Profiles and outcomes of paediatric patients presenting with altered mental status to the emergency department of Muhimbili National Hospital And Muhas academic medical centre

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PROFILES AND OUTCOMES OF PAEDIATRIC PATIENTS PRESENTING WITH ALTERED MENTAL STATUS TO THE EMERGENCY DEPARTMENT OF MUHIMBILI NATIONAL HOSPITAL AND MUHAS ACADEMIC MEDICAL CENTRE

By

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A Dissertation Submitted in Partial Fulfilment of the Requirement for the Degree of Masters of Medicine in Emergency Medicine of

Muhimbili University of Health and Allied Sciences
October, 2019

CERTIFICATION

The undersigned certify that he has read and hereby recommend for examination by Muhimbili University of Health and Allied Sciences a dissertation titled***"The Profiles and outcomes of paediatric patients presenting with altered mental status to emergency department of Muhimbili National Hospital and MUHAS Academic Medical Centre"***in (partial) fulfilment of the requirement for the degree of Masters of Medicine in Emergency Medicine of Muhimbili University of Health and Allied Sciences.

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Dr.Hendry R. Sawe

(Supervisor)

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Date

DECLARATION AND COPYRIGHT

I, **NOEL JAMES MAKUNDI**, declare that this **dissertation** is my original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

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DEDICATION

To my beloved family; My Dear Parents Mr and Mrs James Makundi, My Wife EliciaMkundeUrassa,My daughters Princess and Precious. Thank you for your support and guidance as well as your patience in my times of hardship.

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LIST OF ABBREVIATIONS

ALT	-	Alanine Transferase
AMS	-	Altered Mental Status
AST	-	Aspartate Transferase
AVPU	-	Alert,Verbal,Pain,Unconscious
BCS	-	Blantyre Coma Score
BS	-	Blood Slide for Malaria
CHD	-	Congenital heart disease
CHEM8	-	Chemistry panel-Na+,Cl-,Ca+,K+,glucose,urea,creatine,hematocrit.
CPL	-	Central Pathology Laboratory
CT SCAN	-	Computed Tomography Scan
CXR	-	Chest X ray
DM	-	Diabetes Mellitus
ED	-	Emergency department
EMD	-	Emergence medicine department
FBP	-	Full Blood Picture
GCS	-	Glasgow Coma Score
HIC	-	High income countries
HIV	-	Human Immunodeficiency Virus
HR	-	Heart Rate
ICU	-	Intensive Care Unit
IRB	-	Institutional Review Board
LIC	-	Low income countries
MNH	-	Muhimbili National Hospital
MRI	-	Magnetic Resonance Imaging
MUHAS	-	Muhimbili University of Health and Allied Sciences
MAMC	-	MUHAS Academic Medical Centre
POC	-	Point of Care
POCUSS	-	Point of Care Ultrasound scan

PR	-	Pulse Rate
RBG	-	Random Blood Glucose
RDT	-	Rapid Diagnostic Test for Malaria
RR	-	Respiratory Rate
SCD	-	Sickle Cell Disease
USS	-	Ultrasound scan
VBG/ABG	-	Venous Blood Gas/Arterial Blood Gas
WBC	-	White Blood Cells

ABSTRACT

Background: Altered mental status (AMS) in children is defined as the failure to respond to physical or verbal stimulation as appropriate to the child's development level. AMS has many causes, but in general results from physical or metabolic insult to the brain, making this an emergency condition. Alteration of mental status in a child can indicate a life threatening problem such ashypoglycemia or hypoxia thatrequires early resuscitation, diagnosis and treatment.

Also AMS can develop over time during another illness if the patient deteriorates. Thus altered mental status is often due to the progression of an underlying illness that needs to be diagnosed.

While the causes of altered mental status in HIC's have been described, the causes of AMSin limited income countries (LICs) have not been described adequately. As a result, the management, diagnosis and outcome of children with AMS in resource poor settingsis inadequate.

Aim: To determine the clinical profiles and outcomes of paediatric patients presenting with AMS to the Emergency Department of Muhimbili National Hospital and MUHAS Academic Medical Centre Dar es **s**alaam.

Methodology: This was a prospective cohort study of children aged one month to eighteen years presenting with AMS to the EMDs of MNH and MAMC from June 2018 to December 2018. AVPU was used to assess the level of consciousness and any child who responded to pain, voice or unresponsive was enrolled in the study. Case report form (CRF) was used to collect data demographics, clinical presentation, management and outcomes. Data was imported andanalysed with SPSS. Descriptive data waspresented as means and medians with measures of spread, and frequency and proportions.

Results:Total of 1273 children were screened,median age of those eligible and enrolled in the study was 24months(interquartile range 8-60 months).320(25.1%) childrenmet the inclusion criteria and were enrolled.198(61.9%) were male,188(58.8%) were referred from peripheral hospitals.The EMD-MNH diagnoses were pneumonia63(19.6%),sepsis 37(11.5%),congenital

heart disease 33(10.3%),malaria 24(7.5%) and meningitis 19(5.9%). The most common interventions provided at the EMD were intravenous fluids (90.6%) antibiotics (82.5%),oxygen therapy (54.4%) and antimalarials(12.5%).From the EMD 8(2.5%) were discharged home,212(66.3%) were admitted to the general ward,83(25.9%) were admitted to the ICU,and 17(5.3%) were taken to theatre from the EMD.In-hospital mortality at 24 hours was 15.8%.

Conclusion:Altered mental status was a common presentation amongst paediatric patients presenting to these twoEDs in Dar es Salaam Tanzania.Children presenting with AMS have significant morbidity and mortality as evidenced by very high admission rate and overall twenty four hours hospital mortality of 15.8%.

DEFINITION OF KEY TERMS

- **Emergency Medicine** is a medical specialty with the principle mission of rapidly evaluating,managing,treating and preventing unexpected illness and injury.
- **A Child** is defined by the Convention on the Rights of the Child(CRC) as every human being below the age of 18years.
- **Glasgow Coma Scale**(GCS) is a numerical system used to assess patient's level of consciousness made up of 3 functions: eye opening, motor, and verbal.
- **AVPU** is a system of assessing the depth of consciousness A=alert,V=verbal responses present,P=pain responses present,U=unresponsive.
- **Paediatrics**is a sole discipline concerned with all aspects of well being of children including their health,their physical,mental and psychological growth and development, and their potential to achieve full potential as adult**s.**
- **Altered mental status(In children)** is defined as the failure to respond to physical or verbal stimulation appropriate to the child developmental level.
- **Emergency department** is a dedicated unit within the hospital that is primarily the receiving unit for patients with undifferentiated clinical complaints and acuteness presenting without prior appointment,either on their own,or referred by other facilities.Other names are emergency rooms,casualty centre,accident and emergency unit.
- **Emergency physician** is a specialist working in the emergency department or acute intake areas of the hospital to care for undifferentiated acutely ill patients with no prior appointment.
- **Emergency care** is the provision of initial resuscitation, stabilization,and treatment to acutely ill and injured patients and delivery of those patients to the best available definitive care,regardless of their ability to pay.
- **Acute intake area** is a space within hospitals where undifferentiated new patients are seen and either admitted or treated as outpatients.

- **Tachycardia** is an abnormally high heart rate, above the upper limit of a range specific to the age group of the patient.
- **Tachypnea "**is an abnormally high respiratory rate, above the upper limit of the normal range specific to the age group of the patient".
- **Hyperthermia "**is elevated core body temperature of 38.3^{o} C or more".
- **Hypothermia "is** a reduction of core body temperature to 35^{o} C or lower, as that due to exposure in cold weather or induced as a means of decreasing metabolism of tissues and thereby the need for oxygen".
- Sepsis "is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection".
- **Severe sepsis "**is clinically defined as sepsis with evidence of end-organ dysfunction, example: sepsis with altered mental status, renal failure or respiratory failure".
- **Septic shock "**is clinically defined as severe sepsis with systolic blood pressure of less than 90 mm Hg not responding to adequate fluid therapy".

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Altered mental status in children is defined as the failure to respond to physical or verbal stimulation as appropriate to the child's developmental level. Consciousness is a state of awareness of the self and the environment with normal consciousness being governed by the both arousal and wakefulness, and content (1).Arousal is controlled by the reticular activating system a diffuse group of neurons in the reticular formation of the brainstem(1).The contents of the consciousness depends on the connections among the cerebral cortical neurons and between the cerebral cortex and the major subcortical nuclei (1).So in order to maintain consciousness an individual must have intact brainstem and one intact cerebral hemisphere. Conversely impairment of brainstem function or both cerebralhemispheres results in altered mental status(1).

Causes of altered mental status in children are many and are well remembered by the Mnemonic AEIOU TIPS where the letters stand for Alcohol,Electrolyte imbalances,Intoxications,Overdose,Uremia,Trauma,Insulin(hypoglycaemia),Psychiatry,Seizures/Space Occupying lesions, respectively(2).Furthermore the causes of AMS can be classified into medical causes or structural lesions(3). Space-occupying or structural lesions eg masses,bleeding clinically present with focal neurological findings and pupillary abnormalities.Medical causes, which involve both cerebral hemispheres, present with global depression of the sensorium without focal deficits or pupillary abnormalities.

In developed countries the leading cause of altered mental status is trauma, especially severe traumatic head injury, followed by infectious causes of altered mental status(4).In Tanzania the leading causes of AMS, especially in anemic children, are thought to be bacterial meningitis and severe malaria(5).Altered mental status results from a lot of causes and has numerous differential diagnoses and so caring the child with altered mental status is a challenge both in the diagnosis and treatment to the health care practitioner working in ED(4-(6).

The outcome of children with altered level of consciousness varies depending on the etiology with mortality rates ranging from 3 to 84%,but those with more severe alterations in mental status secondary to infection or severe traumatic brain injury are less likely to survive or do so with the permanent neurological sequelae(4).The risk factors for mortality of children presenting to the emergency department with altered mental status in both Low and high income countries remains under documented (7).

Tanzania has one full capacity emergency department at Muhimbili national hospital. The department plays a big role in resuscitation, stabilising, triaging, treating and providing the appropriate disposition to acutely ill patients. This gives special opportunity for early recognition and resuscitation of children with altered mental status in order to maximize their outcome clinically. The major purpose of this study is to determine the frequency of paediatric patients attending the emergency department of Muhimbili National Hospital and MUHAS Academic Medical Centre with altered mental status, their clinical presentation, and outcomes. In addition, the study will explore factors that are associated with a worse outcome among these patients.

The study will make the emergency medicine practitioners at EMD MNH and MAMC aware of the causes and outcomes of the children they see with altered mental status, helping them to improve their care. This study will also be useful to health care providers working in other acute care settings. Knowledge of the underlying causes and treatments given at MNH and MAMC and outcome will be instructive to better recognition of management options at the referring hospitals. Equally important, this information will help practitioners at outside hospitals recognize when children should be transferred to a higher level facility. This will help improveoutcomes by preventing delays in referral. The study also will create awareness of serious underlying causes of altered mental status to the care givers so that they present early to the appropriate settings. Hence the knowledge gained from this study will improve the health care system and finally improve the outcome of children presenting with altered level of consciousness at ED MNH and MAMC and Tanzania at large.

The study will provide a foundation for more research onmanagement and outcomes of children with AMS in acute settings in ED MNH and MUHAS Academic Medical Centre and Tanzania in general.

1.2 Literature Review

Altered Mental Status –Definition and Pathophysiology

Altered mental status in children is defined as the failure to respond to physical or verbal stimulation as appropriate to the child's developmental level.Consciousness is a state of awareness of the self and the environment with normal consciousness being governed by the both arousal and wakefulness, and content (1). Arousal is controlled by the reticular activating system a diffuse group of neurons in the reticular formation of the brainstem (1).The contents of the consciousness depends on the connections among the cerebral cortical neurons and between the cerebral cortex and the major subcortical nuclei (1).So in order to maintain consciousness an individual must have intact brainstem and at least one intact cerebral hemisphere. Conversely impairment of brainstem function or both cerebralhemispheres results in altered mental status (1).

The lethargic child presents with extreme drowsiness, drifting in and out of sleep states only when aroused by the moderate stimuli. In severe cases these children may become unresponsive when left undisturbed and require vigorous and repeated stimulation to arouse them again. Moreover in the worst case of altered level of consciousness children are completely unresponsive to any stimulus a state referred to as coma.

Alteration of mental status of a child mandates quick and rapid evaluation and actions for stabilization of a child in the ED and may signify a serious condition threatening the brain such hypoxia and hypoglycemia.

Scope

A Review which was done in Canada 2016 revealed that we have a paucity of data on the proportion of altered mental status in the ED for children in both HIC and LIC in published literature(4).

A study from Ontario Canada by Chan et al 2016 on the rate of paediatric and youth non traumatic brain injury revealed that the rate of paediatric non traumatic brain injury episodes of care was 82.3 per 100,000(N=17977),the average stay in acute care was 13.4days(SD=25.6days),35% were intensive care units and 6% died in acute care and so it was concluded that children and youth with non-traumatic brain injury put increased demand on health care system(8).

A study from Kilifi Kenya by Gwear et al 2012 on the Incidences,aetiologies,clinical presentation,mortality and risk factors for death in childhood acute non traumatic coma showed that there was an increase in coma admissions of undetermined aetiology and it was recommended to further examine the other conditions in the aetiology of childhood non traumatic coma(9).

Outcomes of Altered Mental Status

Regardless of age, patients who present to the ED with altered mental status have a high mortality.Xiao at alBeijing China found an 8.1% mortality rate for adults presenting to the ED with AMS(10).However, the mortality rate for children presenting with AMS appears to be higher.A 2016 review on the Clinical Approach to Altered Level of Consciousness stated that in children with altered mental status,mortality ranged from 3 to 84%, depending on the cause and severity of alteration in mental status(4).Mortality was reported to be higher in altered mental status secondary to infectious causes and severe head injury. A 2013 Systematic review of studies of non-traumatic childhood coma in resource poor countries of Africa and Asia by Gwer et al found that mortality ranged between 15 % and 58%, with the mortality for children with AMS in Kenya 25% (19).

Moreover in Tanzania a study which was done by Sawe et al 2015 On Surviving Paediatric Sepsis Showed that mortality was higher 75.4% in children with sepsis and altered mental status than children with sepsis without alteration of mental status(11).

Causes of AMS

There are numerous causes of altered mental status.These can be divided into medical and structuralcauses.Medicalcauses are alcohol intoxication, electrolyteimbalances,infections(cerebralmalaria,meningititis,and encephalitis),drugs overdose, uremia,hypoxia,hypoglycemia,psychiatric causes and seizures.Structural causes include space occupying lesions of the brain(4)-(2).Several common causes of AMS in children such as hypoxemia and hypoglycemia are easily detected, and should be intervened on promptly in the ED; hypoxemia alone increases mortality to 21%(12).However there are some uncommon causes of the AMS in children such as intentional and unintentional ingestions (13)-(14),non-traumatic intracranial bleeding due to Evans disease(3),Cerebral abscess (7-(16),encephalitis (17), ShigellaSonnei gastroenteritis(18),Embolic strokes due to left atrial myxoma(19) which may be more of a challenge to identify quickly. Many of these etiologies come from studies in high income settings and much less is known about LIC's.A systematic review performed in 2013 on the etiologies of childhood acute non traumatic coma, in resource poor countries of Africa and Asia 2013 showed that cerebral malaria and meningitis were the commonest causes of AMS in Africa, encephalitis was common in India and meningitis was the leading cause in Pakistan. The study concluded that the diagnosis of the causes of childhood coma in resource poor settings is really a challenge due to overlap in clinical presentation, limited diagnostic resources, comorbidity and disease endemicity (19). Further studies were recommended to find out the etiology of childhood coma in resource poor settings(20).

The leading cause of altered mental status in anemic children in Tanzania is thought to be bacterial meningitis and severe malaria with the clinical presentation varying from confusion, disorientation, agitation,lethargy, obtundation and coma(5).

A study which was done by Xiao et alin Beijing China 2011 on the evaluation and treatment of AMS in the ED showed that most patients presents with vague symptoms.

Study also showed that quick evaluation and treatment of patients with AMS in the ED is essential to reduce morbidity and mortality associated with AMS(10).

A study which was done by El-Amin et al at National Ribat University Khartoum Sudan in 2011 evaluated 104 febrile Sudanese children with altered mental status 38 patients were suspected to have cerebral malaria but only 5 were confirmed and 63 patients were suspected to have acute bacterial meningitis but confirmed in only 15.Five patients had mixed infections and remainder were not known so it was concluded that the clinical diagnosis of cerebral malaria, acute bacterial meningitis and viral encephalitis were unreliable and hence further studies were recommended to find out the causes of coma in febrile sudanese children(21).

Another study reported by Jumanne et al in Northwestern Tanzania 2017 on clinical predictors of malaria, acute bacterial meningitis and treatment outcomes among febrile children admitted with AMS showed that children with AMS due to febrile encephalopathy were more likely to have malaria than acute bacterial meningitis if they have severe anemia(5).

Risks for Mortality

In the 2013 systematic review by Gwer etal,depth of coma,features of raised intracranial pressure, causes associated with bacterial infection,young age, hypotension,difficulties in breathing on arrival,or seizures which developed within 48 hours after hospitalization were found to be associated with poor outcomes(20). Similarly the study in Canada by Krmpotic revealed that severe traumatic head injury and infectious causes of altered mental status were reported to be the most common risks for mortality(4).

Despite AMS being a very common presentation in the ED, little is known about risk for poor outcomes in AMS in resource limited settings(7).A study conducted by McCormic et al inMalawi 2010 on the risk factors for death and severe sequelae on Malawian children with bacterial meningitis showed that impaired consciousness at the time of admission was strongly associated with death OR=14.4,95%CI(9.42,22.1) and HIV seropositivity was associated with increased odds of death OR=1.65,95%CI(1.20-2,26) (22).

Another study which was conducted by Suganthi et al 2016 in India on non-traumatic Coma in children, Profile and Outcomes revealed that severity of alteration in mental status GCS<6 was associated with increased mortality(2).

Another study which was done in 2017 by Sawe et al at Muhimbili national hospital on surviving paediatric sepsis in Tanzania showed that 75.4% of non survivors had AMS(11).

AMS has a high fatality rate and so AMS should be taken as an important warning signal for emergency physicians. The lack of dedicated emergency departments in most SSA countries has made it difficult to triage,resuscitate and stabilise children with AMS.Emergency medicine is a new specialty in Tanzania established less than 10 years ago(23).EMD MNH receives 60,000 patients per year from all over Tanzania and 25% of all patients who are attending EMD MNH are children(24). The EMD can serve as an integral part of the hospital which offers emergency care services by triaging,resuscitating and stabilising children with undifferentiatedproblems, including those presenting as AMS. Characterizing the clinical profiles, causes, emergent evaluation and management, and early outcomes of children presenting to the emergency department of Muhimbili National hospital with AMS will increase our understanding of the regionally specific burden of diseases leading to this serious symptom, facilitate the development of regionally tailored protocols for the evaluation and management of children with AMS, and thereby improve their outcomes.

1.3 Problem Statement

Altered mental status in children is defined as the failure to respond to physical or verbal stimulation appropriate to the child's development level. AMS in children has many causes and most of them are emergency conditions; alteration of mental status in a child can indicate a life threating condition such hypoglycaemia or hypoxia that requires early resuscitation, diagnosis and treatment. Thus it is essential that practitioners are able to identify children with AMS, and anticipate the likely underlying causes to rapidly address their condition.

While many of those underlyingillnesses have been described in HICs, the causes of altered mental status are not well documented in LICs. Nor are outcomes of these patients well known. As a result, we lack guidance in the appropriate management and diagnosis that could help improve the outcome of children with AMS in resource poor settings.

Understanding the possible causes of AMS in children and how they might present clinically will help the health care providers in diagnosis and treat efficiently to reduce morbidity and mortality.

1.4 Rationale

This study will be a prospective cohort study of children presenting to the emergency medicine department with altered mental status. This will beuseful to health care providers working in acute care settings in Tanzania as it will show the burden of paediatric patients with AMS, the underlying causes, and their outcomes. Once a child with AMS is identified in the ED, knowing the causes will helpthe emergency physician in looking for the reversible life threatening causes and address them immediately as well as stabilize the patient while the underlying cause is being determined. This knowledge will also aid in diagnosis formulation,investigation,treatment and disposition.Understanding risk for poor outcomes will guide the aggressiveness of treatment as well as allow us to counsel family members.

The study also will alert the health providers in other acute settings to effectively recognize, stabilize and treat the life threatening causes of AMS in children and refer them quickly to higher levels of care when appropriate. Hence the knowledge gained from this study will improve the health care system and finally improve the outcome of children presenting with altered level of consciousness at ED MNH/MAMC and Tanzania at large. The study will open room for more research on this aspect of children with AMS in acute settings in ED MNH/MAMC and Tanzania as a whole.

1.5 Research Question

What is the profile and outcome of paediatric patients presenting with altered mental status at the Emergency Medicine Department of Muhimbili National Hospital and MUHAS Academic Medical Centre?

1.6 Objectives

1.6.1 Broad objective

To describe the profile and outcomes of paediatric patients presenting with altered mental status at the Emergency Medicine Department (EMD) of Muhimbili National Hospital (MNH) and MUHAS Academic Medical Centre(MAMC).

1.6.2 Specific objective

1. To determine the proportion of paediatric patients presenting with altered mental status at the EMD-MNH and MAMC.
2. To describe the clinical presentation ofpaediatric patients presenting with altered mental status at the EMD-MNH and MAMC.
3. To describe the management given at peripheral hospitals and at ED MNH and MAMC of paediatric patients presenting with altered mental status
4. To determine twenty four hour inhospital mortalityof paediatric patients presenting with altered mental status at ED MNH and MAMC.

5 To determine the factors associated with mortality among paediatricpatients presenting with altered mental status at ED MNH and MAMC.

CHAPTER TWO

2.0 METHODOLOGY

2.1 Study Design

This was a**prospective cohort study** of paediatric patients older than one month up to 18 years presenting with AMS at the EMD-MNH and MAMC between June 2018 to December 2018.

2.2 Study Settings

The study was conducted at the EMD-MNH and MAMC Dar-es-Salaam. Muhimbili National hospital is situated in Ilala, one of the five districts in Dar-es-Salaam, Tanzania's commercial capital city. This is a tertiary teaching hospital which serves as a tertiary referral hospital and has a capacity of 1500 beds with the weekly admission of around 1200patients(25).

EMD-MNH was inaugurated in 2010 via a partnership between the ministry of Healthy, Community Development, Gender, Elderly and Children (MoHCDGEC), MNH and the Abbott Fund Tanzania (AFT).The department operates 24hours and attends 150 to 200 patients each day. One fourth of all patients are children under the age of 18years(18-(24).

The department is staffed by the Emergency medicine specialists who oversee the care provided by the residents, registrars, intern doctors and undergraduate students. Critical care nurses supervise the nursing care of patients. There is special treatment and resuscitation rooms dedicated to the pediatric patients care, these rooms are under the supervision of specialists and the critical care nurses.

MUHAS Academic Medical Centre(MAMC) is a full capacity heath facility occupying 3800 acres,located 3 Km off the Dar-es-Salaam Morogoro highway,approximately 31.2km from MNH.The state of the art emergency medicine department is operating under the directions of an emergency medicine specialist faculty from MUHAS 24-hours a day who provide clinical supervision on the care of patients to intern doctors,registrars and emergency medicine residents.Nearly all admissions to these two hospitals come through the emergency medicine departments as the main entry point.

2.3 Study Population

2.3.1 Target Population

Children aged one month up to 18 years presenting with AMS to the acute intake areas of hospitals in Tanzania.

2.3.2 Accessible Population

Children older than one month to 18years presenting at ED MNH and MAMC in Dar-es-Salaam with altered mental status and no known trauma. Children younger than one month do not pass by the EMD for evaluation; instead they are admitted directly to the Neonatal unit.

2.3.4 Study Population

Children older than one month to 18years with altered mental status and no known trauma presenting at ED MNH and MAMC during the research period, whose parents or caretaker consented to participate in the study and who were in the ED when the researcher or research assistant was present.

2.4 Sampling Design

A convenience sampling method was used to enroll children between 1month and 18years of age who presented with AMS as reported by the parent/guardian or as depicted by the health care practitioner working at ED MNH/MAMC.A research assistant screened every child who presented during a 12hours shift at ED MNH and MAMC to determinewho met the inclusion criteria. The study procedure was explained to the parent or caretaker followed by a signed consent.No specific number of days or nights which was allocated for data collection and hence data was collected daily for 12 hours for a period of 24weeks.

2.5 Subjects

2.5.1 Inclusion criteria

All children above one month and not older than 18years who present with AMS as scored by the Blantyre Coma Score<_4,Paediatric Glasgow Coma Score <_14 or VPU in the AVPU score systemand who are triaged to resuscitation rooms.

2.5.2 Exclusion criteria

1. Child with AMS due to trauma as this group present with different pathophysiological and management approach.
2. Child with confirmed history of cerebral palsy or mental retardation because it is difficult to delineate altered mental status in these groups of patients.

2.6 Variables

2.6.1 Predictor variables

The main predictor variable is the level of altered mental status as defined by

1. Blantyre coma score
2. Glasgow Coma score
3. AVPU

2.6.2 Other predictor variables

(i) Demographics

Age

Sex

Insurance

Acuity

Accompanied co-morbidities e.g. HIV, DM, sickle cell, malignancy.

Chief Complaint

(ii) Treatment given at periphery and the full course of illness prior to arrival at ED-MNH and MAMC.

Any traditional healer medications given at home

Any surgery which was performed at periphery hospital

History of admission and length of hospital stay at peripheral hospital

Time the illness started and the time of first hospital presentation

(iii) Clinical presentation of the child with AMS at emergence department MNH and MAMC.

Vital signs on arrival e.g. BP, HR, RR, T and oxygen saturation (As normal, below or above normal for age).

Physical findings such as anemia jaundice etc.

Associated symptoms such as general body weakness, difficulty in breathing (DIB), seizures, weight loss, dark urine, pale stools etc.

2.6.3 Outcome of interest/ variables

1. Death in the EMD
2. Disposition (APCU/ICU or CCU, HDU, general paediatric ward, death in ED or Discharge).
3. In hospital Mortality within 24hours.

2.6.4 Sample Size Calculation

The sample size of this study was estimated from the formula below using the Systematic Review byGwer-et al in 2013“Childhood non traumatic coma,aetiology and challenges in management in resource poor countries of Africa and Asia.”Among the studies identified in thisreview,mortality ranged between 15% and 58%(20),Mortality in Kenyar, was found to be 25% and hence 25% mortality from Kenya was used to calculate the sample size for this study:

$N=[(Z^2PX(1-P)]/E^2$

Whereby,

N=minimum sample size

Z=Standard normal deviate which is 1.96 for 95% confidence interval

P=mortality of children with AMS (Coma) which is 25% from Study in Kenya

E=margin of error which is 0.05%

Therefore

N=288

Note: Assuming loss to follow up rate of 10%,then

Adjusting for loss to follow up=**N**X Adjusted factor

=288X [100/100-10]

=320

Therefore,the minimum required sample size is 320 children presenting at EMD MNH and MAMC with AMS.

2.6.5 Patient Recruitment And Data Collection

Patient screening and enrollment was overseen by the principal investigator and research assistant who was available in the emergency department 12hourly, seven days a week to ensure all eligible patients were captured during the study period.

2.6.6 Standardized Data Collection Form

Standardized data collection form was used to assess the eligibility criteria of all patents presenting to the emergency department. All eligible patients or patients' proxy were offered an opportunity to participate in the study by being asked to provide informed consent after they have received full information about the study.

The standardized data collection form had three parts:

1. Part I: Baseline assessment of patients.

Research assistants documented the patient's baseline information (demographics, initial vital signs, chief complaints, pre referral information and EMD diagnoses). This information was recorded in real time from the providers clinical notes while the patient was in the Emergency Department.

2. Part II: Case reporting

Pertinent data from the history and physical examination, laboratory results, treatment delivered, and emergency provider clinical impressions and final EMD diagnoses and disposition were recorded.

3. Part III: Case follow up

A research assistant traced all the participating patients **for 24hours** for all patients admitted to the hospital and made follow up calls to those discharged.Electronic data formand clinical outcome (discharge or death) was prospectively recorded in the second part of the form. The data was transferred from hand written standardized data collection form into online Research Electronic Data Capture (REDCap, Version 6.0.1, Vanderbilt University, Tennessee, USA), every day during the collection. The principal investigator oversaw the data collection to ensure accuracy and quality of the data.

All diagnostic, treatment and disposition decisions were made at the sole discretion of the treating physician in the ED and in the wards.

2.7 Data Analysis

Daily collected data was transferred from hand written standardized data collection form to online Research Electronic Data Capture RedCap(Version 6.0.1, Vanderbilt University, Tennessee, USA).The principle investigator supervised this process to ensure data quality.Data from RedCap was exported into an Excel file(Microsoft Corporation, Redmond, WA, USA) then imported and analyzed with STATAv13 (StataCorp, College Station, TX, USA) statistical software. Procedure, frequency and univariate functions was performed to check for any outliers and clean the dataset. Patient descriptive characteristics were reported, using means, and standard deviation or medians with IQR as appropriate. The proportion of children with AMS was calculated from the enrolled patients divided by the total number of patients who visited the EMD and were triaged to Resuscitation rooms during the study period. 24 hours mortality was estimated from the number of children with AMS who died during the course of 24 hours of hospital follow up divided by the total number of children with AMS who were eligible and enrolled in the study.Relative Risk for factors which were associated with mortality was calculated. A variable with ($p<0.05$) was considered as statisticallysignificant.

2.8 Ethical Considerations

Ethical clearance was sought from Muhimbili University of Health and Allied Sciences Institutional Review board (MUHAS-IRB) and permission to collect data was obtained from the relevant authorities at MUHAS and MNH. Parents or guardian of patients were required to consent prior to enrollment in the study. Questionnaires werecompleted if the parents or guardians accepted to sign the consent forms which were provided in both English and Swahili languages. Data were coded to preserve the patient identity and stored in computer with a password which was only be known by the researchers. The written consent forms were kept in a safe locker which were accessed by the researchers only.

CHAPTER THREE

3.0 RESULTS

Children who presented with altered mental status prospective cohort flow chart

We screened 1273 children below 18years during the study period, of these 320(25.1%) children presented with altered mental status and all consented to participate in the study.Among the 320 children,8(2.5%) were discharged home from the EMD,83(25.9%) were admitted to the ICU,212(66.3%) were admitted to the general paediatric ward and8(16%) died while at EMD.Overall 24 hour in-hospital mortality was 50(15.8%).Mortality in the ICU and general paediatrics ward were 32(64%) and 10(20%) respectively.**(Figure 1)**

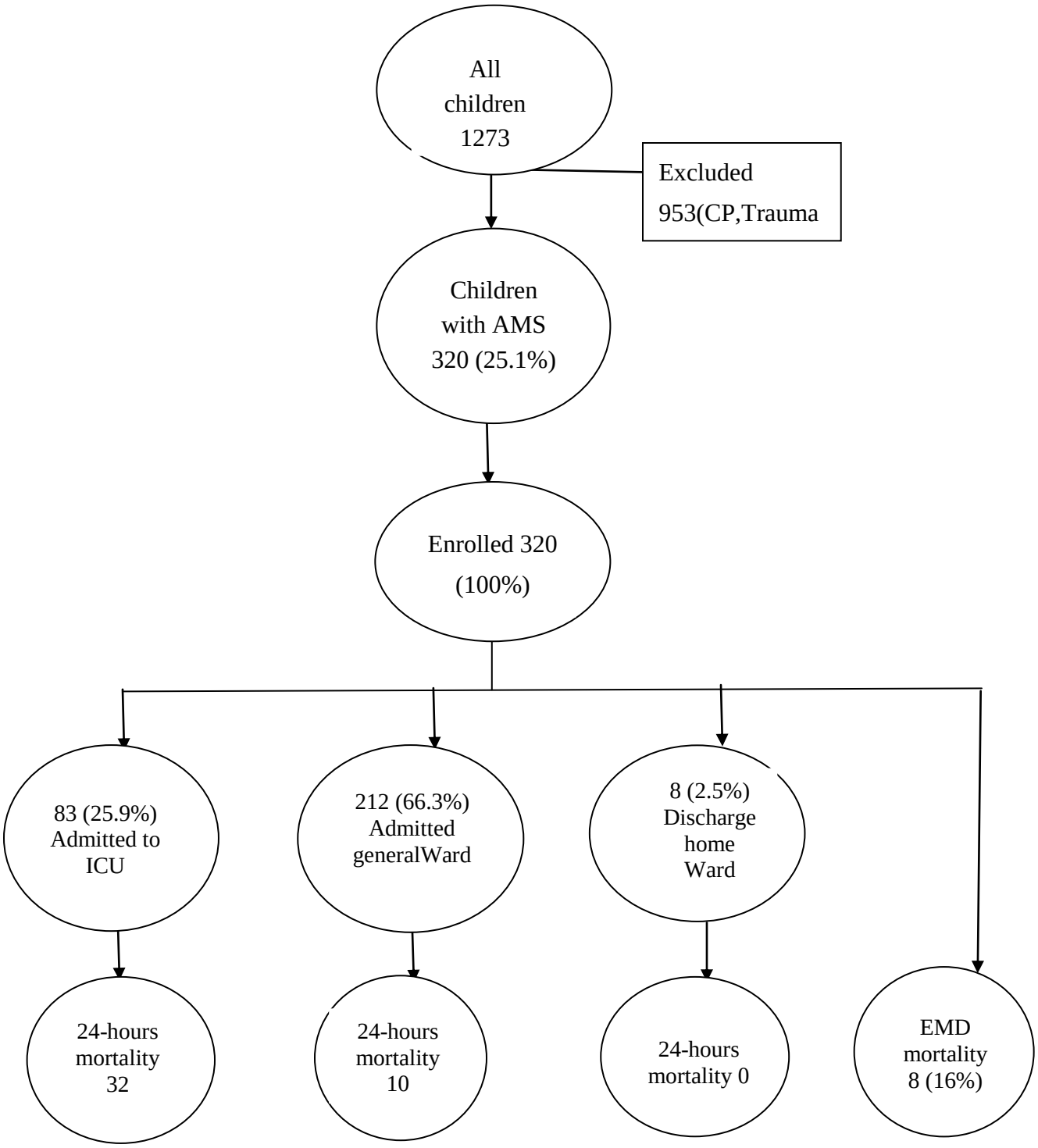


Figure 1: Screening, disposition and mortality of children presenting with AMS at ED MNH

Demographic characteristics

Of the 320 children enrolled,198(61.9%) were male and median age was 24months(interquartile range 8-60months).Overall,188(58.8%) children were referred from other peripheral hospitals.The most common comorbidity was sickle cell disease 18(5.6%) and 6(1.9%) had known HIV.**(Table 1)**

Table 1: Demographic characteristics of the studied children (n=320)

Demographics	**Number**	**Percentage(%)**
	N=320	**n/N**
Age group		
Less than 6months	62	19.4
7 to 11months	59	18.4
1 to 5years	12.3	3.8
6 to 18years	76	23.8
Sex		
Male	198	61.9
Female	122	38.1
Referral status		
Self referral	132	41.2
Referred	188	58.8
Comorbidities		
Sickle cell disease	18	5.6
Congenital heart disease	16	5
Seizure disorder	8	2.5
HIV AIDS	6	1.9
Hematological malignancy	3	0.9

Clinical presentation of children with altered mental status at EMD MNH

The most common reported complaints were fever 145(45.2%) and difficult in breathing 115(40.6%),122(38.1%)had tachycardia,139(43.4%) presented with increased respiratory rate and 123(38.4%) presented withhypoxia.219 (68.4%) were responsive to voice,91(28.4%) responsive to pain and 10(3.2%) were unresponsive. (**Table 2)**

Table 2: **Clinical presentation of children with altered mental status at EMD MNH (N=320)**

	Overall N=320 n/N(%)
Vital sign	
Tachycardia **(HR**)**	122(38.1)
Tachypnoea **(RR**)**	139(43.4)
Temperature (T>38.5C)	142(44.4)
Hypoxia(SPO2<90%)	123(38.4)
AVPU	
Verbal response	219(68.4)
Pain response	91(28.4)
Unresponsive	10(3.2)
Presenting symptoms	
Fever	145(45.3**)**
Difficult in breathing	115(40.6)
Convulsions	65(20.3**)**
Vomiting	40(12.5)
Cough	30(9.3)
Diarrhoea	29(9.8)
Decreased level of consciousness	27(8.4)
Abdominal distension	21(6.6)
Abdominal pain	15(4.7)
Generalized body swelling	10(3.1)

****Vital signs according to age**

EMD Provider's diagnosis

The most frequent EMD provider diagnoses among children presenting with AMS in the department were pneumonia 63 (19.6%), sepsis 37 (11.5%),malaria 24 (7.5%),congenital heart disease 33 (10.3%) and meningitis 19 (5.9%). (**Table 3)**

Table 3: Most Common EMD Diagnosis among Children with AMS, N=320

Diagnosis (s)	Frequency	Percent (%)
Pneumonia	63	19.6
Sepsis	37	11.5
Malaria	24	7.5
Congenital heart disease	33	10.3
Meningitis	19	5.9
Aspiration pneumonia	16	5.0
Acute watery diarrhoea with dehydration	17	5.3
Gastroenteritis with dehydration	12	3.7
Intestinal obstruction	14	4.3
SCD in crisis	9	2.8

Investigations done at EMD

Not all children had all tests done. A total of 108/320 (33.8%) children had severe anemia, while the rapid test for malaria was positive in 41/290 (14.1%), of those tested 32 of these 41 (78%) had a positive blood slide for malaria parasites, Random blood glucose(RBG) test was performed on all children and 40/320(12.5%) had hypoglycaemia. Of the 100 patients with a chest x-ray done, 68(68%) had abnormal CXR.**(Table 4)**

Table 4: Investigation done at EMD among pediatric patients with altered mental status

	Overall n/N (%)
Lab and radiological investigations	
Hemoglobin<7g/dl	108/320(33.8)
Malaria rapid test(MRDT) positive	41/290(14.1)
Hypoglycemia(<3.5mmo/l)	40/320(12.5)
Hyperglycemia(>6.9mmol/l)	69/320(21.6)
Lactate(>2mmol/l)	35/201(17.4)
Hypokalemia*	30/120(25)
Hyperkalemia*	12/120(10)
Hyponatremia*	15/120(12.5)
Abnormal urine result**	69/180(38.3)
White blood cells>11k/Ul	43/225(19.1)
Abnormal chest x-ray***	68/100(68)
Abnormal abdominal x-ray****	13/20(65)

Key:

*Normal range values

**Positive for leukocytes and nitrates

***Infiltrates for Pneumonia

****Multiple air fluid levels

Pre-EMD management of children with AMS

Based on referral documentation for the 188 patients who were referred, 92 (48.9%) received intravenous fluids, and 57 (30%) receivedantibiotics. **(Table 5)**

Table 5: Pre-EMD management of children with AMS

Pre-EMD Treatment	**Overall N=188 n(%)**
Intravenous fluids	92(48.9)
Antibiotics	57(30)
Anticonvulsants	16(8.5)
Blood transfusion	5(2.7)

Interventions provided to children with AMS at the EMD-MNH

The most common interventions given to these children at the EMD were intravenous fluids 287 (90.5%), antibiotics 261 (82.5%),antipyretics 101 (31.9%) and antimalarials 40 (12.5%).(**Table 6)**

Table 6: EMD treatment among paediatric patients with altered mental status (N=320)

EMD treatment	**Overall N=320 n (%)**
Oxygen therapy	213(67.2)
Intravenous Fluid	287(90.5)
Antibiotics	261(82.3)
Antipyretics	101 (31.9)
Analgesics	53 (16.7)
Antimalaria	40 (12.6)
Anticonvulsants	31 (9.8)
CPR	19(6)

Disposition of children with Altered Mental Status

Among the 320 children with altered mental status 8 (2.5%) were discharged home from the EMD,17 (5.3%) were taken to theatre from the EMD,83 (25.9%) were admitted to the ICU and 212 (66.6%) were admitted to the general ward, and eight died in the ED. Overall twenty four hours mortality was 50(15.8%) and 32(64%) of all deaths occurred in ICU (**Table 7**)

Table 7: Patient disposition and hospital outcome among pediatric patients with altered mental status (N=320)

Variable	Frequency	(%) 95% CI
Disposition		
General ward	212	66.6 (61.3 – 71.6)
ICU	83	25.9 (20.9 – 30.9)
Theatre	17	5.3 (3.1 – 7.8)
Discharged home	8	2.2 (0.6 – 4.1)
Hospital outcome		
Mortality at EMD	8	16 (6 – 26)
Mortality at ICU	32	64 (50 – 76)
Mortality at General ward	10	20 (10 – 32)
Overall 24-hours mortarity	50	15.8 (11.7 – 19.9)

Factors associated with twenty four hours in-hospital mortality of children with AMS

Age less than five years,having been referred from another hospital,hypoxia,severe anemia,cardiopulmonary resuscitation,difficulty in breathing,blood transfusion, and ICU disposition were the factors associated with 24 hour mortality in children with AMS. Children who were only responsive to pain or non-responsive were more likely to die, while children with AMS who still had verbal response were less likely to die. **(Table 8)**

Table 8: Distribution of factors associated with mortality among children presenting with altered

AMS(N=320,DIED N*=50)

Variable	Overall (n%)	Died (n%)	RR(95%CI)	P-Value
Age<5years	123(38.4**)**	40(80)	6.4(3.3-12.3**)**	<0.0001
Referred	183(58.8)	38(76)	2.2(1.2-4)	0.01
Hypoxia(sat<92%)	123(38.4)	39(78)	7.8(3.8-16.1**)**	<0.001
AVPU STATUS				
Verbal response	219(68.4)	19(38)	0.3 (0.2-0.5)	0.0001
Pain response	91(28.4)	23(46)	2.1(1.3-3.5)	0.0028
Unresponsive	10(3.2)	8(16)	5.9(3.8-9.0)	0.0001
Fever T>38.5C	145(45.3)	23(46)	1.1 (0.6-1.7)	0.915
Difficulty in breathing	115(40.6)	30(60)	2.6(1.6-4.5)	0.0002
Hemoglobin<7g/dl	108(33.7)	42(84)	10.0 (5-21)	0.0001
MRDT positive	41(14)	10(21.3)	1.7(0.9-3.1)	0.09
Blood transfusion given	27(8.5)	8(16)	2.1(1.1-3.9)	0.027
CPR done	19(6)	15(30)	6.8(4.6-10)	<0.0001
ICU disposition	83(25.9)	32(64)	4.6(2.7-7.8)	<0.0001

CHAPTER FOUR

4.0DISCUSSION

This is the first study within our setting to describe the burden and profile of children presenting with altered mental status within an EMD in East Africa.We found that 25.1% of paediatric patients below 18 years who presented to the EMD-MNH and triaged to paediatric resuscitation room had altered mental status.

In our study more than half of children with altered mental status were referredfrom other peripheral hospitals; this is similar to the percentage of all EMD-MNH patients that are referrals(23).The existence of a referral system in Tanzania requires a patient to be evaluated and managed by a lower level health facility before being transferredto the higher,more advanced facility with experts in different fields for further management(25).In our study we found that being referred was a risk factor for mortality.The nature of the referral system may result in children arriving to MNH EMDbeing delayed by the referring facility and hence arrive sicker than the self-referred children with AMS. An alternative explanation is that only the sickest patients are referred to us, whereas self-referrals may include both very sick and less sick children. From this observational study, we cannot determine a cause and effect. However, health care workers in lower health facilities need to be educated on prompt recognition of children with altered mental status, intervention of the immediate life threatening causes and the importance of early referral to maximize outcome.

The most frequently reported symptoms associated with altered mental status in children were fever,difficulty in breathing,convulsions,diarrhoea and vomiting.The findings were similar in HICs where these symptoms were observed in undifferentiated cases of altered mental status(4),(10).The findings of this study highlights the variability of symptoms that children with altered mental status present with to the hospitals(2).These symptoms could be due to both medical and surgical pathologies found in our cohort(4).

The most frequent specific EMD providers diagnoses in our study werepneumonia,sepsis,malaria,congenital heart disease and meningitis. This implies that causes of altered mental status are mostly infectious in our setting and hence when children

arrive with altered mental status in our setting, the health care providers should search for the source and probably empirically treat infection.These findings are similar in HIC where by the infectious causes of altered mental status were common but among the top four causes of altered mental status in our study were malaria and congenital heart disease which were not common in HIC(4).

More than ninety five percent of children with altered mental status were admitted after evaluation at the EMD.This highlights that, for the vast majority, the causes of altered mental status were not reversible at the ED.The seriousness of illness is also reflected in the twenty four hours in-hospital mortality rate of these children.15.8% of children with altered mental status died. The majority of children who were unresponsive (8/10) also died, indicating that the severity of alteration in mental status is strongly associated with mortality and hence lack of responsiveness suggest a very end stage to the disease(2).Unresponsive children should be admitted to ICU because investigation and treatment should be intensive in unresponsive children due to the high mortality. At the same time, parents should be prepared for the outcome because an unresponsive child has a poor prognosis.Previous studies from Canada show that the mortality of children with altered mental status was directly proportional to the severity of alteration in mental status(4).

The other observed factors that were associated with in hospital mortality in our cohort were age below five years,hypoxia,severe anemia,referrals,and ICU admission. Previous studies in Canada and India has identified similar risks for higher mortality (4)-(2).Hence these factors for worse outcome need to be corrected sooner by immediate blood transfusions to children with severe anemia,early initiation of antibiotics as the most causes of altered mental status were infectious in our setting,giving oxygen to the hypoxic children with altered mental status,early referral and this can translate not the EMD but to the lower facilities which did very little of this.

Also children with altered mental status should be disposed to the ICU and triage should be aware that any child with altered mental status needs to go to resuscitation room.

This study demonstrates the need for further study given the significant number of children died within twenty four period of hospital stay. Overall,our study showed that altered mental status is a common presentation amongst paediatric patients presenting to the EMD-MNH,and that these children have a high mortality rate.

4.1 Study limitations

i. Attempts were made to obtain information in real time from the provider or patient while the patient was still in the EMD.However at times patient acuity,condition,or the workload of the staff may have prevented full documentation.

ii. Documentation may also have been limited by patients being unconscious or too sick to remember some information and care takers not knowing the needed information, for example patient's age or birth date.

iii. This is a single center study, and therefore it is subject tolimited external validity.

iv. For preverbal children i.e children who cannot explain themselves the information was relied on informant's report. This was mitigated by a careful history from the guardian or parent and physical examination which was done by the provider.

v. The etiologies of AMS was based on the preliminary diagnosis made in the ED,which is not always correct,and that not all investigations were carried out in all children,limiting the ability to make definitive statements about many of the test results.

4.2 Mitigation Measures

i. Effort was made to ask the care providers about some information that could not be retrieved.

ii. Effort was made to track missing information such as age or birth date from patients in the wards for patients who improves enough to remember.

iii. Efforts was made to ensure appropriate sampling to maximize the inclusion of patients from different parts of the Tanzania since EMD MNH and MAMC receives patients from different parts of country.

iv. Extensive efforts to retrieve the results of POC test results, radiological investigations etcwere made, and. doctors were reminded and encouraged to record results of the test(s) that they have performed.

v. Equipment was checked for calibrations, but also random check of laboratory values were done frequently.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Altered mental status is a common complaint amongst paediatric patients presenting to the EMD-MNH, often associated with a serious infectious illness. This presentation was associated with significant 24-hour mortality. Further studies and quality improvement efforts should focus on identifying causes,risk stratification and appropriate early interventions to maximise outcome.

5.2 Recommendations

(i) Providers in acute care settings should be trained to promptly recognise life threatening causes of altered mental status and treat the reversible causes such as hypoxia and hypoglycaemia.

(ii) Providers at peripheral hospitals should be trained to promptly recognize life threatening symptoms and signs and need to be more aggressive in care by providing antibiotics,blood transfusion and oxygen therapy and refer to the appropriate facility early once the child with altered mental status is identified.

(iii)Further research is needed to identify gaps in management of children with altered mental status as mortality is high.

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APPENDICES

APPENDIX 1. CONSENT FORM (ENGLISH VERSION)

CONSENT FOR PARTICIPATING IN RESEARCH:ENGLISH VERSION

Study title: The profiles and outcomes of paediatric patients presenting with AMS at ED MNH and MAMC

Introduction

Greetings, my name is Dr. Noel James Makundi, a second year resident in the Emergency Medicine Department at Muhimbili University of Health and Allied Sciences(MUHAS)

I am conducting a study with the above mentioned title as part of my study program.

I hereby request your participation and cooperation in my study if my research assistant or me approaches you. Your decision to participate or not to participate will have no effect on the care and management given to your child. Please ask questions if there is anything about this study you do not understand.

Aim of the study

The purpose of the study is to characterize the burden and describe the outcome of all children who present with AMS at EMD MNH and MAMC.

Benefits

There will be the overall benefit after knowing the results and its implications to the hospital. There will be no payment for participation in the study.

Risks

No any risk in participating in this study

What does this study involve?

This study involves the research assistant or the principal investigator asking structured questions to the informant or patient and filling the responses in the prepared questionnaire. Information about the patient will also be obtained from the patient's file.

Consent

Your participation in this study is completely voluntary and agreeable by signing the consent form. You may refuse to participate and this will not affect the care and management offered to you or the child you brought for treatment. You may choose to stop taking part in this study at any time for any reason.

Confidentiality

The information you provide is highly valued and will be kept strictly confidential. The study information will be stored in a protected computer files and paper records stored in locked filling cabinet. Only study staff will have access to the information.

Access of Information

By signing this form, you allow the research team to use the information and give it to others involved in the research. The research team includes the researcher, facilitators and others working in this study at MUHAS and MNH/MAMC.

For further information, questions or queries, you can contact:

1. The principal investigator,
   Dr. Noel James Makundi,
   Department of Emergency Medicine,
   MUHAS,
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   Email:hendry_sawe@yahoo.com

3. Prof.BrunoSungura
   Director of research and publications
   MUHAS
   S.L.P 65001,
   Dar es Salaam,Tanzania
   Simu: 2152489

Signature:

I (Initial of your names)---------- have read/been told the contents of this form. My questions have been answered. I agree to participate in this study.

Signature of the participant----------

Date of Signed consent----------

Cooperation in my study one my research assists and I approach you. Your decision to participate or not to participate will have no effect on the care and management given to your child. Please ask questions if there is anything about this study you do not understand.

APPENDIX 2. CONSENT FORM (SWAHILI VERSION).

STUDY TITLE: THE PROFILES AND OUTCOMES OF PEDIATRICS PRESENTING WITH ALTERED MENTAL STATUS AT EMD MNH AND MAMC DAR ES SALAAM TANZANIA:

FOMU YA RIDHAA YA KUSHIRIKI KATIKA UTAFITI

Utangulizi

Jinalangunaitwa Noel James Makundi,nidaktarimwanafunziwaudaktaribingwawa magonjwa ya dharura(Emergency Medicine) katikachuokikuu cha Afya na SayansiShirikishi Muhimbili(MUHAS).Ninaombaushirikiwakokwaniaba ya mwanaokatikautafitihuuendapomimiamamsaidiziwanguatakapokufuatailikukuulizataarifamuhi muzamgonjwawako.

Madhumuni ya Utafiti

Utafitihuuunalengakatikakujuaaina,sababu na hatma ya watotowanaokujaidara ya magonjwa ya dharurawakiwa na tatizo la kupunguakwaufahamukatikahospitali ya Taifa ya Muhimbili.

Ushirikikatikautafiti

Mtotoyeyotemwenyeumrizaidi ya mwezimmojanachini ya miaka 18 aliyefikaidara ya magonjwa ya dharurakwalalamiko la kupunguakwaufahamuatajumuishwakatikahospitali ya Taifa ya Muhimbili.

Hatari

Hatutarajiikuweponaathari/hatariyeyoteitokanayo na ushirikikatikautafitihuu.

Faidazautafiti

Kwa kushirikikatikautafitihuu,tutawezajuani magonjwa gani yanayosababishakupunguakwaufahamukwawatoto na pia kujuahatimayaobaada ya kupewamatibabu.Matokeo ya utafitihuuyatamsaidiamtoahudumaatakayemwonamtotoaliye na upungufuwafahamukutoahudumaharakapasipokucheleweshe.

Usiri

Taarifazotezitakazokusanywakatikautafitihuuzitakuasiri,hivyoushirikiwakohautajulikana na mtu.Taarifahizizitajulikana kwenye timu ya watafitituu.

Malipo.

Kwa kushiriki kwenye utafitihuu,hautalipwawalahautalipachochote.

Ukiwa na swali au tatizololote,unawezakuwasiliana na wafuatao:-

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Kuwekasahihi ya makubaliano

Mimi(Herufizamwanzozamajinayako) ----------
,nimesoma/nimesomewamaelezoyoteyaliyomo kwenye fomuhii na nimeelewa.Maswaliyanguyamejibiwavizuri na nikotayarikushiriki

Sahihi ya mshiriki----------

Sahihi ya Mtafiti----------.Tarehe----------

APPENDIX3: CASE REPORT FORM

Study no: **IRBno:**

Patient initials:

MR no:

Date:

A. PATIENT DEMOGRAPHICS:

DOB:

Age (in years):

Sex: ☐ Male

☐ Female

Patient Address:

Mode of Arrival to EMD:

☐Self-referred

☐Referred

Referring facility:

Days in referring facility: days

B. INITIAL VITAL SIGNS:

BP:

Pulse:

RR:

SPO2:

GCS:

T:

C. BASELINE CLINICAL CHARCTERISTICS:

Chief Complaint(s):

EMD diagnosis:

D. COMORBIDITIES:

☐H/o UGIB ☐H/o renal failure ☐HIV

☐H/o Liver disease ☐H/o Cardiac failure ☐H/o Malignancy

☐H/o Diabetes ☐Peripheral vascular disease ☐CVA

☐hemiplegia ☐connective tissue disease

Other:

E. <u>EMD TESTING:</u>

Lactate:

Urea:

Cl

PH

Creatinine

Ca^{2}

Troponin

Na+

Mg^{2+}

WBC

Hb

K

AG

PCO_2

PO_2

HCO_3

Other

F. <u>PHYSICAL EXAMINATION:</u>

PRIMARY SURVEY:

EXAM:	NORMAL	ABNORMAL	NOT DONE	COMMENT
Airway (A)				
Breathing (B)				
Circulation (C)				
Disability (D)				
Exposure (E)				

SECONDARY SURVEY

	Normal	Abnormal	Not Done	Comment(*if any)
HEENT				
Respiratory				
Cardiovascular				
Gastrointestinal				
Genitourinary				
Musculoskeletal				
Neurological				
Skin/Dermatology				
Haem /Lymphatic				
Endocrinological				
Others(specify)				

G. LABORATORY INVESTIGATIONS:

FBP:

Blood slide for MPs:☐Positive

Renal Function Test:

LFT:

WBC:

Creatinine:

ALT:

RBC:

BUN:

AST:

HB:

Bil_T:

PLT:

BIL_D:

Other:

H. IMAGING:

TEST	SITE DONE	RESULTS		
		NORMAL	ABNORMAL	NOT KNOWN
X-RAY				
USS				
CT SCAN				
MRI				
OTHER				

I. EMD TREATEMENT:

Medications: Dosage: Route:

☐_____ _____ _____

☐_____ _____ _____

☐_____ _____ _____

IV Fluids: Amount: _____ mls

☐Yes

☐No

Blood product: Amount: _____ units

☐Yes

☐No

Other EMD interventions: (e.g. Mechanical Ventilation, Procedures such as pericardiocentesis)

☐_____

☐_____

☐_____

J. DISPOSITION STATUS AND OUTCOME:

Disposition to:

☐General ward

☐ICU/HDU

☐Theater

☐Home

Did the patient die/pass away?

☐Yes

Specify area where patient died:

☐ED

☐No

☐ICU/HDU

☐Theater

Time and Date of Death:

☐General Ward

_____

Progress of Patient Post-Admission(24hours outcome):

ALIVE

Any in-hospital transfers?

☐Yes

☐Ward-ICU/HDU

☐No

☐ICU-Ward

☐Other: _____

Working Hospital Diagnosis:

☐_____ ☐_____ ☐_____