



*College of Medicine and Health Sciences
School of Public Health*

Topic: Documentation of patients and health care professional's experiences and perceptions regarding management of acute leukemia in Rwanda: current situation

A Research Report Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Public Health at the University of Rwanda.

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Kigali, October 2019

DECLARATION

I declare that this Dissertation contains my own work except where specifically acknowledged.

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Signed.....

Date.....

DEDICATION

To my God the Creator,

To my beloved wife Verenie Niyonambaza

To our children Pacific and Anael

To my mother.

To my brothers, sisters and in-law family

I dedicate this work.

ACKNOWLEDGEMENTS

I thank the Government of Rwanda and the University of Rwanda/CMHS/SPH for the good organization of the program.

My acknowledgements go to my supervisors: Assoc. Prof Aline UMUBYEYI, Dr Angèle MUSABYIMANA, Dr Belson RUGWIZANGOGA and Dr Isabelle IZIMUKWIYE (co-investigator at RMH) for their guidance and big support to accomplish this work from the beginning to the end.

My warm recognitions to my beloved wife Verenie Niyonambaza for her big support through care and love.

To our lovely children Pacific and Anael for their encouragement .

I thank my mother, brothers, sisters, and all family in-law.

I thank Bertrand Sangano, Jean Baptiste NIYIBIZI and Olivier Nizeyimana, for assisting in data collection, translation and transcription, respectively.

May each one of you find through this work, the fruit of the unforgettable rendered service.

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ABSTRACT

Background: Acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL) are hematological malignancies characterized by clonal expansion of myeloid (AML) or lymphoid (ALL) blasts in the bone marrow, blood or other tissue. Epidemiological information of acute leukemia (ALL and AML) in Sub-Saharan Africa is scarce; available information is usually based on extrapolated data from other regions. The number of reported cases of ALL and AML in Rwanda is even lower than expected, when comparing with the extrapolated data for Rwanda. This low reporting rate may be due to factors specific to the patients or their families, to the health system itself and/or healthcare professionals and infrastructure. The aim of this study was to explore challenges associated with the timely diagnosis, therapy and good prognosis of acute leukemia in Rwanda.

Methods: This is a qualitative study using phenomenological approach. It involved 41 participants including patients, patients' guardians and key informants, that is, physicians from district hospitals and specialists in different fields from referral hospitals, as well as directors from Rwanda Biomedical centres (RBC). In-depth interview was done; we used thematic analysis to analyse the data. Ethical clearance was obtained before starting the data collection.

Results: The identified barriers to healthcare seeking behaviors, on the side of patients and their families, are poor knowledge usually causing them to consult traditional healers, financial constraints such as covering co-payment fees and transport costs to the diagnosis and treatment sites. Moreover, there is a tedious referral system that can lead to the loss of some patients before diagnosis. Furthermore, healthcare professionals in referral hospitals ascertain to receive most of patients at end stage. The existing diagnostic facilities are not used in a way that speeds up the diagnosis. ALL therapy in Rwanda uses only chemotherapy; bone marrow (BM) transplantation is not available. Palliation is the only available option for AML treatment in Rwanda.

Conclusion: ALL and AML exist in Rwanda, though under-reported. This under-reporting is due to patients' factors, tedious referral system and sub-optimal existing diagnostic capacities. This affects negatively the outcome. All these, together with the existing therapeutic options, need to be improved.

LIST OF ABBREVIATIONS

ABL: Abelson tyrosine kinase gene

ALL: acute lymphoblastic leukemia

AML: acute myeloid leukemia

ATRA: all-trans retinoic acid

BCCOE: Butaro Cancer Center of Excellence

BCR: breakpoint cluster region

CHUB: University Teaching Hospital of Butare

CHUK: University Teaching Hospital of Kigali

CML: chronic myeloid leukemia

DH: District Hospital

H&E: Hematoxylin and Eosin staining

HRH: human resources for health

IRB: Institutional Review Board

KFH: King Faisal Hospital

PBF: Peripheral Blood Film

PCR: Polymerase-Chain Reaction

RBC /NRL: Rwanda Biomedical Center /National Reference Laboratory

RBC: Rwanda Biomedical Center

RH: Referral Hospitals

RMH: Rwanda Military Hospital

TKI: tyrosine kinase inhibitor

UR-CMHS: University of Rwanda College of Medicine and Health Sciences

WHO: World Health Organization

1. BACKGROUND

Acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL) are hematological malignancies characterized by clonal expansion of myeloid (AML) or lymphoid (ALL) blasts in the bone marrow, blood or other tissue. In 2015, the global cancer incidence was 161,000 and 190,000 for ALL and AML, respectively [1]. Single-country studies have documented that, among AML patients, those of African descent are younger at the time of diagnosis, and have poorer prognosis, than those of Caucasian origin [1].

Epidemiological information of acute leukemia (ALL and AML) in Sub-Saharan Africa is scarce, and usually based on extrapolated data from other regions [2-5]. Moreover, the reported incidence rates of acute leukemia (and other cancer diseases) are lower in developing countries than in the Western world. This low reporting rate may be attributed to reduced availability and utilization of diagnostic services in developing countries.

Several studies investigated the role of socio-economic factors on the healthcare-seeking behaviour of the population, but the drawn conclusions are conflicting. For example, some studies have identified poverty and low education as barriers to healthcare-seeking behaviour [6]. Other reports suggested that community engagement in healthcare programme as well as the quality of services might be the most important factors [7-10]. In some specific cultural contexts, rural population [11-12], women [12-13], as well as children with many siblings [12, 14], were reported to have very limited access to healthcare services.

The assessment of health services has been usually focusing on the availability as well as geographic and financial accessibility. The willingness of patients to visit health services is usually overlooked. Yet the user's attitudes (perceptions) and expectations as well as the quality of healthcare services (infrastructures and healthcare professionals) are important determinants of the utilization of healthcare services [15]. This is likely the reason, for patients in developing countries, to first seek for care in private facilities, or even traditional healers rather than public modern-medicine facilities. In fact, there are studies that highlighted the preference of some people to seek for healthcare in either private facilities even if the advanced

services are not available in such facilities [11], or traditional healers [16], or even self-care [10, 12]. Moreover, it has been realized that patients often do not visit referral hospitals, even when necessary, until the disease severity has increased [8, 16-17], usually after blind treatment of unidentified illness.

In our clinical practice, we have observed that acute leukemia (both ALL and AML) in Rwanda is associated with apparent low incidence rates, early onset (affecting younger patients) and poor prognosis compared to developed countries. We speculated that the low incidence rates of acute leukemia observed in Rwanda may have been amplified by a low detection rate due to either poor healthcare-seeking behaviour and/or limited diagnostic capacities. Over the past decade, a high rate of the Rwandan population has adhered to health insurance schemes and the number of health facilities at different geographic locations has increased. While these two factors ought to lead to an increased use of health services, this may not be the case in Rwanda for acute leukemia cases because such cases are still under-reported.

Moreover, there is a poor prognosis of ALL patients in Rwanda though this disease is treated by chemotherapy in Rwanda [18]. The Rwanda non-communicable diseases national strategic plan for 2014-2019 shows that the types of cancers considered as priorities to be addressed include chronic myeloid leukemia (CML), but not acute leukemia [19]. The suboptimal management of acute leukemia in Rwanda may also contribute to the low utilization of available services for acute leukemia in Rwanda as acute leukemia is not listed among 13 priorities cancers to be addressed in national strategic plan 2014-2019 [19].

The improvement of healthcare services as well as the importance of early detection and timely referral of cancer patients must be emphasized in healthcare programmes in Rwanda. There is need to document the perceptions and attitudes of acute leukemia patients on these diseases, and explore the current status of the management of acute leukaemia in Rwanda in order to highlight areas to improve.

2. OBJECTIVES OF THE STUDY

2.1 Problem statement

It is reported a poor prognosis of ALL patients in Rwanda though this disease is treated by chemotherapy in Rwanda. AML has no treatment with curative intent in Rwanda, which was reflected by the very poor prognosis for AML patients in Rwanda. The Rwanda non-communicable diseases national strategic plan for 2014-2019 shows that the types of cancers considered as priorities to be addressed include chronic myeloid leukaemia (CML), but not acute leukemia, the suboptimal management of acute leukemia in Rwanda may also contribute to the low utilization of available services for acute leukemia in Rwanda. In order to improved access and quality of care. There is need to investigate the barriers associated with the timely diagnosis and therapy of acute leukemia in Rwanda in order to improve the case reporting and the outcome of the patients.

In the perspective of spurring further understanding on patient's healthcare-seeking behaviours, healthcare providers' experiences and perceptions on quality of health services and the status of health systems in the field of acute leukemia in Rwanda, we designed an explanatory qualitative research project. This research project aimed at generating new themes and hypotheses which are important in addressing challenges associated with the timely diagnosis, therapy of acute leukemia in Rwanda to improve their prognosis. The overall aim is to have improved access and quality of care for acute leukemia patients in Rwanda. To achieve this aim, research questions were designed, the answers of which constitute the objectives of this study.

2.2 Research questions

The main question is to know the factors contributing to the delay of ALL and AML patients to seek health care, have confirmed diagnosis and getting treatment. Specific questions are:

- 1) Are there any barriers for patients with symptoms of acute leukemia to seek healthcare?
- 2) What are the observations of healthcare professionals on the management of acute leukemia in Rwanda?

- 3) What is the perception about the capacity of Rwanda in terms of diagnosis and therapy for ALL and AML?
- 4) Does Rwanda implement the national programmes to improve the management of acute leukemia in Rwanda?

2.3 Objectives

2.3.1 General objective

To investigate the barriers associated with the timely diagnosis and therapy, as well as improve the prognosis of acute leukemia in Rwanda.

2.3.2 Specific objectives

The study has the following specific objectives:

- 1) To identify the barriers for patients with symptoms of acute leukemia to seek healthcare;
- 2) To explore the observations of healthcare professionals about the management of acute leukemia in Rwanda;
- 3) To scrutinize the existing capacities in terms of diagnosis and therapy for ALL and AML in Rwanda;
- 4) To analyse the implementation of national programmes elaborated to improve the management of acute leukemia in Rwanda.

3. METHODOLOGY

3.1 Type and design of study

This was a qualitative study design using phenomenological approach.

3.2 Study sites and subjects

The study included acute leukaemia patients and patients' guardians met at Butaro Cancer Center of Excellence (BCCOE) in Rwanda. Key-informants were physicians working in district hospitals (Masaka hospital which covers an urban catchment area, and Nyamata hospital which covers a mainly rural catchment area), Oncologists, General Pathologists, Hemato-pathologists, Hemato-oncologists from referral teaching and specialised hospitals (university teaching hospital of Kigali – CHUK, university teaching hospital of Butare – CHUB, Rwanda Military Hospital – RMH, and BCCOE), and Directors at the Rwanda Biomedical Center (RBC).

3.3 Sampling

The three referral and one specialised hospitals and 2 district hospitals (one from urban, another one from rural area) and RBC were selected using purposive sampling technique. In-depth interviews were done for acute leukemia patients and patients' guardians selected using convenience sampling techniques. Key-informants were selected using intensity sampling techniques, for healthcare professionals. Data were collected from 15th July to 8th October 2019. The number of participants were determined considering saturation of ideas for patients, patients' guardians, physicians at district hospitals and general pathologists. For hemato-oncologists, hemato-pathologists, oncologists and directors in RBC, the number was determined by their availability.

3.4 Study inclusion criteria

The included research participants are patients with acute leukemia (or their guardians) diagnosed in Rwanda, who agreed to give valid consent to participate and who were willing to participate in the study. The study also included key-informants from above-mentioned institutions (hospitals and RBC) who accepted to provide valid consent for participation and were willing to participate in the study.

3.5 Data collection techniques

An interview guide was pre-designed to help interviewers to cover the important potential themes. The interview guide included both main questions as well as the probes; more probes were emerging according to participant responses. Experienced qualitative researchers were involved in data collection and analysis.

3.5.1 In-depth interview of patients and patients' guardians

The interviewers explained the objectives of study, the types of questions that would be asked during the interview, and made sure an informed consent is signed before starting the interviews. During the in-depth interviews, the interviewer asked questions that lead patients/guardians to state the barriers to timely healthcare-seeking behaviours, and perceptions regarding method of diagnosis disclosure.

3.5.2 Key-informant interviews

Healthcare providers and health administrators were selected to undertake key-informant interviews regarding their experiences, recommendations and plans in relation to acute leukemia. Data on the healthcare service-delivery and referral systems and the capacities of diagnosing and treating ALL and AML in Rwanda were collected from practitioners in concerned healthcare facilities. Health administrators in cancer (respectively the Directors of clinical pathology and cancer treatment units at RBC) were interviewed about existing capacities in terms of diagnosis and therapy for ALL and AML in Rwanda as well as the national programmes addressing acute leukemia in Rwanda.

3.5.3 Data collection procedures

Before interview, we got an office for interview, then enrolled ALL patients (or guardians) receiving treatment at BCCOE. Key-informants were enrolled at their respective working units. Written informed consent was obtained from the participant. During interview, audio recording was done for participants who accepted it; for these who declined it, information was recorded by writing (by two note-takers). Two persons conducted the interview, an interviewer and a note-taker (writing down the information that could not be audio-recorded, such as emotions). Therefore, the notes taken by both note-takers were merged into single file for each research participant.

3.6 Data management and analysis

Qualitative data obtained through in-depth interviews of patients, patients' guardians and key-informants were transcribed into text, then translated into English. However, some interviews for key-informants were done in English. The data were analysed using thematic analysis. Data analysis was performed in order to understand healthcare-seeking behaviours, perceptions on quality of health services and status of health systems. Data processing included reading, coding, displaying, reducing, and interpreting. The reading and coding were initiated during the data collection. The primary themes and sub-themes were identified through initial coding. Transcription was performed by a trained research assistant and then double checked by the investigators. Translation was performed by research assistant competent in English and Kinyarwanda. Investigators double-checked the translation by comparing the information in the original Kinyarwanda data, and the information in the Kinyarwanda text translated back from the obtained English text.

3.7 Ethical considerations

The study was approved by the Institutional Review Board (IRB) of the University of Rwanda College of Medicine and Health Sciences (UR-CMHS), approval number 315/CMHS IRB/2019. Authorization was obtained from each participating institution before data collection. Written informed consent was obtained from research participants. In summary, the research team provided the potential participant with the information about the research. The benefits, potential risks, protection and confidentiality rights in this study were explained. The potential participants were invited to be included in the study, and those who consented to participate signed an informed consent in two copies, one for each party.

The participation in the study was voluntary. Confidentiality of data was strictly maintained. The recorded information was transcribed into anonymous text. The audio recorder device had no possibility to be connected to internet and kept with security code. The transcribed, anonymous text was kept in a password-protected computer. Informed consent and interview notes bore codes instead of participant identifications and were kept in a secure and locked place.

4. FINDINGS

The present study intended to (i) identify the barriers for patients with symptoms of acute leukemia to seek healthcare, (ii) explore the observations of referral healthcare professionals in the management of acute leukemia in Rwanda, (iii) scrutinize the existing capacities in terms of diagnosis and therapy for ALL and AML in Rwanda, and (iv) analyse the implementation of national programmes elaborated to improve the management of acute leukemia in Rwanda. A phenomenological of qualitative study approach was used to collect data through in-depth interviews that were thematically analyzed and results are presented below.

4.1 Characteristics of the research participants

Research participants were 41 in total, among them twelve were patients (4) and patients' guardians (8) aged between 18 -53 years old, met at BCCOE in Rwanda, as shown in Table 1. Key-informants were 17 general practitioners working in district hospitals, 2 oncologists at BCCOE and Rwanda Military Hospital (RMH), 6 general pathologists at BCCOE, RMH, CHUK and CHUB, 1 hemato-pathologist, 1 hemato-oncologist from referral hospitals (CHUK, CHUB, RMH) and 2 directors at the Ministry of Health/ RBC.

Table 1. Characteristics of research participants

Site	Category of participants	Number of participants
Butaro Cancer Center of Excellence (BCCOE)	Patient	4
	Patients' guardians	8
	General pathologists	2
	Oncologist	1
Referral Hospitals (CHUK, CHUB, RMH)	General pathologists	4
	Hemato-oncologist	1
	Oncologist	1
	Hemato-pathologist	1
RBC	Directors of units	2
District hospital (Nyamata and Masaka)	Physicians	17
Total		41

4.2 Barriers preventing patients with symptoms of acute leukemia from seeking healthcare

The most mentioned possible barriers are poor knowledge of patients and/or their families, about acute leukemia. They consult traditional healers from their communities, and spent a lot of time taking traditional medicines until the treatment fails, and the disease reaches advanced stage.

“I had been cared for by traditional healers for about 8 months... when I found that there was no change but my condition was deteriorating, I went to ... health center... I was really very ill at that time” Patient 1

According to some participants, this is linked to insufficient knowledge of the existence of leukemia as a disease, a lack of knowledge of the availability of its treatment in Rwanda, or the idea that they have been bewitched (poisoned).

“... The government should sensitize the community to increase the knowledge of the population about these cancers, so that they can go immediately to a health facility rather than delaying to the traditional healers as we did...” Patient’s guardian 2.

Financial barriers were also mentioned; some people don’t have health insurances and are not able to pay out of their pocket, or if they have community-based health insurance (CBHI), they are not able to pay the co-payment fees.

“...The problem we had was finance, ...really the main problem was finance...ticket, co-payment fees...” Patient 1

In addition, some people have the fear of long distance to diagnosis and treatment sites. Specifically, they mention the transport costs for both patient and patient’s guardian when they have appointments at Butaro. To emphasize this, some participants mentioned that some patients start treatment being in category 3 of Ubudehe and after a period of time they fall into category 1, because they spend much while earning nothing. A kind of stigma in the society is observed in some cases.

A patient's guardian, with tears, says: "... neighbors are bored to help us, they stopped helping, even not inviting us in their party. They are asking themselves the reason why we are struggling for the patient with an incurable disease. They observed how we went from Ubudehe category 3 to category 1 and said that if it was them, they should not even go to Butaro to struggle with an incurable disease..." **Patient's guardian 3.**

The perceptions of healthcare professionals about barriers preventing patients with symptoms of acute leukaemia from seeking healthcare are not different from those listed by the patients and patients' guardians

"Some patients come at advanced stage, they start going to traditional healers thinking about being poisoned. When traditional healers fail, and/or a community health worker (CHW) becomes aware of that sick person, they then come to the health facility. On the other hand, other patients don't have CBHI or fail to find the co-payment fee; they don't come until they become very ill" **Physician DH 1**

"...Some don't have insurances and even co-payment fees, so local administration should work hand in hand with health facilities to help these patients" **Physician DH 3**

"Because there is not enough information or knowledge about cancer. Cancer is usually silent at the onset; patients will ask themselves what problem they have ..." **Physician DH 2**

"... Some patients start thinking about the transport and how the patient's guardian will live there at ... hospital during diagnosis ... and start thinking about treatment at Butaro which is far, not even in the center of the country. Some refuse to be referred to there" **Physician DH 5**

4.3 Observations of health professionals on the management of acute leukemia in Rwanda

The perceptions from participants are that some healthcare professionals at district hospitals are not conversant with the detection of acute leukaemia.

Instead, some start treating these patients for different diseases such as tuberculosis, malaria, or other infections and even transfuse patients several times without improvement. Acute leukemia patients may remain in hospital for weeks or even months without a proper diagnosis instead of referring them to higher level health facility.

“... But it is not every doctor who can identify easily these symptoms. A patient may visit the hospital up to three times without identifying the disease thinking about something else...” **Physician DH 6**

The perception from the patients and patient’s guardians about the health professionals at peripheral level is that the knowledge of doctors working in peripheral hospitals has been suboptimal for the detection of acute leukemia cases. The training of health professionals, coupled with the development of disease detection and diagnosis protocols, may have a significant positive impact on timely diagnosis and treatment.

“... At district hospital a diagnosis of infection (pneumonia) was made, antibiotics given. Then, a diagnosis of malaria was made and its treatment added to the prior treatment, still without improvement...” **Patient’s guardian 2**

“I was treated at 2 district hospitals in our area for a long time ... every time I arrived at health center they immediately referred me because they knew that I was permanently treated at district hospital...” **Patient 1**

During interview with key-informants from referral hospitals about their observations in the management of acute leukemia, it was mentioned that most of patients come to them at end stage. The main reasons are delay in seeking healthcare and a tedious referral system. Others mentioned a poor knowledge of physicians and laboratory scientists at district hospitals to interpret full blood counts and make correlation with clinical features of acute leukemia. The practice of Masaka district hospital is a good example of how the management of acute leukemia can be timely done.

When the physicians suspect a diagnosis of leukemia, the laboratory technologists prepare PBF slides that are directly sent to hematologist at referral hospital, who send the report back to Masaka district hospital. If PBF is suggestive of ALL, the patient is directly referred to BCCOE for diagnosis confirmation (BMA/B) and timely therapy.

“A large number of patients have advanced disease at the time of diagnosis, with impairment of the function of some vital organs. This is likely due to the delay in seeking for healthcare or delay in referring patients to tertiary/specialized hospitals....” **Pathologist 4**

“Yes, we receive patients with end-stage disease. It would be good to have teaching sessions in district hospitals about proper interpretation of full blood count, clinical correlation of FBC findings with clinical presentation of acute leukemia and interpretation of peripheral blood film. This can lead to early detection and treatment of patients suffering from acute leukemia ” **Hemato-pathologist**

“What I know, patient goes to health center and receive treatment. When they are challenged, they refer to district hospital which, eventually, will refer the patient at referral hospital for further investigations, usually after weeks or months. Usually the patients reach oncologist at end-stage of disease. Some die before reaching there and others die before getting these different service. It is really a long journey and long process too” **Oncologist 1**

Other noted experience is that the management of acute leukemia is not adequate due to low number of hematologists, oncologists and pathologists. Others have experienced unavailability of advanced, or even standard diagnostic facilities and treatment. Sometimes they send specimens out of the country for confirmation of diagnosis.

“... up to now the means of diagnosis and treatment of acute leukemia need to be increased and improved, and some of them availed at district hospital instead of referral hospitals alone. We still need hematologists, oncologists, even laboratory scientists. ...

There is a need of early diagnosis, equipped laboratory with advanced materials such as PCR and flow cytometry, and ultimately the qualified laboratory scientists and trained physician for the detection and early screening : Oncologist 2

“I personally testify that I did not know that ALL is treated in Rwanda, although I was working in a referral hospital as a medical specialist. Using witnesses such survivors, or those who completed therapy for example, to testify in the community that ALL is treated in Rwanda, will change the mindset of the population about cancer” Oncologist 1

Patients also ascertain the tedious referral system as a barrier to a timely diagnosis of acute leukemia in Rwanda. A patient passes through many different health facilities, some of which misdiagnose the disease thus giving inappropriate treatments. They refer the patients to the diagnosing hospitals when the disease is very advanced.

“The doctor decides to keep the child at district hospital. But after time, with the deterioration of the clinical condition, the doctor decided to refer the patient to CHUK. I see that it was late; we should have been sent before ...When they decided to give refer us to CHUK, the referral from health center had expired..., I went to get a new referral from the health Center, came to district hospital and got referral to CHUK” Patient’s guardian 3

4.4 Existing capacities in terms of diagnosis and therapy for ALL and AML in Rwanda

4.4.1 Diagnosis

The suspicion of acute leukemia is through thorough clinical assessment and full blood counts. Microscopy of peripheral blood film (PBF), bone marrow aspiration/ biopsy (BMA/B) using hematoxylin and eosin (H&E) staining and immunohistochemistry (IHC) are the means used for the diagnosis of acute leukemia in Rwanda. Generally, these analyses are done at teaching hospitals and BCCOE. However, due to recurrent stockouts, immunohistochemistry tests are sometimes done abroad, or in private laboratories thereby requiring CBHI-affiliated patients to

pay out of their pockets. As such, these tests are intermittently not accessible to the patients.

“To my experience, PBF results are not reliable; bone marrow aspiration and biopsy are necessary, but all the tests (H&E, IHC, PBF) are needed. Flow cytometry would give quicker results...” **Pathologist 1**

‘... and refer those tissue blocks to BCCOE for further testing; sometimes they might be sent even outside the country depending on the case ...’

Hemato-oncologist

Patients’ guardians, physicians at district hospitals, pathologists, hematologists, oncologists, and RBC managers at cancer diagnosis and treatment units confirm that the system used to diagnose acute leukemia is not adequate. This is because this system does not speed up the results, and the system does not clearly show the type of blood cancer subtypes too. The new systems such as flow cytometry and molecular testing quickly provide the results, but are not yet used in Rwanda.

“The means of diagnosis of acute leukemia in Rwanda include morphology (peripheral blood film, bone marrow aspiration/biopsy) and immunohistochemistry. Procedures such as flow cytometry, cytogenetics and molecular pathology are not available in our hospitals.” **Pathologist 4**

“Ooh! Up to now, the means of diagnosis and treatment of acute leukemia need to be increased and improved, and some of them are to be availed at district hospital level ...” **Oncologist 2**

4.4.2 Treatment

There are two centers that receive treat acute leukemia patients in Rwanda, these are Butaro which is public institution and KFH which is private and obviously used by the people who are financially stable. The curative treatment rendered there is only chemotherapy for ALL; bone marrow transplantation, which would be used to treat relapsed cases, is not available. There is no AML therapy with curative intent in Rwanda, AML patients receive palliative care alone inside the country.

“..., I think it is the only treatment center. Butaro is very far, at the extremity of the country. Even if the patients could be facilitated in transport, but in their mind, it is set that it is very far. ... Physician DH 6

“The available means of ALL therapy are chemotherapy. Bone marrow transplantation is not available. There is no AML therapy with curative intent in Rwanda. AML patients receive palliative care alone inside the country; but those who have financial means go abroad for specific therapy with curative intent” Pathologist 3

The number of doctors who treat cancer is quite small, even if the government of Rwanda has put more efforts, as of now there are 7 oncologists in country. The current protocol for ALL treatment that we have in Rwanda is Hunger 3 and 4. This protocol requires BMA/B repeat at day 29 for control to see if the induction is successful. If the patient is not in remission, palliation will be the next option instead of bone marrow transplantation which is used in other countries.

“... We then start consolidation therapy, if remission is achieved (control BMA/Bat day 29) ... Currently, Hunger 3 and 4 protocol is followed. But in case of relapse, there is disappointment to medical staff ... such cases should benefit from bone marrow transplantation”, Oncologist 1

“...There was no single doctor who was trained but now there are almost seven doctors (oncologists) who can treat cancer...” Director 2.

4.5 National programmes to improve the management of acute leukemia in Rwanda

Acute leukemia is not included among the 13 cancer priorities found in the Rwanda Ministry of Health/RBC strategic plan 2014-2019. Although the diagnosis and treatment of acute leukemia are done at tertiary level, there is no special referral system for these cases; the patients use the general referral system used in Rwanda, that is, from health center to district hospital then from district to referral hospital. The director in charge of cancer diagnosis at RBC ascertains that the designing of the referral system for cancer management is under process, as the country is still initiating cancer management in Rwanda.

“... Cancer, like other non-communicable diseases, I would say that these are new diseases in our health care system. It is now, we are starting to think about how we can build this system that can diagnose cancer. ...Regarding referrals, like referring a patient from health centre or district hospital to teaching/specialised hospital that can diagnose cancer, this is a system we are planning to establish.” **Director 1**

In the perspective of improving the detection rate of acute leukemia in Rwanda, RBC is planning to organize sensitization campaigns in the community so that the population may be aware of sign and symptoms of and encourage people to seek healthcare as early as possible. RBC also plans to train health professionals starting from CHWs, nurses and physicians from health centers and district hospitals so that they may screen and refer acute leukemia patients in a timely manner.

“... is improving the awareness of this disease at low level of health facilities even in the communities so that they can be able to suspect these cancers... So, we are actually planning to re-do this again but with a consistent mentorship, before the end of this year. For instance the specialists from referral hospitals could keep going to different health facilities to train health workers about recognizing the symptoms of these cancers including acute leukemia...” **Director 2**

Another plan of RBC for the management of acute leukemia is to increase the number of pathologists and hematologists in charge of acute leukemia diagnosis as well as oncologists in charge of treatment. There is a plan to train laboratory technologists at district hospital level for performing PBF and train the physicians on interpretation of PBF, at least to screen for possible leukemia. Concerning advanced methods for acute leukemia diagnosis, flow cytometry and molecular pathology, machines are available at RBC/National Reference Laboratory (NRL), but so far not used for clinical purposes. This is caused by financial constraints for buying reagents and consumables.

“You see, we have very few experts hematologists in this country. The first thing is to increase the number of specialists in diagnosis ...these will help to train the laboratory staff at district level” **Director 1.**

“...among these new advanced methods such as flow cytometry and molecular pathology, we already have them at NRL. The main problem is the financial means for buying reagents and consumables” **Director 1**

In order to optimize the diagnosis and treatment procedures, workshops are planned that will include experts in hematology, pathology, and oncology; they will standardize the means of cancer diagnosis including flow cytometry, molecular pathology, biochemical tumor markers, PBF and bone BMA/B. The challenges are mainly financial constraints, because the NRL division has other issues they consider as top priorities.

“...The first thing is to put in place the roadmap of comprehensive cancer diagnosis using peripheral blood film, biopsy, tumor markers, flow cytometry, molecular pathology ... We have in mind this comprehensive cancer diagnosis, and we plan to make a collaboration framework incorporating different experts such as hematologists, oncologists, pathologists, laboratory scientists...” **Director 1**

RBC also plans to start developing guidelines for cancer diagnosis (including acute leukemia) at district level and guidelines for treatment of ALL which will be at referral level. For AML, there is no special plan for treatment. The challenge about AML treatment consists of financial affordability and clinical outcome. However, the plan will depend on the number of cases that will be found in the cancer registry.

“...we will then see how many cases of AML you found in your research of course or others, and cancer registry. We will eventually develop guidelines..., I would also like to point out that the diagnosis and treatment of AML still requires a long process. However, I have said earlier we will meet as a team and then see if it is possible to include it in next plan based on the current status of this disease in terms of diagnosis and treatment ...” **Director 2**

It is worthy to note that cases of acute leukemia, including AML, are lost before diagnosis, due to problems discussed above, that is, poor knowledge of patients/families, limited diagnosing capacities at district hospital level and a tedious

referral system. Therefore, it would not be optimal to base future national plans solely on the number of diagnosed cases. A gap between the number of expected cases and the actual number of diagnosed cases should rather boost the intervention of healthcare administration.

“... or because diagnosis take a time maybe the patient may die before diagnosis, then we shall be mistaken saying that they are few” **Physician DH 9**

4.6 Recommendations from the research participants

Some of the participants recommended raising awareness in the community to increase public awareness, and to train nurses and doctors in district hospitals on the signs and symptoms of acute leukemia. This can be combined with smoothing the referral system so that when health care providers suspect acute leukemia, they transfer the patient to the specialized hospital as soon as possible.

“In addition to promoting early healthcare-seeking behaviors and strengthening the skills of health professionals at all levels to timely detect cases of acute leukemia, we also recommend the ministry of health and stakeholders to smoothen the referral system, avail diagnostic services/infrastructures and consumables, and include AML among treatable cancers in Rwanda.” **Pathologist 3**

“...the government should sensitize the community to increase the knowledge of population about these cancers so that they may go immediately to health facility instead of delaying to the traditional healers like we did ...” **Patient guardian 6**

Participants also suggested that the government should increase the number of specialists in acute leukemia diagnosis and treatments, as well as increase the number of centers sites for acute leukemia diagnosis and treatment. The participants insisted by saying that the only center of acute leukemia treatment which is Butaro is far from Kigali and suggested to have another one in Kigali. The research participants also suggested that diagnosis of acute leukemia should be done at district hospitals.

“ ...up to now the means of diagnosis and treatment of acute leukemia need to be increased and improved, availed at district hospital instead of RMH and CHUK only. We still need hematologists, oncologists, pathologists, and even laboratory scientists.” **Oncologist 3**

“.... the government should put effort in teaching or increase the number of scholarship in heamato-pathology and heamato-oncology fields for better managements of patients suffering from acute leukemia” **Hemato – pathologist**

“..., I think it is the only treatment center. Butaro is very far and it is at the extremity of the country. Even if the patients could be facilitated in transport, but in their mind, it is set that it is very far ... **Physician 5**

Other participants recommended to have advanced equipment in diagnosis and treatment centers, that may speed up the diagnosis, and help in treatment of relapsed ALL cases.

“I would recommend the implementation of ancillary tests in diagnosis of acute leukemia such us flow cytometry, cytogenetics and molecular pathology for better categorization of different subtypes of ALL and AML as recommended by WHO. This will facilitate early diagnosis and better management of patients” **Hemato-pathologist**

Participants requested that the government of Rwanda help cancer patients, to cover all the expenses from the time the diagnosis of cancer is made. These expenses include consumables, investigations, caution fees paid to BCCOE, transportation costs for both patients and their guardians, as well as helping them to obtain an adequate diet for patients.

“...The Government of Rwanda should support patients not only on anti-cancer drugs, but also in all other expenses related to the management of cancer such as caution fee paid at Butaro and transport from home to Butaro ” **Oncologist 1**

“.... I think it would be good if the Government of Rwanda could issue instructions allowing all cancer patients in Ubudehe categories 1-3 to have a free care from the time the diagnosis of cancer is made. At Butaro, anti-cancer drugs are free, but there are many expenses that cannot be payed for by families” **Pathologist 1**

5. DISCUSSION

The determination of the frequency of a disease is an important step in addressing challenges associated with such a disease. Given that the observed incidence of ALL and AML in Rwanda is considered low compared to the expected numbers, it is very important to identify the possible factors associated with such a low detection rate. The purpose of this study was to investigate the barriers faced by acute leukemia patients for the timely diagnosis and treatment of their diseases, as well as to document existing technical and management capacities for optimal diagnostic and therapeutic services for acute leukemia in Rwanda.

Our results show that poor knowledge is one of the barriers that prevent patients with acute leukemia from seeking healthcare. Some patients and/or their families think that their diseases may be treated by traditional healers, others think that they are bewitched or poisoned. This barrier has also been observed in other settings and other types of diseases [12, 16]. The report from Pakistan shows that religious beliefs also constituted a cultural obstacle to healthcare-seeking behavior [12], but such a barrier was not mentioned by any of our respondents. The fear of a bad diagnosis, or being stigmatized by the community because of the disease labelled incurable, was also mentioned as an important barrier to healthcare-seeking behavior. These findings show that it is important to raise awareness of the population on acute leukemia and the need for early healthcare-seeking behavior. The need to increase cancer education has also been recently highlighted in neighboring Tanzania [20]. Moreover, traditional healers also need to be aware of acute leukemia and other cancers, in order to send these patients to health facilities in a timely manner. The sensitization of traditional healers in Rwanda is supposed to be easy because they are united in known associations.

Financial issues were also mentioned by respondents as barriers to timely healthcare-seeking behavior, but also a barrier to accessing diagnostic and/or therapeutic services. Although the majority of Rwandans adhere to health insurance schemes, there are some who do not or some members of the CBHI who can not find the co-payment fee, that is, the 10% of the healthcare costs.

In addition, some families have difficulty paying for services not covered by health insurance plans such as transportation, purchase of consumables in private stores, payment of hospital caution fees, or acquisition of the types of foods requested by patients. Geographical accessibility, availability of services and financial accessibility and acceptability were also mentioned as barriers of poor people to seek healthcare in developing countries [8, 10-11, 15]. This observation calls for a policy of free services for patients diagnosed with cancer in Rwanda, as is the case in neighbouring Tanzania [20], in addition to increasing the number and improving the quality of sites offering cancer services in Rwanda.

The knowledge of doctors working in peripheral hospitals has been suboptimal for the detection of acute leukemia cases. It is known that the training of physicians and nurses for the diagnosis of diseases such as tuberculosis increased the detection rate of the disease [21]. Based on our experience in Rwanda, the training of health professionals, coupled with the development of disease detection and diagnosis protocols, has a significant positive impact on timely diagnosis and treatment. Therefore, we assume that training physicians, nurses, and laboratory scientists / technologists in peripheral health facilities to detect acute leukemia will greatly improve the detection of these cases and thereby improve outcomes. Moreover, after realizing that even some Rwandan specialists are not aware of the availability of ALL treatment services in Rwanda, it is obvious that specialists-in-training in Rwanda need to be acquainted with the existing capacities in the management of acute leukemia and other cancers in Rwanda.

The Government of Rwanda had planned that, during the period 2014-2019, the issue of shortage of specialists in the area of cancer should be addressed [19]. Some of the strategies included local training of medical specialists through the human resources for health (HRH) program [22-23]. However, the above-mentioned strategic plan focused on types of cancer other than ALL and AML, because these diseases were not included among the 13 types of cancer considered as priorities in Rwanda [19]. Moreover, that strategy did not include the training of healthcare professionals at district hospital level. The shortage of trained medical specialists and the lack of the training of health professionals at district level are barriers for the optimal detection of cancer cases [24], including acute leukemia.

There is an important need of considering acute leukemia among the types of cancers to include in the next national strategic plan and policies on non-communicable diseases.

The quality of healthcare services depends not only on the knowledge and skills of healthcare professionals, but also on continual availability and accessibility to standard infrastructures and procedures [7, 11, 17]. Suboptimal diagnostic capacities for ALL and AML in Rwanda as compared to the standards established by the World Health Organization (WHO) [25], negatively impact on the standards of care. Furthermore, the absence of therapy with curative intent for AML cases, and the lack of services such as bone marrow transplantation for relapsed ALL cases are important problems to address. The referral system in Rwanda that was alleged by respondents to compromise, to a certain extent, the care of patients, is a big concern. The re-evaluation of the referral system, coupled with the increased awareness of healthcare professionals at peripheral level, as put in the Government plans, would ultimately improve the detection rate of acute leukemia cases in Rwanda.

The quality of care at cancer-treating hospital was judged very good by the respondents. This positive attitude of healthcare professionals is very important in relieving patient's and/or family's stress associated with the diagnosis and/or therapy of cancer [26-28].

Limitation

We interviewed the ALL patients and patients' guardians but no AML patients or AML patients' guardian. This is because AML patients were discharged home for palliative care. Therefore, we didn't document the perceptions, suggestions and recommendations from AML patients.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Blood cancer of the type of ALL and AML do exist in Rwanda though the records are not known statistically, simply because the patients delay to seek their healthcare for different reasons, or due to tedious referral system and/or suboptimal cancer services. Therefore, there are some mechanisms to put in a place in order to speed up the diagnosis as it is done in some hospitals closer to the testing sites.

The new methods for testing and treating blood cancer of the type of ALL and AML has not started yet in Rwanda. The number of specialists in cancer diagnosis and treatment is still low, needing to be increased. Likewise, the number of treatment centers is still low too. Some of the centers for cancer diagnosis at referral hospitals seem to be underutilized due to the tedious referral system on one hand, and to procurement problems on the other hand.

6.2 Recommendations

Our recommendations go to specific entities listed below.

6.2.1 Ministry of Health and RBC

- To develop and implement the policy of free healthcare services to patients diagnosed with cancer, at least for poor and middle-class families; moreover, to support cancer patients/families on other non-hospital expenses such as transport costs to and from appointments at treating sites, as well as support on getting appropriate diets for the patients;
- To increase the number of sites offering cancer services in Rwanda, with at least one center for chemotherapy in Kigali city;
- To include flow cytometry, cytogenetics and molecular pathology testing in the diagnosis package for leukemia in Rwanda, as recommended by WHO;
- To consider acute leukemia among the types of cancers to include in the next national strategic plan and policies on non-communicable diseases;
- To start AML treatment in Rwanda or support patients to get treatment abroad, and to start bone marrow transplantation therapy for relapsed ALL cases;

- To improve the procurement process for consumables, reagents and equipment used in cancer services;
- To increase the awareness of the population on acute leukemia and early healthcare-seeking behaviors, by sensitizing the general population as well as the associations of traditional healers. Involvement of cancer survivors to give their testimonies would be contributive;
- To decentralize the screening of acute leukemia at district hospital level; this can be achieved by training medical, nursing and laboratory staff of the clinical signs and symptoms, and laboratory findings suspicious of acute leukemia, and eventually train them on the interpretation of full blood counts as well as PBF;
- To elaborate and monitor protocols and guidelines for the timely detection and referral of acute leukemia at different levels of healthcare system in Rwanda;

6.2.2 Butaro Cancer Center of Excellence (BCCOE)

- Adjustment of Butaro hospital wards in a way to promote privacy. Specifically, a patient would not see the colleague agonizing of the same diases, because that creates a preventable stress.

6.2.3 Referral/teaching hospitals

- To improve the procurement procedures by preventing stockouts of reagents and consumables for cancer services;
- To improve the turn-around-time for cancer diagnosis and smoothen the referral of patients to the treating site;
- To increase the awareness of the medical staff on the existing capacities in terms of diagnosis and treatment of cancer in Rwanda;
- To supervise district hospitals in the optimal management of cancer cases.

6.2.4 District hospitals

- To increase the awareness of the medical, nursing and laboratory staff on the existence of acute leukemia, and train them on the early detection of such cases;
- To smoothen the referral of patients suspected to have cancer, in general, and acute leukemia particularly. This can be achieved by preparing PBF slides and

send them to a nearby referral hospital with hematology services; once PBF is suggestive of acute leukemia, then the patient is directly sent to BCCOE for diagnosis confirmation (BMA/B) and treatment.

6.2.5 University of Rwanda and Ministry of Education

- To improve cancer education (pre-service training) of trainees by increasing their exposure to the services related to cancer diagnosis and treatment.

6.2.6 Researchers

- To conduct quantitative study to determine the frequencies of barriers to the optimal management of acute leukemia in Rwanda.

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APPENDICES

1. Interview guide Kinyarwanda version)
2. Interview guide (English version)
3. IRB approval

IBIBAZO ABASHAKASHATSI BIFASHISHA MU BIGANIRO MU BUSHAKASHATSI KURI KANSERI YO MU MARASO MU RWANDA (KINYARWANDA VERSION)

Izina ry'ubushakashatsi: “ ikusanyamakuru ryubunararibonye bwabarwayi nabakora kwa muganga kubijyanye nuburyo bwo kwita ku burwayi bwa kanseri yo mu maraso yo mu bwoko bwa ALL na AML mu Rwanda: uko bimeze ubu

ABARWAYI

i. Kureba niba harabayeho gutinda kujya kwa muganga, kandi niba ari byo, kumenya impamvu zabiteye

a. Watubwira muri make uko uburwayi bwawe bwatangiye?

Probe: wivurije hehe?

b. Wivuzza hano watubwiye byatwaye nkigihe kingana gute?

c. Bakuvurisha iyihe miti?

ii. Kureba niba uburyo bukoreshwa mu Rwanda mu kubwira umurwayi uburwayi bwe bukwiye

e. Ni ayahe makuru baguhaye ku bijyanye nuburwayi bwawe?

Wunva watanga uhuhe mu rongo byakorwamo?

e. Ni ayahe makuru baguhaye ajyanye nimyitwarire wagira mu gihe uri gufata imiti?

f. Hari igitekerezo cyangwa ikifuzo ufite kubijyanye no kwita kubarwayi bafite kanseri yo mumaraso?

g. Hari ikibazo watubaza kubijyanye nubushakashatsi turimo gukora?

ABAKORA MU BITARO BY'AKARERE: Masaka na Nyamata

1. Hano mu bitaro mwakira abarwayi mukeka ho ubuhe bwoko bwa cancer ?

probe :niba ntabo murakira, mutekereza ko ari iyihe mpanvu ntabo mubona?

2. Ko mwatubwiye ko mwakira abarwayi mukeka ho kanseri zo mumaraso ni ibihe bimenyetso baba bafite?

3. Iyo mukeka ko umurwayi yaba afite kanseri yo mumaraso ni iki mumukorera?

4. Watubwira muri make uburyo mukoresha iyo mwohereza umurwayi mukekaho kanseri ku bindi bitaro?

Probe :-ryari? Hehe?bitwara nkigihe kinga gute ngo agere yo?

-Tubwire muri make uko ubona bigenda iyo wohereje umurwayi kugirango agere kubitaro bikuru?

-ugereranije nzira bicamo muketse uburwayi.mumwohereje, anageze aho mumwohereza?

5.Ni iki mubona cyakorwa kugira ngo abarwayi bafite kanseri yo mu maraso barusheho kwitabwaho neza mu Rwanda?

6. Hari hari igitekerezo cyangwa ikibazo watubaza kubijyanye nubu bushakashatsi?

ABAKORA MU BITARO BYO KU RWEGO RUKURU:

i. Kureba uburyo buhari bwifashishwa mu gusuzuma ndetse no kuvura abarwayi ba kanseri zo mu maraso zo mu bwoko bwa ALL na AML mu Rwanda:

1..Ese watubwira muri make urugendo rusange rw'umurwayi wa kanseri yo mu maraso uko rumeze mu Rwanda, kuva afashwe n'uburwayi kugeza avuwe?

2. Ni ubuhe buryo buhari bwo gusuzuma kanseri zo mu maraso zo mu bwoko bwa ALL na AML mu Rwanda? (hematology and pathologist)

3.Ni ubuhe buryo buhari bwo kuvura kanseri zo mu maraso mu Rwanda ? (oncologist ,Hematologist)

4..Abarwayi babageraho bafite ibihe bimenyetso? Muhereye kuri ibyo bimenyetso babageraho bari kuruhe rwego ? ni yihe nama watanga ngo abarwayi bajye boherezwa ku gihe ?

5. Ni ibiki ubona byavugururwa ubu, ndetse n'ibyo ubona bikwiye gushyirwamo ingufu byafasha umurwayi wa kanseri yo mu maraso gupimwa neza mu Rwanda

6. Ni ibiki ubona byavugururwa , ndetse n'ibyo ubona bikwiye gushyirwamo ingufu byafasha umurwayi wa kanseri yo mu maraso kuvurwa neza mu Rwanda?

7. Ni iki mubona cyakorwa kugira ngo abarwayi bafite kanseri yo mu maraso barusheho kwitabwaho neza mu Rwanda?

8. Hari hari igitekerezo cyangwa ikibazo watubaza kubijyanye nubu bushakashatsi

RBC:

i. Kwita ku kibazo cy'uburwayi bwa kanseri zo mu maraso zo mu bwoko bwa ALL na AML mu Rwand

a. watubwira muri make uko kanseri zo mu maraso zo mu bwoko bwa ALL na AML zo zihagaze mu Rwanda ?

b. Ese imikorere yo kohereza abarwayi mu mavuriro yisumbuye yubatse gute mu Rwanda kubijyanye no kuvura kanseri zo mumaraso?

c. Ese imikorere yo kohereza abarwayi mu mavuriro yisumbuye yubatse gute mu Rwanda kubijyanye no gupima kanseri zo mumaraso ?

d. Ni uwuhe murongo-ngenderwaho (Guideline) uhari mu kwita ku barwayi ba kanseri zo mu maraso zo mu bwoko bwa ALL?

e. Ni uwuhe murongo-ngenderwaho (Guideline) uhari mu kwita ku barwayi ba kanseri zo mu maraso zo mu bwoko bwa AML mu Rwanda ? ni iki mutaganya gukora ku murongo ngenderwaho wa AML mu Rwanda?

e. Mu bwoko 13 bwa canseri bwashyizwe mu byihutirwa bigomba kwitabwaho mu ngamba z'icyerekezo zibanzeho muri 2014-2019 , ntabwo ALL na AML byari birimo ubona ari iyihe mpanvu bitashyizwemo?

f. Mubona ari ubuhe buryo bwakoreshwa mu Rwanda kugirango uburwayi bwa kanseri yo mumaraso bujye bupimwa vuba? Bunavurwe vuba ?

Mbese hari ingamba zihari? Niba zihari, zirubahirizwa?

g. Hari igamba mufite zo zo gutangiza uburyo bwisumbuyeho bwo gusuzuma kanseri zo mu maraso (Flow Cytometry, Cytogenetics, PCR-based measurements of mutations/translocations)?

h. Hari igamba mufite zo zo gutangiza uburyo bwisumbuyeho bwo kuvura kanseri zo mu maraso zo mu bwoko bwa AML na ALL?

Dusoza

a. Hari ikindi gitekerezo mwaba mufite ku bijyanye no kwita ku barwayi ba kanseri yo mu maraso mu Rwanda.

b. Hari ikibazo mwatubaza kubijyanye nubushakashatsi?
murakoze

Interview guide for a qualitative research on acute leukemia in Rwanda (English version)

Title of the Research project: “Documentation of patients and health care professional’s experiences and perceptions regarding management of acute leukemia in Rwanda: current situation”

1. Patients/guardians (care-givers)

i. Determine if there is a delay in seeking healthcare for acute leukemia patients and if so the reason.

a. May you describe in brief how did you start feeling bad?

b. Where did you go for treatment?

c. How long have you been treated in that hospital? What kind of treatment were you receiving?

ii. Determine if the methods of diagnosis disclosure in Rwanda are appropriate

d. What kind of information were you given about your disease? Any suggestion about how it should be done?

e. Which recommendations were you recommended to follow while taking your medications?

f. Do you have Any idea or suggestion concerning the caring of patients with leukemia?

g. Do you have Any question concerning this research?

2. Healthcare providers

1. District Hospital: Masaka and Nyamata

1. Here in this hospital you receive patients you suspect to have what type of cancer?

Probe: if no leukemia what do you think is the reason?

2. You said that you receive patients who have acute leukemia , In brief, may you just mention some of the symptoms/signs that you consider in order to suspect or confirm that the patient has acute leukemia ?

3. What do you do for the patient you suspect to have leukemia?

4. In brief, may you just tell us how you refer the patient you suspect to have leukemia to other referral hospital?

Probe :When? Where? For how long does it take for him/her to get there?

-In brief, tell us about the situation when you refer the patient to referral hospital?

-How is the situation from the time you suspect the disease, sending the patient, till he/she reaches where you have referred to?

5. What do you think that should be done so that the patients suffering from leukemia would be cared more in Rwanda?

6. Do you have Any question or suggestion concerning this research?

2. Referral health system (Specialized/Referral/Teaching Hospitals):

i. To outline the existing capacities in terms of diagnosis and therapy for ALL and AML in Rwanda:

1. Should you please describe the general journey of an acute leukemia patient in Rwanda, from the disease onset to therapy?
2. According to your experience what are the means of diagnosis if there is a suspected case of acute leukemia in Rwanda?
3. According to your experience what are the means of treatment if there is a suspected case of acute leukemia in Rwanda?

ii. Their experiences in the management of acute leukemia:

4. Reference to the stage of disease of patient you receive, what would you suggest, so that the patient can be referred early/timely?
5. Do you have any recommendations for the improvement of diagnostics, therapeutics and prognostics of ALL and AML diseases in Rwanda?
6. Would you suggest any other observations about acute leukemia patients in Rwanda?
7. Do you have Any question or suggestion concerning this research?

3. Health administrators (RBC)

I. Addressing acute leukemia in Rwanda

- a. May you briefly tell us about status of leukemia type ALL and AML in Rwanda?
 - b. How the patients with leukemia are being referred to referral hospitals in Rwanda concerning their treatment?
 - c. How the patients with leukemia are being referred to referral hospitals in Rwanda concerning their testing/diagnosis?
 - d. What is the guideline to follow when taking care patients with leukemia type ALL?
 - e. How About AML in Rwanda? What are you planning about AML?
 - F. AML and ALL were not among 13 priorities cancer in Rwanda Non-communicable Diseases National Strategic Plan 2014-2019. Why do you think ALL and AML were not priority in measures taken?
 - f. In which ways do you think should be used to reduce turnaround time for patients with Acute leukemia in Rwanda? And get treated quickly? Are there any measures? If there are, are they obeyed?
 - g. Have you set any measures to start using advanced means of diagnosing leukemia, (Flow Cytometry, Cytogenetics, PCR-based measurements mutations/translocations)?
 - h. Have you set any measures to start using advanced means of treating leukemia
- closing**
- a. Do you have any suggestion concerning the caring for the patients with leukemia in Rwanda?
 - b. Do you have Any question concerning this research?



CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 25th/06/2019

Narcisse Niyikora
School of Public Health, CMHS, UR

Approval Notice: No 315/CMHS IRB/2019

Your Project Title *“Management of Acute Leukemia in Rwanda: Current Situation”* has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asiimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS		X	
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 25th June 2019, **Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months.**

You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB June conduct audits of all study records, and consent documentation June be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 25th June 2019

Expiration date: The 25th June 2020



Professor GAHUTU Jean Boseo
**Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR**

Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR