College of Medicine and Health Sciences

School of medicine and Pharmacy

ETIOLOGIES OF ALTERED MENTAL STATUS IN ADULTS AT CHUK EMERGENCY DEPARTMENT

Prospective Observational descriptive study

A Thesis Submitted in partial fulfillment of the Requirement for the Award of Masters Degree in Medicine (Internal Medicine option), school of Medicine and pharmacy, college of Medicine and Health sciences

University of Rwanda

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2020

DECLARATION

I Dr. NKUNDIMANA Venuste, to the best of my knowledge hereby declare and certify that the work presented in this dissertation entitled ‘’**Etiologies of altered mental status in adults at CHUK Emergency Department: Prospective observational descriptive study**’’ is entirely my own original work and it has never been presented or submitted in whole or in part for any other degree at University of Rwanda or any other institution.

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December, 2020

Approved for Submission:

Dr RUTAGANDA Eric, Supervisor

December, 2020

DEDICATION

To my wife Uwizeyimana Marie Claire

To my father Ruberankiko Anastase

To my mother Nyirahabiyaremye Pascasie

To Children Uwase Nkundimana Lyna and Ihirwe Nkundimana Levy Nolan

This work is dedicated with great pleasure

ACKNOWLEDGMENTS

To the almighty God for his great and marvelous work.

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I am in particular grateful to my wife and colleagues without whose help this project could not have been achieved within time frame.

Any attempt at any level can’t be satisfactorily completed without the support of friends. I am over helmed in all humbleness and gratefulness to acknowledge in depth the contribution of Emergency Residents, my classmates in data collection. Without your valuable support this work would never have been possible.

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ABSTRACT

Aims: Altered mental status represents a very common life threatening medical complaint. It is paramount to recognize the etiologies of AMS in order to offer a timely effective management. There is a remarkable lack of data on frequency and causes of AMS in sub-Saharan Africa. This study served to determine etiologies of non traumatic AMS in adults at Kigali university teaching Hospital Emergency.

Methods: A prospective observational study was conducted at Kigali university teaching hospital from 1st December 2019 to 25th March 2020. We have consecutively recruited all adult patients with undifferentiated AMS. Demographics; clinical; laboratory and imaging data were collected and analyzed using descriptive statistics; bivariate and multivariate analysis

Results : Over the 4 months period from 1st December 2019-30th march 2020 , 423 patients with medical conditions presented at CHUK adult Emergency department .of these , 98 patients had Altered mental status and served as the study group ,of whom 52% were female, median age 46.61±19.918. There was 63.3 % of patients with comorbidities including Hypertension(22.4%); Diabetes Mellitus (18.4%); HIV (10%) and a minority of patients had chronic kidney disease; dementia ;70.4% of all had GCS<15 as disease state of AMS

The study showed that the most prevalent causes of AMS were Neurological; infectious; Metabolic and Endocrine disorders (Figure3.). Stroke was the most observed neurological condition followed by brain tumor and epilepsy. Sepsis; cerebral malaria and meningitis were the three most infectious causes of AMS. Among patients with metabolic disorders causing AMS a half had hyponatremia; uremic encephalopathy (26.9 %); hepatic encephalopathy (11.5%); Hypoglycemia (7.7%).

We observed strong association between HIV and Meningitis with P value 0.001, OR: 28.3; Hypertension and Stroke p 0.001 , OR 6.3(Figure 4). The risk of Stroke was significant with advanced age 57.44±18.8, P: 0.001(Figure 5)

Conclusion: In Conclusion, this work has demonstrated a significant frequency of AMS in patients presenting at Emergency department. This study underlined the importance of comorbidities with various causes of AMS .The causes of AMS are significantly different among various age group. In general, neurological, infectious and metabolic disorders are the main etiologies of AMS

Key words: altered mental status, etiology, comorbidity

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LIST OF ABBREVIATIONS

AMS: Altered Mental Status

AVPU: (alert [A], responsive to verbal stimuli [V], responsive to painful stimuli [P], and unresponsive [U]) scale

CHUK: Centre Hospitalier Universitaire de Kigali

CNS: Central nervous System

DKA: Diabetic KetoAcidosis

DM: Diabetes mellitus

GCS: Glasgow coma Scale

HHS: Hyperglucemic Hyperosmolar State

HIV: Human ImmunoDeficiency Virus

HTN: Hypertension

ID: Identification

NCD: Non Communicable Diseases

NTC: non traumatic coma

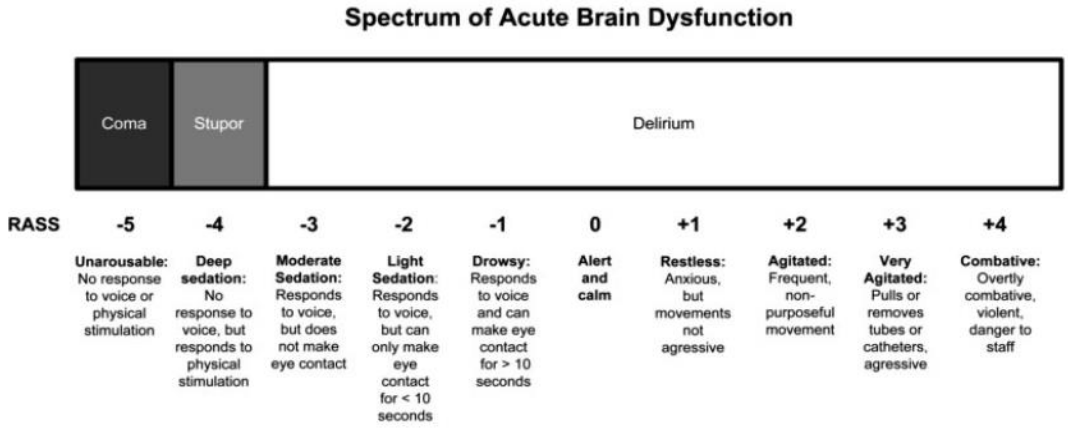
CHAPTER ONE: INTRODUCTION

1.1 Background

The term altered mental status (AMS) refers to an undifferentiated assortment of disorders of mentation. These disorders are divided into: impaired cognition, attention, awareness, or level of consciousness (1)

In the literature there is significant uncertainty in etiology and the ambiguity in defining the clinical presentation that can be minimized with a good understanding of the common pathology associated with AMS and applying a well-organized and thorough evaluation(2)(3).
Altered sensorium is a common complaint in medical practice .
Current works focusing on AMS suggest that the factors leading to AMS include cerebrovascular, traumatic, neurological, cardiac, psychiatric, metabolic, pulmonary, endocrinological, infectious disorders (4).

Several authors have provided different scoring systems used to evaluate the severity of AMS. They have improved communications among health care providers throughout the world.
The widely used systems are the Glasgow Coma Score (GCS) and the AVPU.



Acute changes in mental status has deleterious effects with significant morbidity and mortality outcomes(5) .

A retrospective study conducted in Malawi by Bryna Harrington et revealed a frequency of 26%, carrying a with significant mortality of 46% (6).

A study conducted in Uganda in 2009 has revealed that AMS was frequent in the general medical ward at about 16.1% , infectious causes being the most common(7)

Worldwide, the estimated incidence of AMS in ED patients ranges between 4% and 10% (8)

There are limited that on etiologies of altered mental status in poor resources settings.

It is critical to develop knowledge on diseases leading to AMS in developing countries to improve patient care.

1.2 Literature Review

There is a considerable number of works mainly focusing on causes of coma and few addressing etiologies of altered mental status have shown different results.

A prospective study done in India recruited two hundred patients presenting with non-traumatic coma found that cerebrovascular diseases , CNS infections , and hepatic encephalopathy were the main etiologies of NTC(9)

In a prospective observational study in Nigeria by Owolabi et al conducted in patients presenting mental status changes in medical emergency enrolled 194 patients predominantly males(72%). Patients with NTC were 8.1% of medical admissions in the entire study period .Their analysis has shown that the prevalent etiologies of AMS were metabolic and toxic causes (28.9%),infectious (28.9%); Neurological ,stroke in particular (23.7%) and a striking high mortality 49%(10).

As described by author Yai.H et al in a study conducted at Emergency department in Thailand aiming at determining the etiologies of altered consciousness, AMS remains a life threatening complaint. The study constitutes 350 patients, in which the admission rate was 19.1%, hospital emergency department mortality 10 %. Almost similar to other authors ,the major causes of AMS were neurological disorders (29.1%), metabolic/ endocrine disorders (20.8%), infectious causes (18.8%), cardiovascular disorders (10%), psychiatric (8.8%), pulmonary (7.1%), and toxicological (5.1%) (11).

The available systematic review by M. Horsting and coworkers' on 14 selected publications on non traumatic coma .Major etiologies were stroke; post-anoxic coma; poisoning; and metabolic causes. Available studies in Africa have shown that NTC was mainly due to infections affecting 10-51% of patients (12) .

Regarding the east African region, the study done at Mbarara regional referral hospital , in a total of 621 patients, 100 (16.1%) had AMS, 38 patients living with HIV. More than a half of them had infections, mainly malaria, meningitis and sepsis. Other most established prevalent etiology was metabolic causes , hypoglycemia mainly frequent in patients taking hypoglycemic agents (7) .

A prospective study in Singapore by Leong et al showed that the main etiologies of AMS were of neurological, infectious and metabolic disorders at 34.4%, 18.3%, 12% respectively. Generally, 106 (11%) patients died during hospitalization; 36 (33.9%) and39 (36.8%) deaths related to ischemic and hemorrhagic stroke, respectively (13)

A study conducted by Kekec Z et al in Turkey determining rate of occurrence and causes of altered mental status among adults at Emergency. Etiologic factors were neurological (566; 71.6%), head trauma (82; 10.4%), endocrine/metabolic (48; 6.1%), cardiovascular/pulmonary (49; 6.2%), infectious (30; 3.8%), gynecologic and obstetric (2; 0. 4%), toxicological (12; 1.5%) (1).

1.3 Problem Statement

The causes of altered mental status are broad and various studies have demonstrated different results in its causes, outcomes and prognosis. Altered mental status carries detrimental effects on patients which should be treated effectively. It is vital to determine causes of AMS to provide timely management. To our knowledge, there is no data on frequency and causes of altered mental status in Rwanda. Therefore, this study served in determining the frequency and causes of altered mental status in adult patients presenting in Emergency Department at Kigali University teaching hospital.

1.4 Objectives

1.4.1General objectives

1. Determine the causes of AMS among adults at CHUK

1.4.2 Specific objectives

1. Describe clinical characteristics of patients with altered mental status
2. Identify the frequency of altered mental status in adult medical patients.

1.5 Research Question

What are the Causes of mental status changes in adult emergency at CHUK?

CHAPTER TWO: METHODOLOGY

2.1 Study Design

We have designed a prospective observational descriptive study whereby all medical patients aged 15 and above who presented at CHUK were recruited over a period of four months. Those labeled with any of the spectrum of AMS were enrolled in the analysis group. Two emergency residents, one internal medicine resident and two medical students participated in the data collection.

Medical patients with criteria for AMS managed at emergency department day and night shifts were enrolled in the study by the five members. Patients were labeled to have AMS if any of the following criteria was assigned by internal medicine treating physician ,emergency doctor and resident caring the patient on first initial evaluation: GCS below 15, patient not alert, confused and disoriented, difficult to arouse, agitation, hallucination, inappropriate or bizarre behavior or any finding denoted AMS by the assessing team.

Every single patient enrolled in this study was blinded to the attending physician and investigator. All features used to gather the data for evaluation include elements in the history of present illness, medical history, physical findings, bedside testing, laboratory studies and radiographic studies using a designed standard tool in agreement with abstracters. We collected the assigned etiologies of altered mental status as recorded by the treating team. Without interfering with the usual evaluation and management of patients, clinical; laboratory and imaging data were collected and analyzed descriptive statistics, bivariate and multivariate analysis.

2.2 Study population

We consecutively recruited all patients aged 15 years and above received at CHUK adult Emergency with any of the spectrum of altered mental status. We evaluated them to establish etiologies of AMS.

2.3 Selection criteria

2.3.1Inclusion criteria

Adult patients aged 15 years and above with non traumatic altered mental status

2.3.2 Exclusion criteria

Patient below15 years

Patients whose relatives and or next of keens did not consent to the study

2.4 Data Entry and analysis

All gathered data were entered using EpiData 3.1 software, and analyzed using SPSS 21 for windows. The confection of text, tables, was done via MICROSOFT WORD 2008 and MICROSOFT EXCEL 2008. Descriptive statistics, bivariate and multivariate analysis were used to determine the frequency, etiologies of AMS and assess the relationship between baseline comorbidities; sociodemographics and causes of AMS.

2.5 Study justification

Different studies have shown various etiologies of altered mental status in different countries, infectious causes being the most prevalent in developing countries. Evidences showed that patient with AMS have highest morbidity and mortality. There is lack of data in Rwanda on frequency and etiologies of AMS.

2.6 Ethical consideration

Ethical clearance was obtained from IRB- University of Rwanda before conducting the study.
Verbal and written consents were obtained from the patient's family member(s) or care giver(s).
The aim of the study was introduced and informed the relatives about voluntary participation.
Confidentiality was assured throughout the study period .

CHAPTER THREE: RESULTS

Over the 4 months period from 1st December 2019-30th march 2020 , 423 patients with medical conditions presented at CHUK adult Emergency department .of these , 98 patients had Altered mental status and served as the study group ,of whom 52% were female, median age 46.61±19.918 years old . There was 63.3 % of patients with comorbidities including hypertension(22.4%); diabetes mellitus (18.4%); HIV (10%) and a minority of patients had chronic kidney disease; dementia . 70.4 of all had GCS<15 as disease state of AMS

Patients' flowchart

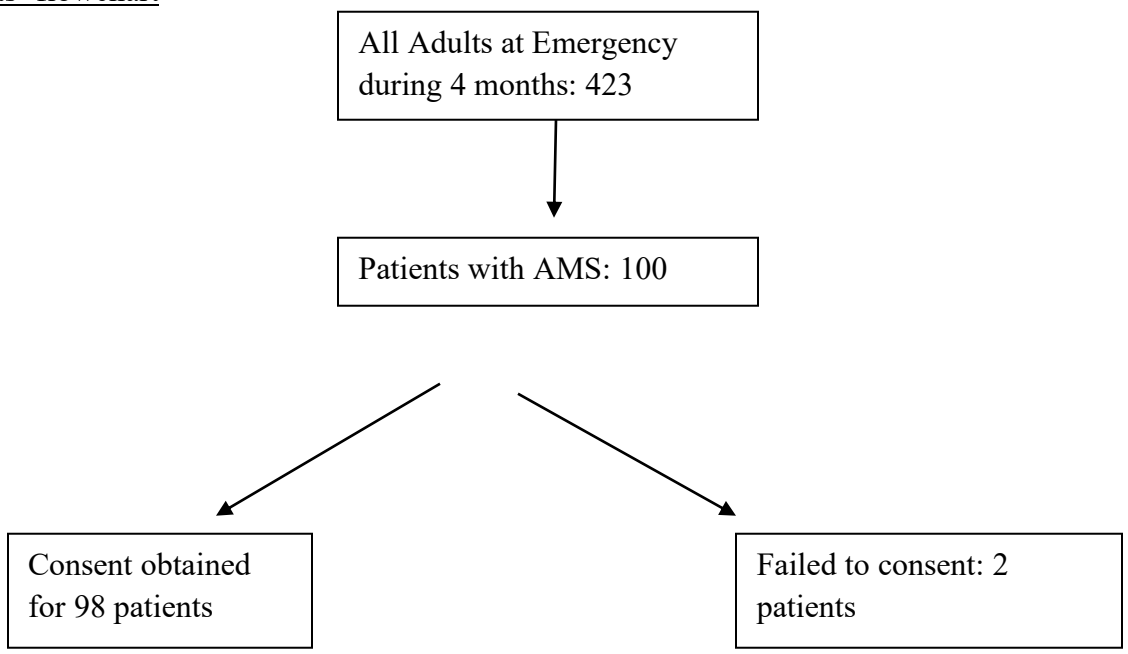


Table 3.1: Demographic Characteristics of patients

Variables	Number of patients (%)
Age in years	
15-19	4(4.1)
20-29	18(18.4)
30-39	24(24.5)
40-49	12(12.2)
50-59	9(9.2)
60-69	15(15.3)
70-79	11(11.2)
80+	5(5.1)
Mean(SD)=46.61(19.918)	
Gender	
Male	47(48.0)
Female	51(52.0)
Occupation	
None	45(45.9)
Government/private employee	11(11.2)
Self-employed	42(42.9)
Residence	
Rural	35(35.7)
Urban	63(64.3)
Alcohol use	
Yes	32(32.7)
No	66(67.3)
Comorbidities	
Chronic kidney disease	1(1.0)
Decompensated liver disease: Cirrhosis ; Hepatocellular carcinoma	3(3.1)
HIV	10(10.2)
HTN	22(22.4)
DM	18(18.4)
Dementia	1(1.0)
Others	13(13.3)
None	36(36.7)

Table 3.2: Disease state of AMS as recorded by admitting doctor

Variables	Number of patients (%)
Glasgow Coma Scale<15	69(70.4)
Confusions	31(31.6)
Bizarre or inappropriate behavior	1(1.0)
Agitation	11(11.2)
Other	6(6.1)

The Majority of patients (70.4%) had AMS defined by GCS<15 followed by confusion and agitation

The study showed that the most common causes of altered mental status were Neurological; infections ; Metabolic and Endocrines (Figure3.). Stroke was the most observed neurological condition followed by brain tumor and epilepsy. Sepsis; cerebral malaria and meningitis were the three most infectious causes of AMS. Among patients with metabolic disorders causing AMS a half had hyponatremia; uremic encephalopathy (26.9 %); hepatic encephalopathy (11.5%); Hypoglycemia (7.7%). Some patients had more than one etiology.

Table 3.3: Etiologic factors

Etiologic factors	Number of patients (%)	Age distribution n (%)	
		Non-elderly <60years	Elderly ≥ 60years
Neurological disorders	**37(37.8)**		
Ischemic vs hemorrhagic stroke	27(73.0)	10(37.0)	17(63.0)
Brain tumor	4(10.8)	2(50.0)	2(50.0)
Epilepsy	2(5.4)	1(50.0)	1(50.0)
Other	4(10.8)	2(50.0)	2(50.0)
Endocrine	**15(15.3)**		
DKA	7(46.7)	5(71.4)	2(28.6)
HHS	6(40.0)	6(100.0)	0(0.0)
Other	2(13.3)	2(100.0)	0(0.0)
Metabolic disorders	**26(26.5)**		
Hyponatremia	13(50.0)	6(46.2)	7(53.8)
Hypernatremia	1(3.8)	1(100.0)	0(0.0)
Hypoglucemia	2(7.7)	1(50.0)	1(50.0)
Uremic encephalopathy	7(26.9)	7(100.0)	0(0.0)
Hepatic encephalopathy	3(11.5)	3(100.0)	0(0.0)
Infectious	**30(30.6)**		
Sepsis	9(30.0)	5(55.6)	4(44.4)
Cerebral Malaria	6(20.0)	5(83.3)	1(16.7)
Meningitis: Bacterial, Tuberculosis , cryptococcal	8(26.7)	8(100.0)	0(0.0)
Encephalitis	1(3.3)	1(100.0)	0(0.0)
Other	6(20.0)	2(33.3)	4(66.7)
Psychiatric disorders	**4(4.1)**		
Depression	1(25.0)	1(100.0)	0(0.0)
Delirium	3(75.0)	0(0.0)	3(100.0)
Adverse effect of drugs used	**98(100.0)**		
Yes	1(1.0)	1(100.0)	0(0.0)
No	97(99.0)	66(68.0)	31(32.0)
Intoxication	**6(6.1)**		
Alcohol	4(66.7)	4(100.0)	0(0.0)
Organophosphates	2(33.3)	2(100.0)	0(0.0)

The three most common causes of AMS were Neurological disorders (37.8%); Infectious (30.6); Metabolic disorders (26.5%) followed by Endocrine (15.3%)and intoxications(6.1%)

We observed strong association between HIV and Meningitis with P value 0.001, OR: 28.3; Hypertension and Stroke p ≤ 0.001 , OR 6.3(Figure 4). The risk of Stroke was significant with advanced age 57.44±18.8, P: 0.001(Figure 5).

Table 3.4: Association between comorbidities and etiologies of AMS

Etiologies	Comorbidities														
	Liver diseases			HIV			Hypertension			Diabetes Mellitus			Others		
	N (%)	P value	OR	N (%)	p value	OR	N (%)	p value	OR	N (%)	p value	OR	N (%)	p value	OR
Stroke (27)	0	-	-	1(3.7)	0.190	0.2	13(48.1)	<0.001	6.3	5(18.5)	0.981	1.0	4(14.8)	0.780	1.2
Brain tumor (4)	0	-	-	0	-	-	0	-	-	0	-	-	3(75)	<0.001	25
Epilepsy (2)	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Others Neurological disorders (4)	0	-	-	1(25)	0.318	3.1	0	-	-	1(25)	0.726	1.5	1(25)	0.480	2.3
DKA (8)	0	-	-	0	-	-	2(25)	0.857	1.2	7(87.5)	<0.001	50	0	-	-
HHS (5)	0	-	-	0	-	-	0	-	-	5(100)	<0.001	-	0	-	-
Others endocrine disorders (2)	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Hyponatremia (13)	0	-	-	3(23.1)	0.100	3.3	4(30.8)	0.440	1.7	4(30.8)	0.215	2.3	1(7.7)	0.525	0.5
Hypernatremia (1)	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Hypoglycemia (2)	0	-	-	0	-	-	1(50)	0.345	3.6	0	-	-	0	-	-
Uremic encephalopathy (6)	0	-	-	0	-	-	4(66.7)	0.007	8.2	0	-	-	0	-	-
Hepatic encephalopathy (4)	3(75)	<0.001	-	0	-	-	0	-	-	0	-	-	0	-	-
Sepsis (9)	1(11.1)	0.141	5.4	1(11.1)	0.924	1.1	1(11.1)	0.392	0.4	0	-	-	3(33.3)	0.063	3.9
Cerebral malaria (6)	0	-	-	0	-	-	1(16.7)	0.726	0.7	1(16.7)	0.912	0.9	0	-	-
Meningitis (8)	0	-	-	5(62.5)	<0.001	28.3	0	-	-	0	-	-	0	-	-
Encephalitis (1)	1(100)	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Others infections (6)	0	-	-	1(16.7)	0.589	1.8	0	-	-	0	-	-	1(16.7)	0.800	1.3
Depression (1)	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Delirium (6)	0	-	-	1(16.7)	0.589	1.8	0	-	-	1(16.7)	0.912	0.9	1(16.7)	0.800	1.3
Adverse drug effects (1)	0	-	-	0	-	-	1(100)	-	-	0	-	-	0	-	-
Alcohol (4)	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Organophosphate (2)	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

Note. N= number of patients, %= percentage, OR= odds ratio

Table 3.5: Association between Age and Gender with Etiologies of AMS

	Age		Gender			
			Male	Female		
Etiologies (N)	Mean	p	N (%)	N (%)	p	OR
Stroke (27)	57.44±18.8	0.001	12(44.4)	15(55.6)	0.668	1.215
Brain tumor (4)	54.5±20.4	0.322	3(75)	1(25)	0.269	0.293
Epilepsy (2)	57.5±40.3	0.438	2(100)	0	-	-
Others neurological disorders (4)	61.25±23.3	0.134	2(50)	2(50)	0.934	0.918
DKA (8)	47.63±23	0.882	5(62.5)	3(37.5)	0.390	0.525
HHS (5)	37.8±14.9	0.312	1(20)	4(80)	0.199	3.915
Other endocrine disorders (2)	28±1.4	<0.001	0	2(100)	-	-
Hyponatremia (13)	59.46±16.9	0.012	4(30.8)	9(69.2)	0.183	2.304
Hypernatremia (1)	38.00	-	0	1(100)	-	-
Hypoglycemia (2)	43.5±26.16	0.822	1(50)	1(50)	0.953	0.920
Uremic encephalopathy (6)	26.33±5.3	0.010	5(83.3)	1(16.7)	0.073	0.168
Hepatic encephalopathy (4)	36.75±5.1	0.309	2(50)	2(50)	0.934	0.918
Sepsis (9)	54.78±25.7	0.195	2(22.2)	7(77.8)	0.105	3.580
Cerebral malaria (6)	33.83±19.2	0.103	3(50)	3(50)	0.918	0.917
Meningitis (8)	33.75±8	0.055	6(75)	2(25)	0.110	0.279
Encephalitis (1)	44.00	-	0	1(100)	-	-
Others infections (6)	64.83±23.2	0.020	4(66.7)	2(33.3)	0.344	0.439
Depression (1)	25.00	-	1(100)	0	-	-
Delirium (6)	53.33±29	0.391	2(33.3)	4(66.7)	0.459	1.915
Adverse drug effects (1)	56.00	-	0	1(100)	-	-
Alcohol intoxication(4)	31±3.4	0.108	4(100)	0	-	-
Organophosphate (2)	31.5±14.8	0.276	2(100)	0	-	-

Note. SD= standard deviation, OR= odds ratio, p= p value, N= number of patients, %= percentage

CHAPTER FOUR: DISCUSSION

In Emergency department, physicians encounter patients with AMS resulting from various causes. However, there has been scarcity of data about causes of altered mental status in Rwanda. This study showed that 23.6% of medical patients at CHUK ED presented with AMS . As noted in previous studies done in Uganda and Lilongwe –Malawi the frequency of AMS in ED were 16.1 and 26% respectively(7)(6). This significant figure (23.6%) comparable to the frequencies observed in Malawi and Uganda can explain the reflection of referrals to CHUK ED as patients with AMS are prioritized given the presence of diagnostic CT scan , improved laboratory capacity lacking in district hospitals served by CHUK.

The median age of population was 46.61±19.918 with the minimum and maximum being 15 and 92. The majority of patients were below 60 years (68.36%) representing the productive age group comparable to reports of Kanich et al and Mohamed et al(8)(9)**.**

It is worthy to note that HIV infection was a significant risk factor for AMS predominantly for meningitis. This highlights the need to screen and take care of patients with HIV in the community. In this study no significant correlation was found between gender and AMS ,in contrast with what has been reported by Owolabi F. et al where male to female ratio was high (10).In Rwanda this statistical finding is elucidated by lack of risk or disease promoting lifestyle as far as gender is concerned.

As anticipated ,there was statistical significant association between NCDs in particular Diabetes mellitus and Hypertension with etiologies of mental status changes namely Stroke and hyperglycemic states(14).

Some studies in various parts of the world including SSA(sub-Saharan Africa) (3)(15)(16)(13) have identified neurological ;infectious; and metabolic etiologies as the main causes of AMS matching with the present study at CHUK.

Among various causes, neurological etiologies are the most common, and this observation is in congruency with what have been reported in previous work by Kanich (8).

Considering causes of mental status changes individually, stroke appeared the most common in congruency with what Marlene WB et al , Yai et al described in the systematic review and study survey on AMS in thailand respectively (12)(11). Furthermore, this serves in time-saving and financial use of work ups in particular brain CT-Scan. The project has as well demonstrated statistical variation of causes of mental status changes among different age groups.

However, this study has limitations. The study period was short and not all patients had all diagnostic investigations like toxicological screening, arterial blood gas. The study being done exclusively at CHUK, one of the 3 tertiary hospitals in Kigali city, there is uncertainty to generalize results in the region. Nevertheless, this study provided a preliminary data on causes of AMS

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

V.1.Conclusion

In Conclusion, this work has demonstrated a significant frequency of AMS in Emergency department patients. This study underlined the importance of comorbidities with various causes of AMS. The evidence from this study suggests that the cause of AMS varies significantly in different age group. Taken together, neurological, infectious and metabolic disorders are the main etiologies of AMS.

V.2. Recommendations

1. Our data suggest that AMS is a main concern in acute care settings at CHUK and doctors should keep the differentials wide open while evaluating patients at Emergency
2. Our research highlights that policy makers should aim at addressing comorbidities like hypertension, diabetes mellitus and HIV to reduce frequency of AMS .
3. Future work with longer period at different sites including the duration of symptoms is needed to evaluate causes and outcomes of AMS

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APPENDICES

Appendix I: Data collection tool

Etiologies of Altered Mental Status at CHUK Adult Emergency

Patient Information

Last name: _____ first name: _____

Province _____ district: ____

DOB: _____ /_____ /_____ or Age: _____ (years) Sex: ☐Male ☐Female

Occupation:

Alcohol use: ☐yes ☐No

Disease state of AMS patients in the emergency department as recorded by admitting doctor : tick what applies

- Glasgow Coma Scale<15
- Confusions
- Bizarre or inappropriate behavior
- Hallucinations
- Agitation
- Other :

Cormobidities :

- Chronic kidney disease
- Decompensated liver disease: Cirrhosis , Hepatocellular carcinoma
- HIV
- HTN
- DM
- Alzheimer
- Dementia
- Others

None

Etiologies

1. Neurological disorders :

☐Ischemic vs hemorrhagic stroke

☐Brain tumor

☐Epilepsy

2. Endocrine:

□DKA □HHS □Thyrotoxicosis □Mxdema coma
□Adrenal insufficiency □Other :

3. Metabolic disorders:

☐Hyponatremia ☐Hypernatremia ☐Hypoglucemia

☐Hypocalcemia ☐hypercalcemia ☐Uremic encephalopathy

☐Hepatic encephalopathy

4.Infectious

☐Sepsis ☐cerebral Malaria

☐Meningitis: Bacterial, Tuberculosis , cryptococcal

☐Encephalitis ☐ Brain Abscess

☐Other

4. Psychiatric disorders :

5. Adverse effect of drugs used :

6. Intoxication :

Investigator: Dr Nkundimana Venuste

Appendix II. CONSENT FORMS: Kinyarwanda and English

KWEMERA GUTANGA UBUFASHA MU BUSHAKASHATSI

GUSHAKA KUMENYA IGITERA GUTAKAZA UBWENGE KUBARWAYI BIVURIZA CHUK

Nitwa NKUNDIMANA Venuste, ,ndi umuganga .Turigukora ubushakashatsi tugamije kumenya indwara zitera gutakaza ubwenge .

Kumenya izi ndwara bizafasha abaganga kujya bihutisha gutanga ubuvuzi bw'ibanze no gusaba ibizami abarwayi bakeneye. .

Ibizakorwa muri ububushakashatsi

Tuzakusanya amakuru y'uburwayi duhereye kucyatumye umurwayi aza mu Bitaro, ibyavuye mu isuzuma rya muganga ,ibizami by'amaraso ndetse n'ibyo mubyuma bisuzuma uburwayi.

Ibitegerejwe kuri ubu bushakashatsi

Ibisubizoni ibanga. Abaganga bakuvura hamwe n'umuganga urigukora ubu bushakashatsi nibo bemerewe kubimenya gusa..

Ushobora guhitamo kutabikora. Icyogihe uzavurwa ukorerwe n'ibizami bisanzwe bikorerwa abarwayi bafite uburwayi bumeze nk'ubwawe muri ibibitaro. Niba kandi wemeye kudufasha, ushobora no guhindura icyemezo cyawe igihe icyo aricyo cyose, muri icyo gihe wabitumenyesha.

Njyewe …….nemeye gutanga ubufasha muri ubu bushakashatsi.

Umukono cg igikumwe)……..Itariki…….

Njyewe (umurwaza/umuvandimwe/umubyeyi)……nemeyeko …….atanga ubufasha mu bushakashatsi.

Umukono (cg igikumwe)……..Itariki……..

Dr Nkundimana Venuste

CONSENT FORM/ English

Etiologies of Altered Mental status at CHUK Adult Emergency

My name is Dr NKUNDIMANA Venuste. We are conducting a study in which we want to determine the causes of Altered mental status at CHUK adult Emergency.

We will need to know demographics of patients , collect data from history , physical examination ,laboratory and radiological findings of the patient .

Patients' records will be handled as confidentially as possible.

Benefits

The results will help CHUK Emergency Doctors to know the Etiologies of Altered mental status ,provide timely initial management and order appropriate investigations .

If you have understood and are willing to take part in this study, then kindly sign below. You have the right to decide to participate or to withdraw at any point in this study without jeopardy to the patient's medical care.

I ,…….wish to take part in this study

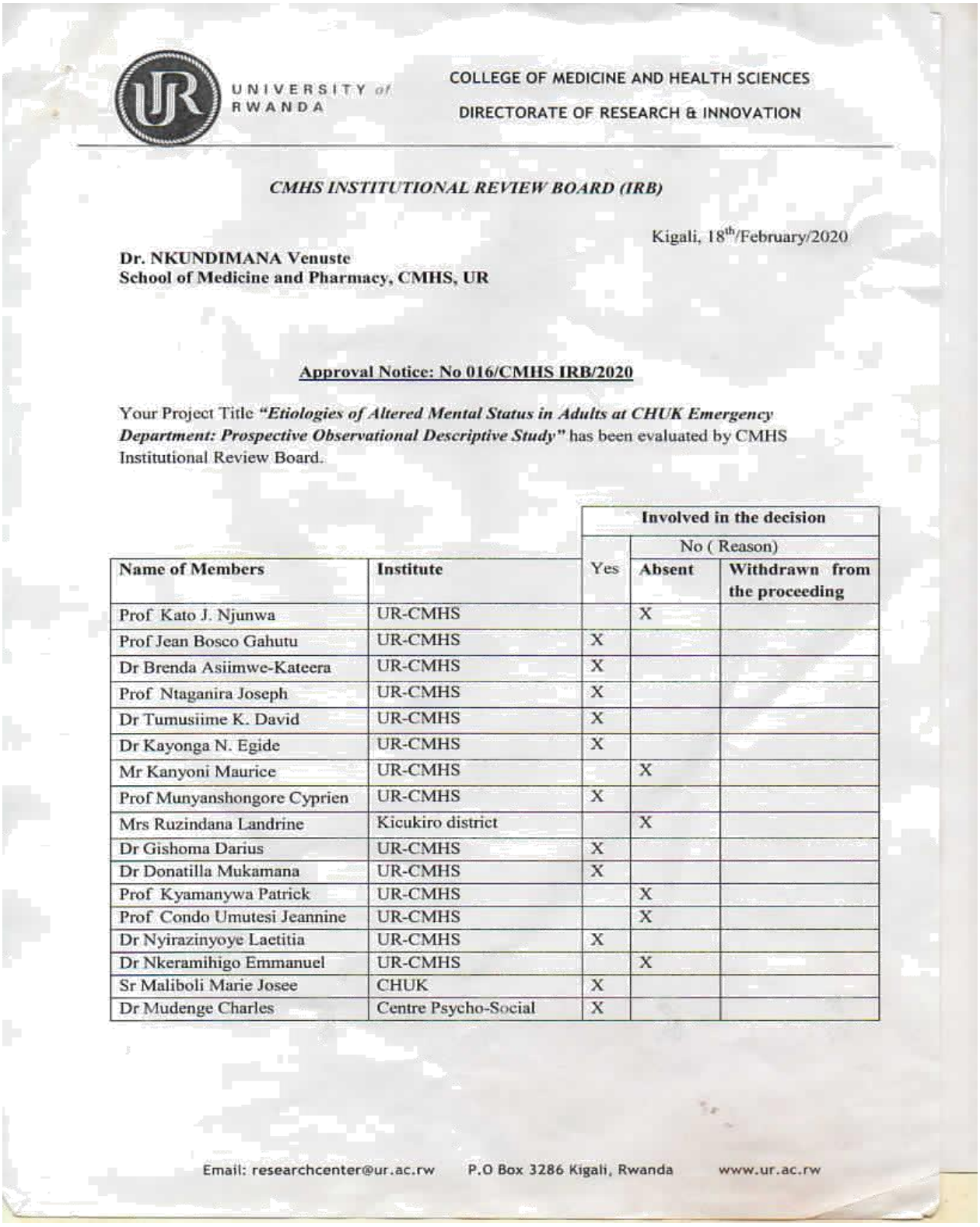
Date…… signature

I (Close attendant)…….accept(name of patient)
…….to take part in this study, signed……

Date……

Investigator : Dr Nkundimana Venuste

Appendix III: Study approval



UNIVERSITY of RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DIRECTORATE OF RESEARCH & INNOVATION

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 18th/February/2020

Dr. NKUNDIMANA Venuste
School of Medicine and Pharmacy, CMHS, UR

Approval Notice: No 016/CMHS IRB/2020

Your Project Title ***"Etiologies of Altered Mental Status in Adults at CHUK Emergency Department: Prospective Observational Descriptive Study"*** 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		

Email: researchcenter@ur.ac.rw P.O Box 3286 Kigali, Rwanda www.ur.ac.rw

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 17th February 2020, **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 18th February 2020

Expiration date: The 18th February 2021

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