THE REPUBLIC OF UGANDA

VALUE FOR MONEY AUDIT REPORT ON
THE MANAGEMENT OF
UGANDA BLOOD TRANSFUSION SERVICES

A REPORT BY THE AUDITOR GENERAL

MARCH, 2013
20th June, 2013

The Rt. Hon. Speaker of Parliament
Parliament of Uganda
Kampala

VALUE FOR MONEY AUDIT REPORT ON THE MANAGEMENT OF BLOOD TRANSFUSION SERVICES BY THE UGANDA BLOOD TRANSFUSION SERVICES (UBTS)

In accordance with Article 163 (3) of the Constitution, I have undertaken a value for money audit on The Management of Blood Transfusion Services by the Uganda Blood Transfusion Services (UBTS) and hereby submit this report.

My office intends to carry out a follow – up at an appropriate time regarding actions taken in relation to the recommendations in this report.

I would like to thank my staff: The Director, Mr. Stephen Kateregga and Assistant Director Ms. Liz Nambuya; and team Mr. Bob Monday – Senior Principal Auditor, Mr. Patrick Ndashura- Principal Auditor, Mr. Joshua Asiimwe Senior Auditor and the two auditors, Ms. Linda Nalubanga and Mr. Samuel Magembe who undertook this audit. I would also like to thank the staff of UBTS for the assistance offered to my staff during the period of the audit.

John F. S. Muwanga

AUDITOR GENERAL
# TABLE OF CONTENTS

LIST OF TABLES.......................................................................................................................... i
LIST OF PICTURES ..................................................................................................................... ii
LIST OF ACRONYMS .................................................................................................................. iii
EXECUTIVE SUMMARY ............................................................................................................. iv

## CHAPTER ONE

**INTRODUCTION**

1.1 Background to the Audit ........................................................................................................ 2
1.2 Motivation ................................................................................................................................ 2
1.3 Description of the Audit Area ................................................................................................. 3
   1.3.1 Background ..................................................................................................................... 3
   1.3.2 Mandate ......................................................................................................................... 4
   1.3.3 Vision and Mission Statement ....................................................................................... 4
   1.3.4 UBTS Specific Objectives ............................................................................................. 5
   1.3.5 Activities carried out by UBTS ..................................................................................... 5
   1.3.6 Organizational Structure ............................................................................................... 5
   1.3.7 Funding of UBTS ......................................................................................................... 5
1.4 Audit Objectives .................................................................................................................... 6
1.5 Audit scope ............................................................................................................................. 6

## CHAPTER TWO

2.1 Audit ....................................................................................................................................... 8
2.2 Sampling .................................................................................................................................. 8
2.3 Data collection methods ......................................................................................................... 8

## CHAPTER THREE

3.1 Systems Description ............................................................................................................... 11
3.2 Process description ............................................................................................................... 13

## CHAPTER FOUR

4.0 Findings ................................................................................................................................. 18
4.1 UBTS Accreditation and Certification ................................................................................... 18
4.2 Blood collection targets and Blood supply .......................................................................... 20
4.3 Systematic Implementation of Quality ............................................................................... 25
4.4 Appropriate use of Blood and Blood Products ................................................................... 28
4.5 Component preparation from whole blood donation and Blood-component therapy .......... 32
4.6 Construction of blood banks ............................................................................................... 34
4.7 Establishment of Collection and Distribution Centers .......................................................... 37
4.8 Laboratory Equipment ............................................................................................................ 40
4.9 Equipment for Blood Collection .......................................................................................... 42
4.10 Supplies of blood bags ......................................................................................................... 45
4.11 Recruitment, selection and motivation of donors ................................................................. 46
4.12 Legislation and regulatory framework for blood transfusion: .............................................. 50
4.13 Blood transportation and storage (Blood cold chain) .......................................................... 52

GLOSSARY OF TERMS ............................................................................................................... 55

APPENDICES
Appendix I- Proposed Organizational Structure ......................................................................... 59
Appendix II- Documents Reviewed .............................................................................................. 60
Appendix III - List of people interviewed .................................................................................. 61
Appendix IV UBTS Lab Equipment Inventory per RBB ................................................................. 62

LIST OF TABLES

Table 1: Showing UBTS funding from 2009/10 to 2011/12 ............................................................ 5
Table 2: Showing the status of selected parameters in the RBBs .................................................. 18
Table 3: Showing UBTS’ annual blood collection targets & actual collected ................................. 21
Table 4: Showing UBTS’ annual blood collection against WHO requirements ............................. 21
Table 5: Showing UBTS’ actual blood collections against issues .................................................. 22
Table 6: Showing blood request and issue to Mulago hospital by UBTS ..................................... 22
Table 7: Showing temperature readings of blood storage facilities ............................................ 30
Table 8: UBTS’ planned infrastructural performance against MoH targets................................. 35
Table 9: Showing UBTS’ Expenditure on laboratory and donor equipment ................................. 40
LIST OF PICTURES

Picture 1: Showing some of UBTS’ temperature recording methods .................................................. 26
Picture 2: Showing blood spilled over onto other blood units at Mbarara RBB ............................. 27
Picture 3: Showing fridge temperature readings at Pakwach and Serere HC IV ............................ 30
Picture 4: Showing frosting of the fridge interior at Busiu Health Centre IV ................................. 31
Picture 5: Showing blood with maggots at Mbale Regional Referral Hospital ............................. 31
Picture 6: Showing a modern RBB constructed at Buhinga Hospital Fort Portal .......................... 34
Picture 7: Showing a typical walk-in donor site at Arua RBB and Nakasero RBB ....................... 36
Picture 8: Showing working conditions at the testing, processing and distribution .................... 36
Picture: 9 Showing a container housing Kabale BCC ................................................................. 38
Picture 10: Showing a blood collection site setup at unhygienic makeshift market ..................... 43
Picture 11: Showing a blood collection session ............................................................................. 43
Picture 12: Showing quadruple and empty satellite blood bags .................................................. 45
Picture 13: Showing records of underage donors in the data maintained at Soroti BCC ............... 49
Picture 14: Showing inappropriate containers for blood storage and transportation .................. 53
Picture 15: Showing abandoned RBB boxes on the verandah ....................................................... 53
# LIST OF ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG</td>
<td>Auditor General</td>
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<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
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<tr>
<td>BCC</td>
<td>Blood Collection Centre</td>
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<tr>
<td>BDR0</td>
<td>Blood Donor Recruitment Officer</td>
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<td>BMIS</td>
<td>Blood Bank Management Information System</td>
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<td>BP</td>
<td>Blood Pressure</td>
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<tr>
<td>CDC</td>
<td>Centre for Disease Control</td>
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<tr>
<td>FFP</td>
<td>Fresh Frozen Plasma</td>
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<tr>
<td>HB</td>
<td>Haemoglobin</td>
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<tr>
<td>HBV C</td>
<td>Hepatitis C Virus</td>
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<tr>
<td>HBV B</td>
<td>Hepatitis B Virus</td>
</tr>
<tr>
<td>HC IV</td>
<td>Health Centre Fours</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immune Deficiency Virus</td>
</tr>
<tr>
<td>HSSP 11</td>
<td>Health Sector Strategic Plan 11</td>
</tr>
<tr>
<td>IBTS</td>
<td>International Blood Transfusion Society</td>
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<tr>
<td>KAP</td>
<td>Knowledge Attitude and Practice</td>
</tr>
<tr>
<td>MDGS</td>
<td>UN Millennium Development Goals</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry Of Health</td>
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<tr>
<td>MOU</td>
<td>Memorandum Of Understanding</td>
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<tr>
<td>NBB</td>
<td>Nakasero Blood Bank</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
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<tr>
<td>NHP</td>
<td>National Health Policy</td>
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<tr>
<td>PEAP</td>
<td>Poverty Eradication Action Plan</td>
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<tr>
<td>PEPFAR</td>
<td>President’s Emergency Plan For Aids Relief</td>
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<tr>
<td>PMO</td>
<td>Principal Medical Officer</td>
</tr>
<tr>
<td>PNO</td>
<td>Principal Nursing Officer</td>
</tr>
<tr>
<td>PPDA</td>
<td>Public Procurement and Disposal of Assets Authority</td>
</tr>
<tr>
<td>QM</td>
<td>Quality Management</td>
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<tr>
<td>GoU</td>
<td>Government of Uganda</td>
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<tr>
<td>OAG</td>
<td>Office of The Auditor General</td>
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<tr>
<td>RBB</td>
<td>Regional Blood Bank</td>
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<tr>
<td>SOP</td>
<td>Standard Operation Procedures</td>
</tr>
<tr>
<td>STI</td>
<td>Sexually Transmitted Infections</td>
</tr>
<tr>
<td>$</td>
<td>United States Dollars</td>
</tr>
<tr>
<td>TTI</td>
<td>Transfusion Transmissible Infections</td>
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<td>UBTS</td>
<td>Uganda Blood Transfusion Services</td>
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<tr>
<td>URCS</td>
<td>Uganda Red Cross Society</td>
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<tr>
<td>Shs</td>
<td>Uganda Shillings</td>
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<tr>
<td>VFM</td>
<td>Value for Money</td>
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<tr>
<td>WB</td>
<td>Whole Blood</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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BACKGROUND

This value for money (VFM) audit on the management of blood transfusion services by the Uganda Blood Transfusion Services (UBTS) was conducted in accordance with Article 163(3) of the 1995 Constitution of the Republic of Uganda. This mandate is amplified by Section 21(1) of the National Audit Act 2008 which requires the Auditor General to carry out VFM audits for purposes of establishing economy, efficiency and effectiveness in the operations of any department or ministry.

UBTS is a semi-autonomous institution, established in January 2003. It is a centrally coordinated department in the Ministry of Health, decentralized to render blood transfusion service to all regions of the country. The Uganda Blood Transfusion Service is mandated to make available safe and adequate quantities of blood and blood products to all hospitals and HC IV’s for the management of patients throughout the country. UBTS operates within the framework of the National Health Policy (NHP) and the Health Sector Strategic Plan (HSSP).


The audit was conducted in accordance with INTOSAI standards. These standards require that a VFM audit should be planned in a manner which ensures that an audit of high quality is carried out in an economic, efficient and effective way and in a timely manner. Data collection methods, such as: Document reviews, Physical Observations, analytical reviews and Interviews were used.
**MOTIVATION**

Blood transfusion is an essential part of modern medical care. Lack of a safe and adequate blood supply is a major detriment in population health outcomes because of the occurrence of avoidable deaths due to unavailability of blood and transfusion-transmitted infections (TTIs) to recipients from unsafe blood. The demand for safe and sufficient blood throughout the country has increased and UBTS has an important task of expanding blood collection capacity to meet this challenge.

According to UBTS, the estimated blood need for the country stands at 200,000 units per year from voluntary non-remunerated donors. This falls short of the World Health Organization (WHO) recommendation of 2% blood collection from a country’s total population per year (2% of estimated Uganda’s population of 34 million) hence creating a shortage of 480,000 units of blood collected annually for the country, which is 71% annual blood collection gap exclusive of the 10% discarded blood due to TTIs.

Currently, the need for blood in Uganda is estimated to increase at a rate of 20% per year. However, there are still inadequate regional blood banks despite the high demand for blood in Uganda.

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Despite several achievements in Uganda, much more is still required to sustain the improvements registered in the safety and availability of the blood supply. Gaps particularly include: monitoring and evaluation, pre-and in-service education, ICT development and Clinical interface.

The audit covered three Financial Years of 2009/10, 2010/11 and 2011/12.

**MAJOR FINDINGS**

Legislation and regulatory framework for blood transfusion:

There is no law establishing UBTS as an autonomous, self-accounting organization with a clear organization structure, and job descriptions. As a result, UBTS cannot effectively handle its administrative challenges, such as, solicitation for better funding and recruitment of its own staff.

**UBTS Accreditation and Certification**

- UBTS was not accredited and there was no evidence that the transfusion service had sought accreditation over the period it has been in existence (2003).

- UBTS was not employing common standards throughout its blood bank network and lacked a system for identification of deviations from standard procedures and detection of adverse effects in its processes; provisions which would have enabled accreditation.

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1 “Improving Blood Safety in Uganda” - A publication by the Division of global HIV/AIDS (DGHA), Centres for Disease Control and Prevention, April 17th 2012
Blood collection targets and blood supply:

- UBTS does not know the overall actual blood requirement for the country. For the period under review, Uganda’s annual average blood collection was short by 72.1%. This is because UBTS is setting its blood collection targets according to the number of teams available, instead of the recommended WHO standard of 2% of the total population of a given country, especially for developing countries.

- The UBTS blood bank records relating to issuance of blood to transfusing units were inaccurate. UBTS was understating the blood requirement needs of the country by over 67%.

Quality management Unit and training

- UBTS did not have a fully functional Quality Management Unit and quality control systems for handling blood; and, as a result, quality audits were not being conducted.

- The UBTS blood bank network uses different testing algorithm. This may impact on the uniformity and consistency in the quality of blood and blood products produced in all its regional blood network around the country and the subsequent efficacy of these products when transfused.

Appropriate use of Blood and Blood Products

- UBTS spent only 0.01% of its total expenditure in the FYs of 2010/11 and 2011/12 that is, Shs.2.6M of 22.7Bn on haemovigilance activities in spite of their critical importance in the management of the transfusion services.

- UBTS was not carrying out effective medical audits on haemovigilance activities, such as: the processes of ordering, distribution, handling and administration of blood as well as monitoring the response of transfusion in transfusion units. This made it difficult for UBTS to track the usage of its blood and blood products as well as the response of transfusion.

Blood-component therapy

World Health Organisation (WHO) recommends a preparation ratio of blood components to whole blood of 90:10 for any national transfusion service. The UBTS preparation ratio of blood component to whole blood was 12:88, implying that patients in Uganda’s health care system may not be appropriately and judiciously transfused with that specific blood product component required for the specific ailment diagnosed.

Construction of blood banks

- Government planned to construct
One [1] Regional Blood Bank (RBB) for each existing 13 regional referral hospitals. However, UBTS had only planned to construct 7 RBBs in its five year strategic plan, contrary to government strategy, and managed to construct only five (5) by the time of audit (January 2013) in the period under review at Nakasero in Kampala, Mbale, Mbarara, Gulu, and Fort Portal, indicating an underperformance of 62%.

- UBTS management did not know the cost of the construction works for Nakasero, Fort Portal and Gulu purpose built facilities (Regional blood banks).
- UBTS did not have title deeds for Mbale and Fort Portal regional blood banks nor did it have Memoranda of Understanding (MOUs) for the use of the land donated to it by hospitals on which the regional blood banks are housed.

**Laboratory Equipment**

UBTS had a 70% shortfall in its blood processing equipment requirements for its entire regional blood network. This is because management did not prioritise the procurement of these equipment, considering that only 5.1% of its total expenditure (Shs31.9Bn) over the period under review (2009/10, 2010/11 and 2011/12), was allocated for laboratory equipment.

**Equipment for Blood Collection**

UBTS did not provide adequate supplies for blood collection equipment to all its RBBs and Blood Collection Centres (BCCs) for efficient collection of blood from potential blood donors and lacked a replacement policy for the worn out equipment.

**Supplies of blood bags**

UBTS provides single bags for whole unit transfusion and quadruple bags for transfusion of blood components. However, 47,750 quadruple bags worth Shs.653,458,750, were issued to transfusing units for whole blood transfusion and not component therapy. This is a waste considering that the 3 blood bags attached to these quadruple bags had to go to waste.
CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND TO THE AUDIT

Blood transfusion is an essential part of modern medical care. Lack of a safe and adequate blood supply is a major detriment in population health outcomes because of the occurrence of avoidable deaths due to unavailability of blood and transfusion-transmitted infections to recipients from unsafe blood.

In Uganda, blood transfusion services are provided by the Uganda Blood Transfusion Services (UBTS). UBTS has its headquarters at Nakasero, Kampala and operates other Regional Blood Banks (RBBs) in Mbale, Mbarara, Kitovu, Gulu, Arua, and Fort Portal. UBTS is responsible for blood collection, processing, testing, waste management and quality assurance in the country.

1.2 MOTIVATION

According to the WHO\(^2\) and UBTS, blood supply systems vary around the world. Approximately 80% of the world’s supply of safe blood goes to 20% of the population, mostly in developed countries. 61% of the global blood supply is donated in developed countries. Only 39% is donated in the developing (Low and medium Human Development Index) countries where 82% of the world population lives.

In many developing countries, blood supply systems are not well developed and do not meet all of the blood needs. Often, the system to identify the actual blood

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\(^2\) WHO Global Data Base on blood safety (GDBS) 2008
needs of a country is inadequate. This creates difficulty in developing a comprehensive program in an attempt to meet those needs. Africa has the lowest blood donation rate per capita in the world.

In Uganda, despite several achievements, much more work is required to maintain the improvements which have been implemented and continue to improve the safety and availability of the blood supply. Gaps, particularly, include: monitoring and evaluation, pre-and in-service education, ICT development and Clinical interface³.

According to UBTS, the estimated blood need for the country stands at 200,000 units per year from voluntary non-remunerated donors. This falls short of the World Health Organization (WHO) recommendation of 2% blood collection from a country’s total population per year (2% of the estimated population of Uganda of 34M); this is, therefore, causing a shortage of 480,000 units of blood collected annually for the country, exclusive of the 10% discarded blood due to TTIs.

Currently, the need for blood in Uganda is estimated to increase at a rate of 20%⁴ per year. However, there are still inadequate regional blood banks despite the high demand for blood in Uganda.

UBTS has another challenge of meeting the increased demand for safe blood transfusion, especially at Health Centre IVs, which are located in rural areas where most of the populace live. Most of the blood is used for transfusion of children and mothers; 50% of all blood collected is used for treating children with severe anaemia, largely due to malaria, intestinal worm infestation and malnutrition;⁵ a further 25% of the blood is used to treat pregnant women with anaemia and complications of child birth and 25% is used to treat accident or surgical cases.

It is against this background that the Office of the Auditor General found it necessary to conduct an audit on the Management of UBTS.

1.3 DESCRIPTION OF THE AUDIT AREA

1.3.1 Background

The Uganda Blood Transfusion Service (UBTS) is the National Blood Service responsible for all blood transfusion and safety activities for the country. It was established as a semi-autonomous institution and commissioned in January

³ Funding proposal submitted to centre for disease control and prevention – reference CDC-RFA-PS10-1026 by UBTS
⁴ “Improving Blood Safety in Uganda”- A publication
⁵ Five year strategic plan 2010-2015 - UBTS
2003. It is a centrally coordinated department in the Ministry of Health, decentralized to render service to all regions of the country. Its headquarters are based at Nakasero Blood Bank, and act as a reference centre for the regional blood banks and other public and private hospitals. UBTS has a network of 7 Regional Blood banks which include Arua, Fort-Portal, Gulu, Kitovu, Mbale, Mbarara and Nakasero; 6 blood collection centres in Hoima, Jinja, Kabale, Rukungiri Lira and Soroti.

The main assignment of UBTS is to make available safe and adequate quantities of blood and its components for treatment of patients who are in need of it.

1.3.2 Mandate

Uganda Blood Transfusion Service is a semi-autonomous organization in the Ministry of Health (MOH), which is mandated to make available safe and adequate quantities of blood and blood products to all hospitals and Health Centre IVs (HCIVs) throughout the country. UBTS operates within the framework of the National Health Policy (NHP) and the Health Sector Strategic Plan (HSSP).

1.3.3 Vision and Mission Statement

Vision

The vision of UBTS is: “To be an effective, efficient and sustainable Blood Transfusion Service in Uganda”

Mission

The mission of UBTS is: “To provide sufficient and efficacious blood and blood components through voluntary donations for appropriate use in health care service delivery.”

1.3.4 UBTS Specific Objectives

The specific objectives of UBTS are:

1. To expand blood transfusion infrastructure to operate adequately within a decentralized health care delivery system.

2. To increase the annual blood collection necessary to meet the transfusion needs for all patients in the country.

3. To operate an active nationwide quality assurance program that ensures blood safety

4. To promote appropriate clinical use of blood.

5. To strengthen the organization capacity of UBTS to enable efficient and effective service delivery.

6 UBTS Five Year Strategic Plan 2010-2015, Page 9
1.3.5 Activities carried out by UBTS

UBTS, with its current network, has the following main activities:-

- Recruitment, retention and care of low-risk voluntary blood donors
- Collection of blood from the recruited donors
- Testing of blood
- Storage and distribution of blood

1.3.6 Organizational Structure

UBTS is headed by a Director who is the chief executive officer of the organization and is responsible to the Permanent Secretary, Ministry of Health. He/She is assisted by the Principal Medical Officer (PMO) who is in charge of regional blood banks. Details of the structure are attached in Appendix II.

1.3.7 Funding of UBTS

In the period from 2009/10 to 2011/12, UBTS received funding to the tune of UGX 32 billion from both the Government and developing partners to operate blood transfusion services as shown in Table 1.

<table>
<thead>
<tr>
<th>FY</th>
<th>PEPFAR ($)</th>
<th>GOU</th>
<th>TOTAL UGX</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/10</td>
<td>5,706,636,700</td>
<td>3,504,519,978</td>
<td>9,211,156,678</td>
</tr>
<tr>
<td>2010/11</td>
<td>7,393,170,600 ($ 3,214,422)</td>
<td>3,318,977,663</td>
<td>10,712,148,263</td>
</tr>
<tr>
<td>2011/12**</td>
<td>7,350,000,000 ($ 3,000,000)</td>
<td>4,692,090,440</td>
<td>12,042,090,440</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total expenditure for the period under review</strong> 31,965,395,381</td>
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</table>

Source: UBTS Audited Accounts and Draft**
1.4 AUDIT OBJECTIVES

The overall objective of the audit was to assess whether UBTS is ensuring adequate provision of blood and blood products to hospitals and HCIVs to meet the transfusion needs for all patients in the country. The specific objectives were:

1. To establish whether UBTS has expanded blood transfusion infrastructure to operate adequately within a decentralized health care delivery system.
2. To establish whether UBTS has increased the annual blood collection necessary to meet the transfusion needs for all patients in the country over time.
3. To ascertain whether UBTS operates an active nationwide quality assurance program that ensures blood safety.
4. To ascertain whether UBTS is ensuring promotion of clinical use of blood.
5. To establish whether funds reflected in work-plans and budgets are received and utilized for the implementation of transfusion services.

1.5 AUDIT SCOPE

The audit was carried out on the management of transfusion services by the Uganda Blood Transfusion Services (UBTS) with the aim of ascertaining whether UBTS is efficiently, economically and effectively performing its role of availing safe and adequate quantities of blood and blood products to all hospitals and HCIVs for the management of patients throughout the country. The audit covered operations in the three financial years of 2009/2010, 2010/2011 and 2011/2012.
CHAPTER TWO
CHAPTER TWO

2.1 AUDIT

The audit was conducted in accordance with the International Organization of Supreme Audit Institutions (INTOSAI) performance auditing standards and guidelines as set out in the VFM audit manual of the Office of the Auditor General. The standards require that the audit should be planned in a manner which ensures that an audit of high quality is carried out in an economic, efficient and effective way and in a timely manner.

2.2 SAMPLING

All the Seven (7) regional blood banks and three (3) out of six (6) blood collection centers were selected for audit. The regional blood banks visited included: Mbarara, Fort-Portal, Arua and Mbale. The collection centers visited include: Masaka, Soroti and Kabale. The UBTS headquarters, which also doubles as a blood bank serving the central region, was brought into the sample frame to corroborate the information that was obtained from the regional blood banks and collection centers.

2.3 DATA COLLECTION METHODS

Various methods were used for collecting data from the field and these included: document review, interviews and physical inspections.

DOCUMENT REVIEW

Various documents, as detailed in Appendix II, were reviewed to extract data relating to transfusion services so as to assess the extent to which UBTS was managing the transfusion services in Uganda.

INTERVIEWS

Sixty one (61) interviews were conducted during the audit in order to assess the operations of UBTS and to corroborate the information obtained from other sources, such as: inspection and document reviews. The officials interviewed are as detailed in Appendix III

7 Details of particular document and type of information extracted is attached as Appendix ii
PHYSICAL INSPECTION
Physical inspection/observation was carried out in all the regional blood banks and the three collection centres in Soroti, Kabale and Masaka with the aim of appreciating and ascertaining the donor recruitment, blood collection, testing, storage and distribution processes. Waste disposal and management procedures were also observed and noted through this procedure.

DATA ANALYSIS
The data collected was analysed to identify the key relationships that existed in the data obtained from UBTS on the management of transfusion services over the last three years. Simple descriptive statistics were calculated to understand the data. These statistics included: averages, percentage totals, and trends. The financial and other transfusion related information prepared by management, such as: budgets, work plans, financial statements, charts, graphs and similar analysis included in the UBTS’ internal management reports were also analyzed.
CHAPTER THREE
SYSTEMS AND PROCESS DESCRIPTION

3.1 SYSTEMS DESCRIPTION

ROLES AND RESPONSIBILITIES OF KEY PLAYERS

Ministry of Health
The functions of the MoH include: resource mobilisation and budgeting; policy formulation and policy dialogue with development partners; strategic planning; regulation & enforcement; advising on health and related matters; setting standards and quality assurance; capacity development and technical support; and provision of nationally coordinated services.

Permanent Secretary - Ministry of Health
He or she is the accounting officer of the Ministry of Health and is responsible for the coordination of UBTS activities through the Director, Clinical Services.

Director Clinical Services
He /She ensures that UBTS contributes to policy making, monitors and evaluates the performance of UBTS, reviews UBTS work plans, provides support supervision to the Director and ensures coordination with the relevant stakeholders.

Director UBTS
The Director is the Chief Executive Officer of UBTS and is responsible to the Permanent Secretary through the Director Clinical Services for the day to day operations of UBTS and is in charge of the supervision of the staff. He/she sits on the top management of the Ministry of Health.

Principal Medical Officer (PMO) / Regional Blood Bank Manager
The Principal Medical Officer, who heads a regional blood bank, reports to the Director UBTS. He/she is responsible for planning, budgeting, directing, coordinating, monitoring and evaluation of blood transfusion services at the regional blood banks.

Principal Laboratory Technologist (PLT)
The Principal Laboratory Technologist is the person responsible for the storage of source materials [test reagents], released products and distribution of released products. He/She is responsible for the availability of sufficient storage and transportation facilities of blood and blood products.
Principal Blood Donor Coordinator (PBDC)
The Principal Blood Donor Coordinator has the responsibility of ensuring the availability of blood donors to fulfill the needs of the hospitals, through good blood donor management. He/she reports to the Director UBTS.

Principal Economist
He/she is responsible for the monitoring and evaluation of UBTS activities; formulation of annual work plans; development of projects, collection of data, analysis and report writing; as well as policy formulation.

Quality Manager
The Quality Manager is responsible for the release of the final products. He/she signs the daily list of released products and is responsible to the Director UBTS.

Principal Assistant Secretary (PAS)
He/she is responsible for administering and safe-guarding all organization property [i.e. land titles, vehicles, log books and policy documents] in the Blood Transfusion Service countrywide. The PAS is also responsible for administering logistics and is a co-signatory to all UBTS documents and correspondences. He/she supervises the human resource, accounts, administration, procurement, Information and Communication Technology and estates functions.

Senior Accountant
He/she is responsible for the formulation and implementation of financial systems and procedures. He/she is also involved in monitoring UBTS financial position and advising the Director UBTS on measures to undertake to improve or enhance financial performance.

Senior Nursing Officer
He/she provides supervision in donor nursing care management and is also a field blood collection team leader, responsible for ensuring that nursing staff and other staff on duty adhere to the professional code of conduct and ethics as they carry out blood collection activities and counsel blood donors before and after blood donations.

Procurement Officer
He/she is responsible for the compilation of all procurement requirements for the organization.

Networks and collaboration: Uganda Red Cross Society (URCS)
There is collaboration with URCS at societal interface. Key partners in the blood safety program in Uganda include: the Uganda Red Cross Society (URCS) who are responsible for about 40% of the activities in blood donor recruitment.

Blood Donor
His/her role is to donate blood.

Blood Transfusion Centres
These are involved in transfusion of patients with safe blood to reduce mortality, morbidity and fertility. They include: regional referral hospitals, hospitals and Health Centre IVs.

Hospital Transfusion Committees
These are committees set up in hospitals to guide, monitor and audit the clinical use of blood.
3.2 PROCESS DESCRIPTION

Donor Recruitment Process

Donor recruitment is carried out by the donor recruitment department at the UBTS. The recruitment is carried out using the following methods: mobilization/organizing - site mobilization, physical contact, internet and tele - recruitment of blood donors, sensitization and education, publicity (print and electronic, posters, brochures/flyers/leaflets, etc) and counselling (pre & post donation). Teams are then formed, which visit institutions, schools, communities and collect blood from non-remunerated voluntary blood donors. During the donor recruitment process, the teams use the AIDA Model to acquire voluntarism. The public is informed using print media, captions, and exhibition posters. Prior to donation of blood, potential donors have to be selected according to the national guidelines. The selection of donors always starts with the identification of the donor prior to the venipuncture. The selection procedure must be performed exactly as described in the Standard Operation Procedures (SOP) by authorized personnel. Donor recruitment or motivation is mainly carried out in schools to get young donors (minimum age of 17 years) to minimize the risks of infectious diseases. The blood bank initiates the formation of donor clubs to retain regular donors and to assist in the motivation of new donors.

Pre-donation counselling is then offered to a person or a group of people intending to donate blood, this involves an interactive discussion following a standard questionnaire relating to a person’s sexual relationships, chronic diseases if any, among others. If one passes UBTS donor selection criteria, he/she qualifies to donate.

After donation, a post-donation care such as:- a caution to drinking more fluids than usual during the four hours before and after donating blood, keeping the plaster on the vein puncture site for usually 3-4 hours, not consuming alcohol until after 12 hours. Donor lists showing particular records, such as: sessions, TTI's, time schedules et cetera are then maintained for recruited donors.

Post-donation counselling is then offered by a counselor to the donor after he/she has learnt their HIV, Hepatitis B & C, and syphilis results.

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8 Voluntarism is the guaranteed humanitarian self-motivation which could be in the form of; Modest remuneration, without pay and in a form of acknowledgment.

9 Implementation guidelines for Blood Donor Counselling – World Health Organization May, 2011
Blood Collection Process

Blood is only collected from voluntary, non-remunerated donors by teams through fixed and mobile location sessions. The set-up of sessions by mobile teams is, in as much as possible, similar to that in fixed locations. Fixed locations refers to walk-in sessions at different regional blood banks, while mobile locations are sessions carried out by various teams in the field (schools, barracks, trading centres, markets etc). All sessions are organized by donor recruiters and where applicable assisted by donor clubs and/or other (Red Cross) volunteers. There is a session file showing blood collection sessions sites organized & the frequency of the visits. All bags, sample tubes and documents related to a donation are identified with a unique number.

All measures are taken to minimize the risk of bacterial contamination. To each blood bag a vacutainer\textsuperscript{10} filled with whole blood of that donation and labelled with the unique identification number is attached. Before, during and after donation donors must be handled with care and medically treated if necessary.

All units of blood collected by mobile teams are transferred to the processing department in cool boxes. Units used for platelets production must be transported at room temperature.

Blood processing

The samples are received from the field into the laboratory in a reception refrigerator and taken for testing. Prior to processing, decision is made based on the test results from the samples as to whether the units will be processed or discarded. Whole blood collected from repeat donors at fixed sites in Kampala is used for platelet production. All other units are used for preparation of red cell concentrates and fresh frozen plasma within 6 hours of collection.

For the separation of various layers, after centrifugation\textsuperscript{11}, manual plasma extractors (hand squeezers) must be used. All intermediate products are stored in quarantine. There must be precautions to avoid quarantine products being issued or transported to hospitals. Product release may be performed by processing personnel but will be under the responsibility of the Quality Manager. Released products must be transferred to the available storage ready for issuing to hospitals. All storage conditions must be monitored and the results must be evaluated.

Blood testing process

The Laboratory performs the ABO Rh [D] blood group determination and performs micro plate/micro-particle ELISA test on Antibodies for HIV, Hepatitis C Virus and antigens for Hepatitis B Virus and particle agglutination test on Syphilis. The blood

\textsuperscript{10} A Vacutainer® blood collection tube is a sterile glass or plastic tube with a closure that is evacuated to create a vacuum inside the tube facilitating the draw of a predetermined volume of liquid.

\textsuperscript{11} Is a process of separating whole blood into plasma, red blood cell and white blood cell fractions.
group testing is performed in both red cells and in serum. The results on these are then compared and must be equal to allow products release. In case of any discrepancy, the determination must be repeated.

At the Nakasero regional blood bank, markers (existence) of infection are screened using Architect while at the other blood banks Micro plate ELISA is used. The products can be released only if all results are negative. In case of any reactive result, the test is repeated on Micro plate ELISA at Nakasero; Axysm at Mbale, Mbarara and Gulu; and Rapid kits at Kitovu and Arua. If the result is still reactive, the whole blood or blood components must be safely discarded and destroyed. In case of a negative result in the (second line) test, the products may be released.

The laboratory conducts quality control on platelet concentrates on 1% of the products on a monthly basis. The Neubear chamber and the microscope are used for counting platelets. If the count result is too low the centrifuge is re-calibrated by adjusting the speed used in Platelet-Rich Plasma (PRP) production and in platelet pallet spin and counting platelets.

Waste Management Process
The departments of blood collection, processing and testing are areas where potential bio-hazardous waste is produced. Potential bio-hazardous waste is put into small special containers that are emptied twice daily or in special containers autoclaved and stored at a special area upon arrival of mobile teams at the blood bank. On a weekly basis, these special containers are transported by the blood bank to Mulago hospital or the adjacent hospital for incineration.

Quality Assurance (QA) Process
UBTS has developed both a quality manual and Standard operating procedures (SOP). The quality manual spells out the quality procedure while the SOP outlines the responsibilities of the quality manual. The quality assurance process covers the whole transfusion process which involves quality control, validation, equipment control, stock control, product release, customer and supplier information management, storage and distribution, warehouse/stores management, medical care for donors and waste management as discussed below:-

Quality control
On a weekly basis, the laboratory forwards the results of the quality control of final products to QA. QA must make a trend analysis and discuss the results with representatives of all core departments.

Validation
The owners of processes, procedures and equipment are responsible for the validation. The validation protocol and the validation report, however, must also be authorized by the Quality Manager. It is the Quality Manager’s authority to release validated processes, procedures and equipment.
Equipment control
All equipment is given a unique identification number; and is regularly cleaned, maintained and calibrated if applicable. Prior to use of new equipment or after repair, the equipment is validated. These activities are the responsibility of the equipment’s owner but it is QA’s responsibility to control these activities.

Stock control
The head of storage and distribution is responsible for the stock of blood components. Overviews of the stock must be sent daily to the Quality Manager who is responsible for the documentation of the stock flow.

Product Release
Final products may only be released if the following requirements are met without any doubt:
- The evidence of the right blood group of the product; and
- The evidence of the negative results of the screening for markers of HBV, HCV, HIV and syphilis.

The release procedure is executed by processing members of staff, but is the final responsibility of the qualified person, which is usually the Quality Manager. A list of released products is transferred daily from the processing department to the Quality Manager. This list must be signed by the Quality Manager.

Storage & distribution
Released final products must be stored according to the storage conditions. These conditions must be monitored continuously; preferably by a central alarm system. When products are issued, the principle of FIFO (First-In; First-Out) must be followed. Before distribution, products must be checked for expiry, visual quality, and release status. The destination of each product must be documented. The contract with the customer must make clear when and where the responsibility of the product(s) is taken over by the customer from the blood bank.

Medical Care
The donor selection is routinely performed by pre-donation counsellors. In case of any doubt about the suitability of a donor a medical doctor must make the decision. Counselling donors about possible positive results in any of the tested infectious diseases should be performed by post-donation counsellors under the final responsibility of a medical doctor. In case of a serious adverse donor event during or after donation, the treatment has to be supported or executed by a medical doctor.
4.0 FINDINGS
In this chapter, findings on the management of the Blood Transfusion Service by UBTS are presented in reference to the audit objectives.

4.1 UBTS ACCREDITATION AND CERTIFICATION
According to the National Blood Transfusion Policy, July 2005, Objective 6 and 13, para 6.8 and 13.5, respectively, UBTS is required to periodically seek accreditation and certification under international and national standards, by recognized agencies; as well as to ensure observance of the standard of service delivery developed by ISO. Best Practices in transfusion medicine further dictate a well-organized Blood Transfusion Service (BTS), with quality systems in all areas as a pre requisite for the safe and effective use of blood and blood products.

It was established that UBTS was not accredited and there was no evidence that the transfusion service had sought accreditation over the period it has been in existence (since 2003). For accreditation to take place, UBTS had to employ common standards based on the international standards through the service, however, this was not the case. For instance, four out of seven (56%) RBBs did not have purposively built facilities which would have assured a conducive environment for testing and processing in terms of cleanliness, adequacy of operating space and temperature regulation. All RBBs did not maintain standard documents and records, and lacked a system for the identification of deviations from standard procedures and detection of adverse effects in its processes.

Table 2: showing the status of selected parameters in the RBBs

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arua RBB</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>F/Portal RBB</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Gulu RBB</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Kitovu RBB</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Mbale RBB</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Mbarara RBB</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Nakasero RBB</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

Source: OAG field visits and documentary reviews

13 In absence of national standards it subscribes to international standards.
In addition, all the collection centres visited (Soroti, Kabale and Masaka), did not meet the selected parameters mentioned in table 1 above.

The major reasons for failure to meet selected parameters for accreditation were:

- Lack of an approved and filled organization structure.
- Failure to plan and prioritize construction of purposively built RBBs by management.
- Absence of a quality assurance unit.
- Failure by the management to harmonize the Blood Bank Management Information System (BBMIS) across the RBB network.

As a result, lack of accreditation is hindering the stimulation of continuous improvements within UBTS; in addition to its failure to demonstrate commitment to quality in the long run. This might run down community confidence in the services provided by UBTS. Similarly, UBTS is missing out on the opportunity to benchmark with the best in transfusion services. Likewise, the UBTS staff is losing out on opportunities for continuous learning, and other benefits of a good working environment.

**Conclusion**

UBTS has no certification of conformity to standards. In the absence of its accreditation, audit cannot give assurance on the quality and safety of collecting, processing, testing and distribution of blood and blood products since its compliance with the set standards, applicable laws and regulations of both national and international accrediting bodies cannot be assured.

**Management’s Response**

In 2009, the Africa Society for Blood Transfusion (AfSBT) initiated a step wise accreditation program so as to empower blood services in African countries achieve an internationally recognized quality accreditation through a standardized process. While many African blood services may find a single assessment of standards at international level beyond their reach (only South Africa and Zimbabwe have achieved this in Africa), a step wise approach would allow services of all levels to begin achieving some of the accreditation requirements. This program provides a roadmap to achieving quality blood transfusion services via a process of increasingly challenging requirements. The ultimate goal of this step-wise approach is for countries to reach full accreditation, but on a schedule that is affordable and responsive to existing human resource and technical capacity. Representatives from the AfSBT and American Association of Blood Banks
(AABB) have created a standards and accreditation framework for the African continent which is now ready for pilot testing in Namibia and Malawi.

To this end, UBTS has received Technical Assistance (TA) to develop a strategy and plan for a functional internal and external Quality Assurance system towards international guidelines and AfSBT accreditation. World Health Organization (WHO) has been appointed to offer TA to UBTS.

**Audit response:**
Audit recognizes the efforts of UBTS towards achieving the accreditation status to date. However, efforts towards this process should be fast tracked if benefits associated with such accreditation are to be realized.

**Recommendations**
- UBTS should put in place mechanisms to support and enforce quality systems in all its activities so as to ensure access to safe and high quality blood and transfusion services.
- UBTS should ensure that the processes that develop blood and its products are well documented, updated and performed in a systematic and quality manner.

### 4.2 BLOOD COLLECTION TARGETS AND BLOOD SUPPLY

For any developing country, World Health Organisation (WHO) recommends units of blood to be collected from at least 2% of its total population as the best practice for meeting its country’s blood and blood product requirements. Demand for blood and blood products in a country depend on the population, health care structure and prevalence of conditions requiring regular transfusions like anemia; severe malaria; major surgeries, such as, organ transplants; accident victims; and complications in pregnant mothers.

Through a review of blood collection targets and the interviews held, audit noted that UBTS did not base its blood collection targets on the WHO recommendations; but, instead, based its blood collection targets on a percentage (10%) increase of the previous year’s collections. Audit established that blood collection by UBTS stood at an annual average of 186,779 units as illustrated in the table 3 below.
Table 3: Showing UBTS’ annual blood collection targets & actual collected.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>UBTS’ annual blood collection targets</th>
<th>UBTS’ actual annual blood collection</th>
<th>Variance</th>
<th>%age variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/2010</td>
<td>177,600</td>
<td>171,620</td>
<td>5,980</td>
<td>3.4</td>
</tr>
<tr>
<td>2010/2011</td>
<td>189,600</td>
<td>184,899</td>
<td>4,701</td>
<td>2.3</td>
</tr>
<tr>
<td>2011/2012</td>
<td>211,200</td>
<td>203,819</td>
<td>7,381</td>
<td>3.5</td>
</tr>
<tr>
<td>Average</td>
<td>192,800</td>
<td>186,779</td>
<td>6,021</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Source: OAG analysis of UBTS’ BMIS data

It is worth noting that although UBTS had an average blood collection of 186,779 units against a target of 192,800 units, yielding an average performance of 96.9% during the period under review, the annual blood collection targets against which this performance was based, was not arrived at scientifically.

Using the WHO recommendations on blood requirements, Uganda, with an average population growth of 33.4 million\(^{14}\), should, therefore, have targeted to collect an annual average of 668,000 units of blood for the period under review, as illustrated in table 4 below.

Table 4: Showing UBTS’ annual blood collection against WHO requirements

<table>
<thead>
<tr>
<th>Year</th>
<th>WHO standard</th>
<th>UBTS annual collection</th>
<th>Variance</th>
<th>%age variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/2010</td>
<td>646,000</td>
<td>171,620</td>
<td>474,380</td>
<td>73.4</td>
</tr>
<tr>
<td>2010/2011</td>
<td>668,000</td>
<td>184,899</td>
<td>483,101</td>
<td>72.3</td>
</tr>
<tr>
<td>2011/2012</td>
<td>690,000</td>
<td>203,819</td>
<td>486,181</td>
<td>70.5</td>
</tr>
<tr>
<td>Average</td>
<td>668,000</td>
<td>186,779</td>
<td>481,221</td>
<td>72.1</td>
</tr>
</tbody>
</table>

Source: OAG analysis of blood collection data against WHO requirements

In relation to the WHO recommendation, this implies that Uganda’s annual average collection target for blood was short by 72.1% for the period under review. UBTS was left to issue blood on the basis of availability other than requests/requisitions from transfusing units, illustrated in table 5 below.

---

\(^{14}\) The population growth (annual %) in Uganda is reported to be 3.19 by UBOS.
Table 5: Showing UBTS’ actual blood collections against issues

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual Units of Blood Collected (A)</th>
<th>Discards (B)</th>
<th>Available blood for issuing (A-B)</th>
<th>Blood requested (C)</th>
<th>Blood issued (D)</th>
<th>Average % variance of blood requested against issued (\frac{(C-D)}{(C)})%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010/2011</td>
<td>184,899</td>
<td>11,382</td>
<td>173,517</td>
<td>190,976</td>
<td>173,735</td>
<td>9</td>
</tr>
<tr>
<td>2011/2012</td>
<td>203,819</td>
<td>10334</td>
<td>193,485</td>
<td>204,756</td>
<td>193,237</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>560,338</td>
<td>31,478</td>
<td>528,860</td>
<td>576,416</td>
<td>534,407</td>
<td>7.3</td>
</tr>
<tr>
<td>Average</td>
<td>186,779</td>
<td></td>
<td>192,139</td>
<td></td>
<td>178,136</td>
<td></td>
</tr>
</tbody>
</table>

Source: OAG analysis of actual blood collection against issued

Audit attributed the inability by UBTS to set targets against WHO recommendations, to its reliance on the available blood collection teams to set targets. For example in the FY2011/12 where the number of teams were 20, and with a monthly target of 990 units per team, only 237600 units were targeted for collection; which is far below the WHO recommendation of 690,000 units that should have been targeted (2% of 34.5 million people).

Absence of data, such as: actual blood requirement based on a well-documented clinical diagnosis from the hospitals stating the reason for transfusion, hemoglobin levels, and expected transfusion outcomes, hampered UBTS ability to accurately ascertain the country’s blood and blood product requirement. In addition, UBTS’ records of blood requisitions and issues to transfusing units was misleading, considering that there was a huge variation between records maintained at transfusing units and these at UBTS.

For instance, an analysis of blood requests and issues for Mulago hospital in the FY 2011/12 showed that there was an acute shortage of blood. Whereas the hospital requisitioned for 34,057 units of blood, only 11,135 units were issued, showing a blood shortage of 67%, as shown in table 6 below.

Table 6: Showing blood request and issue to Mulago hospital by UBTS

<table>
<thead>
<tr>
<th>Source</th>
<th>Requisitioned</th>
<th>Issued</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nakasero Blood Bank Figures (database) (FY 2011/12)</td>
<td>16,737</td>
<td>15,900</td>
<td>95%</td>
</tr>
<tr>
<td>Mulago Hospital Records (auditors’ extraction from hospital delivery forms) (FY 2011/12)</td>
<td>34,057</td>
<td>11,135</td>
<td>33%</td>
</tr>
</tbody>
</table>

Source: OAG analysis

UBOS Abstract October 2012
Further scrutiny of records at UBTS revealed that the database was not accurately maintained. Whereas the source records used to maintain the database indicated that the hospital had requested for 34,057 units, only 16,737 units were entered in the database. Similarly, the database showed that a total of 15,900 units had been issued to the hospital, contrary to the source records that indicated only 11,135 units. According to UBTS, this portrays a performance level of 95%, which is not correct.

This is as a result of the failure by UBTS to maintain and update its database using the source documents from transfusing centers. The actual UBTS performance, as far as Mulago hospital is concerned, was only 33% in the FY 2011/12. The records for the FYs 2009/10 and 2010/11 were purportedly burnt from UBTS headquarters in the process of shifting to their new office block hence not availed for audit.

Blood shortages can lead to longer hospitalization and increased costs to the patients, death, in case of emergency if elective procedures are postponed so as to wait for adequate supplies of blood\textsuperscript{16}.

The shortfalls in blood collection targets by UBTS may lead to increase in mortalities around the country due to transfusible related cases such as acute malaria, anemia and complications in child delivery. For instance, according to the UNICEF statistics\textsuperscript{17}, Uganda registers 430 maternal deaths per 100,000 live births; and one of the major causes of maternal mortality is hemorrhage arising from sepsis, unsafe abortion, hypertensive disorders & obstructed labour. According to UNFPA, post-partum hemorrhage can kill a woman in less than 2 hours.

**Conclusion**

UBTS blood collection targets were not set scientifically as recommended by WHO; but, instead, they were set against a percentage (10%) increase of the previous year’s collections, resulting into blood shortage of 72% of blood and blood products requirements in Uganda’s Health Care system, making it difficult for the country to achieve the 4\textsuperscript{th}, 5\textsuperscript{th} and 6\textsuperscript{th} MDGs.

It may be said that, UBTS does not know the actual blood needs of the country, since there are no statistics anywhere in their records to prove otherwise.

UBTS database is not updated using source documents from transfusing units. This is hindering UBTS from setting accurate and realistic targets that will ensure the sustainability of the various blood and blood products as required, hence, the public outcry on the lack of stock of spectrums of blood and blood products in Uganda’s hospitals and HC IVs.

\textsuperscript{16} Isaac Ksijja, “The current hospital transfusion practices and procedures in Uganda”

Management’s response

National requirements for blood are determined by the capacity of the country’s health care system and its coverage of the population.

WHO estimates that blood donation by 1% of the population (not 2% as indicated in the report) is generally the minimum needed to meet a nation’s most basic requirements for blood; the requirements are higher in countries with more advanced health care systems. There are other methods of estimating the country’s blood needs which include: blood supply data/clinical blood use (currently in use by UBTS -10% increase on previous blood usage) and calculations based on hospital beds.

Blood and blood products are a unique resource because they are obtainable only from individuals who donate blood or its components. (There is no alternative source to blood). Uganda urgently needs a substantial increase in the number of people who are willing and eligible (free from TTI) to donate blood in order to ensure a stable supply of safe blood and blood products that is sufficient to meet national requirements.

However, the UBTS can only meet 80-90% of the hospital requirements for blood. (203,819 units collected in 2011/2012).

In relation to the audit finding on blood collection targets and blood supply, UBTS Management further undertook to take the following actions:

- UBTS will put in place a process to assess current and future blood needs.
- UBTS will set realistic targets for donor recruitment and recall, balancing these targets with blood collection targets and the staff and resources available for blood collection at fixed and mobile donor sessions;
- Revise the MoU with URCS that will define roles, responsibilities and accountability and ensure common standards;
- Establish a mechanism for regular communication with all partner organizations and for planning and coordinating activities; and
- Engage in public relations to build a public image that provides the blood transfusion service with a reservoir of good will.

Audit response:

Audit maintains the requirement of units of blood to be collected from at least 2% of its total population as the best practice since the National Blood Transfusion policy that stipulates the 2% is still in force and has not been amended to cater for the said change as indicated by UBTS management.
Recommendations

- UBTS should encourage transfusing units to document all their blood requirement needs based on the doctor’s clinical diagnosis so as to obtain data on the trend of blood usage and patterns in Uganda’s health care system. This will guide UBTS in setting realistic targets that will ensure the sustainability of the various blood and blood products as required.

- Data should also be obtained on the number of acute beds in all our health units mandated to transfuse so as to clearly obtain data on the average number of units transfused per actual bed in a given year all over the country as an alternative to WHO recommendation.

- UBTS should consider gradually moving towards WHO recommendations for setting blood collection targets scientifically instead of its reliance on the available blood collection teams for setting targets.

- UBTS management should maintain and update its database using source documents from transfusing centers.

4.3 SYSTEMATIC IMPLEMENTATION OF QUALITY

The National Blood Transfusion Policy 2005, Objective thirteen (13) sub-objectives 13.3 and 13.9, requires UBTS to develop quality assurance protocols for the entire blood testing programme and to set up an adequate and efficient quality assurance department at Nakasero Blood Bank to oversee and coordinate quality assurance countrywide. World Health Organisation (WHO) further recommends key elements of quality systems for any National Transfusion Service, to include: Organizational Management, Standards, Documentation, Training and Assessment, if the quality of blood and blood products for clinical use is to be ensured. All products must be safe, clinically effective and of appropriate and consistent quality.

Quality Management Unit and Training

A review of documents revealed that though UBTS had developed quality assurance protocols, it did not have a consistent and systematic schedule for the implementation of these protocols throughout the service. Audit noted that UBTS did not have a fully functional Quality Management Unit.
All UBTS staff had not been introduced to the basics in quality assurance or refresher courses save for the training that was conducted five (5) years ago for laboratory staff, nursing officers and medical officers. Competency testing of staff carrying out the procedures necessary for the safe preparation of blood and blood products had not been carried out either. This made it difficult for UBTS to conduct quality audits to provide assurance that controls, test methods and equipment were working correctly.

**Documentation**

Audit further observed that the documentation of data in UBTS was scanty, and not organized well enough to be stored and retrieved in a reasonable amount of time. Similarly, data from all the regional blood banks was not synchronized at the headquarters.

**Monitoring of equipment instruments**

Documentation was not seen to show that routine maintenance, repairs and testing was performed on all equipment in the UBTS blood banks. In the absence of such documentation, it was difficult to ascertain whether regular maintenance was being done, yet this is a critical process for some of the UBTS equipment.

For instance, blood is supposed to be refrigerated at temperatures between 2 and 6 degrees if its quality is to be maintained. Although temperature monitoring is critical for refrigerators, freezers, incubators and water baths, there was no evidence of periodic testing of the alarms on refrigerators and freezers to ensure that they were functional. Through observations at all the regional blood banks visited, audit noted that the temperatures on blood bank refrigerators and freezers were not manually recorded on a daily basis as is stipulated in the SOP.

The devices that plotted the temperatures on refrigerators and freezers were faulty as the ink from the pens poured on the temperature chart as shown in Picture 1. This prevented an hourly recording of temperatures.

**Picture 1: showing some of UBTS’ temperature recording methods**

Source: OAG photo taken on 23rd/11/2012 at Mbarara RBB
On the left, a temperature reading chart with a faulty plotting pen on one of the UBTS blood refrigerators at Mbarara RBB with readings of below 2 degrees. On the right, is a temperature recording sheet that was rarely filled.

Audit also noted that UBTS lacked appropriate quality-assurance measures, including guidelines and principles to form the basis for manuals of standard operating procedures, selection of donors, control of Laboratory reagents, and continuous assessment systems for its entire blood processing and testing mechanism.

For instance, there was no guidance as to how to handle spilled blood among units under going processing and yet this was an expected phenomenon in all regional blood banks as seen in Picture 2. This could lead to potential contamination of all blood undergoing processing and or blood scheduled to be issued to Transfusing Units.

**Picture 2: showing blood spilled over onto other blood units at Mbarara RBB**

Failure by UBTS to systematically implement quality systems in the entire blood transfusion network was caused by:

- Lack of a fully dedicated quality management Unit with the necessary equipment and personnel to be able to carry out quality audits in all the blood bank networks.

- Lack of a systematically implemented quality protocol in all UBTS RBB networks may lead to many quality incidences going unnoticed and this can compromise the quality of blood.

**Conclusion**

Quality control has not been seen by UBTS as an essential part of its functions as the various blood banks use different testing procedures and testing standards. This casts doubt on the uniformity and consistency in the quality of blood and blood products produced. If the quality of blood and blood products for clinical use is to be ensured, all products must be safe, clinically effective and of appropriate and consistent quality.
**Management’s response**

The use of different testing algorithm is due to different levels of infrastructure in place but is well controlled to ensure the overall safety of the transfusion process from vein to vein. Technical Assistance has been secured from WHO to review the current testing algorithm/test equipment then recommend improvements to optimize the sensitivity and specificity of testing. On acceptance of the recommendations, revision will be undertaken.

Technical Assistance has been secured from WHO to develop materials then conduct Quality Assurance training – train 15 QA trainers per region; and work with them to train Regional staff on Quality.

**Audit response:**

Audit notes that although there was some documentation in relation to this technical assistance, the evidence to show that this had been secured was not availed.

**Recommendation**

UBTS should initiate quality programmes in all its systems to ensure that blood and blood products have the same efficacy across all the blood banks.

### 4.4 APPROPRIATE USE OF BLOOD AND BLOOD PRODUCTS

UBTS is required by its National Blood Transfusion Policy, objective 6\(^{19}\), to promote clinical use of blood and blood products so as to ensure that blood and blood products are appropriately used in hospitals and Health Centre IVs in order to minimize the risk of adverse events such as transfusion of wrong blood group, transfusion reactions and transmission of infections. UBTS was to prepare and disseminate guidelines on effective clinical use of blood, ensure prescription of blood and blood products and to manage adverse effects through regular medical audits on the processes of ordering, distribution, handling and administration of blood.

Audit established that UBTS had not formulated guidelines on clinical use of blood and that there was no evidence to support continuous education and training in effective clinical use of blood. Audit further noted that medical audits on haemovigilance activities, such as the processes of ordering, distribution, handling and administration of blood, as well as the monitoring of the response of transfusion were not carried out by UBTS at the time of audit (January 2013). This made it difficult for UBTS to track the usage of its blood and blood products as well as the response of transfusion.

\(^{19}\) Para 6.1 through to 6.12 of the National Blood Transfusion Policy, July 2005
Although the only work-plan (FY 2011/2012) availed for the period under review reflected the haemovigilance activities, none of the RBBs visited availed evidence of detailed activity plans and budgets against which the said activities would be executed. Scheduling planned activities with actual implementation guidelines, timeframe and expected budget would have helped management to allocate resources according to releases relating to this activity.

This was caused by failure on the part of UBTS to prioritize budget allocations to activities aimed at ensuring its haemovigilance against transfusion practices. For instance, UBTS spent only 0.01% of its total expenditure in the FYs of 2010/11 and 2011/12 that is Shs.2.6 million of its total expenditure of 22.7Bn, for establishing and supporting the formation of hospital transfusion committees and all related functional bodies to improve haemovigilance. Management attributed this anomaly to insufficient funding.

As a result of underfunding, the various Principal Medical Offices could not conduct regular supervisory visits to transfusing units, offer guidance to transfusion committees and conduct regular medical audits on the usage of blood and blood products.

Further, by not carrying out haemovigilance activities, there is likelihood that blood and blood products may not be administered in hospitals and HCVs only when clinically indicated, and at the lowest effective dose and frequency possible. This could be ruling out safer alternatives like encouraging patients to eat foods rich in iron content in order to boost their hemoglobin levels as opposed to outright transfusion.

In addition, there is a likelihood of hospitals transfusing blood of compromised quality, since most of the elective procedure such as processes of ordering, distribution, handling, cold chain management and administration of blood to ensure the necessary quality is likely to be overlooked by transfusing units leading to clotted, expired and haemolysed blood being transfused to patients, which could be fatal.

For instance, most of the fridges in the transfusing units visited did not store blood under appropriate temperature for maximum therapeutic value and shelf life, the temperatures were much higher/lower than the WHO recommended temperatures.20

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20 WHO recommends whole blood and packed cells to be stored between 2-6°C.
<table>
<thead>
<tr>
<th>Transfusing unit</th>
<th>Date</th>
<th>Temp. Readings</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arua RRH</td>
<td>5/11/2012</td>
<td>5°C</td>
<td>Functioning within temperature range</td>
</tr>
<tr>
<td>Maracha</td>
<td>6/11/2012</td>
<td>6°C</td>
<td>Functioning within temperature range</td>
</tr>
<tr>
<td>Pakwach HCIV</td>
<td>7/11/2012</td>
<td>10°C</td>
<td>Functioning outside the temperature range</td>
</tr>
<tr>
<td>Serere HC IV</td>
<td>8/11/2012</td>
<td>-12°C</td>
<td>Functioning outside the temperature range</td>
</tr>
<tr>
<td>Busiu HCIV</td>
<td>9/11/2012</td>
<td>-20°C</td>
<td>Functioning outside the temperature range</td>
</tr>
<tr>
<td>Mbale RRH</td>
<td>9/11/2012</td>
<td>10°C</td>
<td>Functioning outside the temperature range</td>
</tr>
<tr>
<td>Soroti RRH</td>
<td>8/11/2012</td>
<td>7°C</td>
<td>Functioning outside the temperature range</td>
</tr>
<tr>
<td>Fort Portal</td>
<td>11/11/2012</td>
<td>6°C</td>
<td>Functioning within the temperature range</td>
</tr>
<tr>
<td>Kamayiba HCIV</td>
<td>12/11/2012</td>
<td>7°C</td>
<td>Functioning outside the temperature range</td>
</tr>
<tr>
<td>Mbarara RRH</td>
<td>14/11/2012</td>
<td>4°C</td>
<td>Functioning within the temperature range</td>
</tr>
</tbody>
</table>

Source: OAG analysis of temperature readings

As seen from the table above, in Pakwach Health Centre IV- Nebbi district the fridge temperature was 10°C, in Serere Health Centre IV, Soroti district the fridge temperature was negative (-12°C) as seen in picture 3 below.

**Picture 3: showing fridge temperature readings at Pakwach and Serere HC IV**

Source: OAG Pictures taken on 15TH/11/2012 Pakwach HCIV in Nebbi district on the left and 16th/11/2012 Serere Health Centre IV, Soroti district on the right.
At Busiu Health Centre IV in Mbale district, the interior of the fridge was frosted as evidenced from the picture 4 below and had a temperature reading of -20°C.

**Picture 4: showing frosting of the fridge interior at Busiu Health Centre IV.**

Source: OAG Picture taken on 29th/11/2012

Further, audit inspection of transfusing units noted spilled and blood with maggots in a fridge in Mbale referral hospital. On enquiry, it was discovered that the lab-in-charge was not aware of the blood with maggots inspite of the fact that these fridges are supposed to be kept clean at all times considering that blood is a good medium for the growth of microorganisms such as bacteria.

**Picture 5: showing blood with maggots at Mbale Regional Referral Hospital**

Source: OAG Pictures taken on 28th/11/2012 in Mbale District in Mbale District

Blood at Mbale referral hospital blood bank with maggots (circled with yellow). Such blood could be transfused to patients if particular care is not taken to ensure a clean environment in which it is being stored.
Conclusion
UBTS is not following up on its product right to the final consumer and this might be leading to poor quality products being transfused to the end user at the Transfusing Units.

UBTS does not fully appreciate the clinical blood needs of the hospitals they supply; consequently, its objective of promoting clinical use of blood and blood products in hospitals and Health Centre IVs is not being realized.

Management’s response
The UBTS has secured TA from WHO to improve and strengthen the clinical interface between UBTS and the 11 biggest transfusion hospitals;

UBTS will put in place a haemovigilance system required to identify and prevent occurrence or recurrence of transfusion related unwanted events

A study to assess the utilization of blood and blood products within health facilities in Uganda has been undertaken and data is being analyzed in order to improve blood stock management in hospitals.

Audit response:
Audit notes that although there was some documentation in relation to this technical assistance, the evidence to show that this had been secured was not availed.

The study report to assess the utilization of blood and blood products was availed. As indicated by management, the data is still being analysed. This analysis should be expedited to enable improvement in blood stock management.

Recommendations

- The UBTS management should prioritize budget allocations to activities aimed at ensuring haemovigilance against transfusion practices.
- The UBTS management should promote and ensure the functionality of Hospital Transfusion Committees.
- The UBTS management should conduct blood usage audits, especially on the clinical use of blood.
- The UBTS management should prepare and disseminate the guidelines on effective clinical use of blood.

4.5. COMPONENT PREPARATION FROM WHOLE BLOOD DONATION AND BLOOD COMPONENT THERAPY

The national blood transfusion policy objective 6, strategy 6.1 requires UBTS in conjunction with the Ministry responsible for health to ensure that blood and blood products are appropriately used in hospitals. The World Health Organisation [WHO] recommends that the ratio of the use of blood components to whole blood should be 90:10, since only a limited category of clinical interventions require whole blood. It therefore becomes necessary to promote blood-component therapy, which should be actively taken
up by the Blood Transfusion service.

One unit of Whole Blood (WB) contains approximately 450 ml of blood collected from a healthy adult donor into a sterile plastic bag containing 63 ml of anticoagulant/preservative (AP) solution.

It was noted that the ratio of use of blood components to whole blood in Uganda’s health care system was 12:88 contrary to 90:10 as recommended by best practice. The transfusing of a higher ratio of whole blood is believed not to have significant therapeutic benefits.

Audit attributed this to:

- Failure by UBTS to provide regular transfusion practice guidelines to all transfusing units as a result of its poor clinical interface in the region as partly demonstrated by the low percentage of hospitals with functional transfusion committees\(^2\) to guide prescription of blood and blood products, and

- Absence of a system for monitoring of clinical transfusion practice by the transfusion service.

Blood may be transfused as whole blood or as one of its components (Red Blood Cells, platelets, and plasma). Because patients seldom require all of the components of whole blood, it makes sense to transfuse only that portion needed by the patient for a specific condition or disease.

Failure by UBTS to promote component therapy among the transfusion units could result in:

- Patients in Uganda being denied the right to be transfused with the right product, right prescription and at the right time, for the right reason.

- Patients in Uganda’s Health Care System not being appropriately and judiciously transfused with the specific blood product component required for the specific ailment diagnosed.

Conclusion

Blood component preparation in Uganda is very low compared to the WHO recommendation, implying that out of every 9 patients in Uganda transfused, 1 (one) receives the component therapy treatment and 8 (eight) get transfused with whole blood which is not believed to have significant therapeutic benefits. This treatment from one unit of donated whole blood would have benefited up to four (4) patients.

Management’s response

Whole blood is still frequently used for transfusion, particularly in the RBBs (like Arua) where the blood services have limited facilities and resources (human). A number of RBBs face a challenge of staff and equipment required to make
blood components. Many clinicians are not aware of the availability of these blood components, hence, rarely make orders for them. There is need to train the clinicians as regards blood component therapy.

Recommendations
- UBTS should secure the necessary equipment for blood component preparation as this would ensure the provision of the right product to the Transfusing Units, in the long run, and ensure an increase in the efficacy of the product being transfused among all patients in the country.
- UBTS should step up its monitoring of clinical transfusion practice by the transfusion service in the region.

4.6 CONSTRUCTION OF BLOOD BANKS
Uganda’s Blood Transfusion Policy, July 2005 requires the national transfusion service (UBTS) to construct and equip Regional blood banks (RBB). In the strategic plan of MOH, each Regional Referral Hospital was to have a purpose built Regional Blood bank to secure, safeguard and regularly update technologies and other facilities for blood transfusion. There are currently (2012) thirteen [13] regional referral hospitals in the country. Audit noted that UBTS planned to construct Seven [7] purpose built regional blood banks in Gulu, Arua, Fort Portal, Moroto, Mbale, Mbarara and Nakasero, contrary to the Government strategy of having thirteen [13] that is, a purpose built regional blood bank for every regional referral hospital. However, the planned construction by UBTS is less by six (6) regional blood banks [RBB], compared to the national requirement. At the time of Audit (January 2013), UBTS had managed to construct five [5] purpose built regional blood banks at Nakasero in Kampala, Mbale, Mbarara, Gulu, and Fort Portal. The RBB constructed in Fort Portal is shown in Picture 6.

Picture 6: Showing a modern RBB constructed at Buhinga Hospital Fort Portal

Source: UBTS Management
This is an under performance of 62% considering the five constructed, against the Government’s strategy of thirteen [13] RBB as illustrated in table 8 below;
Table 8: UBTS’ planned infrastructural performance against MoH targets

<table>
<thead>
<tr>
<th>Organization</th>
<th>Planned (a)</th>
<th>Actual(b)</th>
<th>Performance (c)</th>
<th>Performance Deviation (100%-c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UBTS</td>
<td>7</td>
<td>5</td>
<td>71%</td>
<td>29%</td>
</tr>
<tr>
<td>MoH</td>
<td>13</td>
<td>5</td>
<td>38%</td>
<td>62%</td>
</tr>
</tbody>
</table>

Source: OAG analysis of UBTS and MoH Strategic plans

Through documentary reviews and interviews, audit also noted that UBTS management did not know the cost of the construction works for Nakasero, Fort Portal and Gulu purpose built facilities.

Through interviews with the Principal Assistant Secretary and review of UBTS land related documents, it was established that UBTS did not have title deeds for Mbale and Fort-Portal regional blood banks, nor did it have Memorandums of Understanding (MOUs) for the use of the land donated to it by hospitals on which the regional blood banks are housed. The only documentation regarding land use rights for these two blood banks is related to Mbale RBB, to which a letter was written by the Medical Superintendent of Mbale Regional Hospital dated July 2003 requesting the Permanent Secretary, MoH to grant UBTS authority to construct its Regional Blood Bank on the hospital land.

Audit attributed the above anomalies to the fact that:

- UBTS had not brought their needs assessment and requirements for purpose built infrastructure and blood bank equipment to the attention of Government, in recognition of Government strategy of having purpose built blood banks in every region where there exists a referral hospital.

- The cost of the construction for the Nakasero, Fort Portal and Gulu regional blood banks was not known by the UBTS management due to the fact that the financing and construction/supervision of the said buildings had been financed by the Center for Disease Control (CDC). By the time of audit (January 2013), CDC was yet to provide the UBTS management with the costing for the buildings.

- Management was reluctant to follow up on the processing of land titles for Mbale and Fort Portal regional blood banks considering that construction works begun in April 2005 and 2010, respectively.

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23 Financial statements, asset register and performance reports
24 Various correspondents on this matter have been intercepted by audit between the management of UBTS and the CDC contact
As a result of not aligning its planning to the national strategy, UBTS did not plan for the construction of the six (6) regional blood banks out of the thirteen (13) envisaged in the HSSP 2010/2011-2014/2015. This is likely to affect the transfusion services around the country. For example, lack of adequate and appropriate space for blood bank operations at ARBB and Kitovu blood banks; Kabale and Soroti Blood collections centres is hindering quality performance especially in the collection, testing, processing and distribution of blood, in addition to failing to avail a conducive environment for staff and members of the public donating blood (Walk in donors) as seen in Picture 7. Notice the contrast in donor donation environment.

**Picture 7: showing a typical walk-in donor site at Arua RBB and Nakasero RBB**

![Picture showing a typical walk-in donor site at Arua RBB and Nakasero RBB](source: OAG photo taken on 14th/11/2012 at Arua RBB and 20th/02/2013 at NakaseroRBB)

Similarly, lack of adequate and appropriate space for blood bank operations is hindering UBTS from securing, safeguarding and regularly updating technologies and other facilities for blood transfusion within its RBB network, which poses a constraint to the proper implementation and development of blood safety activities. **Picture 8** shows a room at ARBB that doubles as a store, pantry and a blood processing unit.

**Picture 8: showing working conditions at the testing, processing and distribution room at ARBB**

![Picture showing working conditions at the testing, processing and distribution room at ARBB](source: OAG photo taken on 13th/11/2012 at Arua RBB)
As a result of not having secured title deeds and/or signed MoUs with the regional hospitals where the Mbale and Fort Portal regional blood banks have been constructed, UBTS has no security of tenure over these assets.

Conclusion
Planning outside the overall government strategy of having regional blood banks in every regional referral hospital may frustrate Government efforts to have a well built and networked blood transfusion service, a setback that may curtail quality performance, especially in the testing and processing of blood.

Management’s response
The MOH Health Sector Strategic plan had proposed to construct a RBB for each RRH. This has been consistently captured in our budget for development but funds have not been released for this activity. There is urgent need to construct a RBB in Moroto.

On the issue of land titles, the UBTS will take up this matter with the MOH with a view of either securing the land titles or memoranda of understanding.

Audit response:
Audit maintains that no budget line item for the construction of these regional hospitals was provided for in the period under review as an effort of UBTS towards fulfilling the MOH Health Sector Strategic plan requirement of constructing a RBB for each RRH.

Audit applauds UBTS management towards the efforts taken so far at securing her assets as verified though the communications to the MoH seen.

Recommendations
- Management should harmonize its strategic plan with that of the National Health Sector Strategic Plan.
- The total costs for each purpose built infrastructure so far constructed should be established and the asset register updated.
- The UBTS management should secure title deeds for its Mbale and Fort Portal RBBs.

4.7 ESTABLISHMENT OF COLLECTION AND DISTRIBUTION CENTERS

The UBTS, in its strategic plan 2010-2015 set out to acquire premises for ten (10) blood collection and distribution centers in Masaka, Jinja, Hoima, Soroti, Kabale, Rukungiri, Bundibugyo, Lira, Kagando and Kitgum to collect, store and distribute blood to improve blood collection quality and efficiency in order to perform those tasks for which they were established.
Audit established that UBTS acquired premises for six (6) of the ten (10) planned collection and distribution centers; but was yet to acquire and set up planned collection centers in four (4) of the places: Bundibugyo, Lira, Kagando and Kitgum. In addition, audit noted that there was no mid-term strategy indicating management’s (UBTS) intention to acquire and set up the said collection and distribution centers as evidenced by their omission from the annual work-plans and budgets reviewed for the past two (2) years (FYs 2010-2011 and 2011-2012).

It was further established that the three (3) blood collection and distribution centers visited (Soroti, Kabale and Masaka) were not carrying out all the functions for which they were established. For instance, Soroti lacked functional storage facilities, such as: fridges for quarantine and distribution of blood, but instead, relied on facilities and staff provided by Soroti regional referral hospital. All collection centres lacked adequate office space as they operated in a single, poorly ventilated room which acted as a store for both blood and equipment and all BCC did not have a lab technologist or technician as stipulated in the SOP\textsuperscript{25} to take care of technical aspects of storage and distribution\textsuperscript{26}.

Kabale BCC operated in a URCS donated container [Picture 9] while Soroti and Masaka BCCs operated in single rooms provided by their respective Regional Referral Hospitals. These centers hardly had room for blood collection equipment, storage and a staff room. As a result, Soroti & Kabale BCCs delegated the blood storage and distribution function to the regional referral hospitals while Masaka delegated these functions to NRBB.

**Picture 9: Showing a container housing Kabale BCC**

Source: OAG photo taken on 13/8/2012 in Kabale Municipal Council

\textsuperscript{25} Processing laboratory, page 2 of 2

\textsuperscript{26} distribution should be by or under the supervision of a qualified person
Similarly, the BCCs were using one vehicle for blood collection, donor recruitment and distribution yet the practice was to have recruitment and collection separated.

UBTS attributed failure to acquire premises for the establishment of these collection centers to underfunding and shortage in staffing, hence the futility of establishing additional BCCs. In addition, a functional review on UBTS staff establishment had not been processed; therefore, the recommendations therein had not been implemented because of the Government ceiling on recruitment. However, a review of UBTS budgets and work plan indicated a lack of budget line item specifically relating to the acquisition and operationalisation of BCCs. Lack of a budget item and work plan to operationalise the establishment of the collection centers casts doubt on the willingness on the part of management to implement this strategy fully over the next three financial years (2012/13-2014/15).

The reliance by UBTS on hospitals to store and distribute blood has compromised the quality of the product since the cold chain and blood stock movement records are not adequately monitored by UBTS.

Conclusion
UBTS has not been able to establish all collection and distribution centers, and for those existing, it has not equipped them to optimally carry out their functions. This is hindering the improvement in the quality and efficiency of blood collection. The distribution of blood and blood products at collection centers has been delegated to hospitals whose laboratory staff skills in transfusion medicine might not be at the levels and standards set by the transfusion service (UBTS).

Management's response
This has been consistently captured in our budget for development but funds have not been released for these activities.

Audit response:
Audit maintains that no budget line item for the construction of BCCs was provided for in UBTS’ budgets seen, for the period under review.

Recommendation
The UBTS management should identify a budget line for the establishment of collection centers and lobby Government and Development Partners so as to operationalise the construction and equipping of these collection centers.

27 Consultancy conducted by Adam Smith International and its consortium partners, UMACIS, DCI and Incaflex on behalf of the MoP to review past public reform initiatives dating back to early 1990s and intended to enhance the performance of Public Service, May 2011
28 Five Year Strategic Plan 2010-2015
4.8 LABORATORY EQUIPMENT

The National blood transfusion policy, July 2005, Objective 5.2, requires UBTS to equip all the regional blood banks with updated equipment for routine screening and blood grouping. All equipment should be maintained to ensure efficient and accurate working at all times. The UBTS, in its strategic plan 2010-2015, set out to adequately equip laboratories at every regional blood bank in Gulu, Arua, Fort Portal, Mbale, Mbarara and Nakasero.

Audit established that UBTS did not meet all the requirements for equipping its regional blood banks. It spent Shs.1.570 billion on laboratory and blood donor equipment (FY 2009/10 to 2011/12) as shown in table 9 below:

Table 9: showing UBTS Expenditure on laboratory and donor equipment

<table>
<thead>
<tr>
<th>FY</th>
<th>UBTS expenditure on Lab equipment</th>
<th>Annual UBTS Expenditure</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>USD</td>
<td>Shs**</td>
<td></td>
</tr>
<tr>
<td>2009/10</td>
<td>411,433</td>
<td>781,722,700</td>
<td>9,211,156,678</td>
</tr>
<tr>
<td>2010/11</td>
<td>36,242</td>
<td>83,356,000</td>
<td>10,712,148,263</td>
</tr>
<tr>
<td>2011/12</td>
<td>288,047</td>
<td>705,715,150</td>
<td>12,042,090,440</td>
</tr>
<tr>
<td>Total Expenditure</td>
<td>735,722</td>
<td>1,570,793,850</td>
<td>31,965,395,381</td>
</tr>
<tr>
<td>Av. % Exp</td>
<td></td>
<td>523,597,950</td>
<td>10,655,139,794</td>
</tr>
</tbody>
</table>

Source: OAG analysis

**Denotes the Shs equivalent of the USD i.e. 1 USD = 1,900; 2300; 2450 in FY 2009/10, 2010/11 and 2011/2012 respectively
UBTS, on average, spent 5.1% of its annual expenditure on lab equipment over the period under review with the highest allocation of its annual expenditure being in 2009/10 and the lowest in 2010/11.

As a result, UBTS had shortfalls of over 70% in blood processing equipment requirements alone in all the regional blood banks, as shown in Appendix IV.

Further analysis of Appendix IV established that vital equipment for various component preparations was still lacking from one regional blood bank to another. All RBBs lacked water baths, water distillers, water de-ionizer, trolleys, vortex mixers microscopes, hematology analyzers and stop clocks; 86% of the RBBs lacked Orbital shakers and analytical balances; 89% lacked plasma extractors.

It was also noted that 86% of RBBs had centrifuge testing equipments, however on further analysis of these equipment, it was noted that 2 out of 7 (Mbarara and Nakasero) RBBs had more than the ideal while 4 out of 7 (Arua, Gulu, Fort Portal and Kitovu) RBB had none.

Audit attributed UBTS’ failure to meet and update its equipment requirements in all of its regional blood banks to the prioritization of other areas over this one, considering that only 5.1% of its total budget had been allocated for laboratory equipment during the period under review.

Failure to uniformly equip all regional blood banks across the country led to inconsistencies in UBTS’ testing algorithm, as their testing equipment deferred from one regional blood bank to another. This poses a great setback towards the Transfusion Service’s quest to standardize quality across all its Regional blood banks.

**Conclusion**

UBTS is not supplying standard equipment in all its regional blood banks and as a result, it is not ensuring common standards throughout the transfusion service thus making it difficult to consistently maintain quality standards over the products being processed. This poses issues over the quality of the different blood and blood products being supplied in the regional blood banks across the country.

**Management’s response**

To ensure the smooth functioning of a RBB; a comprehensive plan for the procurement of basic equipment is essential. Continued provision/replacement of equipment is difficult for the UBTS because of the financial constraints.

UBTS will set up a committee to undertake the planning and procurement/replacement of the necessary equipment and will assess both laboratory and

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29 UBTS has three testing lines for screening of TTIs i.e. Architect, HCV micro-plate Elisa and EOP Abbot Axsym as first, second and third line respectively.
blood collection equipment to ensure procurement of suitable equipment to provide safe and quality blood transfusion service. Designated staff in each region will to be trained to implement maintenance programs for all BTS equipment.

Audit response (Management’s achievements so far),

Infrastructure development – 5 RBBs have been constructed in addition to the headquarters at Nakasero; Vehicles have been procured for donor mobilisation; blood collection and counselling; equipment for blood collection; blood processing; blood testing and storage.

Recommendation

The UBTS management should standardize equipment in all its regional blood banks.

4.9 EQUIPMENT FOR BLOOD COLLECTION

Object 7, paragraph 7.3 of the National Blood Transfusion policy July 2005, requires UBTS to acquire and update systems, technologies and equipment for blood collection, screening, storage and appropriate use of blood, to ensure quality assurance throughout the processes of blood transfusion.

WHO recommends best practice in its Part A30 (requirements for the collection of source materials), appropriate premises,

30 Annex 2, Requirements for the collection, processing and quality control of blood, blood components and plasma derivatives (Requirements for Biological Substances, No.27, Revised 1992)

equipment and personnel when identifying the setup for the collection and fractionation of human blood and blood components. Premises for collection of blood by mobile teams must be adequate to ensure the safety of the donor, the collected blood or blood component and the staff participating in blood collection.

Audit established that UBTS was not providing adequate31 supplies for blood collection equipment to all its RBBs and BCCs for efficient collection of blood from potential blood donors; it had not developed a maintenance and management system for its blood collection equipment and lacked a replacement policy for the worn out equipment.

Through field observations and interviews, all BCCs and RBBs visited lacked some equipment, such as the weighing blood scale, tents, rubber grips, spring balances, sphygmomanometers/B/P, adult stethoscopes, bed sheets, mega phone systems, dressing forceps, artery forceps, bowls, gallipots and kidney dishes. Some blood donor equipment like donor couches were worn out or insufficient.

Similarly, audit noted that in some cases mobile teams were found in unhygienic places which compromised the hygiene and safety of the donor and collected blood; as seen in Picture 10 of a blood collection site in Soroti, Eastern Uganda.

31 SOP-Donor care sop 3.2.04.05
All BCCs and RBBs, except for NRBB, lacked basic facilities for site setup such as tents, tables, chairs, rubber grips, donor beds or mattresses and blood weighing machines\textsuperscript{32}. Gloves, blood pressure machines and weighing scales had not been calibrated and, therefore, imposed a potential risk to donors.

\textbf{Picture 10: Showing a blood collection site setup at an unhygienic makeshift market}

Source: OAG photos taken on 16/11/2012 in Soroti District.

\textbf{Picture 11: Showing a blood collection session}

Source: OAG photo taken 16\textsuperscript{th} /11/2012 for blood donation at Soroti BCC; and 28\textsuperscript{th} /11/2012 at Mbale RBB for the blood weighing machine.

\textsuperscript{32} Blood weighing machine helps to mix the whole blood collected with anticoagulant in the blood bag and control the volume collected
At the top, a phlebotomist gets ready to bleed a donor without basic protective gear such as gloves and aprons. In the bottom left corner, is a container in which a blood bag containing blood is placed while visually estimating the quantity collected, as opposed to placing it on a blood weighing scale as shown in the bottom right corner.

Audit attributed the inadequacy of blood collection equipment to:

- Failure by the UBTS management to communicate and lobby Government and Development Partners on the need for blood collection equipments.
- Absence of a quality assurance unit to carry out frequent field visits to emphasize adherence to the SOPs and monitor the conditions under which the collection teams were operating.

Limited number of blood collection equipment impacts on the units of blood collected from a given session, especially, since some donors are not always willing to wait for long hours before they are bled. Furthermore, in the absence of the blood weighing scales, the likelihood that the blood collected is not 450mls as recommended in transfusion medicine is high.

**Conclusion**

The non-functionality and absence of some blood collection equipment compromises on the quality of blood collected.

**Management’s response**

Like every other element of the health care system, the Blood transfusion service cannot function effectively without adequate, stable financing (60% donor funded). Without an adequate budget, the program cannot meet its objectives in the strategic plan.

Increased commitment and support of the Government to an effective national blood programme is a prerequisite for the achievement of UBTS’ objective. Without concrete recognition of blood transfusion as an integral part of the health care system, the infrastructure and the human and financial resources needed to ensure the availability of sufficient supplies and adequate quantities of safe blood and blood products are unlikely to be provided.

**Recommendation**

- The UBTS management should communicate and lobby Government and Development Partners on the need for blood collection equipment.
- The UBTS management should establish a quality assurance unit to carry out frequent field visits to emphasize adherence to the SOPs.
and monitor the conditions under which the collection teams are operating.

4.10 SUPPLIES OF BLOOD BAGS

According to the SOP on selection of blood bags (3.2.03.12), blood bags should be selected according to the need for which the donation is required. The selection of a blood bag should be according to the type of the donor to be bled that is, single bags for first time donors and quadruple/triple/double bags for repeat donors.

Audit noted that field teams did not select blood bags according to type of donor during bleeding sessions. Quadruple bags were used for the collection of blood from first time donors instead of using single bags as recommended in the SOP in all RBBs and BCCs.

A review of records on the procurement and issue of blood bags to field revealed that 47,750 quadruple bags costing Shs.653,458,750 were issued to Arua, Gulu, Kitovu and Fort portal RBBs that did not prepare blood components in FY 2010/11 and 2011/12. These bags were used to collect and issue blood for whole blood transfusion purposes by UBTS, rendering the satellite bags useless, as seen in picture 11 below, considering that they were not being used for component preparation as required.

Picture 12: showing quadruple and empty satellite blood bags

Source: OAG picture taken on 22/11/2012 in Kasese at St. Paul HCIV.

Left is a picture of a quadruple blood bag containing blood in its mother bag at FRBB and right is a picture of Satellite (the other three blood bags that constitute a quadruple bag) bags cut off from the mother bag at St. Paul’s Health Center in Kasese because the Regional Blood Bank in Fort-Portal did not pre-pack the other three bags. Such bags are supposed to be used for component preparation and not whole blood packaging.

33 Quadruple blood bag system is used for separation of four components from whole human blood. The Quadruple Blood Bag system includes one primary bag having anticoagulant CPDA / CPDA - II / CPD solution USP / BP and three empty satellite bags.
This was attributed to:

- Absence of a dedicated quality control unit at UBTS to ensure that provisions of the SOPs developed are being followed by all responsible persons.
- Procurement of blood bags that did not correspond to the available number of active repeat donors and UBTS’s capacity to prepare blood components.

This is leading to UBTS issuance of blood to transfusing units in quadruple bags for whole blood transfusion purpose. Transfusing units that do not need that whole unit of blood may end up transferring the whole blood to the satellite bags. Transferring of whole blood into the satellite bags could bring about direct damage to the red blood cells and a possible exposure to atmospheric breeding grounds for micro-organisms. This could eventually cause septicemia/sepsis in patients transfused with such blood.

**Conclusion**

UBTS is not following SOPs on selection of blood bags in issuing blood bags to field teams. Using quadruple bags for general blood collection other than collection of blood for component and packed cell preparation leads to wastage of blood bags especially those being issued to RBBs that do not have the ability to prepare all the blood components.

**Management’s response**

UBTS will set up a committee to undertake the planning and procurement/replacement of the necessary equipment and will establish an efficient, standardized system for the procurement and reliable supply of laboratory equipment, spare parts, blood collection equipment and other consumables used in blood donation and donor care.

**Recommendation**

UBTS should set up a quality control unit which will ensure the adherence to all existing SOPs by the rest of UBTS network.

### 4.11 RECRUITMENT, SELECTION AND MOTIVATION OF DONORS

UBTS is required by Objective 3 of the National Blood Transfusion Policy, July 2005, to support extensive and continuous awareness programmes for recruitment, selection, motivation and retention of voluntary non-remunerated blood donors to ensure a safe and adequate supply of blood and blood products. UBTS was to use a multi-media communication programme to encourage potential donors to become donors, suitable donors to remain regular donors, and to deter unsuitable individuals from donating blood through a developed public relations and communication strategy.

**Donor Recruitment**

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Para 3.1 through to 3.10 of the National Blood Transfusion Policy, July 2005
Audit established that UBTS was not supporting extensive and continuous awareness programmes as per its strategic plan, and had not developed advocacy and communication strategy.

Through documentary reviews, audit further noted that UBTS operated without work plans for the FYs 2009/2010 and 2010/2011. The only work plan availed for audit related to the FY 2011/2012, however, it lacked specific activities for blood donor recruitment. It was further noted that the planning for these activities was based on blood collection team sessions targeted and not campaign drives. No specific targets for blood recruitment drives were set for blood donor recruiters at each RBB. This made it difficult to measure the effects and actual achievements realized by the blood donor recruiters.

Audit attributed the combination of blood donor recruitment activities with blood collection activities to inadequate resources, considering that UBTS allocated only 0.43% of its annual expenditure for the FYs 2010/11 and 2011/12 for donor recruitment in the period under review.

The poor facilitation of blood donor recruiters in terms of transport, fuel, stationery and imprest hindered donor recruitment drives, talk shows and production of information flyers. This resulted in recycling of the easy to reach potential donors that might not necessarily meet the set criteria for recruitment for blood donors.

Motivation and Retention
Audit further established that UBTS had not established a customer care strategy and rarely conducted field monitoring and support visits. Budget allocations for activities geared towards donor recruitment, such as: identification, education and motivation of potential donors in the community were delegated to URCS for implementation, however, audit was not availed with guidelines showing how the (MoU) currently in place was to be operationalised. This made it difficult to follow up on the extent of performance on activities for blood donor mobilization as well as accountabilities for monies disbursed to them.

Through a review of UBTS blood donor recruitment reports, it was noted that conducted with a network of ten (10) blood collection teams revealed that a team was facilitated with 80Ltrs of fuel per week for both donor recruitment and blood collection by the responsible Principal Medical Officer of the regional blood banks. This means that a team budgets to use up to 16Liters of fuel per day for five days; implying that, only a distance of up to 56km of a team’s catchment area can be covered per day. This is leading to recycling of the easy to reach potential donors that might not necessarily meet the set criteria for recruitment for blood donors.

Assuming that every Liter will cover a distance of 7km
Signed between GoU and URCS on 30th July, 2009
out of the 825 donor clubs existing country wide, UBTS supported 750 donor clubs. However, audit was not availed with supporting documents to show the existence of these clubs and as a result audit could not confirm whether these clubs were active. UBTS did not have a forecast of the total units of blood expected from these clubs for planning and forecasting purposes.

Audit also established that UBTS did not have a systematic donor retention programme to follow up and retain blood donors. While audit found it commendable for UBTS to have established a Blood Bank Management Information system (BBMIS) for maintaining donor records that would eventually be used for follow-up of previous donors, it was noted that the system lacked some basic query support features and was not inter linked to its RBB network.

For instance, it was difficult to obtain information on UBTS’ repeat donors for the period under review. In addition, Mbarara and Mbale regional blood banks that operated the system used it for donor label generation only. It was not possible for audit to obtain information relating to:

- All blood donors, [first and repeat],
- Donor numbers with positive tests for TTIs, and
- Details of all expiries of blood at the transfusion units and the blood bank for the entire Transfusion Service from the system.
- post donation counseling conducted;
- referrals for donors with TTIs.

Audit attributed this gap to:

- Absence of donor care for Donor Clubs by way of facilitation that is donor awards and recreation to keep them together, which eventually led to their collapse.
- Absence of a donor structure.
- Inadequate counseling session to keep track and encourage repeat donors.

This could have an effect on the type of donors being recruited, such as: under age, disregard of the donor selection criteria currently in place, non-identification of all repeat donors for possible minimization of TTIs in donated blood and isolation of donors that have tested positive for TTIs for onward care (medical attention).

For instance, the audit inspections carried out in November 2012 revealed that blood was being collected from underage donors as evidenced in the circled picture 12 taken from data maintained for donors in Soroti BCC and Kabale.
Conclusion:
UBTS is not adhering to its objective of supporting extensive and continuous awareness programmes for motivating, recruiting, selecting and retaining voluntary non-remunerated blood donors. Consequently, factors which affect having a dependable pool of blood donors, such as: illiteracy, myth, religious principal (Jehovah witnesses) and misconceptions and fear of blood donations might not have been demystified.

Management’s response
There is need for adequate resources to build effective donor education programs; without donor education, there are limited opportunities to attract adequate and consistent numbers of voluntary donors to meet national needs.

Recommendation:
- Management should prioritise the blood recruitment function through revision of its budget as this directly affects the very existence and continuity of any transfusion service.
- The UBTS management should separate blood recruitment activities from blood collection sessions for better planning and measurement of the effects of its recruitment drives.
- The UBTS management should establish a donor structure and emphasize donor care for donor clubs by way of facilitation that is donor awards and recreation to keep them together and active.
4.12 LEGISLATION AND REGULATORY FRAMEWORK FOR BLOOD TRANSFUSION:

The national Blood Transfusion Policy (NBTP) July 2005 paragraph 2.14, provides that there shall be a law establishing UBTS as an autonomous, self-accounting organization with a clear organization structure, and job descriptions as recommended in the restructuring report of June 2002.

Through documentary review, audit established that there was no law establishing UBTS as an autonomous, self-accounting organization with a clear organization structure, and job descriptions as recommended in the restructuring report of June 2002. At the time of Audit (December 2012) UBTS was being supervised by the MOH through the Director, Clinical services. This is leading to UBTS’ failure to effectively handle its administrative challenges, such as: solicitation for better funding and delayed recruitment of its own staff.

Human Resource Development:

Objective 11, paragraph 11.4 of the National Blood Transfusion policy July 2005, requires UBTS to provide for an approved organizational structure and policies that promote career path progression to build and strengthen manpower through human resource development.

According to its strategic plan 2010-2015, UBTS shall continue to deliver high quality blood transfusion services by recruiting and retaining a well-motivated team of highly qualified staff and volunteers, to win the confidence of stakeholders and beneficiaries.

Audit established that UBTS did not have an approved organizational structure and policies that promote career path progression to build and strengthen manpower through human resource development. There was no staff development plan to enable staff acquire the necessary capacity through supporting them to undertake both short term and long term training.

Further, audit noted that UBTS had gaps in the chain of command due to lack of approved organizational structure. The Principal Medical Officers who are in charge of Regional Blood Banks report direct to the Director; and the Principal Officers in charge of blood processes at Nakasero Headquarters who supervises the activities carried out by RBBs also report to the Director. This makes it difficult for a Principal Officer at Nakasero to supervise a fellow Principal at the RBB. Besides, it is not clear as to who heads the Regional Blood Bank at Nakasero as this position was not substantively filled.

Similarly, the understaffing at UBTS, coupled with a high staff turnover, created a shortfall in manpower requirements resulting in technical work being done by unskilled people. For example, drivers
carrying out phlebotomy\textsuperscript{38}, an activity meant for nursing officers. This also led to the overworking of the existing staff with no corresponding reward for overtime and extra assignments and with no possibility of staff rotation. As a result there is poor coordination of UBTS activities and this is causing the de-motivation of existing staff.

**Communication strategy**

The NBTP, July 2005, paragraph 3.2, requires UBTS to develop a public relations and communication strategy in order to market itself as an institution. This is to support extensive and continuous awareness programmes for motivating, recruiting, selecting and retaining voluntary non-remunerated donors.

Audit noted that UBTS lacked a public relations and communication strategy. Having such a strategy would have helped UBTS to manage aspects of its public relations with the vast donor community in the country among others.

Through interviews, it was established that there is inadequate flow of information from top to bottom, leading to poor coordination of UBTS activities and this is causing uncertainty in the operations of UBTS.

This is caused by:

- Delayed approval of the legislation and regulatory framework.
- Lack of an approved organization structure.
- Lack of human resource policies on recruitment, motivation and retention.
- Lack of a public relations and communication strategy to market itself as an institution.

**Conclusion:**

Lack of a regulatory framework and approved organization structure is leading to UBTS’ failure to effectively handle its administrative challenges, deliver improved operations and achieve effective communication to market itself as an institution.

**Management’s response**

The issue of effective donor communication strategies and educational materials is closely linked to the issues of budgets and staffing. These are inadequate educational and motivational activities. Communication is at the core of a successful and sustainable voluntary blood donor program. Thus it requires a dedicated budget and specialist staff to undertake research, planning, donor information and education and evaluation.

**Recommendation:**

- The UBTS management should lobby Government for approval of its regulatory framework and organization structure.
- The UBTS management should

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\textsuperscript{38} Phlebotomy ("to cut a vein" in Greek) is the process of making an incision in a vein.
develop a human resource policy on recruitment, motivation and staff retention.

- The UBTS management should develop a public relations and communication strategy in order to market itself as an institution.

### 4.13 BLOOD TRANSPORTATION AND STORAGE (BLOOD COLD CHAIN)

Objective 4 and annex 2 of the National Blood Transfusion policy, July 2005, requires UBTS to transport and store blood and blood products under recommended conditions to allow maximum shelf life. These conditions vary with product and include storage temperature, transportation conditions and anticoagulant in the blood bags.

According to SOP 3.2.03.17\(^{39}\), blood should be transported in specific designated vehicles, motor bikes and appropriate containers under regulated temperature\(^{40}\) conditions.

Audit established that UBTS did not transport and store collected whole blood and blood samples under recommended conditions as per SOP on packaging and transportation of blood and blood samples. Through interviews and field visits, audit noted that UBTS lacked appropriate containers, designated specific vehicles or motor bikes to transport blood and blood products from the centre to transfusing units.

For example, field visits to six (6) RBBs of Fort portal, Arua, Gulu, Mbale, Mbarara and Kitovu; and to three (3) BCCs of Kabale, Masaka and Soroti noted that phlebotomists and or counsellors were not ensuring proper packaging of whole blood and blood samples, transported blood in cool boxes with no ice packs, overpacked cool boxes, and did not ensure the filling of the storage and transport forms as per the requirements of the SOP. The blood was transported by public transport as opposed to official means of transport for longer distances.

In Arua, the field team stored blood in cardboard boxes for onward transportation to the regional blood bank after an average of 3 days safari camping aimed at collecting blood from far and remote areas (away from the RBB) of the region such as Adjumani, Nebbi, Koboko depending on the teams’ programme for blood collection.

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\(^{39}\) Packaging and transport of whole blood and blood samples.

\(^{40}\) 2-8\(^{\circ}\) C – Whole blood and packed cells, 22-24\(^{\circ}\) C-platelet and granulocytes.
Blood in cardboards at Arua Regional Blood Bank and right is a cool box still in use at Gulu RBB. Such a cool box cannot maintain the required temperatures of collected blood and is a risk to the quality chain management system of blood from this regional blood bank.

While in Mbale audit observed that, the cool boxes supplied to field teams for blood collection and storage were inappropriate in size as they were too big to fit in field vehicles allocated to the teams and public transport system was sometimes used for the transportation of blood from the field to the blood bank. Consequently, the Mbale RBB abandoned these cool boxes on its verandah as seen in the picture below.

While the policy specifies the mode of transport as designated specific vehicles and motor bikes to transport blood and blood products from the centre to the transfusing units and distinctive

Designated specific vehicle and motor bikes; temperature for transportation to be 2-8°C and 22-24°C for platelets and granulocytes; fresh frozen plasma and cryoprecipitate transported in the manner that will maintain them frozen.
clothing for blood courier using the bikes, UBTS transported its blood using public means that did not meet this set criteria.

In addition, collected blood from collection centres was stored in mal-functioning refrigerators for longer periods at temperatures above the recommended range. For example, through interviews, audit noted that both Soroti and Kabale collection centres took an average of five (5) days from the date of collection to have blood transported to their respective regional blood banks of Mbale and Mbarara for processing respectively.

Audit attributed UBTS’ inability to transport and store blood and blood samples under recommended conditions to:

- Lack of designated specific vehicles, motor bikes (blood courier) for each blood collection team and at every collection centre for transporting blood. For instance each blood collection team comprising eight (8) people is provided with one vehicle (land cruiser) to transport blood collection equipment, whole blood and the team to the field.
- Lack of functional freezers that made it difficult for RBBS and BBCs to make icepacks for example in Arua RBBs, Soroti and Kabale collection centres.
- Lack of a power backup system for UBTS’ upcountry networks.

This may lead to the deterioration of the whole blood and/or blood samples since blood that is stored for longer than six (6) hours at ambient temperature conditions start to haemolyse. Haemolysed whole blood is harmful to the patient receiving it and haemolysed samples give a (false) positive result in the infectious disease testing leading to an unnecessary dispatch of the collected unit.

**Conclusion**

Inappropriate transportation and storage of blood leads to haemolysis of blood, which could be contributing to UBTS’ high percentage (10% of its total collections) discards.

Appropriate temperature and conditions from the point of collection to the point of use, that is “from vein to vein”, is not being realized.

**Recommendation**

The UBTS management should set aside resources to procure appropriate facilities for storage and also to acquire designated specific vehicles, motor bikes (blood courier) for each blood collection team and at every collection centre for transporting blood.

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John F. S. Muwanga

AUDITOR GENERAL
GLOSSARY OF TERMS

**Anticoagulant:** is a substance that prevents coagulation (clotting) of blood

**Apheresis:** Procedure that involves withdrawal of blood, ex vivo separation and collection of a desired component (e.g. red cells, plasma or platelets) and reinfusion of the other components.

**Audit:** Systematic, independent and documented examination to determine whether activities comply with a planned and agreed quality system.

**Blood centre:** A facility which carries out all or part of the activities for donor recruitment, blood collection (whole blood and, in some cases, apheresis), testing for transfusion-transmissible infections and blood groups, processing into blood components, storage, distribution to hospital blood banks within a defined region, compatibility testing, issue of blood and blood components for clinical use and liaison with clinical services. Blood centres may be stand-alone or hospital-based.

The following should NOT be categorized as blood centres:

n Mobile or fixed blood collection sites/rooms which are operated as part of a blood centre

n Hospital blood banks which only store, check compatibility and issue screened blood.

**Blood cold chain:** The storage and transportation of blood and blood products at the appropriate temperature and conditions from the point of collection to the point of use – “from vein to vein”.

**Blood donors**

n Voluntary non-remunerated blood donor: A person who donates blood (and plasma or cellular components) of his/her own free will and receives no payment for it, either in the form of cash, or in kind which could be considered a substitute for money.

n Family/replacement blood donor: A person who gives a replacement unit of blood only when a family member or friend requires transfusion.

n Paid “donor”: A person who provides blood for money or other form of payment.
Blood product (blood components): Any therapeutic substance derived from human blood, including whole blood, labile blood components and plasma-derived medicinal products.

Blood transfusion services (BTS): A generic term to describe blood centres and other facilities that are involved in the provision of blood for transfusion where there is no National Blood Transfusion Service.

Calibration: The set of operations which establish, under specified conditions, the relationship between values indicated by a measuring instrument or system, or values represented by a material measure, and the corresponding known values of a reference standard.

Deferral: These are people registered to donate blood who are not permitted to donate blood, either temporarily or permanently for medical or other reasons.

Documentation: Written policies, instructions and records involved in providing a product or service.

Evaluation: The specific selection process to determine the suitability of a procedure or material [e.g. assay, reagent, equipment].

Haemovigilance: A set of surveillance procedures for the monitoring, reporting and investigation of adverse events (reactions and incidents, including nearmisses) covering the whole transfusion chain, from the collection of blood and its components to the follow-up of recipients, intended to collect and assess information and to prevent their occurrence or recurrence.

Hepatitis: This is an inflammation of the liver.

Hepatitis B: This is a virus transmitted through blood and other body fluids. All blood units that test positive for Hepatitis B are destroyed and the blood donor is permanently deferred from donating blood.

Hepatitis C: This is the virus identified as the leading cause of Non –A, Non-B Hepatitis. The Hepatitis C antibody (or anti – HCV) test detects antibodies to that Hepatitis C virus.

HIV: Human Immune Deficiency Virus – is a virus that causes AIDS. The anti – HIV test for exposure to the AIDS virus detects antibodies to HIV. A confirmed positive result from anti –HIV antibody test means that the person has been exposed to the
AIDS virus, has developed antibodies to the virus and is a carrier of the virus. All blood units that test positive are destroyed and the blood donor is counselled and permanently deferred from donating blood.

**Hospital blood bank:** A laboratory or part of a laboratory within a hospital which receives and stores supplies of screened whole blood and blood components from a blood centre. The hospital blood bank performs compatibility testing and issues blood and blood components for clinical use within the hospital. It may be called a hospital transfusion laboratory.

**Incidence of infection:** The proportion of a defined population becoming newly infected by an infectious agent within a specific period of time.

**Infrastructure:** System of permanent facilities and equipment of an organization – ISO 9000 (2000).

**National blood transfusion service (NBTS):** The organization with statutory national responsibility for the provision of blood for transfusion, and liaison with clinical services. The NBTS coordinates all activities concerned with blood donor recruitment and the collection, testing, processing, storage and distribution of blood and blood products, the clinical use of blood and surveillance of adverse transfusion events. Activities are carried out within a network of national/regional/provincial blood centres and hospital blood banks.

**Platelets:** These are the smallest blood cells. Platelets are necessary to prevent bleeding from smaller vessels and form a necessary part of the clotting mechanism.

**Prevalence of infection:** The proportion of a defined population that are infected with an infectious agent at any particular time.

**Preventive action:** Action taken to prevent the recurrence of potential nonconformity, defect or other cause of error.

**Quality control samples:** Well-characterized samples, individual or pooled, that are where possible calibrated against international standards and are diluted in an appropriate matrix.

**Released products:** These are blood products which include whole blood, packed cells, platelets and fresh frozen plasma.
**Screening algorithm:** A sequence of steps in the blood screening process to determine the suitability of each unit of donated blood and its components for clinical or manufacturing use. A blood screening algorithm specifies the actual tests to be used and, based on each test result, directs the user to the next step.

**Standard operating procedure (SOP):** Local written instructions for the performance of a specific procedure in a standardized manner.

**Transfusion-transmissible infection:** An infection that is potentially capable of being transmitted by blood transfusion.

**Validation:** Confirmation and provision of objective evidence that the requirements for a specific intended use or application have been fulfilled.

**Whole Blood:** Blood from which no constituent, such as red blood cells, white blood cells, plasma, or platelets, has been removed. It contains all blood elements plus the anticoagulant-preservative in the collecting bag. Whole blood is commonly obtained through blood donation and can be transfused directly or broken down into blood components that can be transfused separately.
## Appendix II- Documents Reviewed

<table>
<thead>
<tr>
<th>SNO</th>
<th>DOCUMENT REVIEWED</th>
<th>INFORMATION OBTAINED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>List, addresses and contact persons for all upcountry locations.</td>
<td>Information pertaining to the Management, contacts and location of UBTS Offices.</td>
</tr>
<tr>
<td>3.</td>
<td>UBTS Strategic plan</td>
<td>Strategies to operationalise activities of UBTS.</td>
</tr>
<tr>
<td>4.</td>
<td>UBTS Quality Manual</td>
<td>Standard operating procedures (SOPs)</td>
</tr>
<tr>
<td>5.</td>
<td>Annual Work plans and progress reports (quarterly/annual) for the last 3 F/Ys</td>
<td>High lights of operation performance.</td>
</tr>
<tr>
<td>7.</td>
<td>Funding and sources of funds</td>
<td>Funding to UBTS</td>
</tr>
<tr>
<td>11.</td>
<td>A code of Ethics for blood donation and transfusion- WHO(ISBT), SEPTER 5, 2006</td>
<td>Code of ethics in blood transfusion,criteria</td>
</tr>
</tbody>
</table>
### Appendix III - List of people interviewed

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation</th>
<th>Location</th>
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<tbody>
<tr>
<td><strong>Staff of UBTS</strong></td>
<td></td>
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</tr>
<tr>
<td>1. Dr. Dorothy KyeyuneByabazaire</td>
<td>Director</td>
<td>Headquarter</td>
</tr>
<tr>
<td>2. Awiyo Godwin</td>
<td>Senior accountant</td>
<td>Headquarter</td>
</tr>
<tr>
<td>3. Grace Atekat</td>
<td>Principal lab technologist</td>
<td>Headquarter</td>
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<td>4. William</td>
<td>Principal donor recruiter</td>
<td>Headquarter</td>
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<tr>
<td>5. TaremwaJoram</td>
<td>Principal personnel officer</td>
<td>Headquarter</td>
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<tr>
<td>6. Chris Mugalula</td>
<td>Senior economist</td>
<td>Headquarter</td>
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<tr>
<td>8. Mike Mukundane</td>
<td>Blood donor recruiter/ TL</td>
<td>Headquarter</td>
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<tr>
<td>9. Biryomumisho Melesin</td>
<td>Nursing officer/team leader</td>
<td>Kabale</td>
</tr>
<tr>
<td>10. Dr. Byamungu Andrew</td>
<td>Principal medical officer</td>
<td>Mbarara</td>
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<tr>
<td>11. NdebesaThomas</td>
<td>Laboratory technician</td>
<td>Mbarara</td>
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<tr>
<td>12. Joshua Ahumuza</td>
<td>Blood donor recruiter</td>
<td>Mbarara</td>
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<tr>
<td>13. AgabaElton</td>
<td>Senior nursing officer / team leader</td>
<td>Mbarara</td>
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<td>14. EroidaMwebaze</td>
<td>Accounts assistant</td>
<td>Mbarara</td>
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<td>15. KatumbaVincent</td>
<td>Laboratory technician</td>
<td>Kitovu</td>
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<td>16. Akankwasa Paul</td>
<td>Blood donor recruiter/ team leader</td>
<td>Kitovu</td>
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<tr>
<td>17. AyubuMutebi</td>
<td>Blood donor recruiter/in charge</td>
<td>Masaka BCC</td>
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<td>18. Lydia Akello</td>
<td>Blood donor recruiter officer</td>
<td>Gulu</td>
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<td>19. Charles new Kidega</td>
<td>Blood donor recruiter officer</td>
<td>Gulu</td>
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<td>20. Emily Bako Atria</td>
<td>Senior nursing officer</td>
<td>Gulu</td>
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<td>21. Komaketch Clay</td>
<td>Senior lab technologist</td>
<td>Gulu</td>
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<td>22. OjokPolycap</td>
<td>Laboratory technician</td>
<td>Gulu</td>
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<td>23. Sunday Godfrey</td>
<td>Accounts assistant</td>
<td>Gulu</td>
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<tr>
<td>24. AjilongMartha</td>
<td>Blood donor recruiter officer</td>
<td>Soroti BCC</td>
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<tr>
<td>25. Wabwire Benjamin</td>
<td>Principal medical officer</td>
<td>Mbale RBB</td>
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<tr>
<td>26. Sister Harriet</td>
<td>Senior nursing officer</td>
<td>Mbale RBB</td>
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<td>31. Busingye Jude</td>
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## Appendix IV UBTS Lab Equipment Inventory per RBB

Source: UBTS

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