank's aim is to increase the proportion of whole blood units converted into components each year, though it is not clear how this figure is calculated. When speaking with blood bank staff members, there is a strong belief that component production is advantageous as a single blood donation can serve a greater number of patients and that increasing the availability of blood components will increase their demand and usage. According to the KATH's transfusion medicine review, in 2013, 16247 units of blood were collected and 2131 units of FFP were produced (13.0%). This is a considerable increase from previous years where FFP production was 1622 units in 2012 (10.3%), 1292 units in 2011 (8.2%), 773 units in 2010 (4.9%) and 540 units in 2009 (4.1%). Evidently, there has been a steady rise in the proportion of components produced.

7.3 Weekly blood component stock levels at KATH

Below is a summary of the components available at KATH between August-December 2014. This period was chosen as it included school holidays, when donation rates are low (December), malaria season, when usage rates are high (September-October) and the dry season, when usage rates are lower (November-December). The data were collected weekly

by two blood bank staff members. They counted all blood components available, by blood type. The included both cross-matched and non-cross matched units.

Table 7.1 – Weekly stock levels of whole blood units at KATH, by blood type

	O-	**O+**	**A-**	**A+**	**B-**	**B+**	**AB-**	**AB+**	**Total**
02/08/2014	2	14	1	29	0	58	1	24	**129**
09/08/2014	10	19	1	35	0	90	0	37	**192**
16/08/2014	2	55	0	56	0	122	1	52	**288**
23/08/2014	0	8	1	47	4	74	3	58	**195**
30/08/2014	0	6	0	22	0	54	0	48	**130**
06/09/2014	2	9	0	5	1	36	2	48	**103**
13/09/2014	3	7	0	6	0	28	0	40	**84**
20/09/2014	3	9	3	8	1	13	0	52	**89**
27/09/2014	0	8	3	4	1	10	0	48	**74**
04/10/2014	0	49	2	17	1	39	35	0	**143**
11/10/2014	1	13	3	5	2	31	0	32	**87**
18/10/2014	6	19	5	11	3	35	0	39	**118**
25/10/2014	10	22	5	20	7	17	0	32	**113**
01/11/2014	2	12	8	32	5	32	0	33	**124**
08/11/2014	0	7	0	17	1	15	0	11	**51**
15/11/2014	0	11	1	3	0	8	0	2	**25**
22/11/2014	5	22	3	12	0	12	1	16	**71**
29/11/2014	0	80	5	18	1	11	1	15	**131**
06/12/2014	3	66	8	22	1	35	1	17	**153**
15/12/2014	7	186	7	55	8	59	1	36	**359**
20/12/2014	1	132	0	56	1	45	2	40	**277**

Table 7.2 – Weekly stock levels of packed red blood cells units at KATH, by blood type

	O-	**O+**	**A-**	**A+**	**B-**	**B+**	**AB-**	**AB+**	**Total**
02/08/2014	0	7	0	2	0	19	0	5	**33**
09/08/2014	2	19	0	6	0	12	0	0	**39**
16/08/2014	1	15	0	13	0	3	0	0	**32**
23/08/2014	0	0	1	5	0	19	0	3	**28**
30/08/2014	0	0	0	5	0	8	0	0	**13**
06/09/2014	0	0	0	0	0	8	0	0	**8**
13/09/2014	0	1	0	0	0	0	0	0	**1**
20/09/2014	0	3	0	0	0	0	0	0	**3**
27/09/2014	0	2	0	0	0	0	0	3	**5**
04/10/2014	0	4	0	6	0	23	0	0	**33**
11/10/2014	0	0	0	0	0	8	0	0	**8**
18/10/2014	0	13	0	5	0	0	0	0	**18**
25/10/2014	3	5	0	7	0	8	0	0	**23**
01/11/2014	0	5	0	5	2	8	0	0	**20**
08/11/2014	0	0	0	3	0	0	0	8	**11**
15/11/2014	0	5	0	0	0	0	0	0	**5**
22/11/2014	0	9	2	4	0	0	0	0	**15**
29/11/2014	0	10	2	10	0	4	0	0	**26**
06/12/2014	0	4	0	2	0	0	0	3	**9**
15/12/2014	0	11	0	5	0	15	0	0	**31**
20/12/2014	0	35	0	0	0	14	0	0	**49**

Table 7.3 – Weekly stock levels of fresh frozen plasma units at KATH, by blood type

	O-	O+	A-	A+	B-	B+	AB-	AB+	Total
02/08/2014	0	0	0	4	0	0	0	0	**4**
09/08/2014	0	6	0	2	0	4	0	0	**12**
16/08/2014	0	6	0	0	0	1	0	0	**7**
23/08/2014	0	8	0	1	0	3	0	0	**12**
30/08/2014	0	2	0	0	0	0	0	0	**2**
06/09/2014	0	4	0	2	0	12	0	0	**18**
13/09/2014	0	0	0	2	0	0	0	0	**2**
20/09/2014	0	8	2	0	0	0	0	0	**10**
27/09/2014	0	4	2	6	0	7	0	2	**21**
04/10/2014	0	1	0	0	0	0	0	0	**1**
11/10/2014	0	0	0	0	0	0	0	0	**0**
18/10/2014	1	0	0	0	0	0	0	0	**1**
25/10/2014	0	0	0	1	0	2	0	1	**4**
01/11/2014	0	4	0	0	0	0	0	0	**4**
08/11/2014	0	0	0	0	0	0	0	0	**0**
15/11/2014	0	4	0	0	0	0	0	0	**4**
22/11/2014	0	3	0	2	0	6	0	0	**11**
29/11/2014	0	11	0	0	0	2	0	0	**13**
06/12/2014	0	1	0	5	0	2	0	2	**10**
15/12/2014	0	4	0	2	0	2	0	0	**8**
20/12/2014	0	9	0	3	2	2	0	9	**25**

As seen in Tables 7.1-7.3, there was considerable variability in the number of blood products components available. For example, the number of whole blood units available ranged from 25 units mid-November, to 359 units mid-December. While overall whole blood stock levels never dropped to zero, there were several times when there were not O- or AB- units available. PRBC and FFP availability also varied from 1 to 49 units and 0-25 units respectively. Like with whole blood, there were several instances when certain blood groups were completely unavailable.

7.4 Blood component demand

Daily requests for blood components at KATH over a period of nine months (February-October 2014) were recorded and analysed. This period included both dry and rainy seasons (malaria-related anaemia rates are at their highest during the rainy season and demand for blood is often higher than during the dry season) as well as school term time and school holidays (when donation rates, and thus blood supply, tend to be lower). At KATH, the blood bank record all incoming requests by hand. All request, therefore, were entered into MS Excel and subsequently analysed.

For each blood request the blood bank received, staff recorded by hand the date, the name of the patient, patient's age and sex, which ward they were admitted to, the type of blood component requested and the amount. At times, some of these fields were not completed in request form and left blank in the records book. If the type of component or amount was unspecified, it was processed with the assumption that the component was whole blood and the amount was one unit. Requests for patients at nearby private hospitals were also recorded. Occasionally, if blood bank staff members suspected there was an error with the volume requested, they would clarify this with the prescribing doctor.

To maintain anonymity, when entering data from the record books, patients' names were not included. I, however, did enter the date, patient's sex, age and ward they were admitted in as well as the blood component and amount requested. The data were entered into MS

Excel, and SPSS was used to generate descriptive statistics, including number and percentage of blood components requested, stratified by month and by hospital speciality. The median age of patients requiring transfusions was 32 with the age ranging from 1 day to 107 years. In 1.79% of cases the patient's gender was not recorded. In the remaining cases where it was recorded, 43% were male and 57% were female.

One major limitation was that if any subsequent blood requests for a given patient were received within seven days of the initial request, the blood bank would not record these in the request book and the request would be directly passed on to the laboratory staff who would issue the blood, as the patient's blood sample for grouping and cross-matching was deemed viable for up to seven days. Thus, while in total, 17,278 whole blood and blood component requests were recorded and analysed, this represents an underestimation of their demand at KATH.

Generally, blood components were prescribed by volume (ml) for children and by unit for adults. For analyses purposes, the units have been converted to their corresponding volume in millilitres, where one unit of whole blood and fresh whole blood were equivalent to 500ml, one unit of packed cells is equivalent to 300ml, one unit of fresh frozen plasma is equivalent to 300ml, one unit of platelets is equivalent to 50ml and one unit of cyroprecipitate is equivalent to 10ml (Fuenfer and Creamer, 2010).

Most blood policies reviewed insist that doctors specify the blood component and volume requested when prescribing. The same is true for the blood component request forms at KATH. However, in practice, there are times when either the blood component requested, the amount or both were not provided. In these cases, the component and amount requested were assumed to be whole blood and one unit respectively, as this is what is done in practice. Of the 17,278 requests, there were 417 (2.41%) instances where blood volume was not specified and 1,282 (7.42%) instances where blood component was not indicated.

7.4.1 Demand according to blood requests

Overall, whole blood was prescribed significantly more often than any other component and accounted for 74.2% of all blood requests (see Table 7.1). The remaining requests were mostly for packed cells. Fresh whole blood, platelets, cyroprecipitate and Autologous transfusion requests were rare in comparison (see Table 7.1).

	Whole Blood	**Packed Cells**	**Fresh Frozen Plasma**	**Platelets**	**Cyroprecipitate**	**Fresh Whole Blood**	**Autologous (Whole Blood)**	**Total**
February	1175	317	26	12	0	5	0	1535
March	1552	475	25	3	0	1	0	2056
April	1433	437	31	15	0	1	0	1917
May	1503	466	22	5	0	3	0	1999
June	1520	524	24	5	0	2	0	2075
July	1418	563	35	9	0	4	0	2029
August	1380	507	30	1	0	6	0	1924
September	1385	386	24	8	1	1	1	1806
October	1454	437	32	10	2	2	0	1937
Total (%)	12820 (74.2)	4112 (23.8)	249 (1.4)	68 (0.4)	3 (0.2)	25 (0.1)	1 (0.006)	17278

Table 7.4 – Blood component requests over a period of nine months in 2014, stratified by month

In terms of amount requested, there was a considerably higher demand for whole blood (see Table 7.4). On average, the monthly demand for whole blood was 1424 units, though monthly demand varied between 1175-1552 units throughout the nine-month period. Average monthly demands for PRBC, FFP and PC were 456, 28 and 8 units respectively.

Table 7.4 shows how the number and amount of blood components requested varied between hospital specialities. Both in terms of number of requests and volume requested, the Accident and Emergency (A&E) department was responsible for most of the hospital's blood component demand (N=6552; 37.9%), with Obstetrics and Gynaecology (O&G) second (N=3125; 18.1%). This pattern of demand has been validated by the blood bank and KATH and is the major reason why the main blood bank is situated in the hospital's A&E unit and why a second 'mini blood-bank' has been created in the O&G unit.

Note that while the Child Health unit accounts for over 1/8th of the blood requests at KATH, in terms of volume, it accounts for very little in demand due to the nature of paediatric transfusions and the limited volume required.

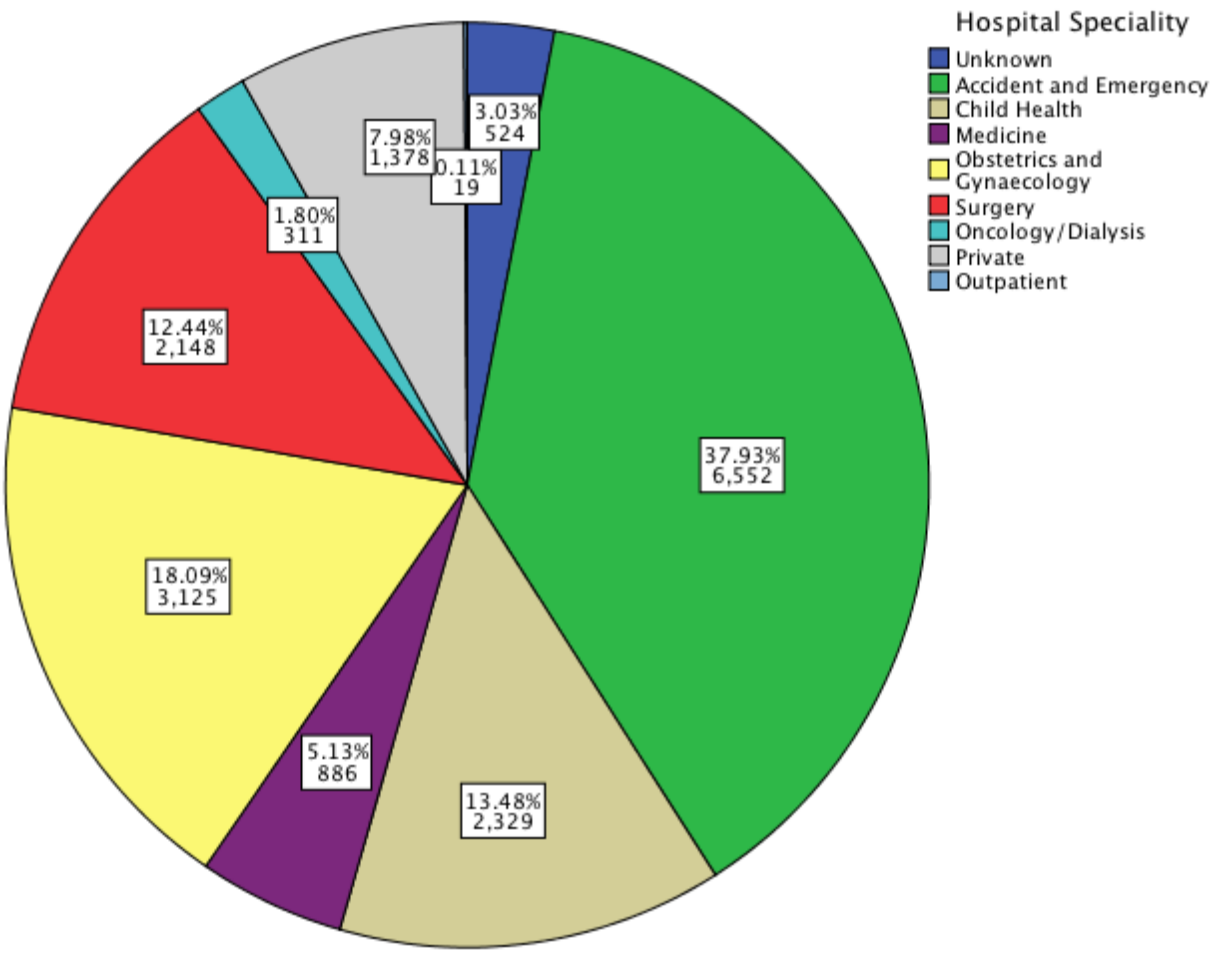


Figure 7.1 – All blood component requests by hospital speciality

7.5 Blood component discards

The number of blood components discarded and the reason for the discard were recorded to determine whether any of the blood components were being over-produced and consequently wasted. Similar to the blood requests, the serial number of the blood components discarded, the date they were discarded, the blood group of the component discarded and the reason for discard were recorded by the blood bank in a log book. I entered the data into Microsoft's Excel and used SPSS to generate descriptive statistics. Units testing positive for syphilis, expired units and underbled units were most commonly discarded.

Note, however, when looking through the book recording discards, it was unclear which blood component they were. Nevertheless, the data do illustrate a couple of important points (see Figure 7.5): 1) There are relatively few discards given the amount of blood issued and 2) Most of the units that have expired are AB+.

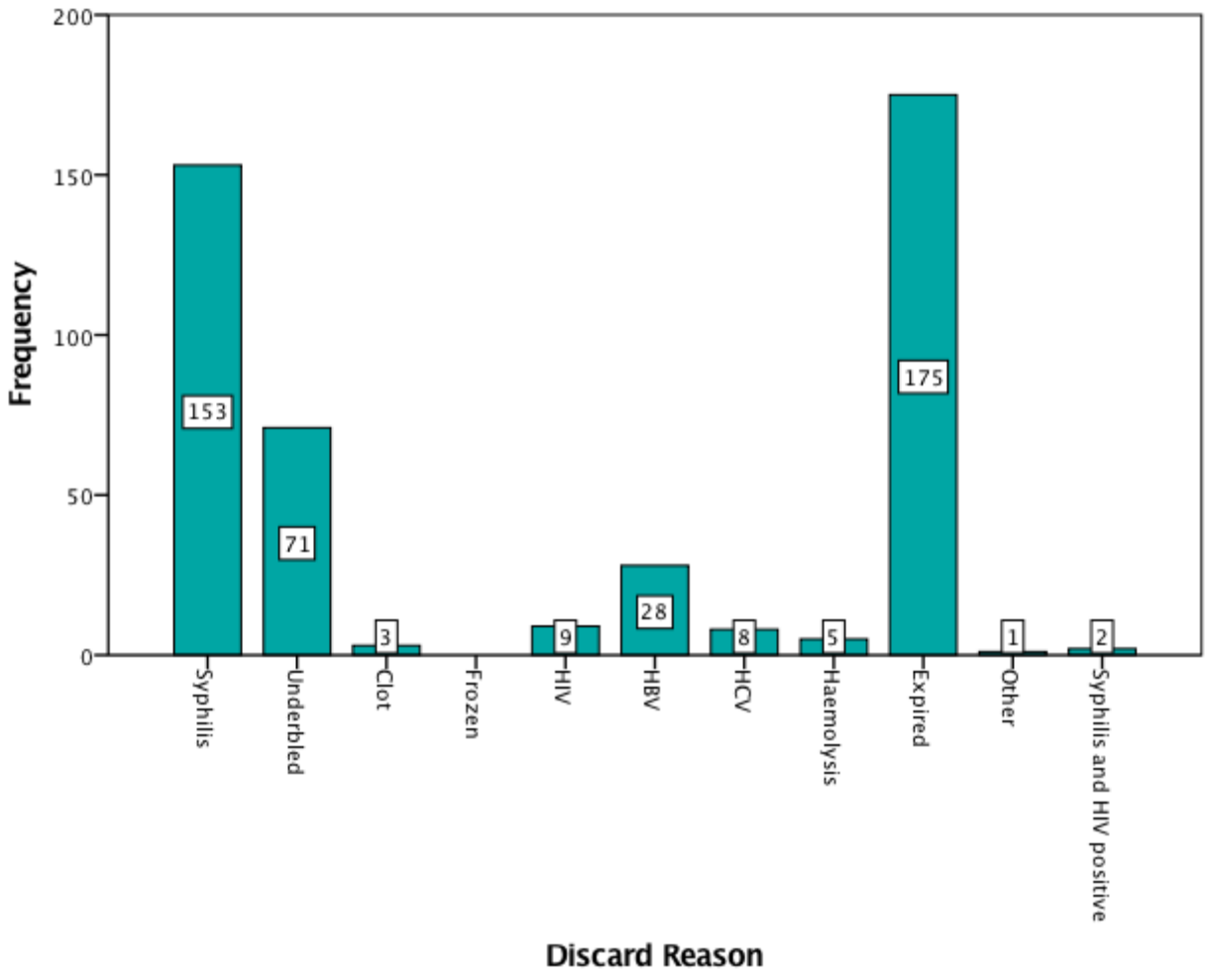


Figure 7.2 – Reasons for discarding units of blood

7.6 Blood component usage according to prescribing doctors

Semi-structured interviews were conducted with fifteen doctors across six different units. Initially, I visited the different wards weekly to make contact with doctors and ask if they would be willing to participate in the study. However, after the first eight interviews, it became clear that it was easier to recruit house officers, particularly from the Medicine and Child Health specialities. To obtain a wider spectrum of perspectives, I then focused on interviewing doctors from the other specialties and with more clinical experience. I was put in contact with three doctors by a visiting doctor and others were approached in the ward. Given unpredictability of hospital medicine, it was challenging to recruit participants. On eight occasions I was asked to return at a different time to conduct the interview. On three of these occasions I managed to conduct the interview. In five instances, the prospective participant was unavailable. Generally, I made three attempts to contact a prospective participant. If by the third attempt I was still unable to make contact, I moved on to another participant. The aim was to ensure I interviewed doctors from each of the hospital's specialties to ensure a variety of clinical perspectives were included in the study.

The interviews explored issues such as patient consent (discussed in Chapter 8), blood usage and the positive and negative aspects of blood services at KATH. Further details on the methodology are described in Chapter 3. Most interviews were audio-recorded, but in some cases the respondent requested that the interview not be recorded. Additionally, there were times when the background noise of the hospital setting made it difficult to make out certain parts of the interview. However, thorough notes were also taken throughout every interview (regardless of whether it was audio-recorded), thus minimising any loss of data. Interviews were transcribed within two days. Upon initial review of the transcriptions, responses for questions consistently asked were tabulated and compared between the hospital specialities Common themes were identified and responses were grouped accordingly. Responses that did not fit into a particular theme were also noted.

The results from the interviews are presented according to the specialty the doctor was working in, as illnesses and disorders commonly seen will vary by specialty and consequently so will blood component needs and usage. They are summarised at the end of this section.

Results from Interviews in Child Health

Seven doctors were interviewed from the Child Health department. Four house officers, one resident, one specialist and one senior specialist were interviewed. Doctors were based in different wards within the unit, such as the mother baby unit (MBU), the paediatric emergency unit (PEU) and general paediatric wards.

MBU

A specialist and two house officers were interviewed in MBU. The specialist was aware that blood components such as whole blood (WB), packed red blood cells (PRBC), platelets and fresh frozen plasma (FFP) were available at KATH's blood bank. According to this physician, in MBU, transfusions occur almost daily and WB is the most required and the most 'readily available' and 'because of the indications for which we prescribe it'. It is mostly needed for severe neo-natal jaundice (NNJ) cases where twice the baby's blood volume is required. PRBC were sometimes necessary to increase the baby's Hb level and in rarer cases, platelets may be given for severe thrombocytopenia. These responses were echoed by a house officer participant from MBU.

The above results, however, conflicted slightly with the response from a second house officer who was also interviewed in MBU. This participant was aware of the availability of the same blood components as the specialist paediatrician and agreed that WB was the most needed on the ward for NNJ exchange, but felt that in MBU they prescribed PC more often as it was more readily available. When asked which blood components were available at the hospital the house officer responded:

"Normally we often get packed cells. Sometimes we get FFP. And then sometimes we get platelet concentrates and then in on other conditions we also get full – whole blood. But, the prevalent one is the packed cells." (House officer, MBU)

When probed further whether this meant "Prevalent in terms of quantity at the blood bank or what you prescribe most often in MBU?", the house officer replied:

"*Availability. The one that is really available is packed cells." (House officer, MBU).*

To clarify, I explicitly asked "Do you request packed cells or whole blood more often because there is a greater need or because they are more readily available or both?", to which the house officer responded:

"[Because] Packed cells are readily available".

According to this house officer, PC was mostly prescribed in MBU for anaemia, platelets for bleeding disorders and FFP for patients who had received several PC transfusions.

PEU

A senior specialist in PEU with 18 years of experience in Child Health was interviewed. The doctor was aware of blood components being available at KATH and listed WB, PC, FFP and platelets as examples.

According to the doctor, 80% of blood transfused in PEU was WB and this was due to the fact that it was the most needed and the most readily available. The participant explained that WB was largely required for acute blood loss, sickle cell anaemia, severe malaria, bleeding disorders and malignancies in PEU. PC were also used for sickle cell anaemia while FFP was usually prescribed for nephritic syndrome and haemophilia and platelets for thrombocytopenia

However, when asked whether blood usage in PEU would change if all blood components were available at all times, the senior specialist responded that in that case the use of PC would increase and that the proportion of WB transfusions would decrease from 80% to 55%.

Child Health General Wards

Two house officers and one resident were interviewed in the Child Health wards. All three were aware that the blood bank produced WB, PRBC, FFP and platelets. All agreed that PRBC were the most needed in the wards, based on the conditions seen most often on the words, but most felt that there were times WB was more readily available and thus prescribed more often. PRBC were particularly required for treatment of severe malaria related anaemia and iron deficiency anaemia (often due to malnutrition) as they raise the haemoglobin level quickly and effectively. Platelets were seen to be the most difficult to obtain. According to one doctor:

"We prescribe whole blood most often because it is easier to get, but packed cells are needed more but packed cells are not as easily available so we make do with whole blood" (House officer, Child Health ward)

Another doctor cited delays in obtaining FFP and platelets, but seemed satisfied with the availability of WB and PRBC :

> *"We have fresh frozen plasma…FFP. But sometimes we have challenges with it because for that one they need fresh blood. So if they are not getting fresh blood it's difficult, but we do get them when we request. Platelet concentrates, there are also some delays. Platelet concentrates and FFP. But for the full blood and packed red cells we usually get them" (House officer, Child Health ward)*

The same doctor went on to elaborate on the usage of WB and PRBC and explain how FFP shortages are managed:

> *"We use more of the full blood and then the packed cells. […] Mostly […] one of the commonest ones is severe malaria so they're usually packed cells. In cases where they're bleeding, for example, haemophilia we give whole blood. And also some of the children are suffering from cancers like leukaemia we give whole blood, sometimes packed cells. Depending on the blood results…If it's just the red blood cells or the Hb is down then we give packed cells, if there is platelet deficiency alone we give platelets concentrate. […] Compared to packed cells, [we give whole blood] because there is a need for it, but when you compare it to something like FFP, that one is more difficult to get. Sometimes if you don't get FFP you give whole blood." (House officer, Child Health ward)*

A paediatric resident echoed the houseman's comments, stressing the difficulty in obtaining platelets as well as Factor VIII. In response to my question "Do you have difficulty obtaining any of the blood or blood components?", he/she responded:

> *"I think only the platelets – it takes time before they prepare it. They ask for relatives to come donate. They give some blood and pull the platelets out. Factor VIII too – it's very difficult. At time it gets finished for the haemophiliacs. It comes in season. At times when there is no Factor VIII we give them whole blood. If we are lucky we give them Factor VII" (Paediatric Resident, Child Health ward)*

When probed further as to when platelets may be needed in paediatrics, the resident responded:

> *"For thrombocytopenia. Cases of ITP (idiopathic thrombocytopenic purpura). And even for the leukaemias – before they do the bone marrow aspirate they have to build their platelets up before they go for the bone marrow." (Paediatric Resident, Child Health ward)*

Results from Interview in Medicine Unit

A physician specialist was interviewed from the Medicine department. When asked about component production at KATH, the doctor responded that he/she was aware that components were available and included cryoprecipitate, platelets, whole blood, FFP and PRBC. According to the doctor, almost daily he/she requested for blood. PRBC were most often prescribed because it was most needed but that it being 'readily available is one of the things'. Generally PRBC were most commonly prescribed for infection, patients with sickle cell anaemia and renal failure, whole blood for aplastic anaemia and leukaemia and FFP for DIC and liver failure. PRBC was preferred for sickle cell anaemia as it can increase a patient's Hb level, without the volume overload. FFP is often used in those with liver failure and it can help improve a patient's prothrombin time (note, prothrombin is made by the liver, and thus in liver failure blood may take longer to clot).The doctor said that platelets were difficult to obtain but that 'we don't see so many things we require platelets. Maybe chronic liver disease with decreased platelet count'.

The specialist was unaware of any official guidelines for component usage and felt that the introduction of guidelines could help guide clinicians on component prescribing.

Results from Interviews in Surgery Unit

Two members from the Surgery Unit participated in the study – one was a house officer who had spent three months in the unit and the other was a consultant. Both were aware that blood components were available at the hospital, and both listed whole blood, PRC, FFP and platelet concentrate as examples.

When asked what is prescribed more often, the consultant replied:

> *"Most often is packed cells. […] Well, if there's whole blood we take whole blood, but most of the time we have packed cells. But if there is whole blood, most of them in surgeries have hypovolaemia due to blood loss so we have whole blood. […] You see normally we*

request for whole blood when we need fresh blood […] but otherwise I think the blood bank normally have packed cells, I'm not too sure" (Consultant, Surgery department)

The consultant estimated that 65% of the blood components prescribed [in his/her field] were PRBC, 30% whole blood and 5% FFP. According to the doctor anaemia was the most common reason for PRC transfusion, whole blood was used to replace blood volume (e.g. patient has lost a lot of blood in surgery) and FFP when 'we've done a massive transfusion – more than 4 pints, or when platelets are low [and platelets are unavailable]'.

When asked whether PRBC were "prescribed most often because they're most need, they're more readily available or a combination of the two", the consultant responded:

"Because they are most readily available".

When asked how component usage would change if all blood components were equally available, he/she said they would prescribe WB more, estimating that 80% of transfusions would be WB and 15% PRBC.

In contrast, according to the doctor in the wards 75-80% of the components prescribed were whole blood and 15-20% PRC, with platelets and FFP rarely transfused. In the wards, whole blood was most often required for loss of blood, anaemia, haemorrhage and shock, while PRC was used for severe anaemia. The houseman felt that whole blood was prescribed partially because it was most needed but also because it was more readily available and that if all components were available, the proportion of whole blood to PRC prescription would change to 50:50.

The consultant felt that increased knowledge about components was needed among doctors as he felt that the correct component was not always prescribed, though he was not sure whether this was due to difficulty procuring certain components, however this sentiment was not echoed by the houseman. The consultant gave the following example:

"I've seen people prescribe fresh frozen plasma when the patient needs platelets. Whereas fresh frozen plasma does not contain platelets. So he needs platelets but he asks for fresh frozen plasma, which does not contain platelets. So the knowledge impacts on the prescription habits." ((Consultant, Surgery department)

The consultant suggested that increased education through workshops or meetings would be useful in improving how blood components are prescribed. The houseman felt that greater communication between the blood bank and doctors was needed so that doctors were aware of what the blood bank had in stock. He/she also thought that a more detailed blood request form would be beneficial to differentiate between urgent cases. Both doctors felt that published guidelines on component usage would be useful and were unaware of any current guidelines.

The consultant did emphasise that over the years things have improved in terms of blood transfusion services. He explained:

"Most of the time they have the blood available. […] [Some of the improvement] now they have a dedicated head of unit [who] is a clinician who can understand issues and anytime we have problems we can easily fall back upon. Now they have components, before it was only whole blood. No you have packed cells, platelets FFP."

The main challenges expressed by the consultant were that rare blood groups were sometimes not in stock and that it was difficult to obtain large quantities when needed. Similar positive aspects were mentioned by the houseman, though he mentioned that when it came time to collect the blood he received it quicker if he went in person to collect rather than sending a nurse. His hypothesis was that:

" […} maybe the nurse doesn't realise the urgency. Senior nurses don't go. Junior nurses may not know as much about the patient's condition" (House man, Surgery department)

<u>Results from Interviews in Obstetrics and Gynaecology (O&G) Unit</u>

Two doctors in O&G were interviewed, one was a houseman who had been based in obstetrics for four months and the other a resident who had been there for one year and who had worked as GP before that. For these interviews, it is important to keep in mind that the unit is served by its own 'mini blood bank'. This is a room within the O&G department with its own refrigerators which are capable of storing whole blood. The main blood bank transfers some units to the O&G 'mini blood bank' to ensure that blood is delivered more quickly, given the high demand and urgency of the cases in this unit.

Both knew that components were available at the hospital and cited whole blood, PRC and FFP as examples. The resident also mentioned platelets. Both agreed that whole blood was the most of prescribed, largely for post-partum haemorrhage, ectopic pregnancies and pre-eclampsia. PRBC are used particularly to increase Hb levels in gynaecological malignancies. According to the houseman about 60% of blood prescribed was whole blood, 30% FFP and 10% PRBC. However, when asked if and how those proportions would change if whole blood and all blood components were all readily available at all times, the house man responded:

> *"I think the prescription for packed cells for instance would increase. Because at times you request for packed cells and it's not available so you have to just do your whole blood transfusion. […] I think packed cells might increase to about 20-30 percent. Whole blood would come down." (Houseman, O&G)*

The houseman also specifically noted that it was nice that in acute situations patients do not need to find replacement donors, only if they receive three or more units are they usually asked.

Results from Interviews in Accident and Emergency (A&E) Unit

Two first year medical residents were interviewed from the A&E unit. Given the fast paced nature of this unit it was difficult to a) find participants from this unit and b) have a lengthy discussion with respondents. Both doctors were aware that components were available at

KATH and both provided similar responses regarding demand and usage, stating that whole blood was most often prescribed in A&E, largely because it was in fact most needed (usually for trauma), but both admitted that if all blood components were equally available, they would prescribe packed cells more often. According to one of the resident's:

> *"Whole blood [is prescribed most often] … 70% whole blood, 20% fresh frozen plasma - packed cells is not common… [Whole blood is prescribed] for trauma, haematuria, severe anaemia and carcinoma…for packed cells when the kids come in they have anaemia we want to give them packed cells…FFP is used when they have DIC (disseminated intravascular coagulation)" (1st year resident in A&E)*

The same resident was asked whether whole blood was prescribed more often because it was more needed, more readily available or a combination of the two, to which he/she responded:

> *"Because it's readily available, but also needed"*

When probed further to determine how the prescribing of blood components in A&E would change if all components were readily available, the resident replied:

> *"Oh definitely we'd go in for the packed cells more […] [we'd prescribe] maybe 50% packed cells, FFP would stay the same and the remaining [30%) would be whole blood]."*

While one doctor was aware of both national and KATH blood transfusion guidelines, the other resident was unsure if KATH had their own guidelines as he/she had only been working at KATH for three months at the time of the interview and had not had a chance to familiarise his/herself with all the available guidelines and protocols. The two residents, however, felt that there was sufficient knowledge among doctors on blood components and that this was not impacting prescribing patterns.

Results from Interviews in the Oncology/Dialysis Unit

One resident in the dialysis unit was interviewed. He/she had previously been based in the Medicine unit for five years. In this unit, 'close to 100%' of transfusions were packed cells. Generally, the main cause for transfusion in the unit was anaemia for chronic disease. According to the doctor:

"They mostly have anaemia of chronic disease. What you do here is mostly some come to the ward, most of the CKD patients. Unlike the other patients who are currently bleeding so we want to give the whole components of the blood to correct the anaemia […] but if the problem is only with the haemoglobin we try to put it up faster, so the packed cells help […]"
(Resident in the Dialysis unit)

Whole blood may occasionally be transfused for nephrotic syndrome as could FFP, if a patient's albumin level was low. Platelets, however, were unlikely to be used in the dialysis unit. Thus, according to the respondent, PC were prescribed most because they are the most needed, and even if all components were widely available, demand from the unit would not alter. The participant was unaware of any published guidelines on transfusion policy, and while he/she did feel that doctors had the necessary knowledge regarding blood components, he/she felt that additional training and an update on transfusion services would be helpful.

Summary of responses by doctors according to unit

Overall, it seems that there is demand for blood components and that they would be prescribed more often (compared to whole blood) in some of the wards if all components were more readily available. It is, however, important to note that while all the doctors interviewed felt that obtaining blood at times could be challenging, they unanimously praised the KATH blood bank for the strides they have made over the past few years, highlighting the impressive increase in blood component availability. This is a true testament to the progress the transfusion team has made. The table below illustrates common blood

components used in each of the hospital's specialties and summarises which specialties blood requests' are influenced by availability and to what extent.

7.7 Summary of results

	Specialty	Position	Blood component most prescribed in the ward	Does the ward ever have to prescribe alternative blood components because the first choice is unavailable?	Would your blood prescribing pattern change if all blood components were readily available? If so, how?
Participant 1	Child Health	Houseman	WB and PRBC	No. "Though FFP difficult to procure sometimes"	No
Participant 2	Child Health	Resident	PRBC	Rarely	Yes. If factor VIII and platelets can't be obtained, whole blood is prescribed
Participant 3	Child Health	Houseman	WB	Yes	Yes. Would prescribe PRBC more (rather than WB)
Participant 4	Child Health	Specialist	WB	No	No
Participant 5	Child Health	Houseman	WB/PRBC	Yes	Yes. WB needed for neo-natal jaundice (NNJ), but PRBC prescribed often because it is readily available
Participant 6	Child Health	Houseman	WB	No	No
Participant 7	Medicine	Specialist	PRBC	No	No

Participant 8	Child Health	Senior Specialist	WB	Yes	Yes. WB requests would drop from 80% to 55%. PRBC would be prescribed more often.
Participant 9	Surgery	Consultant	PRBC	Yes	Yes. PRBC would be prescribed more often than WB
Participant 10	O&G	Resident	WB	Yes	Yes. If platelets were more easily obtained more they would be prescribed 5X more.
Participant 11	O&G	Houseman	WB	Yes	Yes. PRBC would be prescribed more frequently.
Participant 12	A&E	Resident	WB	Yes	Yes. PRBC would be prescribed 5X more often.
Participant 13	A&E	Resident	WB	Yes	Yes. PRBC would be prescribed more.
Participant 14	Surgery	Houseman	WB	Yes	Yes, PRBC would be prescribed 2.5-3X more often
Participant 15	Dialysis	Resident	PRBC	No	No

Table 7.5 – Most common blood components prescribed on wards according to clinicians interviewed and whether infinite blood component availability would result in a change in their prescribing pattern

7.8 Discussion

Researchers in South Africa have advocated for the use of component therapy in low and middle income countries, arguing that in areas of limited blood supply a single donated unit can have a greater effect and benefit more people when separated into components (Erhabor and Adias, 2011) – an argument that has been made by many high income countries who rely exclusively on components. In fact, the WHO also advocates for all countries to move towards component therapy, but there is insufficient evidence to demonstrate how or to what extent this will change outcomes in low and middle income countries. To understand this, we need to have a better idea of the needs of regional blood banks (for example, what blood components their clinicians require most) as well as take into account the cost of component therapy and consider how to best manage limited resources, including what services can be provided and those that may need to be cut, while maximising the best patient outcomes.

The aim of this part of the study was to address sub-objective 3:

'Quantify component usage and demand, understand its influencing factors and determine whether the appropriate amount of resources is being utilised.'

Data presented in KATH's Annual Report (2011) indicates that the number of donors willing to donate blood and the number of units of blood collected are both increasing (see section 2.3.1.2), which explains the increased satisfaction by staff with regards to blood availability. Past years' data and anecdotal evidence from blood bank staff members indicate that the blood bank's aim is to continue to increase the proportion of their blood units converted to components. Based on the results from this study, it is evident that there is significant demand and use of whole blood across all of the hospital's specialities. Currently, the demand for whole blood far outnumbers the demand for any other blood component. However, there is a considerable demand for packed cells, which represented nearly ¼ of the blood component requests. Moreover, past data suggest that the demand for components is growing. A similar trend has been witnessed in Namibia and has been attributed to the

changing health needs of the population (Pitman et al., 2015). For example, HIV/AIDS treatment has improved and the prevalence of chronic illnesses, such as malignancies, is increasing (consequently, there is increased use of FFP in Namibia, as it is use in patients with cancer) (ibid).

As stated earlier, I was unable to obtain the calculations used to estimate component production. Several doctors admitted that if all components were equally available the amount of whole blood and components prescribed would alter. However, other doctors also highlighted the need and importance for whole blood in situations of trauma and extreme blood loss. Thus, 100% component production may be unnecessary at KATH at the moment. To better approximate component demand, it would be useful to conduct another yearlong study with an added section on the blood request forms which asks 'what component is preferred if all are available?'. It would also be helpful if the doctors could justify their preference so it can be determined to what extend in each case the use of a different component might alter the patient's outcome. This would provide a more accurate estimation of blood component needs to which the blood bank could work towards.

7.8.1 Demand exceeding supply

Weekly stock levels provide a snapshot view of the number of blood components available at a moment in time, while data collected regarding blood component requests indicates that on average 47 units of whole blood are requested each day. As mentioned earlier, this figure is likely an underestimation as additional requests received within seven days of the initial request are not recorded in the requests log book. Given that stock levels for whole blood varied from 25-359 units, it is likely there is a high turnover rate of whole blood units and there may be days when demand exceeds supply.

There were several instances where WB, PRBC and FFP were available for O- blood type. Patients with O- blood can only receive O- blood, meaning that any patients requiring a blood transfusion would have to wait until a unit became available. O- blood is referred to as the

universal donor and its supply levels are vital for any blood bank as it can also be used in emergency settings when there may be no time to group or cross-match a patient's blood. At KATH, the blood bank tries to avoid a situation where a given blood group's supply is depleted, by calling blood donors with the needed blood type to come and donate. A similar approach is taken by the American Red Cross (2016) – when supply is low, the organisation calls on eligible donors with O-, A- and B- blood to donate. However, as illustrated by the stock levels, this strategy is not providing sufficient results.

In addition, the pattern of blood demand at use at the hospital by each speciality may be unique to KATH given that it has the largest A&E in the region and is thus the main trauma centre. Given its tertiary regional hospital status, the O&G department may also attract more complicated pregnancies and thus the risk of PPH may be higher than in smaller, lower hospitals. All of this results in an increased demand of blood from these two specialities. The proximities of the blood bank and mini-blood bank to these specialities, however, minimises delays in obtaining blood.

7.8.2 Discarding blood components

The majority of discards were due to expired units, most of which were AB+. One way to minimise this may be to temporarily defer donors with known AB+ blood when stock levels are high. However, it is important to consider the impact a temporary deferral may have on the donor. As discussed in Chapter 6, temporary deferrals may discourage blood donors from returning. An alternative would be to phone nearby hospitals, when KATH's AB+ blood stock levels are high, and determine whether they could use extra units of AB+ units, to prevent wastage.

There were also a high number of discards due to syphilis, but by screening blood for active infections post-donation, the donor clinic can avoid deferring potentially safe and healthy donors. The alternative would result in few successful blood donations and thus a lower supply.

7.8.3 Blood component demand according to clinicians and how demand might change if all blood components were consistently available

Results from the interviews with prescribing doctors indicates that demand for components may increase if they were more readily available. However, it should be noted that while many doctors felt that certain components (namely packed cells) might be prescribed more often if there was a greater supply, they still felt that in many cases whole blood was the blood component most needed. This is an important finding, because it suggests that while the KATH's blood bank is on the right track, aiming to slightly increase its component production each year, current data suggest that it would not be suitable for the blood bank to shift to component production exclusively as this would not necessarily meet the needs of the hospital. This is in contrast to blood banks in high income countries, which in most cases have done away with whole blood and rely exclusively on components.

It can, however, be argued that the lower demand for blood components may be due to insufficient knowledge regarding components and their usage. The responses from prescribing doctors varied with regards to this, with some confident that all doctors had sufficient knowledge regarding components and that the demand levels reflected need and availability, while others felt that increased training on component usage would result in increased component prescription from doctors. Indeed, this may change given that according to the more junior doctors, component usage and prescription is a part of the medical degree curriculum. However, further research should be conducted to better understand what training the doctors are seeking, particularly since the blood bank organises and provides training in this area.

In addition, regular studies regarding component therapy and doctors' blood prescribing habits should be conducted to correctly identify when the blood bank has achieved the perfect balance between whole blood use and component production. As long as there

remains a significant demand for whole blood, from a practical and economic standpoint, it does not seem necessary to shift to exclusive component therapy.

7.9 Limitations

Below are a list of challenges faced in obtaining the necessary data and any implications they may have on the results of this study:

1. Obtaining blood stock levels – To obtain regular, weekly blood stock levels, I had to rely on a member of the blood bank team to record the stock levels for me, as I was not qualified to deal with blood components could not be responsible if any damages or loss occurred. To provide 24/7 access to the blood bank, the employees' work schedules are shift based, meaning the same person is not always working the same day of the week. It, therefore, took some time to organise a weekly stock level count and is these data were only recorded from August-December. While ideally a longer period of data collection would have provided greater validity to the study, the period of time covered included both the dry and rainy seasons as well as term time and school holidays – i.e. the times when demand and supply vary the most.
2. Entering blood requests – All the blood requests are handwritten in record books at the blood bank. Entering these data daily onto the computer took the better part of the day most days. To reduce time consumption, we did consider employing a research assistant, but it was difficult to find someone who could devote the necessary time. Given that the data were initially handwritten, transcription errors were possible. To minimise this possibility, data entered were cross-referenced with the initial handwritten data.
3. Discards – It was not clear what components were discarded, making it difficult to ascertain whether certain blood components are being wasted, and whether any specific components are being over produced. However, collecting weekly stock levels provides some indication of this, and generally component levels were on the low end.

4. Interviews with prescribing doctors – At times, it was difficult to identify senior level consultants to provide a wider spread of participants. In addition, it was challenging to find sufficient time to conduct some of the interviews given the doctors' heavy schedules.

7.10 Conclusion

Overall, whole blood is still in high demand at KATH and while doctors do prescribe components regularly and would prescribe them more often if they were more readily available, many still feel that whole blood is most needed. The KATH blood bank has clearly made excellent progress in providing greater accessibility to both whole blood and components over the past few years and this has been acknowledged and greatly appreciated by all doctors interviewed. However, if clinicians feel that the need for whole blood transfusions remains high, it may be necessary to maintain both whole blood and component therapy at KATH. Thus, despite the WHO's recommendation for component therapy, further research should be conducted to determine the health outcomes and financial impact exclusive component therapy would have at KATH, before determining component production targets.

Chapter 8 – Blood transfusions in patients

8.1 Introduction

Most policy recommendations regarding blood transfusions relate to blood donors, the vein-to-vein process and haemovigilance. The most common recommendation concerning patients is to obtain informed patient consent prior to transfusion. There is no evidence on how often this occurs nor the challenges doctors may face in obtaining consent. Additionally, there is limited research on patients' experiences in receiving blood transfusions and any challenges they may face. For example, replacement donors remain common in sub-Saharan Africa and at the Komfo Anokye Teaching Hospital they accounted for 34.3% of blood donations in 2013 (KATH, 2014), but there is no data concerning patient experiences in securing a replacement donor. This chapter presents results from twenty-four semi-structured interviews with patients from varying units of the hospital and is complemented by data obtained from semi-structured interviews with doctors prescribing blood transfusions. Interviews with patients were conducted in English or Twi. Mr. Maxwell Owusu provided translation assistance. Interviews with physicians were conducted in English. All interviews were audio recorded and transcribed, and a list of responses for each topic was created. Common responses were grouped in themes and the transcripts were reviewed to identify helpful quotes.

8.2 Informed Patient Consent

Not all patients were made aware of their transfusion prior to receiving the transfusion, and only some were informed about both the risks and benefits. Doctors from different units were interviewed to determine how they addressed the issue of informed patient consent when transfusing patients with blood and to understand why patients may not be given more detailed information about the risks of blood transfusions.

8.2.1 Clinician Participants Profile

Fifteen physicians of varying levels from all different units and who were involved in prescribing blood transfusions were interviewed. Physicians were approached in the wards, explained the study and asked if they would be willing to participate. This initially led to an overrepresentation of House Officers. Thus, using existing contacts in the hospital and contacts made through study participants, individual residents and specialists were approached to partake in the study. Below is a brief description of the doctors interviewed based on the hospital unit they were working in at the time of interview.

- Two A&E Residents
- Four Child Health House Officers
- One Child Health Resident
- One Child Health Specialist
- One Child Health Senior Specialist
- One Medicine Specialist
- One O&G House Officers
- One O&G Resident
- One Dialysis Resident (had previously been based in Medicine)
- One Surgery House Officer
- One Consultant in Surgery

8.2.2 Is informed patient consent sought?

Doctors were asked whether informed consent was sought from patients needing blood transfusions. The responses were mixed.

'Yes, informed consent is sought'

The majority of participants said that informed consent was obtained from patients. Generally consent was sought orally, though a couple of doctors said there were cases where written consent may be documented. For example, according to one doctor, consent for blood transfusion is part of the general surgical consent form. In some cases doctors admitted that while generally oral consent was obtained, it was not consistently sought. For example:

> *"No written consent required. [Oral consent] is not strictly enforced" [Physician specialist In the Medicine Unit]*

When informed consent is sought, the current condition of patients and why they require blood are explained to them. In addition, the risks and the benefits of the transfusion is explained. One doctor also mentioned that the risks of transfusion are explained to the patients, while a couple others admitted that the potential risks and complications arising from transfusion are not always discussed.

> *"Limited information on complications is provided … no reason, but more literate parents ask questions so it is not practical" [Senior specialist in Child Health]*

> *"[Risks?] Normally we don't tell them." [House Officer in O&G]*

> *"[Risks?] Not so much, but if they ask we do" [Resident in A&E]*

> *"Honestly, we don't go into much details about the risks." [Resident in O&G]*

The doctor from the dialysis unit, however, stated that patients were told of any expected reactions with blood transfusions. According to him:

"Patients are told about their blood group, what component is given, why they need blood and any expected reactions." [Resident in the Dialysis Unit]

No consent is sought

A resident and a specialist in Child Health both said that no consent was sought for blood transfusions. According to a consultant in Surgery, generally verbal consent is sought but:

"If patient is unconscious we hardly tell them afterwards. Some patients may not be aware of the transfusion." [Consultant in Surery].

Unsure

The resident in the Dialysis unit provided information patients are given, but was unclear if consent was regularly sought and if so, how. According to this participant, the nurses handle this aspect.

8.3 Results from patient interviews

8.3.1 Patient Participants Profile

Following two pilot interviews, twenty-four patient interviews were successfully completed across six of the seven main hospital units, as identified by the KATH blood bank. They were conducted throughout the year, during periods of both high and low blood component demand, and high and low supply. Patients were interviewed 24-48 hours after their last transfusion. Three patients from A&E were interviewed, seven patients from Child Health, four from the Medicine unit, four from the O&G unit, one from Oncology and five from Surgery (see Figure 8.1). All interviews in Child Health were conducted with the patients'

mothers. Though multiple attempts were made to recruit participants from the Dialysis unit, there were limited numbers of transfusion patients in this unit and nearly all eligible for the study left the hospital shortly after transfusion.

Patients' age ranged from 5 days to 70 years, with the average age being 27.0 years old. 15/24 patients were male whereas only 10/24 of the participants interviewed were male, as five of the participants were the mothers of male children. The education level of participants ranged from none to post-secondary, with the majority having completed some form of secondary school, either junior high school (JHS) or senior high school (SHS) (16/24). One participant had not attended school, two had completed up to primary school level, two had not finished primary school, one was enrolled in a post-secondary institution and one had completed post-secondary schooling. One participant did not disclose his educational background. Household income ranged from 1-200 Ghana Cedis/day with an average income of 18.1 cedis/day.

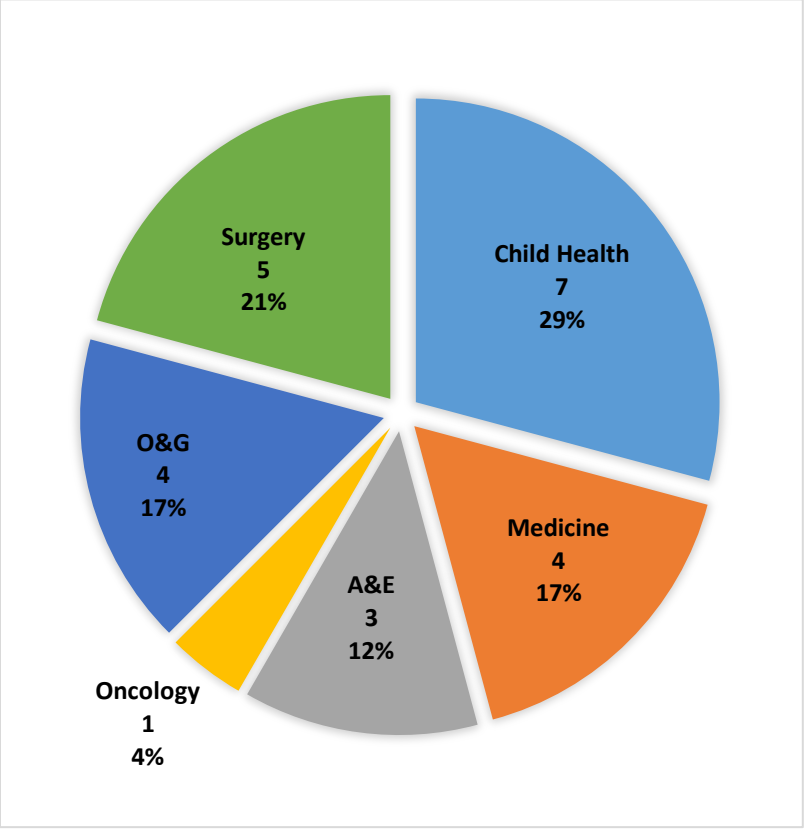


Figure 8.1 – Patient participant distribution according to hospital speciality

8.3.2 Patient experience in obtaining blood

8.3.2.1 Patient understanding of blood transfusions and their need for blood

Need for transfusion

Nearly every patient or caregiver interviewed was advised about their blood transfusion and why it was necessary. Patients were generally spoken to before receiving blood, but in cases where the patient was unconscious during transfusion the patient was advised once they regained consciousness. One patient, a nineteen-year-old male, was not personally told he would receive blood, but according to him his parents were given the information. Based on participants' responses, most patients were provided with similar reasons for transfusion, which are presented below.

<u>Anaemia/Low Hb</u>

The most common reason for blood transfusion was anaemia and/or low Hb. Patients who were told they were receiving blood for this reason were male and based in the Medicine and Child Health units, though there were also individual cases from Surgery, O&G and A&E. Among those transfused for anaemia or low Hb, there was no association between participants' education level and the information they received. For example, when asked what reason(s) staff gave for his need for blood, the only respondent who had completed post-secondary education answered:

> *"They said I'm pale." (Male, 36 years old, Medicine Unit, HND Accountancy)*

Another respondent with junior high school education answered:

> *"They told me I am anaemic and need blood." (Male, 45 years old, Medicine Unit, JHS)*

Insufficient amount of blood

A second popular reason given to patients needing blood transfusions was they had an insufficient amount of blood or had lost a considerable amount of blood. Again, there was no association between education attainment and information received, as described by participants. Only one respondent had completed SHS. Both men and women were transfused due to loss/shortage of blood and at the time of interview and these patients were admitted in the A&E, Medicine, Surgery and O&G units. 'Loss of blood' was the most common reason for transfusion by patients in the Surgery unit.

> *"I was told I would need blood because in the operation I lost a lot of blood and I need blood to replace it." (Male, 38 years, Surgery Unit, SHS).*

> *"They say I don't have enough blood […] the blood transfusion will help me gain blood" (Male, 50 years, A&E, <Primary School)*

No reason

According to some respondents, they did not receive any information as to why they were being transfused. When probed further as to whether they asked staff questions about the transfusion, only one participant sought additional information regarding the need for blood.

Other reasons

Jaundice

There was one case of neo-natal jaundice observed. The mother of a baby boy five days old was told that her child needed blood because he had jaundice. According to the respondent:

> *"They said the child needs blood because of jaundice." (Female, No age, Secondary*

school, Child Health)

Cancer

A 62 year old female participant in the Oncology unit was told that she was receiving blood because she has cancer. The participant, however, had forgotten which type of cancer and said her son knew this information.

Information patients received regarding blood transfusions

No information

All participants were asked whether they were made aware of their blood transfusion and if so, when they were told and what information they were given. Aside from the reason(s) for transfusion, the majority of respondents claimed to have received no information about blood transfusions. When further probed, a few listed some benefits and a couple were advised to pay attention to adverse reactions.

Other information

Benefits

Some patients were told that following blood transfusion their condition or symptoms (e.g. low Hb) would improve. For example:

> *"They said if he receives the transfusion the symptoms of jaundice will decrease" (Female, No age, Secondary school, Child Health)*

> *"I was told I would need blood because in the operation I lost a lot of blood and I need blood to replace it." (Male, 38 years, Surgery, SHS)*

"I was told I would be strong." (Male, 26 years, Medicine, SHS – currently enrolled in university)

Potential adverse reactions

Two participants were indirectly made aware that they may experience some adverse reactions. According to one respondent:

"I was told if I experienced any difficulty during transfusion to tell staff, but I didn't have any difficulty." (Female, 22 years, O&G, SHS)

The second participants was more specifically advised:

"[…] if when I get blood it is itching to let them know" (Male, 56 years, Surgery, JHS)

Information patients requested from staff (i.e. nurses or doctors) regarding blood transfusions

<u>None</u>

Most of the patients interviewed did not pose staff any questions relating to blood transfusions. When probed as to why not, patients said they had nothing to ask:

"I was told I was pale so I didn't have any other questions."

"I had nothing in mind to ask them"

Towards the end of each interview patients were asked if there were any other blood transfusion related issues they would like to discuss. Two participants discussed experiencing an adverse reaction during or post transfusion (e.g. itching). These respondents were asked whether they have made any of the staff aware of this.

According to a pregnant woman in O&G suffering from severe anaemia:

> *"I felt dizzy after the blood transfusion" [Female, 24 years, O&G, JHS].*

According to the patient she did not make any staff members aware of this because *"It went away on its own".*

Another patient responded:

> *"After blood transfusion my stomach has become big. Itching started last night. There was no doctor so I told the nurses and they paid no attention." [Female, 70 years, O&G, JHS].*

<u>Other information</u>

Blood Group

One patient asked the nurse transfusing him what blood group he was receiving. The patient was aware of his blood group and wanted to ensure that he was receiving the same group.

Purpose of the transfusion

One of the participants asked staff why he needed the transfusion and was told he would get better. According to the patient, this was a satisfactory response.

Necessity of transfusion

One patient remained unconvinced regarding the need for transfusion and was at first hesitant to consent to transfusion. According to this patient:

"[…] I asked them whether it was necessary.[…] That yes it would me because my Hb was not high enough. At first I didn't want the transfusion but after the explanation I accepted it." (Female, 41 years, Surgery, Not provided)

Adverse Reaction

One mother brought to the attention of a doctor a potential adverse reaction the child may have suffered as a result of transfusion:

"One day after transfusion there were rashes on his stomach. I told the doctor. I am waiting to hear from doctor". [Patient: Male, 3 years, Child Health, NA; Respondent was the child's mother: Female, unknown, NA, primary school]

8.3.3.2 Difficulties associated with the transfusion according to participants

None

The majority of participants responded that they had no difficulties with regards to obtaining blood or the transfusion itself. According to these participants, it did not take long for them to receive the blood. When further probed as to how long it took, the answers varied from "about five minutes" to "the next day", indicating the time elapsed from when the patient first found out they would require a blood transfusion to when the transfusion began. One patient responded:

"They went to collect the blood but it wasn't ready but it didn't take long […] 2-3 hours" (Female, 41 years, Surgery, Not provided)

Another patient similarly responded:

"[…] it took about 2 hours […] To me it is not long." (Female, 35 years, Surgery, JHS)

Time elapsed in obtaining blood for transfusion

While the majority of patients did not express any difficulties with obtaining blood, according to three participants it took long to receive the blood, with the time ranging from one to three and a half hours. All three patients were admitted in the A&E unit. One patient responded:

> *"Three and a half hours […] it's a long time!" (Male, 50 years, A&E, Form 4)*

Another patient similarly responded:

> "*It took an hour to get blood. It took long." (Male, 24 years, A&E, SHS).*

Other

Difficulty finding a vein

One participant discussed difficulties staff had with finding her child's vein. She said:

> *"They had a difficult time inserting the needle." (Female (patient's mother), unknown, Child Health, Primary)*

Weakness

One mother mentioned that her child was *"weak and crying"* when probed about any difficulties experienced with regards to the blood transfusion.

8.3.3.3 Securing replacement donors: Patients' perspectives

Of the twenty-four patients who took part in this study, seventeen were requested by hospital staff to find one or more replacement donors, 11/17 of whom were male. 5/17 were admitted to the Surgery unit, 4/17 to Medicine, 3/17 to A&E, 3/17 to O&G and 2/17 to Child Health (see Figure 8.2). Every patient interviewed in the Surgery unit was asked to find replacement donors. Note, in this study, none of the surgical patients were in for elective surgery. The number of transfusions these patients had received at the time of interview ranged from one to five, with the average being 2.6 blood transfusions. Highest level of education achieved by these participants ranged from primary to post-secondary.

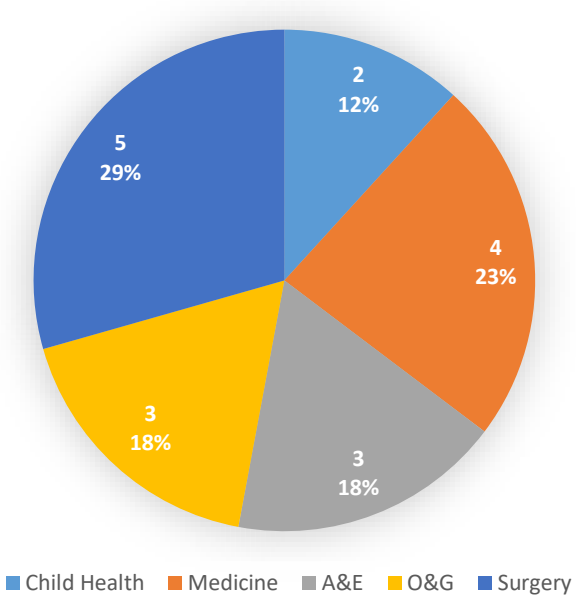


Figure 8.2. Distribution of participants requested to find one or more replacement donors according to unit admitted in

At the time of interview, six patients had not been requested to secure a replacement donor, 4/6 of who were male. 5/6 of these patients were admitted in the Child Health unit and 1/6 in O&G. 4/6 of the patients had only received one transfusion while the remaining two patients had received two and three transfusions each. The average number of blood transfusion patients, who were not approached to find a replacement donor, received was

1.5. Education level among these participants ranged from nil to JHS.

One female patient from the oncology ward with primary school education and who had received five transfusions was unsure as information concerning her transfusion was given to her son.

Timing of replacement donors' blood donation with regards to patients' blood transfusions

Pre-Transfusion

Some patients were asked to secure replacement donors before their blood transfusion. This was most common among surgical patients, particularly for scheduled surgeries. The time elapsed between donation and transfusion varied. For example, one donor with a scheduled surgery said:

> *"They donated one week before my operation" (Male, 38 years, Surgery, SHS)*

In contrast, another donor received the blood one day after his replacement donor donated.

Between multiple transfusions

Patients receiving multiple units were often asked to find replacement donors as needed. As patients received additional blood transfusions they were asked to find additional replacement donors. For example:

> *"After the first one my brother came, after the second my other brother came, after the 3rd one my sister came and after the 4th another sister came. Any time I was given blood I was told I have to find someone to come and replace." (Female, 22 years, O&G, SHS)*

> *"I was first asked a week ago. I brought someone before the first transfusion. Then asked*

to bring two more people as needed." (Male, 56 years, Surgery, JHS)

In one case, the patient received the first unit before finding a replacement donor but required additional transfusions and was told to find donors. According to this patient:

"I got the first unit in 30 minutes. But they told me to get two people to come and donate blood. No one has come. I am still waiting for donors." (Female, 39, O&G, JHS).

Post-Transfusion

Patients were sometimes asked to find a replacement donor post-transfusion. This was the case for one of the patients admitted in the Child Health unit:

"My husband donated after my child's transfusion" (Female [patient's mother], unknown, Child Health, SHS)

Number of people patients approached to donate blood

The number of people that patients or their caregivers approached to act as replacement donors ranged from zero to six, whereas the number of people who successfully donated blood for a given patient ranged from zero to four. One patient was unable to find anyone to donate blood. Another patient was asked to find three replacement donors, but three had low Hb and could not donate therefore he approached three more individuals. In contrast, in some cases patients were able to find more replacement donors than requested.

Relationship between patients and replacement donors

Immediate Family

Most patients interviewed requested their immediate family members to act as their replacement donors. This included parents, siblings and children.

Extended Family

In some cases the replacement donors secured were more distantly related to the patient. For example, nieces, nephews, in-laws and other relatives donated for some of the patients interviewed.

Other

Friends

In rare cases, patients said their friends or family's friends had donated blood for them

Tenants

In one case, the replacement donors for the patient were her tenants.

Difficulty securing replacement donors?

"No difficulties"

The majority of participants interviewed stated that they did not encounter any difficulties in finding the requested number of replacement donors. These patients relied on immediate family, extended family and friends to act as replacement donors. The number of donors these patients were requested to find varied from one to four.

"Some difficulty"

Some patients did express some difficulties in finding replacement donors. The number of transfusions these patients received and the number of replacement donors they were requested to find varied between one and four. Most common was that the patient did not know anyone available to ask. Below are examples of these patients' responses:

> *"Yes. It is difficult. I live alone." (Male, 26 years, A&E, SHS)*

> *"My husband and two brothers are not around so I asked tenants. I don't know when they will come." (Female, 39 years, O&G, JHS)*

In one case, the patient had successfully found three replacement donors, but struggling to secure a fourth, as requested:

> *"[No difficulties] to get the first three. My husband has now gone to our hometown in the Western region to find the fourth." (Female, 35 years, Surgery, JHS).*

In another isolated case the patient suggested that he was having difficulty finding replacement donors who possessed the same blood type as the patient.

> *"Yes. I have B+ and their blood is not B+. If they had B+ I could take their blood." (Male, 50 years, A&E, Primary)*

Gift/compensations provided by patients to replacement donors

Donors were asked whether they had or would consider giving any type of gift or compensation to their replacement donors. Below are the results:

None

Most patients said that they would not give their replacement donors any gifts or compensation. Generally this was due to the close relationship patients had with the donors, and thus patients did not feel obliged to provide any compensation. For example:

> *"No [I did not give them anything] because they are my brothers and sisters." (Female, 22 years, O&G, SHS)*

> *"Oh, they are my good friend. I don't have to give." (Male, 36 years, Medicine, post-secondary)*

Other

Food – In some cases patients provided or planned to give their replacement donors with food items such as local food or soda drinks. In these cases, donors did not ask for any food items and patients provided this free willingly. For example:

> *"If they donate I will give them milo or malt […] no, [the donors] did not ask for anything." (Female, 39 years, O&G, JHS)*

Money – There were cases where patients compensated (or were willing to compensate) their donors with money. In one case the donor was having difficulty finding replacement donors and said he would be willing to negotiate a price with potential donors, though he was unsure of what would be a fair price. In another case, the patient's grandmother gave the patient 10 Ghana Cedis to give to the donor (the patient's brother-in-law), though the donor had not requested anything. In an isolated case, the patient provided monetary compensation to the donor because the donors had asked for it. According to this patient:

"I gave food before and after I will give money […] I gave them Banku, 40 cedis per donor […] the donors asked for the money." (Male, 38 years, Surgery, SHS)

In the above case, the three donors were the patient's brother and cousins. In total the patient paid 120 cedis for three replacement donors. The patient's own income was quoted as 20-30 cedis per day, meaning the patient spent 4-6 days worth of income to secure three replacement donors.

Unsure - In a couple of cases the patients were unsure if the donors had been provided with anything as their family members had helped find and secure the donors.

8.3.3.4 Patient incurred costs associated with blood transfusion according to participants

Unaware of any costs

Unanimously, all participants were unaware of any costs associated with the blood transfusion. One participant had been told there may be lab costs but was not told an amount. Another participant responded that he had not been told about any costs but speculated that they would be added to the final bill.

8.3.3.5 Patients feelings regarding transfusion

Interestingly, none of the patients expressed any fears or concerns regarding their transfusion. Their main interest was for their health to improve and the fact that the clinicians had told them that the transfusion would help them was enough to satisfy them. When one patient was asked if and why he consented to a blood transfusion, he responded"

"Yes, I did. He told me I am anaemic. I was told I would be strong [post transfusion]" (26 year old male patient in Medicine Unit)

As mentioned in Chapter 2, there are some people who believe that donating blood might lead them to become infected with HIV or hepatitis, yet this was not a concern mentioned by any of the patients. This suggests either a high level of trust in the clinicians and health care system or fear of asking more details or lack of knowledge regarding transfusions.

One patient was particularly concerned about some symptoms he experienced during and post transfusion:

> *"I [was] told I lost a lot of blood. […]. After getting the blood I had difficulty stretching my leg. […] It is better than before, but during the transfusion I sometimes felt a bit of dizziness" (40 year old male patient based in the Medicine Unit; Transfused 5 times during that hospital visit at the time of interview)*

The same patient was asked whether he made the staff aware of the symptoms, and he replied 'no'. The fact that the patient divulged this information to me and none of the staff members suggests that perhaps patients are less likely to share this information on their own and need to be asked specifically whether they are experiencing any symptoms.

8.4 Discussion

8.4.1 Communication between hospital staff and patients receiving blood transfusions

There is limited information concerning communication between hospital staff and patients in Ghana, including the challenges both parties face. Ensuring patients understand their health situation and treatment options is crucial to achieving improved treatment adherence and better outcomes. While the focus of this study is blood transfusions, the results from the

patient interviews highlight some positive links of communications between staff and patients while also revealing the presence of a communication gap, which may be present in other aspects of patient care.

8.4.1.1 Obtaining informed consent

Obtaining informed consent is a commonly recommended guideline in national blood policies. Informed consent requires that patients have a good understanding of the procedure at hand. The results from the interviews with physicians and patients indicate that generally at KATH oral consent for blood transfusion is obtained from patients, though not enforced. There did not appear to be any relation between a doctor's ranking and his/her responses.

8.4.1.2 Explaining the need for blood

According to the patients interviewed, most were made aware prior to transfusion that they required blood and were further explained the need for transfusion. This is an important aspect in obtaining consent. The information provided did not appear to be influenced by a patient gender, age or socioeconomic group. While it appears that the information provided to patients is not extensive, it is important that patients receive information that can be easily comprehended by those with poor health literacy.

There were, however, a few cases where patients were not told why they required blood. This may be due to numerous reasons such as limited staff resources, or the patient was not coherent or conscious. Regardless, from ethical and policy standpoints, it is imperative that staff members strive to ensure patients are well versed in their need for blood prior to consenting to the transfusion.

8.4.1.3 Lack of communication about the risks of blood transfusion

While patients were commonly made aware of their need for transfusion, they were not made aware of the risks of transfusion. Paling (2003) argues "Effective risk communication is the basis for informed patient consent for medical treatment". Indeed, patient understanding of both the benefits and risks of a treatment is imperative before a patient can provide informed consent. Additionally, educating patients on potential adverse reactions can help them and their caregivers identify early symptoms and report them to the health care staff, therefore potentially improving patient care and outcome.

According to some of the doctors interviewed, patients are explained the risks or adverse reactions associated with blood transfusions. However, other doctors openly admitted that the risks are not often discussed with patients. This may be due to the difficulty in explaining risks to those with poor health literacy. For example, a study in Mali researching challenges in obtaining informed consent found that 93% of the participants in a malaria vaccine trial did not have a good understanding of the study's side effects (Krosin et al., 2006). It is also possible that doctors limit providing patients with information on the risks of transfusion as they fear it will deter the patient from treatment even when risks are minimal, There are ways to effectively communicate the risks of treatment and their probabilities. For example, doctors are advised to communicated the risk of a medical procedure to the risks associated with a common every day task (e.g. driving) (Edwards, 2003; Picano, 2004).

Interestingly, according to one doctor interviewed, risks were not always explained because more literate patients or parents may ask more questions, suggesting that the doctor was not entirely willing to spend more time explaining the risks obtaining informed consent, a scenario Picano (2004) describes among radiologists.

Based on Paling's definition, the results from patient and physician interviews indicate that informed consent is not consistently sought among patients receiving blood transfusions at KATH. Not only is consent itself not always sought, but also patients not always properly informed about the transfusion. While it can be difficult to adequately explain health and risks benefits of a treatment to those with limited health literacy, efforts must be made to do

so using appropriate jargon. Health care providers must work together to adequately inform patients of the risks and benefits of treatment and test patients' understanding to ensure they have truly understood before requesting consent from patients.

8.4.1.4 Informed consent for underage patients

Note that two of the doctors who said informed consent is not routinely sought were based in the Child Health unit. This may be due to the laws that govern child health, as stated in 'The Children's Act: Act 560' by the Republic of Ghana(1998) where doctors do not require parents' consent if a procedure or treatment is deemed to be in the child's best interest.

8.4.1.5 Patient Staff Communication Pathway

Interestingly, the vast majority of patient participants did not approach staff with any questions about their blood transfusion. This may be due to the fact that they were satisfied with the information provided. However, since most patients interviewed were unaware of the risks associated with blood transfusion, it is possible that they were unsure of what to ask, assumed that they have been provided with all the necessary information or were uncomfortable asking staff questions. When probed as to why patients did not pose staff questions about their transfusions, most patients responded that they had nothing to ask.

There were cases where patients experienced a potential adverse reaction during or post transfusion but did not report them to staff members. According to one patient he didn't want to bother the staff while another stated that he was paid no attention. One patient said the symptoms 'went away on [their] own'. These responses may indicate a gap in patient-staff communication. Patients should feel comfortable in asking hospital staff questions and should feel that their concerns will be heard and addressed. Additionally, patients must not feel that their concerns are unimportant as they may neglect to communicate important details that may affect their health.

8.4.2 Patients' experiences securing replacement donors

Replacement donors remain common in most African countries and account for a considerable proportion of donors at KATH (34.3%), in spite of the hospital's many initiatives to collect blood from volunteer donors. 75% of the patients interviewed were asked to find at least one replacement donor. The majority of patients who were not approached to find replacement donors were admitted in the Child Health unit. This was interesting given that while children often require less volume of blood, the Child Health unit accounts for a large proportion of blood usage at KATH. All patients interviewed in the surgery unit, however, were asked to find replacement donors. In some cases the surgery was scheduled and thus these patients may have more time to secure a donor.

Time of year the interviews were conducted will also have affected who was asked to donate. During peak donation periods, patients will have been less likely to be asked to secure replacement donors. Interviews with physicians show that there is no specific policy on when to ask patients to find donors. Some may ask after every transfusion, some ask if the patient has received multiple transfusions (often knowing the blood bank will request for blood) and others only ask if the blood bank requests the patient secure replacement donors (this generally occurs when blood stocks are low).

There did not appear to be a link between patient/caregiver education level or household income and whether they were asked to find a replacement donor, suggesting that there is likely little to no discrimination on who is asked to find donors based on socioeconomic status.

8.4.2.1 Relationship between patients and replacement donors

Most patients' replacement donors were immediate family members. In some cases they were extended family or friends and in rarer cases they were associated through business or work or the donor was unable to find replacement donors.

These results highlight the importance of family in Ghana. Also, in most cases patients said they had little difficulty finding replacement donors. When probed as to whether they would provide gifts or compensation to the donors, most patients replied 'No', explaining that the donors were good friends or close family. This is an important finding as there has been little research in the area of patient experience in securing donors. Advocates of 100% voluntary donors sometimes argue that finding a replacement donor adds to the patient's burden, but the qualitative results from this study that for many this is not the case. This may not be true in other locations but it suggests that there is an important place for replacement donors in Ghana. Studies have shown that they are no less safe than first time volunteer donors and if most patients do not find it difficult to secure replacement donors, in a country like Ghana where there is difficulty meeting blood demands, it may prove worthwhile to continue to include replacement donors.

The KATH has an interesting policy where patients are provided with blood regardless of whether they find donors, *so long as the blood is available*. Thus, patients are not compelled to find donors, and when they do, it can be argued that they are volunteers. Staff do, however, need to communicate with patients to determine whether they are experiencing difficulties in finding donors and take appropriate steps. In a couple of cases, patients found more donors than transfusions they received. Encouraging patients to bring in more donors than the patient required may be one way of limiting times when blood is unavailable.

8.4.2.1 Gifts and compensation from patients to replacement donors

As noted above, most patients did not provide their donors with any gifts and compensations. Some gave their donors something to eat, drink or a small amount of money as a thank you, but this was not requested by donors and was done free willing by patients. Thus, it can be considered more as a gesture of appreciation rather than compensation. There were, however, some cases where patients admitted to compensating donors because they had asked for money or where patients struggling to find replacement donors said they

would be willing to negotiate a price with potential donors. This illustrates that in spite of the hospital's best efforts to eliminate paid donation, it still occurs. It is therefore important that staff encourage patients to communicate with them if they are having difficulties finding donors. In such cases, it might be better to waive this request for such patients. Also, asking donors periodically whether they have had to compensate donors may help identify potential risky units from paid donors before they are transfused.

8.4.3 Patient awareness of costs associated with blood transfusions

None of the patients interviewed were aware of any costs associated with blood transfusions. At KATH, patients are not charged for the blood, but they are charged 30 Ghana Cedis for blood grouping and testing. Some patients stated that they expected to find out about any costs when their final bill is prepared suggesting that they were more concerned with their total medical costs.

8.5 Limitations

There are some limitations to the interviews conducted with patients, which may impact the results. They are listed below.

1. Interviews were conducted with patients 24-48 hours post transfusion. Consequently, the information recorded is based on a patient's knowledge during that time period. It is possible that patients were later approached by staff a) to find a replacement donor or b) with information about the costs associated with blood transfusion.
2. Most patient interviews were conducted in Twi. While follow up questions were asked to ensure translation was correct, it is possible that certain elements may not translate to English appropriately.
3. Interviews were conducted at different times of the year, thus blood stock levels would vary and influence which patients were asked to find a replacement donor.

8.6 Suggested guidelines to supplement existing policy

Below is a list of proposed guidelines to aid in the implementation of existing policy and to improve transfusion patients' experiences.

1. Ensure informed consent is sought when possible (e.g. patient is conscious)
2. Develop and implement a framework across the hospital outlining exactly what information must be provided to patients to obtain informed consent. E.g.
    - Why is a blood transfusion needed?
    - What are the benefits of a transfusion
    - What are the risks associated with transfusion?
3. Educate patients and their caregivers on potential adverse reactions associated with blood transfusions and when to alert health care staff
4. Create an open and safe patient-staff communication atmosphere. Some suggestions to achieve this are:
    - Keep patients thoroughly up to date on their care using appropriate jargon
    - Encourage patients to ask questions and to take part in the decision making process of their medial treatment
    - Address patients needs and concerns in a timely manner
5. During blood shortages, advise all units and staff involved with transfusions to encourage patients receiving blood to secure replacement donors
6. Actively communicate with patients to determine whether they are having any difficulties finding replacement donors. In such cases, reassure the patient that in critical cases they will receive blood even if they have not secured any replacement donors, so long as the blood is available.

8.7 Conclusion

Educating patients on the risks associated with blood transfusion and obtaining informed consent are important in providing patients with the tools needed to make appropriate decisions about their medical care. To achieve this, more efforts are needed to improve communication between health care staff and patients. Though most participants did not find it difficult to secure a replacement donor, there were some who struggled and these people were more likely to provide some type of financial or material incentive to secure donors. Thus, while replacement donors should not be excluded when blood is needed, staff members must communicate frequently with patients to identify those at risk of securing donors using financial or material incentives.

Chapter 9 –Discussions and Conclusions

9.1 Summary of findings

The review of Ghanaian and other African national blood policy documents highlighted that many of the common policies in place are non-specific and can be implemented in a variety of ways. Each national blood service, must therefore, conduct local research and assess how to implement the policies in a manner that best meets their population's needs.

At KATH, donor counselling was regularly conducted, but the results from donor interviews indicated preferential areas of counselling from donors. Most notably donors wanted to know more about their general health status and learn more about the donation process as well as post donation care. By encouraging open communication with donors and regularly requesting donors for their input on donor counselling and the donation process, donor staff can continuously update their counselling framework to best meet donor needs.

An estimated 20% of donors in this study did not complete the donation process. 50% of these (therefore 10% overall) were permanently deferred due to a positive HIV, HBV or HCV test. The remaining were either temporarily deferred due to low haemoglobin, hypertension or voluntarily left before completing the donation process. As discussed in Chapter 6, it is unclear exactly what the cut-off criteria for donors should be. To prevent unnecessary donor deferrals, clinicians and policy makers must work together to identify whether certain biological criteria (for example the systolic blood pressure cut off) can be *safely* modified to reduce the number of temporary deferrals. Staff members should also direct their efforts at encouraging temporary deferrals to return, as studies have shown they are less likely to. Finally, though a small number, 1.2% of donors left before making a donation. More research is needed to understand why this occurs so that it can be prevented in the future.

Component usage is growing in KATH and this has been shown to be true elsewhere in Africa. Results from the interviews with prescribing doctors showed that doctors appreciate the

availability of components at KATH and would prescribe them more often than they do now, if they were always available. Ghana and other African nations will have to continuously reassess their population's transfusion needs as the continent experiences a shift from increased prevalence of infectious and communicable disease to an increased prevalence of chronic diseases. However, national blood services will need to consider their resource limitations and determine how to maintain the best patient outcomes.

Finally, while patients seem satisfied with their transfusions, the evidence from this study shows that greater efforts need to be directed at ensuring patients are made aware of the risks and benefits of transfusions and that proper consent is sought. As discussed in section 3.5.1, it can be difficult to determine to what extent patients should be made aware of the risks of an intervention. The information provided should be based on the patient's needs, current situation and values. The benefit of informing patients and their families of the common side effects and complications of blood transfusions is that they can also self-monitor and raise alarm if any transfusion reactions occur. Interestingly, overall, patients did not find it as troublesome to secure replacement donors as I had anticipated. This is an important finding because Africa and other LMICs continue to rely on replacement donors to maintain their blood stocks. If patients find this difficult, the added stress may reduce their ability to heal as quickly. However, this does not appear to be the case in Kumasi, which may be due to a number of factors including the fact that KATH does not demand a replacement donor be found prior to transfusion and the fact that the family and community aspect of life is very strong in Ghana.

9.2 Limitations of the study

To begin with, only 15 national blood policy documents were obtained – representing approximately one third of Africa. Moreover, I did not receive responses from some of the people contacted in blood service departments. Thus, a) I was unable to determine if there is an actual paucity of national blood policy documents in Africa or if I was just unable to obtain them and b) it means the sub-objectives I developed are based on the policy

documents of a limited number of African countries. Any potential bias occurring from b) was limited by also reviewing WHO policy documents.

In terms of better understanding the pros and cons of how things run in the donor clinic, it would have been useful to also incorporate the health care assistant perspective, but as mentioned earlier, they were less willing to participate in the study. Consequently, it meant that my qualitative data was obtained from 'higher ranked' staff who may be more or less likely to give a fair critique of the system, depending on how involved they were in developing it.

In order to obtain more qualitative data, I chose to focus on one study site – KATH. The limitation of this is that it reduces the generalisability of the study. However, one point I've tried to highlight in this thesis is that more regional or even hospital based studies are needed, because while some things may be common to a region, individual hospitals will serve a unique population and will therefore have their own unique needs to which a more general national policy will need to be tailored to.

Another key limitation was the inability to adequately assess blood component demand as only the first request in a seven-day period was recorded at the blood bank. As mentioned earlier, a computerised system will help greatly in record keeping and data collection at KATH and will provide the hospital with a more accurate estimate of their needs so they can plan their mobile sessions and component production more precisely.

9.3 Study strengths

One of the strengths of this study is that it examined blood transfusions services from a holistic lens by looking at all vein-to-vein policies. By looking at the entire process form donation to transfusion, I was able to identify if there were any gaps in policy. This later informed sub-objectives 1-4, allowing for multiple parties' views and perspectives to be shared. For example, in this study I obtained information from blood donors, transfusion

patients, clinicians prescribing blood transfusions, donor clinic staff members and laboratory staff involved in grouping, cross-matching and component production.

The mixed methods methodology used in this study helped to provide a deeper understanding of the vein-to-vein process. The collection and analyses of quantitative data helped illustrate current trends in donor deferrals and component production and usage. It also highlighted weaker areas of record keeping, such as only recording the initial request for a blood component for a patient, which was important, as addressing this will aid the blood bank in collecting more accurate data with regards to blood component demands at KATH. The use of semi-structured interviews and focus groups as data collecting tools meant that I could collect more detailed information as well as clarify points that were unclear and further probe relevant points.

9.4 Implications of findings

1. Feasibility of WHO's 100% volunteer, non-remunerated donor recommendations

The WHO and 14/15 of the African national blood policy documents reviewed recommended that blood be exclusively collected from VNRD. As discussed in Chapter 2, this is recommendation is rooted in the belief that volunteer donors are safer than replacement donors, but currently the evidence indicates that this is untrue. While repeat donors have been shown to be the safest, there is no difference in blood safety between first time volunteer donors and first time replacement donors. There is, however, evidence that paid donors remain unsafe.

Nevertheless, African blood services continue to be working towards a 100% VNRD pool, in spite of replacement donors being common. The results from interviews with replacement donors in this study indicate that donating for a friend or family member is a considerable motivating factor. Moreover, interviews with patients showed that in most cases patients did not find it difficult to secure a replacement donor. The interviews with patients indicate that

paid donation does still occur, but it appeared to be rare. This might be due to KATH's policy of giving blood when needed (and if available), and asking for replacement donors after. Given that blood supply remains a challenging issue in most countries, African blood services should consider focusing on making replacement donors repeat donors rather than discouraging them from donating.

One intervention that saw success in New Zealand was to inform donors of their blood type and the percentage of people in the national population with their blood type who donate blood. Those with O- blood (universal donors) were also given information about the advantages of their blood type. Donors who received this information were 43% more likely to return than those who did not (Chamla et al., 2006). A similar intervention could be employed in Ghana via text message or phone calls. The intervention could also be delivered during donor counselling if the donor's blood type is already known.

2. Increasing the donor pool by altering donor selection criteria

A study examining variations in blood pressure, weight and haemoglobin level selection criteria is necessary to determine criteria thresholds that are accurate, safe and yet as inclusive as possible. This study would require implementing different cut off points based on the variations seen in policy documents and in the literature and recording the number of adverse events following donation to determine whether altering the criteria does in fact impact donor health. To my knowledge no such study has ever been done and would be instrumental in a) providing evidence for the donor criteria set and b) limiting the number of temporary donor deferrals while maintaining donor safety.

3. Meeting the demand for components

Currently, KATH is working towards increasing component production. At the start of this study it was unclear the extent to which there was demand for blood components and for whole blood. However, the responses from clinicians clearly indicate that there is a demand for components that is still not being fully met and thus the blood bank at KATH is on the

right track. One suggestion, however, would be for the blood bank to record every single request for blood in a computer based system so that they can more accurately assess the demand for components and whole blood and aim to meet that demand. The production of components is costly and in countries with limited financial resources as well as storage issues, it is important resources are not wasted in producing a supply of components that exceeds demand.

9.5 Conclusion

International policy documents, like those published by the WHO, are helpful in providing a starting point or structure to national blood services, but it is important to recognise that different regions have different needs and thus the same approach will not produce the same results everywhere. The results from this study provide context specific information about blood transfusion services at KATH, which can help them implement national blood policies in a way that addresses their needs. Africa, however, is a large and diverse continent and it is impossible to know whether the recommendations made in this thesis would be helpful elsewhere. Thus, similar studies should be conducted across the African continent to better understand local needs so that policies can be developed and implemented in a manner that meets the given populations' needs.

References

National blood policy documents reviewed

Government of Malawi - Ministry of Health, (2012). *Guidelines for safe blood transfusion*.

La République de Madagascar - Ministère de la Santé, (1999). *Politique nationale de la transfusion sanguine a Madagascar*.

Lesotho Blood Transfusion Services - Ministry of Health and Social Welfare, (2006). *National Blood Transfusion Policy*.

Ministère de la Santé du Bénin, (n.d.). *Manuel Qualité du SNTS*.

Nigerian Federal Ministry of Health - National Blood Transfusion Service, (2006). *Nigerian National Blood Policy*.

Republic of Ghana - Ministry of Health, (2006). *National Blood Policy for the Health Sector*.

Republic of Namibia - Ministry of Health and Social Services, (2007). *National Blood Policy*.

Republic of Uganda - Ministry of Health, (2005). *National Blood Transfusion Policy*.

Republic of Zimbabwe, (n.d.). *National Blood Policy of the Republic Of Zimbabwe*.

République Algérienne Démocratique et Populaire Ministère de la Santé, de la Population et de la Reforme Hospitalière: Agence de Sang, (2005). *Les bonnes pratiques transfusionnelles*. République Algérienne Démocratique et Populaire Ministère de la Santé.

République du Cameroun - Ministère de la Santé Publique, (2012). *Politique Nationale de Transfusion Sanguine*.

République du Sénégal: Ministère de la Santé et de la Prévention Médical - Centre National de transfusion Sanguine, (2006). *Politique nationale de transfusion sanguine du Senegal*.

République Togolaise - Ministère de la Santé, (1999). *Politique Nationale de Transfusion Sanguine*.

The United Republic of Tanzania Ministry of Health, (2005). *Tanzania National Blood Transfusion Service Policy Guidelines*.

Western Province Blood Transfusion Service (WPBTS) and South African National Blood Service (SANBS), (2013). *Standards of Practice for Blood Transfusion in South Africa – 6th edition*.

Other references

Addo, J., Agyemang, C., Smeeth, L., de-Graft Aikins, A., Edusei, A. and Ogedegbe, O. (2012). A review of population-based studies on hypertension in Ghana. *Ghana Medical Journal*, 46(2 (Supplemental), pp.4-11.

Adjei, A., Kudzi, W., Armah, H., Adiku, T., Amoah, A. and Ansah, J. (2003). Prevalence of antibodies to syphilis among blood donors in Accra, Ghana. *Japanese Journal of Infectious Disease*, 13(4), pp.260-265.

AfSBT, 2011. *Africa Society for Blood Transfusion.* [online} Available at: <http://www.afsbt.org/index.php > [Accessed 28 August 2012].

Agbovi, K., Kolou, M., Fétéké, L., Haudrechy, D., North, M. and Ségbéna, A. (2017). *Étude des connaissances, attitudes et pratiques en matière de don de sang. Enquête sociologique dans la population de Lomé (Togo)*.

Alaishuski, L., Grim, R. and Domen, R. (2008). The informed consent process in whole blood donation. *Archives of Pathology & Laboratory Medicine*, 132(6), pp.947-951.

Alinon, K., Gbati, K., Sorum, P. and Mullet, E. (2013). Emotional-motivational barriers to blood donation among Togolese adults: a structural approach. *Transfusion Medicine*, 24(1), pp.21-26.

Allain, J. (2011). Moving on from voluntary non-remunerated donors: who is the best blood donor?. *British Journal of Haematology*, 154(6), pp.763-769.

Allain, J., Owusu-Ofori, S. and Bates, I. (2004). Blood Transfusion in Sub-Saharan Africa. *Transfusion Alternatives in Transfusion Medicine*, 6(1), pp.16-23.

Allain, J., Sarkodie, F., Asenso-Mensah, K. and Owusu-Ofori, S. (2010). Relative safety of first-time volunteer and replacement donors in West Africa. *Transfusion*, 50(2), pp.340-343.

Allain, J., Sarkodie, F., Boateng, P., Asenso, K., Kyeremateng, E. and Owusu-Ofori, S. (2008). A pool of repeat blood donors can be generated with little expense to the blood center in sub-Saharan Africa. *Transfusion*, 48(4), pp.735-741.

American Red Cross. (2016). *Red Cross Encourages Type O Negative Blood Donors to Give*. [online] Available at: http:// [Accessed 19 Jan. 2017].

Ampofo, W., Nii-Trebi, N., Ansah, J., Abe, K., Naito, H., Aidoo, S., Nuvor, V., Brandful, J., Yamamoto, N., Ofori-Adjei, D. and Ishikawa, K. (2002). Prevalence of Blood-Borne Infectious Diseases in Blood Donors in Ghana. *Journal of Clinical Microbiology*, 40(9), pp.3523-3525.

Anon, (2008). *World Health Statistics*. [online] Available at: http://www.who.int/gho/publications/world_health_statistics/EN_WHS08_Full.pdf [Accessed 6 Oct. 2014].

Arslan, Ö. (2007). Whole blood donor deferral rate and characteristics of the Turkish population. *Transfusion Medicine*, 17(5), pp.379-383.

Bahadur, S., Jain, S., Goel, R., Pahuja, S. and Jain, M. (2009). Analysis of blood donor deferral characteristics in Delhi, India. *The Southeast Asian Journal of Tropical Medicine and Public Health*, 40(5), pp.1087-1091.

Baig, M., Habib, H., Haji, A., Alsharief, F., Noor, A. and Makki, R. (2013). Knowledge, misconceptions and motivations towards blood donation among university students in Saudi Arabia. *Pakistan Journal of Medical Sciences*, 29(6).

Bani, M. and Giussani, B. (2010). Gender differences in giving blood: a review of the literature. *Blood Transfusion*, 8(4), pp.278-287.

Barimah, K. and Mensah, J. (2013). Ghana's National Health Insurance Scheme: Insights from Members, Administrators and Health Care Providers. *Journal of Health Care for the Poor and Underserved*, 24(3), pp.1378-1390.

Bates, I. and Hassall, O. (2010). Should we neglect or nurture replacement blood donors in sub-Saharan Africa?. *Biologicals*, 38(1), pp.65-67.

Bates, I., Chapotera, G., McKew, S. and van den Broek, N. (2008). Maternal mortality in sub-Saharan Africa: the contribution of ineffective blood transfusion services. *BJOG: An International Journal of Obstetrics & Gynaecology*, 115(11), pp.1331-1339.

Bates, I., Manyasi, G. and Lara, A. (2007). Reducing replacement donors in Sub-Saharan Africa: challenges and affordability. *Transfusion Medicine*, 17(6), pp.434-442.

Beutler, E. (2005). Hematologic differences between African-Americans and whites: the roles of iron deficiency and -thalassemia on hemoglobin levels and mean corpuscular volume. *Blood*, 106(2), pp.740-745.

Blanchet, N., Fink, G. and Osei-Akoto, I. (2012). The Effect of Ghana's National Health Insurance Scheme on Health Care Utilisation. *Ghana Medical Journal*, 46(2), pp.76-84.

Bloch, E., Vermeulen, M. and Murphy, E. (2012). Blood Transfusion Safety in Africa: A Literature Review of Infectious Disease and Organizational Challenges. *Transfusion Medicine Reviews*, 26(2), pp.164-180.

Bugge, H., Karlsen, N., Oydna, E., Rake, M., Wexels, N., Bendabenda, J., Roald, B., Heier, H., Chisuwo, L. and Jourdan, P. (2012). A study of blood transfusion services at a district hospital in Malawi. *Vox Sanguinis*, 104(1), pp.37-45.

CFIR – Consolidated Framework for Implementation Research. (2009). [online] Available at: http://www.cfirguide.org/ [Accessed 4 Aug. 2014].

Creswell, J. (2009). *Research design*. 1st ed. Thousand Oaks, Calif.: Sage.

Chamla, J., Leland, L. and Walsh, K. (2006). Eliciting repeat blood donations: tell early career donors why their blood type is special and more will give again. *Vox Sanguinis*, 90(4), pp.302-307.

Cunha, L., Plouzeau, C., Ingrand, P., Gudo, J., Ingrand, I., Mondlane, J., Beauchant, M. and Agius, G. (2007). Use of replacement blood donors to study the epidemiology of major blood-borne viruses in the general population of Maputo, Mozambique. *Journal of Medical Virology*, 79(12), pp.1832-1840.

Custer, B., Chinn, A., Hirschler, N., Busch, M. and Murphy, E. (2007). The consequences of temporary deferral on future whole blood donation. *Transfusion*, 47(8), pp.1514-1523.

Custer, B., Schlumpf, K., Wright, D., Simon, T., Wilkinson, S. and Ness, P. (2010). Donor return after temporary deferral. *Transfusion*, 51(6), pp.1188-1196.

Data.worldbank.org. (2017). *Ghana | Data*. [online] Available at: http://data.worldbank.org/country/ghana [Accessed 22 Nov. 2012].

de-Graft Aikins, A. (2007). Ghana's neglected chronic disease epidemic: a developmental challenge. *Ghana Medical Journal*, 41(4), pp.154-159.

Diarra, A., Kouriba, B., Baby, M., Murphy, E. and Lefrere, J. (2009). HIV, HCV, HBV and syphilis rate of positive donations among blood donations in Mali: Lower rates among volunteer blood donors. *Transfusion Clinique et Biologique*, 16(5-6), pp.444-447.

Dolea, C., AbouZahr, C. and Stein, C. (2003). *Global burden of maternal haemorrhage in the year 2000*. [online] World Health Organization. Available at: http://www.who.int/healthinfo/statistics/bod_maternalhaemorrhage.pdf [Accessed 12 Nov. 2012].

Drislane, F., Akpalu, A. and Wegdam, H. (2014). The Medical System in Ghana. *The Yale Journal of Biology and Medicine*, 87(3), pp.321-326.

Duboz, P., Macia, E. and Cunéo, B. (2010). Sociodemographic and attitudinal factors to blood donation in the urban population of Dakar, Senegal. *Transfusion*, 50(12), pp.2713-2720.

Edwards, A. (2003). Communicating risks. *BMJ*, 327(7417), pp.691-692.

Eligibility for blood donation. (2009). 1st ed. Washington, DC: Pan American Health Organization, p.42.

Field, S. and Allain, J. (2007). Transfusion in sub-Saharan Africa: does a Western model fit?. *Journal of Clinical Pathology*, 60(10), pp.1073-1075.

France, C., France, J., Kowalsky, J. and Cornett, T. (2010). Education in donation coping strategies encourages individuals to give blood: further evaluation of a donor recruitment brochure. *Transfusion*, 50(1), pp.85-91.

Fuenfer, M., Creamer, K. and Lenhart, M. (2010). *Pediatric surgery and medicine for hostile environments*. Washington, DC: Borden Institute, Walter Reed Army Medical Center.

Ghana AIDS Commission, (2014). *2014 Status Report*. [online] Available at: http://www.ghanaids.gov.gh/gac1/pubs/2014%20STATUS%20REPORT.pdf [Accessed 12 Apr. 2016].

Ghanahealthservice.org. (2015). *About Us | Ghana Health Service*. [online] Available at: http://www.ghanahealthservice.org/ghs-category.php?cid=2 [Accessed 10 Jul. 2015].

GMC (2017). *GMC | Consent guidance: Discussing side effects, complications and other risks*. [online] Available at: https://www.gmc-uk.org/guidance/ethical_guidance/consent_guidance_discussing_side_effects_and_complications.asp [Accessed 10 Nov. 2017].

Guirguis-Younger, M., Runnels, V., Aubry, T. and Turnbull, J. (2006). Carrying out a social autopsy of deaths of persons who are homeless. *Evaluation and Program Planning*, 29(1), pp.44-54.

Hensher, M. and Jefferys, E. (2000). Financing blood transfusion services in sub-Saharan Africa: a role for user fees?. *Health Policy and Planning*, 15(3), pp.287-295.

Hijji, B., Parahoo, K., Hussein, M. and Barr, O. (2012). Knowledge of blood transfusion among nurses. *Journal of Clinical Nursing*, 22(17-18), pp.2536-2550.

Hopkins, W. (1998). *Sportscience: Quantitative Research Design*. [online] Sportsci.org. Available at: http://www.sportsci.org/resource/design/design.html [Accessed 23 Nov. 2012].

Jacobs, B. and Mercer, A. (1999). Feasibility of Hospital-Based Blood Banking: A Tanzanian Case Study. *Health Policy and Planning*, 14(4), pp.354-362.

Javadzadeh Shahshahani, H. (2007). Why don't women volunteer to give blood? A study of knowledge, attitude and practice of women about blood donation, Yazd, Iran, 2005. *Transfusion Medicine*, 17(6), pp.451-454.

Javadzadeh Shahshahani, H., Yavari, M., Attar, M. and Ahmadiy?h, M. (2006). Knowledge, attitude and practice study about blood donation in the urban population of Yazd, Iran, 2004. *Transfusion Medicine*, 16(6), pp.403-409.

Karp, J. and King, K. (2010). International variation in volunteer whole blood donor eligibility criteria. *Transfusion*, 50(2), pp.507-513.

Kasraian, L. and Maghsudlu, M. (2012). Blood donors' attitudes towards incentives: influence on motivation to donate. *Blood Transfusion*, 10(2), pp.186-190.

Kimani, D., Mwangi, J., Mwangi, M., Bunnell, R., Kellogg, T., Oluoch, T., Gichangi, A., Kaiser, R., Mugo, N., Odongo, T., Oduor, M. and Marum, L. (2011). Blood donors in Kenya: a comparison of voluntary and family replacement donors based on a population-based survey. *Vox Sanguinis*, 100(2), pp.212-218.

Komfo Anokye Teaching Hospital. (2015). *About us: Our History*. [online] Available at: http://www.kathhsp.org/about.html [Accessed 19 Aug. 2015].

Komfo Anokye Teaching Hospital. (2011). *Komfo Anokye Teaching Hospital Annual Report – 2011: Chapter 18: Transfusion Medicine Unit.*

Koster, J. and Hassall, O. (2011). Attitudes towards blood donation and transfusion in Bamenda, Republic of Cameroon. *Transfusion Medicine*, 21(5), pp.301-307.

Kotoh, A. and Van der Geest, S. (2016). Why are the poor less covered in Ghana's national health insurance? A critical analysis of policy and practice. *International Journal for Equity in Health*, 15(1).

Kouao, M., Dembelé, B., N'Goran, L., Konaté, S., Bloch, E., Murphy, E. and Lefrère, J. (2012). Reasons for blood donation deferral in sub-Saharan Africa: experience in Ivory Coast. *Transfusion*, 52(7pt2), pp.1602-1606.

Krosin, M., Klitzman, R., Levin, B., Cheng, J. and Ranney, M. (2006). Problems in comprehension of informed consent in rural and peri-urban Mali, West Africa. *Clinical Trials*, 3(3), pp.306-313.

Lal, R. and Stewart, B. (2012). *Soil water and agronomic productivity*. 1st ed. Boca Raton, FL: CRC Press, p.30.

Laperche, S. (2012). Multinational assessment of blood-borne virus testing and transfusion safety on the African continent. *Transfusion*, 53(4), pp.816-826.

Lara, A., Kandulu, J., Chisuwo, L., Kashoti, A., Mundy, C. and Bates, I. (2007). Laboratory costs of a hospital-based blood transfusion service in Malawi. *Journal of Clinical Pathology*, 60(10), pp.1117-1120.

Loua, A. and Nze Nkoure, G. (2010). Relative safety of first-time volunteer and replacement donors in Guinea. *Transfusion*, 50(8), pp.1850-1851.

Lownik, E., Riley, E., Konstenius, T., Riley, W. and McCullough, J. (2012). Knowledge, attitudes and practices surveys of blood donation in developing countries. *Vox Sanguinis*, 103(1), pp.64-74.

Maghsudlu, M., Nasizadeh, S., Abolghasemi, H. and Ahmadyar, S. (2009). Blood donation and donor recruitment in Iran from 1998 through 2007: ten years' experience. *Transfusion*, 49(11), pp.2346-2351.

Mayo Clinic. (2016). *Blood donation Risks - Mayo Clinic*. [online] Available at: http://www.mayoclinic.org/tests-procedures/blood-donation/basics/risks/prc-20020069 [Accessed 7 Dec. 2016].

Mbanya, D., Takam, D. and Ndumbe, P. (2003). Serological findings amongst first-time blood donors in Yaounde, Cameroon: is safe donation a reality or a myth?. *Transfusion Medicine*, 13(5), pp.267-273.

Messina, J., Humphreys, I., Flaxman, A., Brown, A., Cooke, G., Pybus, O. and Barnes, E. (2014). Global distribution and prevalence of hepatitis C virus genotypes. *Hepatology*, 61(1), pp.77-87.

Minga, A., Dohoun, L., Abo, Y., Coulibaly, A., Konaté, S., Ouattara, H., N'Guessan, B., Dabis, F., Salamon, R. and Lewden, C. (2010). Risk behaviors in volunteer blood donors who seroconverted for HIV, Abidjan, Côte d'Ivoire 1997 to 2005. *Transfusion*, 50(4), pp.888-893.

Moore, A., Herrera, G., Nyamongo, J., Lackritz, E., Granade, T., Nahlen, B., Oloo, A., Opondo, G., Muga, R. and Janssen, R. (2001). Estimated risk of HIV transmission by blood transfusion in Kenya. *The Lancet*, 358(9282), pp.657-660.

Murray, C. and Lopez, A. (1996). *The global burden of disease*. 1st ed. [Cambridge, Mass.]: Published by the Harvard School of Public Health on behalf of the World Health Organization and the World Bank.

Nair, S. and Mammen, J. (2015). Repeat voluntary non-remunerated blood donor is the best quality indicator for blood safety. *Indian Journal of Medical Research*, 141(6), p.749.

National Blood Service, Ghana, (2009). *Clinical Blood Transfusion Policy*.

National Blood Service (Ghana). (2017). *National Blood Service, Ghana — Providing Safe Blood That Saves Lives*. [online] Available at: http://nbsghana.org [Accessed 31 Jan. 2017].

Nchinda, E., Tagny, C. and Mbanya, D. (2012). Blood donor haemovigilance in Yaoundé, Cameroon. *Transfusion Medicine*, 22(4), pp.257-261.

Nébié, K., Olinger, C., Kafando, E., Dahourou, H., Diallo, S., Kientega, Y., Domo, Y., Kienou, K., Ouattara, S., Sawadogo, I., Ky, L. and Muller, C. (2007). Faible niveau de connaissances des donneurs de sang au Burkina Faso ; une entrave potentielle à la sécurité transfusionnelle. *Transfusion Clinique et Biologique*, 14(5), pp.446-452.

Nébié, K., Ouattara, S., Sanou, M., Kientega, Y., Dahourou, H., Ky, L., Kienou, K., Diallo, S., Bigirimana, F., Fretz, C., Murphy, E. and Lefrère, J. (2011). Poor procedures and quality control among nonaffiliated blood centers in Burkina Faso: an argument for expanding the reach of the national blood transfusion center. *Transfusion*, 51(7pt2), pp.1613-1618.

NHIA. (2015). *National Health Insurance Scheme*. [online] Available at: http://www.nhis.gov.gh/nhia.aspx [Accessed 23 Oct. 2015].

NHS Blood and Transplant. (2016). *Blood components*. [online] Available at: https://www.blood.co.uk/why-give-blood/how-blood-is-used/blood-components/ [Accessed 18 Oct. 2016].

Nkrumah, B., Owusu, M. and Averu, P. (2011). Hepatitis B and C viral infections among blood donors. A retrospective study from a rural community of Ghana. *BMC Research Notes*, 4(1), p.529.

Nwagbo, D., Nwakoby, B., Akpala, C., Chukudebelu, W., Ikeme, A., Okaro, J., Onah, B., Okeke, V., Egbuciem, P. and Ikeagu, A. (1997). Establishing a blood bank at a small hospital, in Anambra State, Nigeria. *International Journal of Gynecology & Obstetrics*, 59, pp.S135-S139.

Nyarwornota, V., Aryeetey, R., Bosomprah, S. and Aikins, M. (2013). An Exploratory Study of Physical Activity and Over-Weight in Two Senior High Schools in The Accra Metropolis. *Ghana Medical Journal*, 47(4), pp.197-203.

Osaro, E., Isaac, Z., Abdulrahaman, Y., Ndakotsu, M., Ikhuenbor, D. B., Aghedo, F., Ibrahim, K. K. and Ibrahim, S.(2013). Female Gender Participation in the Blood Donation Process in Resource Poor Settings: Case study of Sokoto in North Western Nigeria. *Journal of Blood Disorders & Transfusion*, 05(01).

Olaiya, M., Alakija, W., Ajala, A. and Olatunji, R. (2004). Knowledge, attitudes, beliefs and motivations towards blood donations among blood donors in Lagos, Nigeria. *Transfusion Medicine*, 14(1), pp.13-17.

Osaro, E. and Adias, T. (2011). The challenges of meeting the blood transfusion requirements in Sub-Saharan Africa: the need for the development of alternatives to allogenic blood. *Journal of Blood Medicine*, p.7.

Owusu-Ofori, S., Temple, J., Sarkodie, F., Anokwa, M., Candotti, D. and Allain, J. (2005). Predonation screening of blood donors with rapid tests: implementation and efficacy of a novel approach to blood safety in resource-poor settings. *Transfusion*, 45(2), pp.133-140.

Palinkas, L., Horwitz, S., Green, C., Wisdom, J., Duan, N. and Hoagwood, K. (2013). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), pp.533-544.

Palmboom, G., Willems, D., Janssen, N. and de Haes, J. (2007). Doctor's views on disclosing or withholding information on low risks of complication. *Journal of Medical Ethics*, 33(2), pp.67-70.

Picano, E. (2004). Informed consent and communication of risk from radiological and nuclear medicine examinations: how to escape from a communication inferno. *BMJ*, 329(7470), pp.849-851.

Pitman, J., Wilkinson, R., Liu, Y., von Finckenstein, B., Smit Sibinga, C., Lowrance, D., Marfin, A., Postma, M., Mataranyika, M. and Basavaraju, S. (2015). Blood Component Use in a Sub-Saharan African Country: Results of a 4-Year Evaluation of Diagnoses Associated With Transfusion Orders in Namibia. *Transfusion Medicine Reviews*, 29(1), pp.45-51.

Planet, L. (2017). *Map of Ghana*. [online] Lonelyplanet.com. Available at: http://www.lonelyplanet.com/maps/africa/ghana/ [Accessed 17 Feb. 2013].

Polonsky, M., Renzaho, A. and Brijnath, B. (2011). Barriers to blood donation in African communities in Australia: the role of home and host country culture and experience. *Transfusion*, 51(8), pp.1809-1819.

Pottle, J., Staves, J. and Curry, N. (2011). Transfusion delays: an audit of transfusion practice for major blood loss in a UK teaching hospital. *Transfusion Medicine*, 22(1), pp.71-72.

Reddy, R. (2012). Blood donation patterns and challenges in Southern Africa. *ISBT Science Series*, 7(1), pp.296-299.

Reich, P., Roberts, P., Laabs, N., Chinn, A., McEvoy, P., Hirschler, N. and Murphy, E. (2006). A randomized trial of blood donor recruitment strategies. *Transfusion*, 46(7), pp.1090-1096.

Republic of Ghana, (1998). *https://doi.org/10.1136/bmj.329.7470.849*.

Republic of Ghana, (1998). *The Children's Act*.

Roysam, V. (2017). *We were denied blood until we got donors: the dark side of blood donation no one talks about*. [online] YourStory.com. Available at: https://yourstory.com/2017/06/replacement-blood-donation/ [Accessed 10 Oct. 2017].

S., Uma, R., Arun and P., Arumugam. (2013). The Knowledge, Attitude and Practice Towards Blood Donation Among Voluntary Blood Donors in Chennai, India. *Journal of Clinical and Diagnostic Research*.

Salaudeen, A. and Odeh, E. (2011). Knowledge and behavior towards voluntary blood donation among students of a tertiary institution in Nigeria. *Nigerian Journal of Clinical Practice*, 14(3), p.303.

Sengeh, P., Samai, O., Sidique, S., Kebbie, A., Fofana, P. and Stephens, S. (1997). Improving blood availability in a district hospital, Bo, Sierra Leone. *International Journal of Gynecology & Obstetrics*, 59, pp.S127-S134.

South African National Blood Service, (2012). *Integrated blood safety*.

Spinella, P., Perkins, J., Grathwohl, K., Beekley, A. and Holcomb, J. (2009). Warm Fresh Whole Blood Is Independently Associated With Improved Survival for Patients With Combat-Related Traumatic Injuries. *The Journal of Trauma: Injury, Infection, and Critical Care*, 66(Supplement), pp.S69-S76.

StatsGhana. (2012). *Population by region, district, age groups and sex, 2010*. [online] Available at: http://www.statsghana.gov.gh/docfiles/pop_by_region_district_age_groups_and_sex_2010.pdf [Accessed 13 Jan. 2013].

StatsGhana. (2012). *2010 Population & Housing Census: Summary Report of Final Results*. [online] Available at: http://www.statsghana.gov.gh/docfiles/2010phc/Census2010_Summary_report_of_final_results.pdf [Accessed 22 Jan. 2013].

Systematic review identifies main causes of maternal mortality and morbidity. (2005). *Progress Report in Reproductive Health*, 71, pp.5-8.

Tagny, C., Mbanya, D., Tapko, J. and Lefrère, J. (2008). Blood safety in Sub-Saharan Africa: a multi-factorial problem. *Transfusion*, 48(6), pp.1256-1261.

Tagny, C., Owusu-Ofori, S., Mbanya, D. and Deneys, V. (2010). The blood donor in sub-Saharan Africa: a review. *Transfusion Medicine*, 20(1), pp.1-10.

Tazi-Mokha, A., Soulaymani, A., Mokhtari, A. and Alami, R. (2012). Blood donation in Morocco: a 20-year retrospective study of blood collection in the Rabat blood centre. *Transfusion Medicine*, 22(3), pp.173-180.

Trouern-Trend, J., Cable, R., Badon, S., Newman, B. and Popovsky, M. (1999). A case-controlled multicenter study of vasovagal reactions in blood donors: influence of sex, age, donation status, weight, blood pressure, and pulse. *Transfusion*, 39(3), pp.316-320.

UNICEF. (2013). *At a Glance: Ghana - Statistics*. [online] Available at: https://www.unicef.org/infobycountry/ghana_statistics.html [Accessed 19 Sep. 2014].

van Hulst, M., Sagoe, K., Vermande, J., van der Schaaf, I., van der Tuuk Adriani, W., Torpey, K., Ansah, J., Mingle, J., Sibinga, C. and Postma, M. (2017). *Cost-Effectiveness of HIV Screening of Blood Donations in Accra (Ghana)*.

Walana, W., Hokey, P. and Ahiaba, S. (2014). Sero-Prevalence of Hepatitis B Virus Infection among Blood Donors: A Retrospective Study in the Kintampo Municipal Hospital, Ghana. *Open Journal of Medical Microbiology*, 04(01), pp.64-69.

Wang, W. and Dwan, K. (2013). Blood transfusion for preventing primary and secondary stroke in people with sickle cell disease. *Cochrane Database Sytematic Review*.

Wfp.org. (2016). *Ghana | WFP | United Nations World Food Programme - Fighting Hunger Worldwide*. [online] Available at: http://www.wfp.org/node/3467 [Accessed 22 Aug. 2016].

World Health Organization. (2001). *Developing a National Policy and Guidelines on the Clinical Use of Blood* [online] Available at: http://www.who.int/bloodsafety/clinical_use/en/who_bct_bts_01_3.pdf [Accessed 15 Aug. 2012].

World Health Organization. (2001). *The Clinical Use of Blood*. [online] Available at: http://www.who.int/bloodsafety/clinical_use/en/Handbook_EN.pdf [Accessed 18 Aug. 2012].

World Health Organization. (2002). *The Blood Cold Chain: Guide to the selection and procurement of equipment and accessories*. [online] Available at: http://www.who.int/medical_devices/publications/en/Blood_Cold_Chain.pdf [Accessed 15 Nov. 2012].

World Health Organization. (2003). *The Africa Malaria Report*. [online] Available at: http://whqlibdoc.who.int/hq/2003/WHO_CDS_MAL_2003.1093.pdf [Accessed 9 Oct. 2012].

World Health Organization. (2005). *Worldwide prevalence of anaemia 1993–2005*. [online] Available at: http://apps.who.int/iris/bitstream/10665/43894/1/9789241596657_eng.pdf [Accessed 16 Aug. 2014].

World Health Organization. (2007). *Blood Donations per 1000 population*. [online] Available at: http://www.who.int/mediacentre/factsheets/donations_per1000_population_20091110.pdf [Accessed 18 Aug. 2014].

World Health Organization. (2007). *Blood safety and availability*. [online] Available at: http://www.who.int/mediacentre/factsheets/fs279/en/index.html [Accessed 17 Dec. 2011].

World Health Organization. (2009). *Screening Donated Blood for Transfusion Transmissible Infections Recommendations*. [online] Available at: http://www.who.int/bloodsafety/ScreeningTTI.pdf [Accessed 15 Aug. 2012].

World Health Organization. (2010). *Towards 100% voluntary blood donation: A global framework for action*. [online] Available at: http://www.who.int/bloodsafety/publications/9789241599696_eng.pdf?ua=1 [Accessed 20 Jul. 2014].

World Health Organization. (2012). [online] Available at: http://www.who.int/malaria/high_risk_groups/infants/en/index.html [Accessed 10 Nov. 2012].

World Health Organization. (2012). *Maternal mortality*. [online] Available at: http://www.who.int/mediacentre/factsheets/fs348/en/ [Accessed 15 Aug. 2012].

World Health Organization, (2013). *Global policy report on the prevention and control of viral hepatitis in WHO member states*.

Yankah, J. (1965). Observation on the Frequency of A. B. O. and Rh Blood Groups in Leprosy and Non-Leprosy People in Ghana. *Leprosy Review*, 36(2).

Zou, S., Musavi, F., Notari, E., Rios, J., Trouern-Trend, J. and Fang, C. (2008). Donor deferral and resulting donor loss at the American Red Cross Blood Services, 2001 through 2006. *Transfusion*, 48(12), pp.2531-2539.

Appendix 1

Ethics approval from Committee on Human Research Publications and Ethics, Kwame Nkrumah University of Science and Technology

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL
COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/039/13 — 27th February, 2013.

Dr. Alex Owusu-Ofori
Department of Clinical Microbiology
Komfo Anokye teaching Hospital
KUMASI.

Dear Sir,

LETTER OF APPROVAL

Protocol Title: ***The Strengths and Weaknesses of Blood Transfusion Services in Kumasi, Ghana.***

Proposed Site: ***Komfo Anokye Teaching Hospital.***

Sponsor: ***Liverpool School of Tropical Medicine.***

Your submission to the Committee on Human Research, Publications and Ethics on the above named protocol refers.

The Committee reviewed the following documents:

- A notification letter of 19th December, 2012 from the Komfo Anokye Teaching Hospital (study site) indicating approval for the conduct of the study in the Hospital.
- A completed CHRPE Application Form.
- Participant Information Leaflet and Consent Form.
- Research Proposal.
- Questionnaire.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, renewable annually thereafter. The Committee may however, suspend or withdraw ethical approval at anytime if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at close of the project, whichever one comes first. It should also be informed of any publication arising from the study.

Thank you Sir, for your application.

Yours faithfully,

Osonfuor Prof. Sir J. W. Acheampong MD, FWACP
Chairman

Room 7 Block J, School of Medical Sciences, KNUST, University Post Office, Kumasi, Ghana
Phone: +233 3220 63248 Mobile: +233 20 5453785 Email: chrpe.knust.kath@gmail.com / chrpe@knust.edu.gh

Appendix 2

Ethics approval from Liverpool School of Tropical Medicine

LSTM
LIVERPOOL SCHOOL OF TROPICAL MEDICINE

Pembroke Place,
Liverpool, L3 5QA, UK
Tel: +44 (0)151 705 3100
Fax: +44 (0)151 705 3370

www.liv.ac.uk/lstm

Miss Veena Sharma
5611 Rand Avenue
Cote Saint-Luc
Quebec
H4W 2H4
Canada

19/02/2013

Dear Miss Sharma,

Research Protocol (13.04) The Strengths and weaknesses of blood transfusion services in Kumasi, Ghana

Thank you for your email responding to the action points requested by the Research Ethics Committee. The protocol now has formal ethical approval from the Chair of LSTM Research Ethics Committee.

The approval is for a fixed period of three years, renewable annually thereafter. The committee may suspend or withdraw ethical approval at any time if appropriate.

Approval is conditional upon:

- Submission of ethical approval from other ethics committees.
- Notification of all amendments to the protocol for approval before implementation.
- Notification of when the project actually starts.
- Provision of an annual update to the Committee. Failure to do so could result in suspension of the study without further notice.
- Reporting of all severe unexpected Adverse Events to the Committee
- Reporting of new information relevant to patient safety to the Committee
- Provision of Data Monitoring Committee reports (if applicable) to the Committee

Failure to comply with these requirements will result in withdrawal of approval. The Committee would also like to receive copies of the final report once the study is completed.

Yours sincerely

Dr Angela Obasi
Chair, Research Ethics Committee

Appendix 3

Participant Consent Form

Committee on Human Research Publication and Ethics
School of Medical Sciences, Kwame Nkrumah University of Science and Technology
Kumasi, Ghana. Tel: 233 3220 63248 or 233 20 5453785. Email: chrpe.knust.kath@gmail.com

Participant Information Leaflet and Consent Form

This leaflet must be given to all prospective participants to enable them know enough about the research before deciding to or not to participate

Title of Research: The strengths and weaknesses of transfusion services in Kumasi, Ghana.

Name(s) and affiliation(s) of researcher(s): Dr. Owusu-Ofori[1,2], Professor Imelda Bates[2], Dr. Oliver Hassall [2] and Miss Veena Sharma [2]

1 Komfo Anokye Teaching Hospital, Kumasi Ghana
2 Liverpool School of Tropical Medicine, Liverpool, UK

Background:

This study will explore the strengths and weaknesses of transfusion services in Kumasi, Ghana, particularly in accessing and providing blood transfusion services.

Purpose(s) of research: The purpose of this study is to identify the strengths and weaknesses of transfusion services in Kumasi, Ghana and to make policy recommendations aimed at improving blood transfusion services.

Procedure of the research, what shall be required of each participant and approximate total number of participants that would be involved in the research:

You are being recruited for this study because you a) are involved in blood transfusion services, b) you are receiving a blood transfusion or c) you are the family member or caregiver of a patient receiving a blood transfusion. We are looking to include all perspectives to assess the blood transfusion services at the Komfo Anokye Teaching Hospital. If you choose to participate in this study you will be asked to complete a questionnaire. You may also be interviewed and invited to participate in a focus group. During this time you will be able to share your experiences relating to transfusion services at the hospital. Please note, interviews and focus groups will be audio recorded, but rest assured your responses will remain confidential. We expect to recruit approximately 325 participants.

Risk(s):

There are no known physical or psychological risks. The information provided by participants will not impact the health care you receive or jeopardize your career. Any information you provide will be confidential. You may always choose not to respond to questions that make you uncomfortable and you may withdraw from the study at any time.

Benefit(s):

The ultimate goal of this project is to make policy recommendations aimed at improving transfusion services. Thus, this study has the potential to benefit future KATH patients and staff.

Confidentiality:

All data will remain confidential. No names will be used. Instead, you will be provided with a unique personal identification number.

Voluntariness:

Participation in this study is completely voluntary. You are not obligated to take part.

Alternatives to participation:

If you choose not to participate, the health services you receive will not be impacted as a result. For staff members who choose not to participate, rest assured your career will not be jeopardized.

Withdrawal from the research:

You do not have to answer any questions you find uncomfortable. You may withdraw from the study at any point without explanation.

Consequence of Withdrawal:

There will not be any consequences as a result of withdrawing from the study. Your health care will not affected, nor will your career. However, any responses already provided may be used in the study. They will, of course, remain confidential and anonymous.

Costs/Compensation:

There is no compensation for participating in this study.

Contacts:
If you have any question concerning this study, please do not hesitate to contact Dr. Owusu-Ofori at 0209149370.

Further, if you have any concern about the conduct of this study, your welfare or your rights as a research participant, you may contact:

The Chairman
Committee on Human Research and Publication Ethics
Kumasi Tel: 03220 63248 or 020 5453785

CONSENT FORM

Statement of person obtaining informed consent:
I have fully explained this research to _____ and have given sufficient information about the study, including that on procedures, risks and benefits, to enable the prospective participant make an informed decision to or not to participate.

DATE: _____ NAME: _____

Statement of person giving consent:
I have read the information on this study/research or have had it translated into a language I understand. I have also talked it over with the interviewer to my satisfaction.

I understand that my participation is voluntary (not compulsory).

I know enough about the purpose, methods, risks and benefits of the research study to decide that I want to take part in it.

I understand that I may freely stop being part of this study at any time without having to explain myself.

I have received a copy of this information leaflet and consent form to keep for myself.

NAME:_____

DATE: _____ SIGNATURE/THUMB PRINT: _____

Statement of person witnessing consent (Process for Non-Literate Participants):

I _____ (Name of Witness) certify that information given to

_____ (Name of Participant), in the local language, is a true reflection of what l have read from the study Participant Information Leaflet, attached.

WITNESS' SIGNATURE (maintain if participant is non-literate): _____

MOTHER'S SIGNATURE (maintain if participant is under 18 years): _____

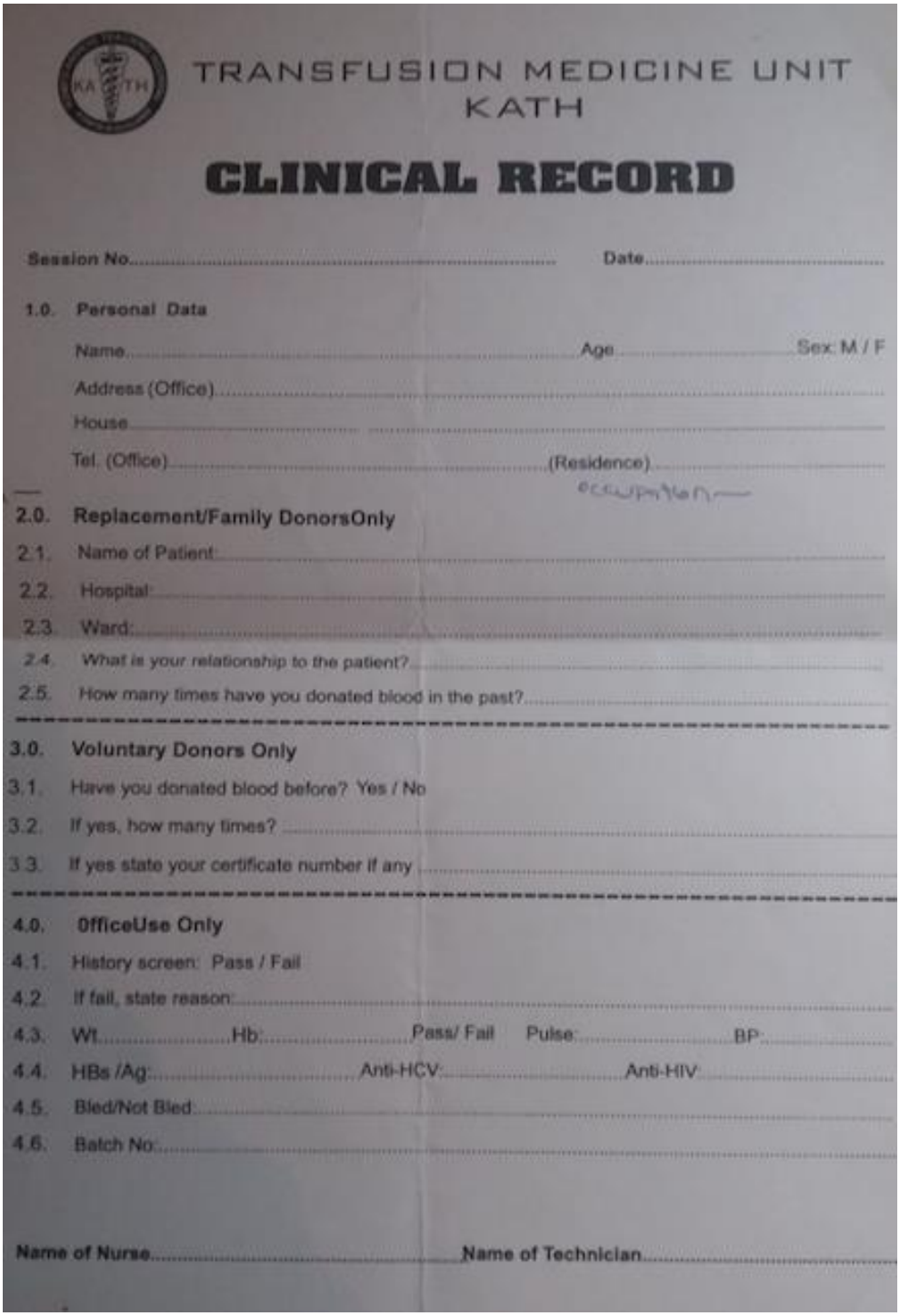
MOTHER'S NAME: _____

FATHER'S SIGNATURE (maintain if participant is under 18 years): _____

FATHER'S NAME: _____

Appendix 4

Donor Clinical Record Form



TRANSFUSION MEDICINE UNIT
KATH

CLINICAL RECORD

Session No..... Date.....

1.0. **Personal Data**

Name..... Age..... Sex: M / F

Address (Office).....

House.....

Tel. (Office)..... (Residence).....

occupation

2.0. **Replacement/Family DonorsOnly**

2.1. Name of Patient:.....

2.2. Hospital:.....

2.3. Ward:.....

2.4. What is your relationship to the patient?.....

2.5. How many times have you donated blood in the past?.....

3.0. **Voluntary Donors Only**

3.1. Have you donated blood before? Yes / No

3.2. If yes, how many times? .....

3.3. If yes state your certificate number if any .....

4.0. **OfficeUse Only**

4.1. History screen: Pass / Fail

4.2. If fail, state reason:.....

4.3. Wt.....Hb:.....Pass/ Fail Pulse:.....BP:.....

4.4. HBs /Ag:..... Anti-HCV:..... Anti-HIV:.....

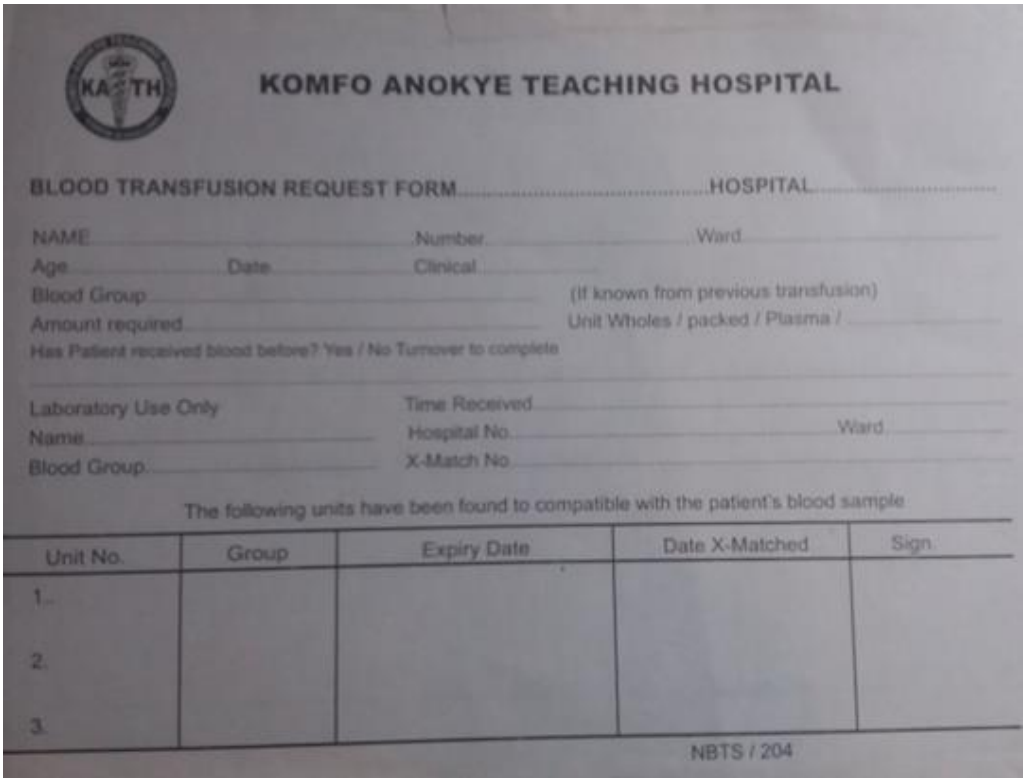
4.5. Bled/Not Bled:.....

4.6. Batch No:.....

Name of Nurse..... Name of Technician.....

Appendix 5

Transfusion Request Form



KOMFO ANOKYE TEACHING HOSPITAL

BLOOD TRANSFUSION REQUEST FORM.....HOSPITAL.....

NAME.....Number.....Ward.....

Age.....Date.....Clinical.....

Blood Group.....(If known from previous transfusion)

Amount required.....Unit Wholes / packed / Plasma /.....

Has Patient received blood before? Yes / No Turnover to complete

Laboratory Use Only Time Received.....

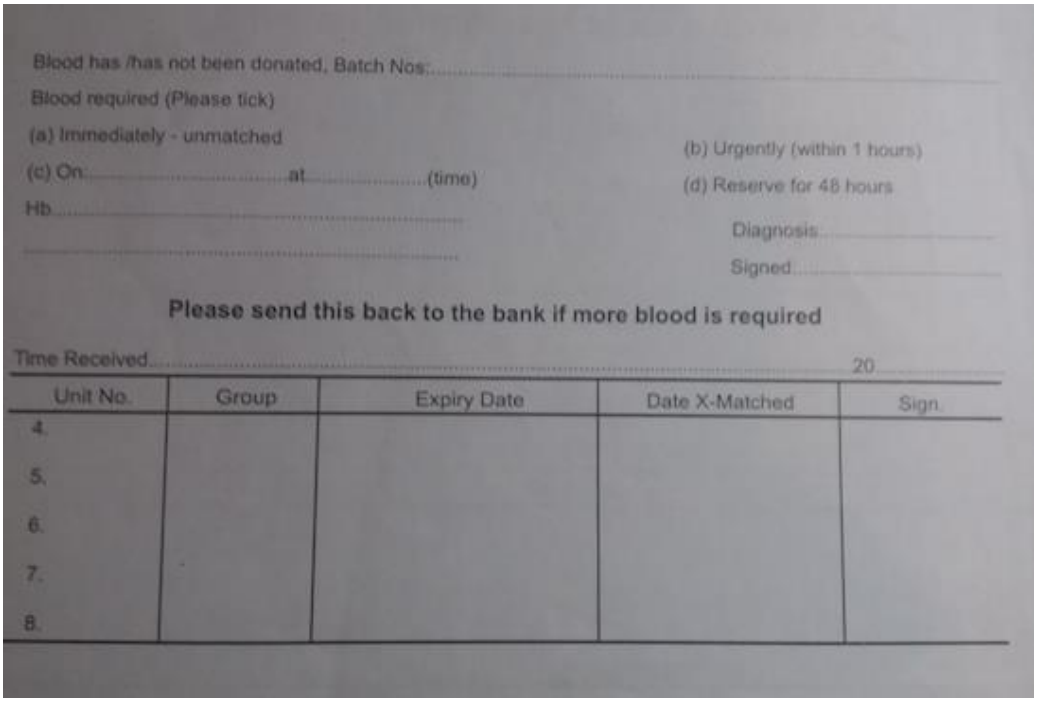
Name.....Hospital No.....Ward.....

Blood Group.....X-Match No.....

The following units have been found to compatible with the patient's blood sample

Unit No.	Group	Expiry Date	Date X-Matched	Sign.
1.				
2.				
3.				

NBTS / 204



Blood has /has not been donated, Batch Nos:.....

Blood required (Please tick)

(a) Immediately - unmatched (b) Urgently (within 1 hours)

(c) On.....at.....(time) (d) Reserve for 48 hours

Hb.....Diagnosis.....

.....Signed.....

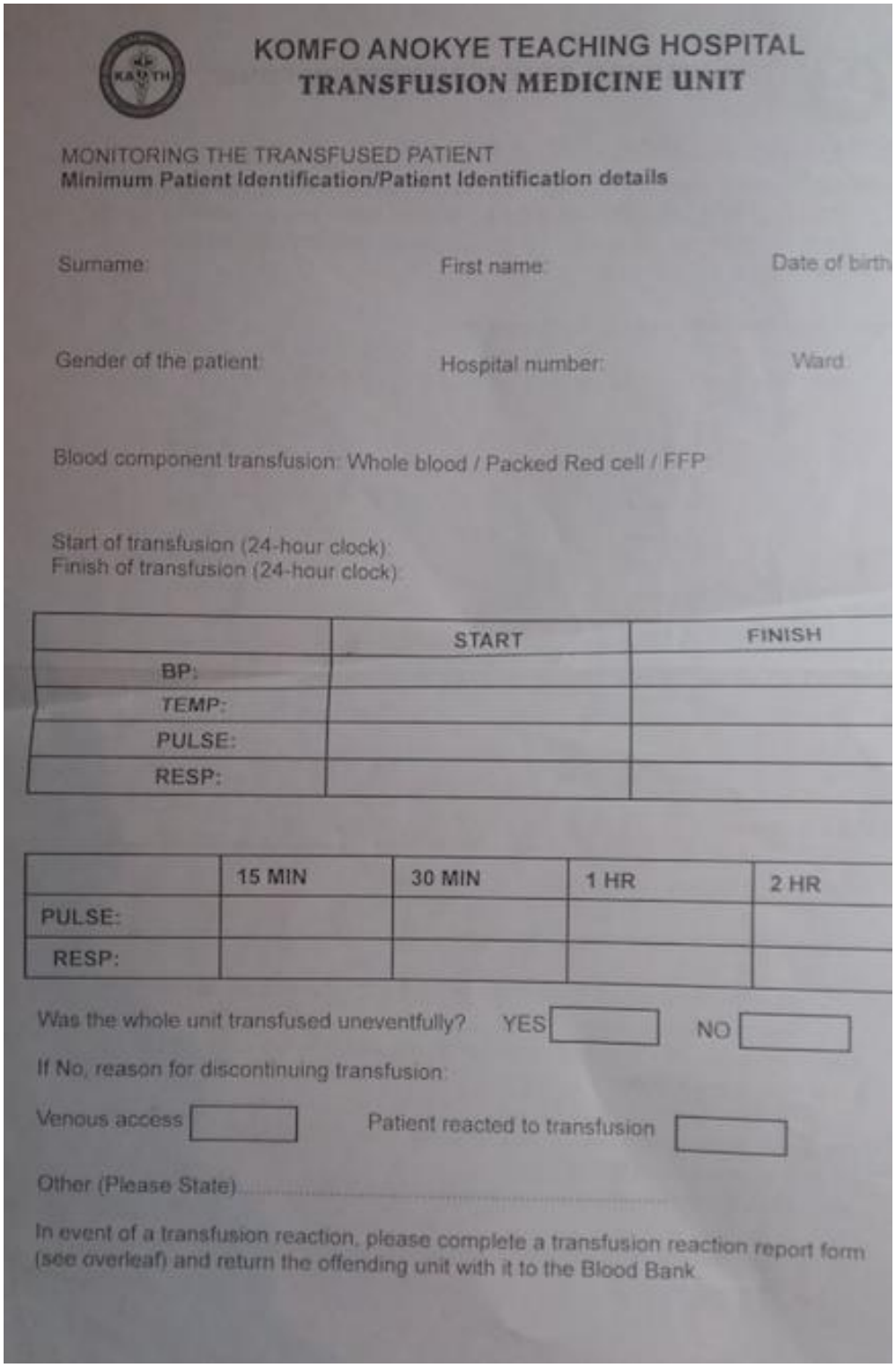
Please send this back to the bank if more blood is required

Time Received.....20.....

Unit No.	Group	Expiry Date	Date X-Matched	Sign.
4.				
5.				
6.				
7.				
8.				

Appendix 6

Transfusion Monitoring Form



KOMFO ANOKYE TEACHING HOSPITAL
TRANSFUSION MEDICINE UNIT

MONITORING THE TRANSFUSED PATIENT
Minimum Patient Identification/Patient Identification details

Surname: First name: Date of birth

Gender of the patient: Hospital number: Ward:

Blood component transfusion: Whole blood / Packed Red cell / FFP

Start of transfusion (24-hour clock):
Finish of transfusion (24-hour clock):

	START	FINISH
BP:		
TEMP:		
PULSE:		
RESP:		

	15 MIN	30 MIN	1 HR	2 HR
PULSE:				
RESP:				

Was the whole unit transfused uneventfully? YES ☐ NO ☐

If No, reason for discontinuing transfusion:

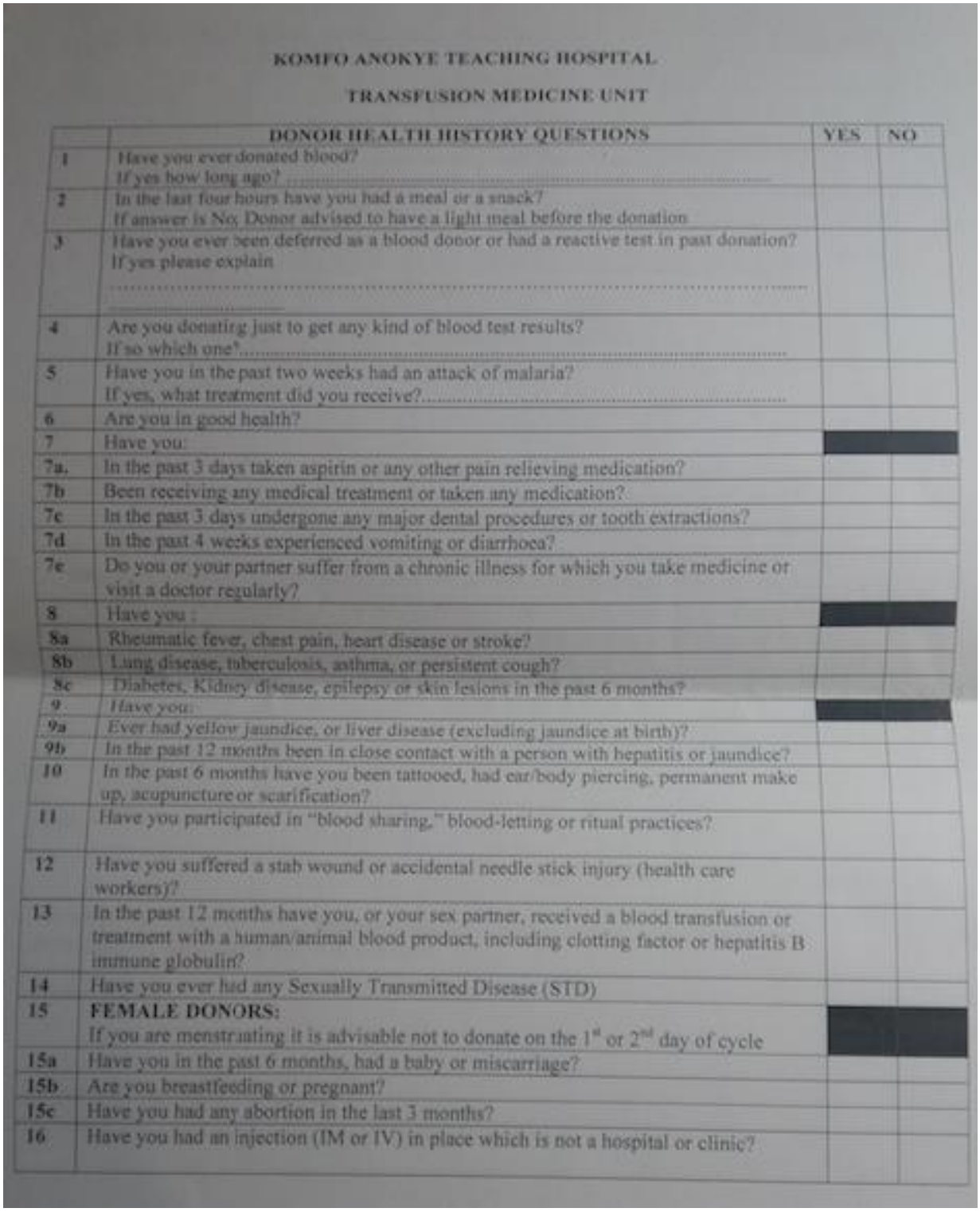
Venous access ☐ Patient reacted to transfusion ☐

Other (Please State) .....

In event of a transfusion reaction, please complete a transfusion reaction report form (see overleaf) and return the offending unit with it to the Blood Bank.

Appendix 7

Donor health and risk assessment



KOMFO ANOKYE TEACHING HOSPITAL

TRANSFUSION MEDICINE UNIT

	DONOR HEALTH HISTORY QUESTIONS	YES	NO
1	Have you ever donated blood? If yes how long ago?		
2	In the last four hours have you had a meal or a snack? If answer is No; Donor advised to have a light meal before the donation		
3	Have you ever been deferred as a blood donor or had a reactive test in past donation? If yes please explain		
4	Are you donating just to get any kind of blood test results? If so which one?.....		
5	Have you in the past two weeks had an attack of malaria? If yes, what treatment did you receive?.....		
6	Are you in good health?		
7	Have you:		
7a.	In the past 3 days taken aspirin or any other pain relieving medication?		
7b	Been receiving any medical treatment or taken any medication?		
7c	In the past 3 days undergone any major dental procedures or tooth extractions?		
7d	In the past 4 weeks experienced vomiting or diarrhoea?		
7e	Do you or your partner suffer from a chronic illness for which you take medicine or visit a doctor regularly?		
8	Have you :		
8a	Rheumatic fever, chest pain, heart disease or stroke?		
8b	Lung disease, tuberculosis, asthma, or persistent cough?		
8c	Diabetes, Kidney disease, epilepsy or skin lesions in the past 6 months?		
9	Have you:		
9a	Ever had yellow jaundice, or liver disease (excluding jaundice at birth)?		
9b	In the past 12 months been in close contact with a person with hepatitis or jaundice?		
10	In the past 6 months have you been tattooed, had ear/body piercing, permanent make up, acupuncture or scarification?		
11	Have you participated in "blood sharing," blood-letting or ritual practices?		
12	Have you suffered a stab wound or accidental needle stick injury (health care workers)?		
13	In the past 12 months have you, or your sex partner, received a blood transfusion or treatment with a human/animal blood product, including clotting factor or hepatitis B immune globulin?		
14	Have you ever had any Sexually Transmitted Disease (STD)		
15	FEMALE DONORS: If you are menstruating it is advisable not to donate on the 1st or 2nd day of cycle		
15a	Have you in the past 6 months, had a baby or miscarriage?		
15b	Are you breastfeeding or pregnant?		
15c	Have you had any abortion in the last 3 months?		
16	Have you had an injection (IM or IV) in place which is not a hospital or clinic?		

	SOCIO-BEHAVIORAL DONOR RISK ASSESSMENT	YES	NO
1	In the past 6 months, have you had more than one sex partner, engaged in casual sex or had sex with someone whose sexual background you don't know?		
2	In the past 5 years have you had male to male sex?		
3	In the past 5 years, have you had sex with a male or female prostitute (escort or sex worker), or exchanged money, goods, drugs or favour in return for sex?		
4	In the past 5 years have you ever had a sexually transmitted disease (STD) e.g. syphilis, gonorrhoea, genital, herpes, genital ulcers, AIDS or HIV		
5	Do you or your sexual partner have AIDS or are you HIV positive		
6	In the past 12 months have you had an accidental exposure to blood or body fluids or been the victim of sexual assault?		
7	Have you ever injected yourself, or been injected, or shared a needle with any drug or substance including steroids, not prescribed by a doctor		
8	To your knowledge, do any of the above apply to your sex partner?		
9	Have you come to donate blood just to be tested for HIV/AIDS?		
10	Have you ever been denied an offer to donate blood?		

Declaration and Consent:

I do not consider myself to be a person at risk of spreading HIV/AIDS. I consent to my blood being tested for transmissible diseases including HIV/AIDS. Should any of the tests be positive, I understand I will be invited for counselling and for further management. I confirm that I have answered all the questions truthfully and I am donating blood on the understanding that it will be transfused to a patient. I accept that my blood will be used at the discretion of the service, for transfusion, for the preparation of reagents for scientific research, the main objective of which is to increase safety of the blood supply to patients. I understand that any misinterpretation of the facts could endanger the patient, and others, and lead to legal proceedings.

I consider my blood safe to give a patient or my own family	YES	NO
Donor Signature/Thumbprint:		
Date: Time:		

On behalf of all patients who will be receiving your blood, we thank you for truthfully answering the questions about Risk Behavior.

Donor Status:

Acceptable for blood collection:

Appendix 8

Donor Interview Template

1. Are you currently donating blood as a volunteer or for someone in hospital (e.g. as a replacement donor) (→Define the different types of donors for the participant).
2. Please describe how you were recruited to donate blood and the donation process.
    a. Probing questions
        - Who recruited you?
        - Where did you donate?
        - How long was the process?
        - How long were the wait times?
        - Were you provided with anything after donation?
            - *In pilot study donors seemed confused by this question – clarified by giving examples – t-shirt, food, pens etc.*
3. Did you encounter any difficulties (i.e. during the donation experience)?
    a. *This question may be used to follow up on any difficulties mentioned by the donor in response to question two and the donation process*
4. What motivated you to donate blood?
5. What expectations did you have regarding blood donation prior to your first donation?
    a. *Probe further if they say none (this occurred in the pilot). Move to specific questions if needed (e.g. did you expect it would be painful, did you expect to have to provide any information, how long did you expect the process would take).*
6. Are there any positive or negative experiences from today you'd like to discuss?
    a. *Try and connect this to the donor's expectations if relevant*

Appendix 9

Donor Questionnaire

1. Sex:

   ☐ Male ☐ Female

2. What is your age?

   _____ years

3. How many times have you donated blood before?

   _____

4. How did you first learn about blood donation?

   _____
   _____
   _____

5. How were you recruited to donate blood (this time)?

   _____

6. How efficient did you find the donation process? Please justify your answer.

   _____
   _____

7. Will you donate blood again in the near future?

   ☐ Yes ☐ No

   Why or why not? _____
   _____

Appendix 10

Donor Focus Group outline

- **Size:** 6-10 people
- **Population:** Blood donors. My plan is to conduct the following focus groups – one with students (SHS or University), one with replacement donors, one at a church mobile session, one at a mosque mobile session and one at an FM drive.
- **Prior to discussion:** I will record basic socio-demographic information (i.e. age, sex, marital status, religion and occupation).
- **Translation:** For most of the focus groups I will require the assistance of a translator. I will request the translator to translate on the spot so that I can probe when necessary.

Discussion Points

- What are the main reasons people donate blood?

- Have you or anyone you know received a gift for donating blood when donating for a patient? (Probe – what type of gift? Donor/Patient relationship?)

- What expectations do donors have regarding the donation process?
    - How many of you expected donation to be painful
    - How many of you expected the process to be more difficult? In what way?
    - How many expected to receive more information? What kind of information?

- What were your thoughts on the health and risk assessment questionnaire? (Probe – were questions too long? Did they make you uncomfortable? Were any of the questions difficult to answer?)

- Did you receive any information about post-donation care (ex: regarding diet and exercise)

- Were you informed of when you will be able to donate blood next?

- Which of the following pieces of information do you think is the most important for donors to receive? Second most important? Third most important?
    - STD status
    - Blood group
    - My general health status
    - The benefits of blood donation
    - The risks of blood donation
    - The amount of time the donation process will take
    - The steps involved in the donation process

    - Dietary recommendations post donation
    - Physical activity permitted post donation
    - The time it will take to regain the blood lost
    - Information on how to replace the blood lost
    - The maximum blood I can donate
    - When I can next donate

- Is there any other important information you feelsdonors should be give during the donation process?

- Under what circumstances would you donate blood again?

- Under what circumstances would you consider donating blood again? (Probe – if friend/family member requires blood, if someone paid you to donate, at a blood drive…)

- Are you more likely to donate blood at the hospital's donor clinic, at school/work, at a church/mosque/other place of worship, or at a blood drive hosted by a radio/TV station?

- What would prevent you or other donors from donating again? (Probe: Pain, lack of time, lack of money, fear of finding out blood status…)

Appendix 11

Clinician Interview Guide

What is your current position?

Do you rotate between the different units?

Do you know if currently, consent is required before giving transfusions? [If so, is it oral or written consent?]

Do you know if blood components are available at the hospital, and if so which components?

How often in this hospital speciality do you prescribe blood or blood components?

What do you prescribe the most often?

Is this because it is most needed or because it is more readily available?

What do you prescribe the various blood components for? [List the ones mentioned by participant]

Do you know if there are currently any guidelines on blood component prescription and usage?

Are there any other issues with blood services or obtaining blood that you would like to discuss.

So when it comes to asking mothers or family members to find replacement donors here, do you always ask them before a blood transfusion or do you ask them when the blood bank tells you there is not enough blood and requests you to ask the patient to find donors?

Is there anything else you would like to discuss?

Appendix 12

Donor Clinic Staff Interview Guide

What is your current position at the donor clinic?

What is your role and what are your responsibilities?

Who is currently given pre-donation counselling? [probe further – is it given only to high risk individuals or all donors?]

When is pre-donation counselling given?

What information do you give in the pre-donation counselling?

How was the pre-donation counselling framework developed?

Do you give post-donation counselling?

What information is given in post-donation counselling?

How was the post-donation counselling developed?

Do you have any suggestions on how donor counselling can be improved?

Do you have any other suggestions for the donor clinic?

Appendix 13

Blood bank staff interview guide

Please describe your role at the blood bank?

How long have you been working in blood banks (either at KATH or elsewhere)?

Please describe how blood donors are recruited.

What challenges do you face in recruiting donors? (or what challenges does the donor clinic face?

Who collects the blood from the donor?

Please describe how the blood is stored.

What measures are in place to ensure proper storage in case of a power failure?

What is the maximum length of time blood is stored?

What challenges do you encounter in recruiting donors/collecting blood/storing blood?

Appendix 14

Patient Interview Guide

How many transfusions have you had while you've been in the hospital this time?

Do you know why you needed the transfusion(s)?

Were you told before the transfusion that you would be receiving blood?

What were you told about the transfusion?

Were you told any other information about the transfusion? Example, benefits, side effects?

Did you have any questions for the staff about the transfusion?

Did you have difficulty obtaining blood at any point?

How long did it take for you to receive your transfusion?

Were you asked to find someone to donate blood?

Are you aware of any costs associated with the transfusion?

Were there any issues relating to the blood transfusion you'd like to discuss

For statistical purposes – you don't need to answer this – what is the highest level of education you have achieved?

What is your household income?