



UNIVERSITY *of*
RWANDA

**PROFILE OF THE PATIENTS ADMITTED FROM THE EMERGENCY ROOM TO INTERNAL
MEDICINE WARDS AND THEIR ASSOCIATED OUTCOMES IN A TERTIARY CARE
HOSPITAL IN KIGALI: CASE OF CHUK**

Martin HAKORIMANA NDAHIRO, MD

College of Medicine and Health Sciences

School of Medicine and Pharmacy

Master of Medicine in Internal Medicine

2020



PROFILE OF THE PATIENTS ADMITTED FROM THE EMERGENCY ROOM TO INTERNAL MEDICINE WARDS AND THEIR ASSOCIATED OUTCOMES IN A TERTIARY CARE HOSPITAL IN KIGALI: CASE OF CHUK

By

Martin HAKORIMANA NDAHIRO, MD

Registration number: 10103327

A dissertation submitted in partial fulfillment for the requirements for the degree of
MASTER OF MEDICINE IN INTERNAL MEDICINE

In the college of Medicine and Health sciences

Supervisors:

Dr. NKESHIMANA Menelas MBBS, MMED, MSc

Dr. KAILANI Leway MD, MPH

July 2020

DECLARATION

I, Martin HAKORIMANA NDAHIRO, hereby declare to the best of my knowledge and certify that the work presented in this dissertation entitled "**Profile of the patients admitted from the emergency room to Internal Medicine wards and their associated outcomes in a tertiary care hospital in Kigali: case of CHUK**" is entirely my original work. This has never been submitted or presented in whole or in part to any other university and it has been passed through the Turnitin and was found compliant.

Dr. Martin HAKORIMANA NDAHIRO

Reg. number **10103327**

Signature: 

Kigali, December 20, 2020

Supervisors:

We, hereby declare that this dissertation was submitted after our approval as the supervisors.

Dr. Menelas NKESHIMANA MBBS, MMED, MSc

Signature: 

Date: December 21, 2020

Dr. Leway KAILANI MD, MPH

Signature: 

Date: December 21, 2020

DEDICATE

To God the Almighty

To my wife and children

To my beloved parents

To my sisters and brothers

To my relatives and friends

To my supervisors

I dedicate this work

ACKNOWLEDGEMENT

This dissertation was possible owing to the continuous guidance and support from various persons to whom I thank.

I thank the Almighty Lord, my Savior Jesus Christ, my redemptory Holy Spirit for my life and blessing during my studies and work.

I thank the Ministry of Health for the scholarship offered to me in the University of Rwanda.

I thank the College of Medicine and Pharmacy in the University of Rwanda for the knowledge I received during residency training.

I thank very much the administration of the Centre Hospitalier Universitaire de Kigali (CHUK) for allowing us to carry out this research.

I am grateful especially towards the supervisors, Dr. NKESHIMANA Menelas, and Dr. KAILANI Leway, I will always remember the remarkable advice and effort you have made.

I thank patients who agreed to take part in this research by voluntarily signing a consent.

Much gratitude is presented to my friends, relatives for their perseverance and charity.

“May our Almighty God bless you all “.

Dr. Martin HAKORIMANA NDAHIRO

ACRONYM

- CHUK:** Centre Hospitalier Universitaire de Kigali
- HAART:** Highly Active Antiretroviral Therapy
- HIV:** Human Immunodeficiency virus
- IRB:** Institutional Review Board
- UR:** University of Rwanda
- CMHS:** College of Medicine and Health sciences
- GCS:** Glasgow coma scale
- USA:** United State of America
- sSA:** Sub-Saharan Africa
- WHO:** World Health Organization
- JUSH:** Jimma university specialized hospital
- COVID:** Coronavirus disease
- MMSE:** Mini-mental state Examination
- BP:** Blood pressure
- RR:** Respiratory rate
- HR:** Heart rate
- WBC:** White blood cell count
- Hb:** Hemoglobin
- CBHI:** Community Based Health Insurance
- SDGs:** Sustainable Development Goals
- NCDs:** Non communicable Diseases
- HIV:** Human Immunodeficiency Virus
- AIDS:** Acquired Immunodeficiency Syndrome
- TB:** Tuberculosis
- CVD :** Cardiovascular disease
- HSSP4 :** Fourth Health Sector Strategic Plan
- ICD:** International Statistical Classification of Diseases and Related Health Problems
- COPD:** Chronic obstructive pulmonary disease

ABSTRACT

Background: Non-communicable diseases, which are the common reasons of admissions to Internal Medicine in developed countries, are nowadays becoming the most prevalent in developing countries. However, data about patients' profiles in tertiary hospitals and their associated outcomes is rare. Therefore, this study aims at assessing patients' profiles and their associated outcomes in the internal medicine wards at the tertiary hospital.

Methods: This prospective and descriptive cohort study was conducted at the Centre Hospitalier Universitaire de Kigali on 176 patients admitted from the emergency room to medical wards from December 1, 2019 to February 29, 2020. Socio-demographic variables, initial laboratory variables, diagnoses at discharge and outcomes after two weeks were recorded. The ICD 10 Version: 2019 was used for categorizing the diagnoses. Data entry was done with Microsoft Excel 2010 and then data were exported into SPSS windows 16.0 for analysis.

Results: A total of 176 patients were enrolled with the male to female ratio of 1:1.66. The young and middle aged group (16-65 years) represented 76.71%, and the mean age was 48.8 years. The leading reasons of admission were circulatory system diseases 44.88% (n=79) followed by the respiratory system diseases 27.84% (n=49) and infectious and parasitic diseases 26.14%(n=46). Moreover, the overall leading diagnosis was pneumonia accounting for 8.23% (n=29) of diagnoses and it was followed by congestive heart failure with 5.40% (n=19). Most of participants were discharged 59.09% and death rate was 10.8%. Lastly, tachycardia, bradycardia and anemia, systolic hypotension, systolic hypertension and low GCS were strongly linked with significant risk of mortality (P value ≤ 0.05).

Conclusions: There was a noticeable double burden of NCDs and communicable diseases among the studied population. However, the NCDs were more commonly observed than communicable diseases among admissions. Therefore, much effort should be put in raising and strengthening the awareness and preventive measures of both the NCDs and communicable diseases.

Key words: patients, internal medicine, emergency, profile, Kigali

Table of Contents

DECLARATION	ii
DEDICATE.....	iii
ACKNOWLEDGEMENT	iv
ACRONYM	v
ABSTRACT.....	vi
LISTS OF TABLES AND FIGURES	ix
CHAPTER ONE: INTRODUCTION	1
1.1. Background of the study.....	1
1.2. Justification of the study.....	2
1.3. Objectives of the study.....	2
1.4. Hypotheses of the study	2
CHAPTER TWO: LITERATURE REVIEW	3
2.1. General overview	3
2.2. Burden of non-communicable and communicable diseases	4
2.3.1. Communicable diseases	4
2.3.2. Non-communicable diseases.....	4
2.4. Review on parameters influencing poor outcome	5
2.5. Review on outcomes at separation.....	6
CHAPTER THREE: METHODOLOGY	7
3.1. Methods.....	7
3.2. Study design.....	7
3.3. Study site and period	7
3.4. Inclusion criteria	7
3.5. Exclusion criteria	7
3.6. Sample size and sampling technique	8
3.7. Data collection	9
3.8. Data analysis.....	10
3.9. Ethical considerations.....	10
3.10. Plan for utilization and dissemination of the results.....	10

CHAPTER FOUR: RESULTS	11
4.1. Introduction.....	11
4.2. Socio-demographic characteristics of participants	11
4.3. The reasons for admission.....	12
4.4. The outcomes of the admitted patients.....	16
4.5. The correlation between patients' clinical profile and their outcomes	17
CHAPTER FIVE: DISCUSSION	20
5.1. Socio-demographic characteristics	20
5.1.1. Gender.....	20
5.1.2. Age.....	20
5.2. The common reasons for admission	20
5.3. The outcomes of admitted patients.....	22
5.4. The correlation between patients' clinical profile and their outcomes	23
5.5. Study limitations and weaknesses.....	23
5.6. Strengths of the study	23
6.1. Conclusions	24
6.2. Recommendations	25
➤ To the general population:	25
REFERENCES	26
ANNEXES.....	28
i. Consent form	28
ii. Data collection form.....	31
iii. CMHS IRB approval	33

LISTS OF TABLES AND FIGURES

LISTS OF TABLES

Table 1: Socio-demographic profiles of participants admitted at Internal Medicine wards from emergency room during the period of the study.....	11
Table 2 : Association of the sex with the reasons of admission of patients to CHUK Internal Medicine wards during study period of 14 days (N=176)	12
Table 3: Reasons for admission of patients (A or B, C, F, G categories) to CHUK Internal Medicine wards during study period of 14 days (N=176)	13
Table 4: Reasons for admission of patients (D, E, I, L, and M categories) to CHUK Internal Medicine wards during study period of 14 days (N=176)	14
Table 5: Reasons for admission of patients (J, K, N, R, and S or T categories) to CHUK Internal Medicine wards during study period of 14 days (N=176)	15
Table 6: Outcomes of the admitted patients during 14 days (N=176)	16
Table 7: The correlation between outcomes and the time between the onset of the symptoms to the admission into CHUK	17
Table 8: Initial parameters linked with mortality among patients admitted in Internal Medicine.	18

List of Figures

Figure 1: Study participants' flowchart	9
---	---

CHAPTER ONE: INTRODUCTION

1.1. Background of the study

As far as Sub-Saharan Africa is concerned, there is an ongoing epidemiological transition resulting in the burden of both non-communicable diseases (NCDs) and communicable diseases. Although the prevalence of communicable diseases in Africa is the highest in the world, that of the NCDs is also rising (1).

This rapidly increasing burden of the NCDs in developing countries is not only promoted by ageing of the population, but also it is influenced negatively by the effects of globalization such as the rapid and unplanned urbanization, sedentary lives and high total energy consumption (2).

Even though NCDs have been considered like diseases affecting the rich people, they are becoming the leading causes of death among developing countries nowadays (3).

Rwanda is among the most highly inhabited African countries with the density of 368 inhabitants per square kilometer and the fourth population. According to the housing census done in 2012, Rwandan population was 10,515,973 residents from which 52% were female and 48% were males (4).

Despite of being among developing countries in the world with Human Development Index ranking of 158 /189, Rwanda has made the remarkable progress in various sectors including health, social, and economic development during the past 26 years after the 1994 genocide. Furthermore, the Rwanda's life expectancy at birth has risen to 67.5 years during 2017 from 32.0 years during 1995 (5, 6).

The HSSP4 of Rwanda, serving like a foundation for Vision 2050, was fully incorporated in the overall economic development plan of the government. This was done to adhere to the Universal Health Coverage principles towards implementation of the Sustainable Development Goals (SDGs) (7).

Moreover, this HSSP4 anticipates the epidemiological transition of the country, the increase of the population density, life expectancy and an increase of the NCDs prevalence (7).

1.2. Justification of the study

The disease pattern is dramatically shifting from communicable diseases to NCDs in developing countries. As far as the WHO prediction is concerned, the disease profile and causes of mortality in the sub-Saharan Africa would have remarkably changed towards endemic NCDs, and away from infectious diseases in 2020 (3).

In fact, one of very crucial role played by tertiary hospitals in health care system is to help in managing referrals from primary and secondary health institutions. Moreover, data about tertiary hospital admissions may provide orientations about the diseases profile among the community.

However, the data indicating patients' profile, reasons of admissions to tertiary hospitals and their associated outcomes is rare in Rwanda.

Therefore, this study will aim at describing the profile and associated outcomes of patients admitted into the Internal Medicine wards at CHUK, which may be helpful to have a clear picture of the patients admitted in tertiary hospitals, their anticipated outcomes, avenues for improvement in the process of care provision and preventive measures.

1.3. Objectives of the study

The principal aim of this research was to describe the reasons of admission and the outcomes among patients admitted into the Internal Medicine wards from emergency room of CHUK from 1st December 2019 until 29th February 2020.

The specific objectives are:

1. To describe the socio-demographic profile of patients admitted in Internal Medicine wards.
2. To determine the common reasons of admission in Internal Medicine wards.
3. To describe the outcomes of patients admitted into Internal Medicine wards.
4. To assess the correlation between patients' initial clinical parameters and poor outcomes in Internal Medicine wards.

1.4. Hypotheses of the study

The profile of patients admitted from emergency room to medical wards influences the patients' care outcomes at the CHUK.

CHAPTER TWO: LITERATURE REVIEW

2.1. General overview

The pattern of diseases varies with the country's location, and it demonstrates the causes of admission to a health institution and the society (8).

For instance, the communicable diseases are the principal causes of hospitalization in the developing countries whereas the NCDs are the main causes of hospitalization into the Internal Medicine wards in the developed countries (9). Even though, there is an increase of the prevalence of the NCDs among developing countries, data about causes of hospitalization to the Internal Medicine wards in many developing countries are rare (9).

A number of studies reported that admitted patients were young and middle aged person and the male gender dominated. These studies include those which were conducted in Bangladesh, Ethiopia and Nigeria.

The study done at Jimma University Specialized Hospital found that male: female ratio was 1.1:1 and the age of patients was between 14 and 90 years and mean age of 36 years (10). Among the study population, most of participants were between 21 to 30 years (36.0%) (10).

Furthermore, another study which was conducted at Igbinedion University Teaching Hospital on 1066 patients found that female patients were 47.5% whereas male were 52.5% (Male to Female ratio: 1.11:1) (8).

On the other hand, a study done at Mulago Hospital which showed that 50,624 admitted patients aged between 13 and 122 years and the female sex predominated among admissions (51.7%) (12).

According to gender domination among admitted patients, this study was in agreement with another study conducted in Soudan at Al-ban Jadeed Teaching Hospital in which males represented 46.1% and female represented 53.9% (9). The mean age was 43.06 years and patients aged below 50 years were 61.4% of the population (9).

2.2. Burden of non-communicable and communicable diseases

Many researches were done in many countries to demonstrate the profile among their patients; some of them showed the increased prevalence of communicable diseases over non-communicable diseases while other researches were in favor of increased prevalence of communicable diseases.

2.3.1. Communicable diseases

Some studies showed that in some developing countries there is still high prevalence of communicable diseases such as the study conducted at Al-ban Jadeed Teaching Hospital in Soudan showed that the infectious diseases were the major cause of hospitalization 44.3% (9).

According to another study at done at Igbinedion university teaching hospital in Nigeria, the infectious and parasitic diseases constituted the largest proportion of diseases profile and followed by digestive diseases 10.5% and circulatory diseases 7.6% (8).

The systematic review of thirty articles describing causes of 86,307 admissions to hospital in Africa showed that the principal reasons of admission comprised infectious and parasitic diseases (19.8%), respiratory illnesses (16.2%) as well as circulatory illnesses at a proportion of 11.3% (2).

In addition to that, another study done at Jimma University Specialized Hospital showed that respiratory system conditions (26.9%) were the most common, followed by infectious and parasitic diseases (16.4%), nervous system diseases (14.4%), and circulatory system diseases (12.8%) (10). The community acquired pneumonia predominated with 84.8% among the respiratory system diseases while malaria (52.0%) and tuberculosis with 33.0% predominated among the parasitic and infectious diseases (10).

2.3.2. Non-communicable diseases

Worldwide, there is an increasing prevalence of NCDs in some developing countries as supported by some researches.

According to the study conducted Dhaka Medical College Hospital in Bangladesh which showed that in geriatric age group regardless of the leading diagnosis, 44.32% of patients had diabetes, 58.52% of patients were hypertensive, 17.61% of patients had ischemic heart diseases, 14.77% had chronic kidney disease, 13.64% had stroke and another 13.64% were suffering from COPD (11).

In addition, another study which was done at GF Jooste Hospital showed that diseases of the cardiovascular system were the most common cause of admission (14). It showed that main reason of admission in male patients were mainly circulatory system diseases (39%), parasitic and infectious diseases (39%) among men, whereas there was the predominance of cardiovascular diseases (41%) and infectious diseases (38%) among women (14).

Another study which was conducted at Mulago Hospital in Uganda, showed that 72% of the patients had an NCD as the main cause for admission (12). Moreover, this study showed that there was a reduction of the admission due to malaria, pneumonia and tuberculosis, and there was also an increase of admission due to stroke, hypertension, cancer and chronic kidney disease (12).

On the other hand, a study done at Igbinedion university Teaching hospital in Nigeria demonstrated that the trend admission of NCDs per year was not conclusive whether it was rising or decreasing (8). In this study, hypertension, sickle cell disease, peptic ulcer disease, asthma, congestive heart failure, cerebrovascular accident and diabetes mellitus together represented 22.3% in 2009; 24.0% in 2010; 37.2% in 2011; and 27.2% in 2012 (8).

2.4. Review on parameters influencing poor outcome

There are factors at the initial presentation of a patient to the health facilities that impact on their overall outcome. Even though the literature on this subject are scarce, some researches were done to highlight some initial clinical parameters which were associated with poor outcome.

According to a study done in Delhi, it was demonstrated that the advanced age, tachycardia, bradycardia, leucopenia, leukocytosis, hypertension, hypotension, hyponatremia, hypernatremia, low MMSE, low GCS, hypoglycemia, hyperglycemia, azotemia, acidosis, hyperkalemia and hypokalemia were linked with increased all-cause mortality in the hospitalization within the first week of admission (15).

Furthermore, a review of 53 articles showed an association between increased WBC and mortality (16). This was supported by another study done at Boston, which showed that baseline WBC was an independent predictor of subsequent mortality after an average of 13 years of follow up (17).

As far as hypotension is concerned, patients with hypotension had high risk of unexpected in-hospital death (18). In addition, another prospective cohort study in Boston showed that hyponatremia was linked with high risk of death (19).

2.5. Review on outcomes at separation

The literature on the outcomes among various hospital settings were reviewed and showed the remarkable variabilities from one country to another, but all of them show that high proportion of the admitted patients were discharged safely.

For instance, a study conducted at Al-ban Jadeed Teaching Hospital in Soudan showed the hospital stay was less than 5 days and 76.3% of patients were discharged safely with good health (9).

These findings were supported by another study done at Jimma University Specialized Hospital showing that 75.0% of the patients were discharged with improvement whereas 12.6% of patients died during admission (10). Those who were evaded, discharged, and referred to other hospitals represented the remaining 12.4% of the cases (10).

According to another retrospective trend analysis of patients at Tambo Memorial Hospital showed that most of the patients were discharged safely for both years of study (86.93% in 2005 and 80.24% in 2007) (21). In this study, there was a little difference among those who evaded, representing 0.5% and 0.6% in 2005 and 2007 respectively (21).

Lastly, the results of the retrospective descriptive study done at Igbinedion university teaching hospital in Nigeria showed that 1.6%, 4.6%, and 81% of participants were dead, referred and discharged respectively (8)

CHAPTER THREE: METHODOLOGY

This section provides a description of adopted research approach, research design, study site and period and target population, data collection methods, sample and sampling methods. It also includes validity, reliability, ethical considerations, as well as data analysis.

3.1. Methods

This study used the quantitative approach to assess reasons of admission and their associated outcomes among patients admitted into the Internal Medicine wards from the emergency room in CHUK from 1st December 2019 until 29th February 2020.

3.2. Study design

This is a prospective and descriptive cohort study targeting patients admitted into the Internal Medicine wards from the emergency room in CHUK during the study period.

3.3. Study site and period

We conducted this study in the Internal Medicine department at CHUK, one of three major referral hospitals located in Kigali city, Nyarugenge District, it has 519 beds in hospitalization. It serves patients mainly from 19 districts hospitals located in 14 districts of Rwanda.

Furthermore, it has 18 clinical services and specialties among which Internal Medicine consists of 4 inpatients wards with 68 beds capacity. The study was done from December 2019 until February 2020.

3.4. Inclusion criteria

The population included patients admitted into the Internal Medicine wards from emergency room in CHUK during the period of the study. However, participants were only those aged 15 years and above who has signed informed consent forms.

3.5. Exclusion criteria

The excluded patients include those who are below 15 years, prisoners and those who did not sign the informed consent form.

3.6. Sample size and sampling technique

All patients who meet inclusion criteria admitted in the period of the study were recruited consecutively and we recruited the selected sample of 176 participants out of 324 patients admitted in the study period. This sample size **n** was found sufficient after calculations using the following

formula by John Sanders et al (22): $n = \frac{[Z^2 \times p \times \frac{(1-p)}{e^2}]}{[1 - (Z^2 \times p \times \frac{(1-p)}{(e^2 \times N)})]}$

where: z = 1.96 for a confidence level (α) of 95%, p = proportion, N = population size, Z = z-score corresponding with a level of confidence, e = margin of error.

z = 1.96, p = 0.5, N = 324, e = 0.05

$$n = \frac{[1.96^2 \times 0.5 \times \frac{(1 - 0.5)}{0.05^2}]}{[1 - (1.96^2 \times 0.5 \times (1 - 0.5)/(0.05^2 \times 324))]}$$

$$n = \frac{384.16}{2.1857} = 175.762$$

$$n \approx 176$$

The sample size (with finite population correction) is equal to **176**

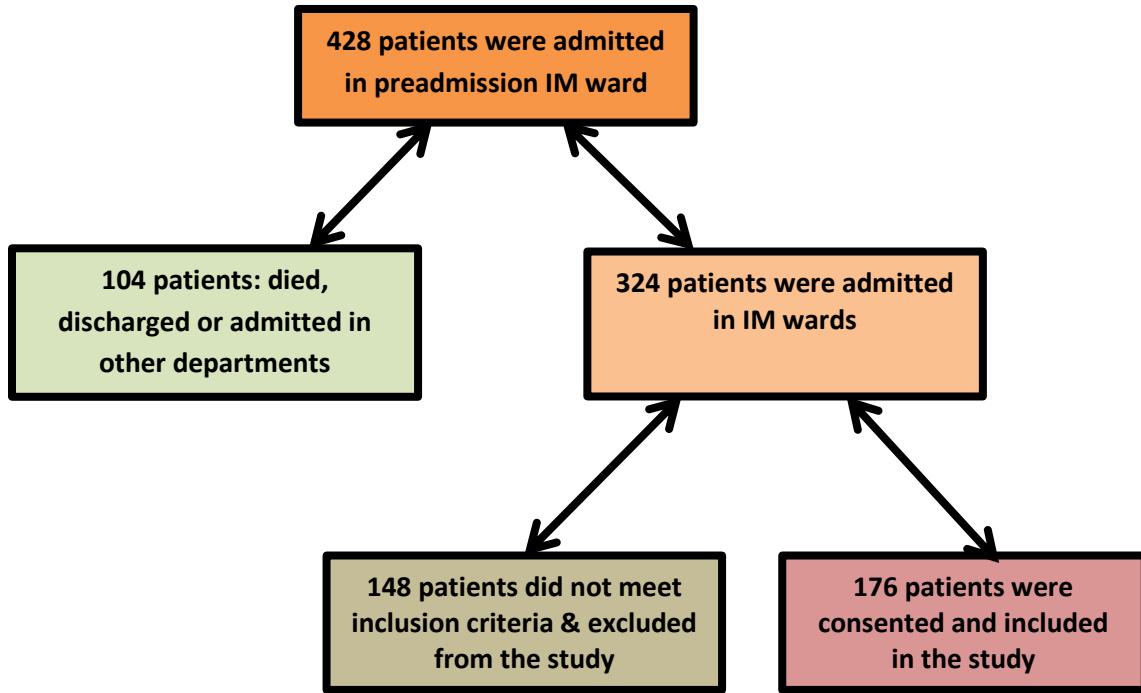


Figure 1: Study participants' flowchart

3.7. Data collection

The collection of data was performed using a tool of variables under investigation. Data was recorded by investigator himself. The investigator did not influence in any case the treating team in the management or discharge plan of the patient. Patients meeting criteria were progressively identified using the records or registers from medical wards. Data collection focused demographic and clinical profile data of the patients basically including the following elements: past medical, surgical, family and social histories, vital signs, working diagnosis, basic laboratory findings, and outcomes at separation. Data were initially extracted from the files of the patients who had signed the informed consents. Those participants were followed for 2 weeks in order to ascertain whether the patient has improved and discharged, not improved and still in hospital, referred to another department, and whether the patient had evaded. After 2 weeks in hospital, outcome of the patient was recorded.

3.8. Data analysis

Data entry was done with Microsoft Excel 2010, by the researcher. Then, data were cleaned and exported into SPSS 16.0 so as to undergo analysis. Data were summarized into frequencies and percentages using descriptive statistics. Pearson's chi square was calculated to compare variables and p value ≤ 0.05 was considered statistically significant. A Chi-Square Test analysis of the variables was done to determine variables associated with mortality during 2 weeks of admission.

3.9. Ethical considerations

The study was assessed for the validity by the staff members of Internal Medicine department who gave relevant advice to be followed during the study. The research protocol was presented for review and approval, respectively to the Internal Medicine department, Ethical committee at CHUK and UR ethical and research committee at School of Medicine and Health Sciences (CMHS /IRB).

The consent was obtained from patients themselves or next of kin (who was legally accepted) in case the patient was not able to give his/her consent. To take part in the study was voluntary and it did not affect the patient's management. The patients' information was completely confidential and only used for research purposes.

3.10. Plan for utilization and dissemination of the results

The results of this work will be submitted to the University of Rwanda for the partial fulfillment of the Masters of Medicine in Internal Medicine. Their submission to the CMHS/IRB will be done for their recognition. The results of this work will be presented during research days as an oral presentation or poster. Lastly, the research results will be submitted not only to local journals, but also to international journals for clinical and academic advancements.

CHAPTER FOUR: RESULTS

4.1. Introduction

The principal results of this study are described in this chapter. The socio-demographic characteristics of the participants are presented, followed by the common reasons for admission, the clinical outcome at separation, and the correlation between patients' clinical parameters and poor outcome respectively.

4.2. Socio-demographic characteristics of participants

This study included one hundred and seventy-six (176) patients for a period of three months. In terms of gender, it comprises of 62.5% (n=110) females and 37.5% (n=66) of males (male: female ratio=1:1.66).

Table 1: Socio-demographic profiles of participants admitted at Internal Medicine wards from emergency room during the period of the study

Socio-demographic characteristics of patients	Sex		
	Female, n (%)	Male, n (%)	Total
Gender	110 (62.50%)	66 (37.50%)	176 (100%)
Marital status			
Married	51 (28.98%)	40 (22.73%)	91 (51.70%)
Single	14 (7.95%)	24 (13.64%)	38 (21.59%)
Widowed	37 (21.02%)	1 (0.57%)	38 (21.59%)
Separated	3 (1.70%)	0.00	3 (1.70%)
Divorced	5 (2.84%)	1(0.57%)	6 (3.41%)
Age category			
16-25	5 (2.84%)	11 (6.25%)	16 (9.09%)
26-35	21 (11.93%)	14 (7.95%)	35 (19.89%)
36-45	17 (9.66%)	15 (8.52%)	32 (18.18%)
46-55	22 (12.50%)	8 (4.55%)	30 (17.05%)
56-65	15 (8.52%)	7 (3.98%)	22 (12.50%)
66-75	14 (7.95%)	6 (3.41%)	20 (11.36%)
76-85	11 (6.25%)	4 (2.27%)	15 (8.52%)
86-95	5 (2.84%)	1 (0.57%)	6 (3.41%)

The majority of the participants were married representing 51.7% of the participants, while widows and single participants were equally distributed at 21.6%. Furthermore, the majority of our participants were mainly in the young and middle aged group (16-65 years) comprising of 76.71% of all participants, whereas the elderly aged group (66-95 years) was 23.29%.

4.3. The reasons for admission

The table 2 below describes the association of the sex with the reasons of admission of patients to CHUK Internal Medicine wards during the study period, while the general distribution of diagnoses in the major ICD 10 disease categories (23) is shown from table 3 to table 5.

Table 2 : Association of the sex with the reasons of admission of patients to CHUK Internal Medicine wards during study period of 14 days (N=176)

ICD category*	Diagnoses	Sex		Total, N (%)
		Female,	Male,	
		n (%)	n (%)	
A or B	Parasitic and Infectious diseases	31 (17.61%)	15 (8.52%)	46 (26.14%)
C	Neoplasms	12 (6.82%)	19 (10.80%)	31 (17.61%)
D	Immunological and hematological diseases	17 (9.66%)	7 (3.98%)	24 (13.64%)
E	Endocrine, nutritional and metabolic diseases	25 (14.20%)	11 (6.25%)	36 (20.45%)
F	Mental and behavioral disorders	7 (3.98%)	1 (0.57%)	8 (4.55%)
G	Nervous system diseases	7 (3.98%)	5 (2.84%)	12 (6.82%)
I	Circulatory system diseases	42 (23.86%)	37 (21.02%)	79 (44.88%)
J	Respiratory system diseases	33 (18.75%)	16 (9.09%)	49 (27.84%)
K	Digestive system diseases	19 (10.80%)	9 (5.11%)	28 (15.91%)
L	Skin and subcutaneous tissue diseases	3 (1.70%)	1 (0.57%)	4 (2.27%)
M	Musculoskeletal system and connective tissue diseases	3 (1.70%)	0	3 (1.70%)
N	Genitourinary system diseases	16 (9.09%)	10 (5.68%)	26 (14.77%)
R	Laboratory and clinical findings not elsewhere classified	1 (0.57%)	0	1 (0.57%)
S or T	Poisoning, injury, and certain other consequences from external causes	3 (1.70%)	2 (1.14%)	5 (2.84%)
Total		219	133	352

*ICD-10 Version: 2019 (23)

The total number of diagnoses was 352 due to the fact that many patients had more than one diagnosis. The leading reasons of admission were the cardiovascular diseases, respiratory system diseases, and parasitic and infectious diseases accounting for 44.88%, 27.84% and 26.14% of all diagnoses, respectively. In addition, female participants were more affected than male in all systems except in the neoplasm category where male were 10.80% and female were 6.82%.

Table 3: Reasons for admission of patients (A or B, C, F, G categories) to CHUK Internal Medicine wards during study period of 14 days (N=176)

ICD category	Reasons for admission	Number	Percentage
A or B	Parasitic and Infectious diseases		
	Malaria	10	2.84
	Tuberculosis	12	3.4
	Cryptococcal meningitis	3	0.85
	HIV/AIDS	5	1.42
	Sepsis	5	1.42
	Gastroenteritis	3	0.85
	Others*	8	2.27
C	Neoplasms		
	Lymphoma	9	2.56
	Leukemia	3	0.85
	Colon cancer	2	0.57
	Intra-abdominal tumors	2	0.57
	Other malignancies	5	1.42
	Others**	10	2.84
F	Mental and behavioural disorders		
	Delirium	3	0.85
	Others***	5	1.42
G	Diseases of the nervous system		
	Meningitis	3	0.85
	Status epilepticus	2	0.57
	Migraine Headache	4	1.14
	Others****	3	0.85

*Acute viral hepatitis B, Typhoid fever, Tetanus, Cystic echinococcosis, Candidal esophagitis, Acute viral hepatitis C, Neurocysticercosis, Brain abscess

**Pancreatic cancer, Hepatocellular carcinoma, Esophageal cancer, Myelofibrosis, Gastric cancer, Thyroid cancer, Rhabdomyosarcoma, Malignant ascites, Metastatic cancer, Ovarian Cancer

***Traumatic brain injury, HIV related psychosis, Mood disorders, Dementia, Attention deficit hyperactivity disorder

****Peripheral neuropathy, Brain space occupying lesion, Generalized partial seizures

Tuberculosis and malaria were predominant among infections and parasitic diseases representing 3.4% and 2.84% of all diagnoses respectively.

On the other hand, lymphomas were the most common among the neoplasms, representing 2.56% and it was followed by leukemias accounting for 0.85% of all diagnoses. Moreover, migraine headache predominated with 1.14%, followed by pyogenic meningitis 0.85%, and status epilepticus 0.57% among the nervous system diseases.

Table 4: Reasons for admission of patients (D, E, I, L, and M categories) to CHUK Internal Medicine wards during study period of 14 days (N=176)

ICD category*	Reasons for admission	Number	Percentage
D	Immunological and hematological diseases		
	Anemia	14	3.98
	Vitamin B12 deficiency	3	0.85
	Neutropenia	2	0.57
	Idiopathic Thrombocytopenic Purpura	2	0.57
	Others*	3	0.85
E	Endocrine, nutritional and metabolic diseases		
	Diabetes Mellitus	11	3.13
	Electrolyte imbalance	10	2.84
	Diabetic ketoacidosis	3	0.85
	Hypothyroidism	3	0.85
	Dehydration	2	0.57
	Hypoglycemia	2	0.57
	Others**	5	1.42
I	Circulatory system diseases		
	Congestive heart failure	19	5.40
	Hypertension	9	2.56
	Pulmonary embolism	8	2.27
	Peripheral vascular disease	7	1.99
	Oesophageal varices	4	1.12
	Ischemic stroke	10	2.84
	Valvular heart disease	3	0.85
	Coronary heart disease	3	0.85
	Deep vein thrombosis	2	0.57
	Dilated cardiomyopathy	6	1.70
	Others***	8	2.28
L	Skin and subcutaneous tissue diseases		
	Drug allergy	1	0.28
	Cellulitis	3	0.85
M	Musculoskeletal system and connective tissue diseases		
	Muscle weakness in post stroke	1	0.28
	Myositis	1	0.28
	Spine degenerative disease	1	0.28

**Myelodysplastic syndrome, Hepatic hemangioma, Pancytopenia*

***Protein-energy malnutrition, Fluid overload, Goiter, Vitamin B deficiency, and Hyperglycemic coma*

****Obstructive pericarditis, varicose veins, acute pericarditis, Arrhythmia*

There was predominance of anemia among the immunological and hematological diseases representing 3.98% of all diagnoses. Diabetes Mellitus and electrolytes imbalances were the most common among the endocrine, nutritional and metabolic diseases accounting for 3.13% and 2.84% of all diagnoses, respectively.

Moreover, the congestive heart failure was the most common among the diseases in circulatory system accounting for 5.40% of all diagnoses. Lastly, the musculoskeletal and connective tissue diseases and dermatological diseases were not commonly found.

Table 5: Reasons for admission of patients (J, K, N, R, and S or T categories) to CHUK Internal Medicine wards during study period of 14 days (N=176)

ICD category*	Reasons for admission	Number	Percentage
J	Respiratory system diseases		
	Pneumonia	29	8.23
	Asthma	6	1.70
	Chronic obstructive pulmonary disease	6	1.70
	Pulmonary edema	2	0.57
	Others*	6	1.70
K	Digestive system diseases		
	Chronic liver diseases	12	3.41
	Gastric outlet obstruction	2	0.57
	Peptic ulcer disease	4	1.14
	Hepatic encephalopathy	2	0.57
	Upper gastrointestinal bleeding	2	0.57
	Other**	6	1.68
N	Genitourinary system diseases		
	Acute kidney injury (AKI)	9	2.56
	Chronic kidney disease	7	1.99
	Nephrotic syndrome	2	0.57
	Other***	8	2.27
R	Abnormal laboratory and clinical findings not elsewhere classified		
	Hypovolemic shock	1	0.28
S or T	Poisoning, injury and other consequences from external causes		
	Methanol Intoxication	2	0.57
	Other****	3	0.85

**Lung fibrosis, Bronchiolitis, Pneumothorax, Bronchopneumonia, Parapneumonic effusion, Massive unilateral pleural effusion*

***Acute pancreatitis, Chronic Gastritis, Cholelithiasis, Liver abcess, Oesophagitis, Hepatorenal syndrome*

****Obstructive uropathy, Ovarian cyst, Urolithiasis, Rectovaginal fistula, Pelvic inflammatory disease, Benign hyperplasia of prostate, Urinary tract infection, Urinary tract obstruction*

*****Gastric trauma, Anaphylactic reaction, Suicidal attempt*

It was observed that pneumonia was the most common among the respiratory system diseases and accounted for 8.23% of all diagnoses and was followed by asthma, chronic obstructive lung diseases accounting each for 1.7% of all diagnoses, respectively.

On the other hand, chronic liver diseases predominated among the diseases of digestive system, accounting for 3.41% in all diagnoses and they were followed with peptic ulcer disease, gastric outlet obstruction, hepatic encephalopathy and upper gastrointestinal bleeding accounting for 1.14%, 0.57%, 0.57% and 0.57% of all diagnoses, respectively. Lastly, acute kidney injury and chronic kidney diseases predominated among diseases of the genitourinary system and accounted for 2.56% and 1.99% of all diagnoses respectively as shown in the **Table 5**.

4.4. The outcomes of the admitted patients

Table 6: Outcomes of the admitted patients during 14 days (N=176)

Outcomes	Female, n (%)	Male, n (%)	Total, N (%)
Discharged	70 (39.77%)	34 (19.32%)	104 (59.09%)
Still in hospital	25 (14.20%)	22 (12.50%)	47 (26.70%)
Died	13 (7.39%)	6 (3.41%)	19 (10.80%)
Counter-referred	1 (0.57%)	1 (0.57%)	2 (1.14%)
Referred to another department	0.00	3 (1.70%)	3 (1.70%)
Evaded	1 (0.57%)	0.00	1 (0.57%)

The majority of the participants were discharged at the end of the period of the study while 26.70% of participants were still in the hospital. The evaded patients represented 0.57%. The counter-referred and referred patients to another department represented 1.14% and 1.70% respectively. However, it was found that 10.80% of participants died while conducting the study.

4.5. The correlation between patients' clinical profile and their outcomes

This section consists of the correlation between some initial laboratory and clinical parameters linked with mortality in patients hospitalized in Internal Medicine wards and associated Chi-Square test results in table 8, and the correlation between outcomes and the time from the onset of the symptoms to the admission into CHUK in table 7.

Table 7: The correlation between outcomes and the time between the onset of the symptoms to the admission into CHUK .

		Disease onset to admission time				P-value = 0.253
		Less than one week	One week to two weeks	Two to four weeks	More than four weeks	
Outcomes	Counter-referred	1 (0.57%)	0	0	1 (0.57%)	P-value = 0.253
	Evaded	1 (0.57%)	0	0	0	
	Died	9 (5.11%)	4 (2.27%)	1 (0.57%)	5 (2.84%)	
	Discharged	58(32.95%)	28 (15.91%)	10 (5.68%)	8 (4.55%)	
	Still in hospital	27 (15.34%)	5 (2.84%)	4 (2.27%)	11 (6.25%)	
	Referred to other departments	3 (1.70%)	0	0	0	

There was no strong statistically significant association between duration of the symptoms on admission in CHUK and outcomes (P-value=0.253).

Table 8: Initial parameters linked with mortality among patients admitted in Internal Medicine.

Initial Parameters	Number of Deaths in Patients with parameter (%)	Number of Patients with parameter (%)	Number of Deaths in Patients without parameter (%)	Number of Patients without parameter (%)	P - Value
Bradypnea (RR < 12)	0 (0%)	0	16 (10.6%)	155	1.000
Tachypnea (RR > 22)	3 (14.3%)	21	16 (10.6%)	155	1.000
Bradycardia (HR< 60/min)	1(20%)	5	8 (7.9%)	101	0.003
Tachycardia (HR> 100/min)	10 (13.5%)	69	8(7.9%)	101	0.003
Hypotension (SBP < 90 mmHg)	5 (35.7%)	14	9 (6.9%)	130	0.050
Hypertension (SBP > 140 mmHg)	5 (15.6%)	32	9 (6.9%)	130	0.050
Hypernatremia (Na< 135 mEq/L)	14 (17.7%)	79	5 (5.2%)	95	0.993
Hypernatremia (Na > 145 mEq/L)	(0%)	2	5 (5.2%)	95	0.993
Hypokalemia (K < 3.5 mEq/L)	4 (12.5%)	23	10 (14.5%)	102	0.597
Hyperkalemia (K > 4.5 mEq/L)	5 (8.4%)	51	10 (14.5%)	102	0.597
Glasgow Coma Scale	6 (33.3%)	18	13 (8.2%)	158	0.004
Hypoglycemia (<70 mg/dL)	7 (31.8%)	22	11 (8.0%)	137	0.497
Hyperglycemia (>200 mg/dL)	1 (6.25%)	16	11 (8.0%)	137	0.497
Leukopenia (<4 x10⁹/L)	2 (10%)	20	13 (10.8%)	120	0.458
Leukocytosis (> 11x10⁹/L)	4 (11.1%)	36	13 (10.8%)	120	0.458
Anemia (<12 g/dL)	9 (9.9%)	91	10 (11.8%)	85	0.000
Serum Urea (>40 mg/dL)	5 (22.7%)	22	14 (9.1%)	154	0.939

Certain initial clinical parameters were associated with increased risk of mortality including bradycardia, tachycardia, tachypnea, systolic hypertension, systolic hypotension, leucopenia, leukocytosis, hyponatremia, hypokalemia, hyperkalemia, increased serum urea, and decreased GCS score.

However, after Chi-square test analysis, anemia, low GCS score, hypertension, hypotension, bradycardia and tachycardia were significantly associated with increased mortality (P -value ≤ 0.05).

CHAPTER FIVE: DISCUSSION

5.1. Socio-demographic characteristics

5.1.1. Gender

This study demonstrated that women predominated among admissions; the population comprised of 62.5% (n=110) women and 37.5% (n=66) of men (male: female ratio=1:1.66). This finding closely was not only related to the result of the studies done at Al-ban Jadeed Teaching Hospital from Soudan (9), but also to another study done in Uganda which documented the similar trends in gender among admissions to medical wards (12). However, other studies which were conducted in Ethiopia, in Bangladesh, and in Nigeria found that men were admitted more often than women (8, 10, 11).

Even though, there is a variability of gender trend of admission among various studies, the findings of this study was attributed to the higher morbidity and longer survival rates for women (21).

5.1.2. Age

This study demonstrated that the most of medical admissions were among the young and middle aged people. The age of the participants was between 16 - 92 years (mean age: 48.8 years). The admissions among the patients aged (16 - 65 years) were 76.71% (n=135) of all participants while the elderly aged group (66 - 95 years) was 23.29% (n=41).

This finding was closely related to many other studies which were done at JUSH in Ethiopia (10), Dhaka Medical College in Bangladesh (11), Igbinedion University Teaching Hospital in Nigeria (8), Mulago Hospital in Adult medical wards in Uganda (12), and at Al-ban Jadeed Teaching Hospital in Soudan (9). These findings may be attributed to the low life expectancy; which is 67.5 years for Rwandan population (6).

5.2. The common reasons for admission

This study found that the circulatory system diseases were the most common, accounting for 44.88% (n=79) of among participants and they were followed with the diseases of the respiratory system 27.84% (n=49), the infectious and parasitic diseases 26.14% (n=46) and the endocrine, metabolic and nutritional diseases at 20.45% (n=36).

On the other hand, the neoplasms, the digestive diseases, the genitourinary diseases and immunohematological diseases represented 17.61% (n=31), 15.91% (n=28), 14.77% (n=26) and 13.64% (n=24) of all diagnoses respectively. The similar trend of the disease was found in another study which was done at GF Jooste Hospital which showed that diseases of cardiovascular systems were most common cause of admission and that infectious diseases and respiratory system disorders were more prevalent (14).

Even though, it is difficult to accurately highlight that the infectious diseases are decreasing according to this research results due to seasonal variability of the diseases and shorter study period, it was supported by another study done at Mulago Hospital in Uganda which was showing that there was a reduction of admissions due infectious diseases and an increase of admissions due to NCDs (12).

On the other hand, other studies which were done in various African countries such as the study done in Ethiopia, in Soudan and in Nigeria and the systematic review of African articles showed that the major reasons for admission were predominantly the infectious and parasitic diseases (2, 8, 9, 12).

This study also demonstrated that the overall leading diagnosis was pneumonia at 8.23% (n=29) of all diagnoses. This might have been the seasonal impact on the disease pattern as the enrollment was done during the rainy season when the respiratory diseases are common.

Furthermore, other nine common diagnoses were congestive heart failure at 5.40% (n=19), anemia 3.98% (n=14), tuberculosis 3.4% (n=12), chronic liver diseases 3.41% (n=12), diabetes mellitus 3.13 % (n=11), malaria 2.84% (n=10), acute kidney injury 2.56% (n=9), lymphomas 2.56 % (n=9) and chronic kidney disease 1.99% (n=7) respectively. In fact, the findings from this study are closely related to another study done at Jimma University Specialized Hospital (10).

Although there is a changing trend of the diseases among the countries from communicable to non-communicable diseases, various studies show variabilities of disease profiles depending on each country. This can be due to the differences in life expectancies, sanitation, security, health care network, and wellbeing of the population.

5.3. The outcomes of admitted patients

This study demonstrated that the majority of participants 59.09% were improved and discharged while other 26.70% were still in the hospital at the end of the period of the study.

This finding is supported by other studies done at Igbinedion university teaching hospital (8), Jimma University Specialized Hospital (10), Al-ban Jadeed Teaching Hospital (9), and Tambo Memorial Hospital (21). These studies found that most of patients admitted in medical wards were discharged home safely.

Regarding death as outcome, only 10.80% (n=19) patient died while conducting this study. This result was closely related to the result of the study which was done in Ethiopia (10). However, this study showed a mortality rate which is higher than that found other studies such as those done at Igbinedion university teaching hospital (8) and Tambo Memorial Hospital (21). The reason for this was thought to be that CHUK mainly admits the sickest patients from many district hospitals across country, and the emergency room is often congested due to access block to the inpatient medical wards (average length of stay in the emergency room while waiting for a regular inpatient medical bed is 3 days, but it can be much long for medical patients in need to high care medical bed).

Regarding the evaded patient, it was found that the evasion represented 0.57% of the study population which was quite similar to the result of the study done at Tambo Memorial Hospital (21).

Lastly, the patients that were counter-referred and referred to another department were 1.14% and 1.70% respectively. However, these results of the study showed lower rate of referred cases than that which was shown by the study done in Igbinedion university teaching hospital (8) and Tambo Memorial Hospital (21).

5.4. The correlation between patients' clinical profile and their outcomes

Among the initial clinical and laboratory parameters taken during admission, this study showed that bradycardia, tachycardia, tachypnea, systolic hypotension, systolic hypertension, leucopenia, leukocytosis, hyponatremia, hypokalemia, hyperkalemia, serum urea and low GCS score were found to be linked with mortality.

After Chi-Square Test analysis, anemia, hypotension, hypertension, bradycardia and tachycardia and low GCS score were associated significantly with mortality (P value ≤ 0.05).

These study results were quite closely related to the results of the study which was done at a Tertiary Care Hospital in Delhi (15). Moreover, this study did not show any strong statistically significant association between duration of the symptoms on admission in CHUK and outcomes (P -value=0.253).

5.5. Study limitations and weaknesses

The major limitation was the study period which compelled the researcher to be limited to the short study period of three months. Thus, it didn't allow demonstrating the seasonal variability of the disease pattern throughout the year.

The data collection was also disturbed by arrival of the COVID-19 pandemic in the country and subsequent imposed control measures such as lockdown, which made it quite difficult to reach the site for data collection.

Moreover, some patients were discharged before signing informed consents, so they were not enrolled in the study.

Therefore, these last two limitations had an impact of having the lower number of the sample size to be analyzed in our study.

5.6. Strengths of the study

This study strength resides in fact that it is the first prospective cohort study done at CHUK describing the profile of the patients admitted through the emergency room and their associated outcomes in the medical department. Therefore, it serves as a baseline study against which to compare other studies.

The sample size of 176 participants was sufficient and all participants were followed up for 2 weeks. Thus, there was no drop out of the participants in this study. Lastly, this study is reproducible in other health care institutions.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

The principal findings and conclusions were drawn from this study as follow:

- This study found that the majority of medical admissions were among the young and middle aged people (median age:48.8 years).
- The number of female participants was more predominant among medical admissions (male: female ratio=1:1.66).
- In total, 352 diagnoses were found among 176 patients. This was due to the fact that many patients had more than one diagnosis.
- This study demonstrated that there is a noticeable dual burden of communicable diseases and NCDs among our population. However, the NCDs were observed to be more common than communicable diseases.
- It was observed that the circulatory system diseases were the leading diagnoses among participants (44.88%). They were followed with the respiratory diseases (27.84%) and the infectious and parasitic diseases (26.14%), respectively.
- The observation from this study showed that the two leading diagnoses were pneumonia and congestive heart failure accounting for 8.23% and 5.40% of all diagnoses, respectively.
- The majority of patients was improved and discharged (59.09 %) comparatively to those who were still in the hospital (26.7%), died (10.8%), evaded (0.57%), counter-referred (1.14%) and referred to another department (1.70%).
- Among the initial clinical and laboratory parameters, anemia, systolic hypertension, systolic hypotension, bradycardia, tachycardia, low GCS were linked significantly with increased mortality ($P\text{-value} \leq 0.05$).

6.2. Recommendations

Due to the findings of increasing prevalence of the NCDs among the population, it is recommended for all stakeholders involved in health issues including Ministry of Health, Rwanda Biomedical Center, and public health authorities in collaboration with the local administration to raise the awareness of NCDs. In fact, there is an imperative need of an increased collegial effort from these different institutions in raising the awareness of NCDs and their preventive measures.

On the other hand, the burden of communicable diseases is not negligible. Therefore, the effort to maximize the preventive measures of communicable diseases must be reinforced too, especially in the era of emerging and re-emerging viral pandemic such as COVID-19.

➤ **To the general population:**

Much effort should be put in sensitizing and raise the population awareness about the NCDs preventive measures and early screening through seminars, conferences, workshops, medias and trainings at the different levels of health institutions. This will help us to both the control of this issue of the increasing prevalence of NCDs, and also their associated morbidity and mortality.

Further researches:

This study analyzed only medical admissions and excluded patients seen in the outpatients' department. Therefore, an additional study is needed to assess the disease profile among patients treated in outpatients' department, and it is expected that information gained from such a study may help in the planning and management ambulatory care services. Lastly, a study with the longer study period is needed in the future so as to better demonstrate the seasonal variations of the disease profile.

REFERENCES

1. Maher D, Smeeth L, Sekajugo J. Health transition in Africa: practical policy proposals for primary care. *Bull World Health Organ.* 2010 May; 88: p. 943–948.
2. Etyang AO, Scott JAG. Medical causes of admissions to hospital among adults in Africa: a systematic review. *Glob Health Action.* 2013 January; 6: p. 1-14.
3. WHO. Global status report on noncommunicable diseases 2010. Geneva: World Health Organization; 2011.
4. NISR, MOH, National I. Rwanda demographic and health survey 2014-15. Rockville, Maryland, USA: National Institute of Statistics of Rwanda (NISR) [Rwanda], Ministry of Health (MOH) [Rwanda], and ICF International; 2016.
5. Mbanjumucyo G, DeVos E, Pulfrey S, Epino HM. State of emergency medicine in Rwanda 2015: an innovative trainee and trainer model. *International Journal of Emergency Medicine.* 2015 December; 8(20).
6. UNDP. Human development indices and indicators: 2018 statistical updates: Briefing note for countries on the 2018 statistical update. Rwanda: United Nations Development Programme; 2018.
7. MOH. Fouth health sector strategic plan- July 2018 – June 2024. Ministry of Health; 2018.
8. Osarenkhoe J, Omoruyi L, Imarhiagbe L, Adebayo O, Freeman O. Pattern and outcome of medical admissions in a Nigerian rural teaching hospital (2009-2012). *Annals of tropical medicine and public health.* 2014; 7(3): p. 171-176.
9. El Bingawi HM, Hussein MB, Bakheet MY. Characteristics of patients admitted to medical ward of a referral hospital in a developing country. *International Journal of Sciences: Basic and Applied Research (IJSBAR).* 2014; 14(1): p. 86-92.
10. Ali E, Woldie M. Reasons and outcomes of admissions to the medical wards of Jimma University Specialized Hospital, Southwest Ethiopia. *Medicine Ethiopian Journal of Health Sciences.* 2010 July; 20(2): p. 113-120.
11. Bala CS, Biswas S, Sarkar M, Sarkar PK, Chowdhury JA, Ahasan HN. Changing disease profile of medical inpatients on the first post admission day of a Tertiary Care hospital. *Journal of National Institute of Neurosciences Bangladesh.* 2018 July; 4(2): p. 113-115.
12. Kalyesubula R, Mutyaba I, Rabin T, Andia Biraro I, Alupo P, Kimuli I, et al. Trends of admissions and case fatality rates among medical in-patients at a tertiary hospital in Uganda; A four-year retrospective study. *PLoS ONE.* 2019 May ; 14(5).
13. Ajayi EA, Ajayi OA, Adeoti OA, Raimi TH, Fadare JO, Dada SA, et al. A five-year review of the pattern and outcome of cardiovascular diseases admissions at the Ekiti State University Teaching Hospital, Ado Ekiti, Nigeria. *Nigerian Journal of Cardiology.* 2014 January; 11 (1).

14. Marszalek J, De Villiers P. Morbidity profile of admissions to GF Jooste Hospital, Manenberg, Cape Town. *South African Family Practice*. 2006 August; 48(6): p. 5-15e.
15. Choudhary R, Goel A, Pruthi S, Kalra S. Profile of patients hospitalized through the emergency room to the medicine ward and their short-term outcome at a tertiary care hospital in Delhi. *Prehospital and Disaster Medicine*. 2015 December; 30(6): p. 593-598.
16. Asadollahi K, Beeching NJ, Gill GV. Leukocytosis as a predictor for non-infective mortality and morbidity. *QJM: An International Journal of Medicine*. January 2010; 103(5).
17. De Labry LO, Campion EW, Glynn RJ, Vokonas PS. White blood cell count as a predictor of mortality: results over 18 years from the normative aging study. *Journal of Clinical Epidemiology*. 1990 July; 43(2).
18. Jones AE, Yiannibas V, Johnson C, Kline JA. Emergency department hypotension predicts sudden unexpected in-hospital. *CHEST*. 2006 October; 130(4).
19. Waikar SS, Mount DB, Curhan GC. Mortality after hospitalization with mild, moderate, and severe hyponatremia. *The American Journal of Medicine* (2009) 122, 857-865. 2009 September; 122(9).
20. Kagansky N, Levy S, Rimon E, Cojocaru L, Fridman A, Ozer Z, et al. Hypoglycemia as a predictor of mortality in hospitalized elderly patients. *Archives of Internal Medicine*. 2003 August; 163(15).
21. Naidoo A. Trends in adult medical admissions at Tambo Memorial Hospital, Gauteng, between 2005 and 2007. Johannesburg: University of the Witwatersrand, Faculty of Health Sciences; 2009.
22. Calculators. Good calculators: Free online calculators. [Online]. [Cited 2020 April 4. Available from: <https://goodcalculators.com/sample-size-calculator/>.
23. WHO. ICD-10 Version: 2019: International Statistical Classification of Diseases and Related Health Problems 10th Revision. [Online].; 2019 [cited 2020 March 31. Available from: <https://icd.who.int/browse10/2016/en>.

ANNEXES

i. Consent form

CONSENT FORM IN ENGLISH

Patient's number:

I am Dr. HAKORIMANA NDAHIRO Martin, a postgraduate student at University of Rwanda in the department internal medicine who is carrying out a study on "**Profile of the patients admitted from Emergency rooms to the Internal Medicine wards and their associated outcomes at a Tertiary Care Hospital in Kigali. Case of CHUK**"

It is necessary to understand its purpose, risks and benefits before your participation agreement.

Aim: To assess reasons of admissions of patients admitted into the Internal Medicine wards from CHUK emergency department and their associated Outcomes.

Risks to the participants: No expected major risks to take part in this study.

Benefits: There are no financial benefits to be provided to the participants in the study.

Confidentiality: Information given will be confidentially kept by the investigator for purposes of the study.

Questions: Participants are allowed to freely ask questions and any clarifications about the study whenever they wish. My phone number: 0788456856.

Rights to withdraw from the study: You can withdraw freely from the study anytime without any consequence.

Statement of consent: I have understood completely after reading the contents of the information given above. I have fully understood the aims, nature, risks as well as benefits of the study. I have understood that I have freedom to pull out of the study whenever I want.

By signing this informed consent, I accept to be enrolled in this study.

I hereby sign for myself.../next of kin.....as a proof to participate in the study.

Names: Date:

We have explained completely the objectives of the study to the participant and she/he has fully understood its purpose, benefits and risks to him or her.

Signature: Date:

URUPAPURO RWO KWEMERA KUGIRA URUHARE MU BUSHAKASHATSI

Numero y'umurwayi:

Nitwa HAKORIMANA NDAHIRO Martin nkaba ndi umuganga w'umunyeshuri wiga ibijyanye n'indwara zo mu mubiri muri Kaminuza y'u Rwanda, nkaba ndigukora ubushakashatsi ku: **"Imiterere y'uburwayi n'ingaruka zabwo mu bitaro bikuru bya kaminuza bya CHUK".**

Urasabwa kubanza gusobanukirwa intego y'ububushakashatsi, inyungu n'ingaruka zishobora kubaho igihe wemeye kubugiramo uruhare.

Intego: kureba imiterere y'uburwayi bwo mu mubiri n'ingaruka bugira ku barwayi bavurwa baba mu bitaro bya CHUK.

Ingaruka: Ugize uruhare muri ubu bushakashatsi nta ngaruka azagira.

Inyungu: Ibizava muri ubu bushakashatsi bizafasha kuvura neza abarwayi kuko bizafasha kumenya uburwayi bwiganje hamwe n'ingaruka bwatera uyiwaye. Nt'amafaranga uwemeye kujya mu bushakashatsi azabukuramo.

Ibanga: Amakuru yose kuri buri muntu azajya abikwa n'umushakashatsi kugirango akoreshwe mu bushakashatsi gusa.

Ibibazo: wemerewe kubaza ibibazo byose igihe cyose wifuza ibindi busobanuro.

Nimero ya telefoni yanje ni: 0788456856.

Uburenganzira bwo kwivana mu bushakashatsi:

Ufite uburenganzira bwo kwivana mu mubare w'abakorerwa ho ubushakashatsi igihe ubishakiye kandi ntangaruka ugize.

Amasezerano yo kwemera gukorerwa ho ubushakashatsi:

Maze gusoma ibyanditse hejuru kandi nabisonukiwe. Nasobanuriwe birambuye mu rurimi numva intego, inyungu n'ingaruka muri ubu bushakashatsi. Nasobanuriwe n'uko nemerewe kwivana mu mubare w'abakorerwa ho ubushakashatsi igihe mbishakiye ntangaruka ngize.

Nshyize umukono kuri aya masezerano nsobonukiwe kandi nemerako nkorerwaho/umurwayi wanje akorerwaho ubushakashatsi.

Umukono wanje: Itariki:

Umukono w'umurwaza: Itariki:

Nasobanuriye umurwayi/umurwaza neza intego, inyungu z'ubu bushakashatsi.

Umushakashatsi: Itariki

ii. Data collection form

A. Identification

1.Study number	
2.Hospital number of the patient	
3.Date of enrollment	
4.Mobile phone/ contact	
5.Province of origin	
6.District of origin	
7.Referring hospital	

B. Socio-demographic data

8.Gender	Male	Female	
9.Age			
10.Marital status	Single	Married	Separated
11.Insurance	<input type="radio"/> CBHI <input type="radio"/> Other : <input type="radio"/> No insurance		
12.Ubudehe category	1	2	3
13.Alcohol consumption	Yes	No	
14.Tobacco smoking	Yes	No	

c. Medical history

15.Surgical history	
16. Medical history	
17. Gynecological history (female)	

D. Clinical variables on admission

variables	values
18. RR	
19..HR	
20. Systolic BP	
21. T°	
22.WBC	
23 Glycemia	
24. Hemoglobin	
25. Serum Na	
26. Serum K	
27. Serum Urea	
28. Serum Creatinine	
29. Low GCS	

E. Clinical presentation

30 Time from the onset to consultation to the nearest health facility.	<input type="radio"/> < 1 week <input type="radio"/> 1-2 weeks <input type="radio"/> 2-4 weeks <input type="radio"/> >4 weeks
31.Time from the onset to admission in CHUK	<input type="radio"/> < 1 week <input type="radio"/> 1-2 weeks <input type="radio"/> 2-4 weeks <input type="radio"/> >4 weeks
32.Final diagnoses	1. 2. 3.
33.Outcomes after 2 weeks of hospitalization	<input type="radio"/> Patient died <input type="radio"/> Patient improved <input type="radio"/> Patient not improved <input type="radio"/> Shifted to another department <input type="radio"/> Evaded

iii. CMHS IRB approval



UNIVERSITY of
RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES
DIRECTORATE OF RESEARCH & INNOVATION

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 12th/September/2019

Dr HAKORIMANA NDAHIRO Martin.
School of Medicine and Pharmacy, CMHS, UR

Approval Notice: No 445/CMHS IRB/2019

Your Project Title "*Profile Of Patients Admitted From The Emergency Room To Internal Medicine Wards And Their Associated Outcomes In A Tertiary Care Hospital In Kigali : Case Of CHUK*" has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahuna	UR-CMHS	X		
Dr Brenda Asiimwe-Kateera	UR-CMHS	X		
Prof Ntagamira 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 11th September 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 may conduct audits of all study records, and consent documentation may 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 12th September 2019

Expiration date: The 12th September 2020



Professor GAHUTU Jean Bosco
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