Etiologies, Definitive Diagnosis and Patient Outcomes in Altered Level of Consciousness in the Emergency Department

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In Partial Fulfillment of the

Requirement for the Degree of

Master of Science in Allied Health Sciences

By

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Roll No. SU91-MSAHW-S23-221

Session: 2023-2025

Faculty of Allied Health Sciences

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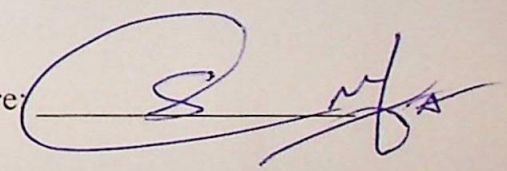
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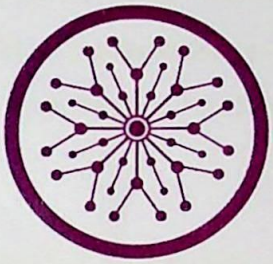
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Session: 2023-2025

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This is to certify that the research work presented in this thesis, titled **"Etiologies, definitive diagnosis and patient outcomes in altered level of consciousness in the emergency department."** was conducted by **"Samsaam Fazal"** under the supervision of **"Dr.Chanda Naseem"**

No part of this thesis has been submitted anywhere else for any other degree. This thesis is submitted to the Faculty of Allied Health Sciences, The Superior University, Lahore in partial fulfillment of the requirements for the degree of Master of Sciences in the field of "**Allied Health Sciences**" in Faculty of Allied Health Sciences at The Superior University, Lahore.

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DEDICATION

In the name of ALLAH TALA, the Most Gracious and the Most Merciful, all praises and gratitude to ALLAH TALA for HIS infinite blessings and guidance throughout my journey. I am deeply grateful to H for granting me the strength, patience, and perseverance to successfully complete this thesis. The trials and opportunities along the way have shaped my understanding and enriched me both academically and personally. My heartfelt gratitude also extends to the HOLY PROPHET MUHAMMAD (Peace be upon him), whose life continues to inspire and guide me.

I would like to express my deepest appreciation to my respectful supervisor for their invaluable support, insightful guidance, and unwavering encouragement throughout this process. Their dedication and kind spirit have made this journey a rewarding experience, and it has been an honor to work under their supervision.

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May Allah bless my supervisor and my parents with long, healthy, and prosperous lives, and may He grant me the wisdom and ability to contribute to the betterment of humanity.

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LIST OF ABBREVIATIONS

GCS.....Glasgow comma scale

AMS.....Altered Mental Status

MRI.....Magnetic Resonance Imaging

ALOC.....Altered Level of Consciousness

EEG.....Electro- encephalogram

AML.....Altered Mental Level

ABSTRACT

New-onset altered level of consciousness (ALOC) is a common issue for people coming to the emergency department (ED). The objective was to determine the common and definitive etiologies of altered level of consciousness in emergency department.. The study was conducted in Superior University for duration of 4 months. Data was collected from CMH Rawalakot AJK. Inclusion was age 18-90 years and GCS <15. Data was collected through a slightly modified Performa. The study revealed that extra-cranial causes were the most prevalent, accounting for 83 cases, compared to 67 intra-cranial cases. Among the definitive diagnoses, ischemic stroke (14 cases), tonic-clonic seizures (12 cases), and sepsis (12 cases) were the most common, with ischemic stroke being a leading cause among vascular etiologies. Patients were categorized based on their Glasgow Coma Scale (GCS) scores, with the majority in the moderate range (6-8), comprising 44 cases, followed by the severe range (3-5) with 37 cases. The distribution highlighted a higher occurrence of extra-cranial causes in the moderate GCS group. Patient outcomes indicated that ICU admissions were the most frequent, with 35 cases, while 7 deaths were recorded, primarily within the severe GCS range (3-5).This study underscores the predominance of extra-cranial causes in altered levels of consciousness, with ischemic stroke, tonic-clonic seizures, and sepsis being the most common diagnoses. Lower GCS scores correlated with higher ICU admissions and mortality, highlighting the importance of early detection and management.

Key Words: ALOC, Definitive diagnosis, Etiologies, Patient outcomes, GCS.

Chapter 1

INTRODUCTION

In particular, the Glasgow Coma Scale (GCS), as well as the NIH Stroke Scale (NIHSS), is very useful in evaluating awake but aphasic patients. The GCS is a standardized way of assessing the level of consciousness of a patient based on integrated assessment of three criteria: eye opening, verbal response and motor response. This categorizes it separately, where eye opening is scored from 1 to 4, verbal response from 1 to 5 and motor response from New onset patients present to the ED with a common problem that is altered level of consciousness (ALOC). ALOC occurs for many reasons, neurological and other medical conditions related, and it is when a person experiences a change in his usual awareness or awareness, not simply due to a feeling sleepy. The word consciousness is being aware of oneself and the environment. An individual can achieve and maintain this awareness by being awake, to receive, perceive and process the external and internal stimuli with accuracy. In particular, metaphysical awareness requires intact metabolization of brain components and intact structures. It includes protecting the brain from the toxic effect of gluten, insulin and chemical pollutants; enough cerebral blood flow, PH balance, body temperature, glucose and oxygen for cellular energy. Additionally, cellular metabolism requires essential substances for metabolism, and without deficiencies, cellular metabolism must be supplied with these essential substances for metabolism. Any disruption in the level or content of consciousness is a disorder of consciousness [1],[2],[5].

Altered consciousness is specifically defined as reduced alertness or inability to arouse, resulting in decreased awareness of the environment. It can be seen in a number of clinical conditions including coma, agitation, hallucinations, or inability to communicate. More than 5% of hospital admissions are due to impaired consciousness, and the elderly are more prone to it, which has a major impact on mental functioning. About 10% of elderly who arrive at the Emergency Department (ED) have altered consciousness. Both structural and non-structural causes are common in the elderly, but nonstructural causes are more common in younger adults. Many of these causes are non-traumatic, and emergency physicians find it difficult to diagnose these, as they have to do a thorough evaluation. The assessment process is time consuming, as information is obtained from the patient's family,

review of medical records, laboratory and radiological tests, and additional consultations [2],[5].

Older patients admitted to emergency departments (EDs) often have altered mental status (AMS), and studies have reported that 41% to 60% of elderly patients have AMS. Diagnosing AMS in younger patients is usually easier and often due to clear toxic. Altered mental status (AMS) is a common problem in older patients, but the prevalence of delirium in older patients with AMS is not well established. The effects of AMS have been documented in the literature, but there has been no research on the coexistence of delirium with AMS. This condition can be evaluated using the Brief Confusion Assessment Method, which is used to assess delirium[3],[7]. Despite that, blood work, brain scans and an EEG (a test that measures brain waves) are definitely good at eliminating possibilities as well as finding out what treatment will work. It also has a GCS (Glasgow comma scale) world wide scale for measuring the altered level of consciousness. This scale has a score up to 15. Altered consciousness or alter level of consciousness will be considered for anything less than 15. The GCS is a standard to check the level of consciousness by observing their eye, motor and verbal actions [4],[5].

This is utilized to give a total score from m 1 to 6 to produce a result of deep unconsciousness to full alert. As the GCS score increases, the worse a person's level of impaired consciousness. Despite it even being of good use in patients with severe speech limitations such as patients who are aphasic, the GCS is very useful with regard to its attention in to the eye opening and motor response. Moreover, this tool allows monitoring changes with time, evaluation of the severity of brain injuries and guiding treatment decisions. The assessments made owing to disorders of consciousness (DoC) evaluations depend often on neuroimaging and neuro-monitoring tools, which can be used to perform the assessment. Categorization of these can be done according to the patients that they cannot be used and the ones that are used at bedside with the patient handy. These neuros diagnostically procedures done in Radiology suite are normally: CT scan (plain or with contrast, CT angiography, CT perfusion, MRI (plain or with diffusion weighting or cerebral blood flow determination), MRA, and function MRI. Bedside assessments may include both CT or MRI scans and lumbar punctures (LP) [5],[7].

The COVID-19 pandemic has profoundly affected healthcare systems and daily life. In the setting of new onset of the highly pathogenic SARS-CoV-2, changes in

healthcare utilization patterns and national health policies are observed. After COVID 19 (AC) ER visits were greatly decreased by 22%; USA (72%; 13%; Europe 5.7%; South Korea 37% . The decline of utilization of emergency medical services also took place and continued below pre-pandemic level through the first quarter 2022, The altered level of consciousness (ALC) that often requires visit to ER, healthcare providers must remain alert to changes in the etiology and signs and symptoms of ALC cases in the ER [6],[9].

When the clinician systematically explores various aspects of the patient's medical history, the onset, the acuity, the surgical history, the vascular risk factors, the seizure and psychiatric history as well as the substance use, the most likely diagnosis can be reached and the patient on the way to getting the most precise and time sensitive care [7],[5].

Further, it is imperative that the safe discharge of patients to a private home as opposed to a nursing facility be provided. Many families want to keep patients at home when medically stable but unable to emerge from DOC. This can provide a family with a thorough education, hands on training and continuous post discharge programmatic support to begin with life care planning, managing new medical conditions and often avoiding the need for any NF placement. Inherent in this support is the ongoing support it affords to families to cope with the emotional aspects of caregiving which for many rarely ends, even after the death represents prolonged grief, anxiety, depression, and social isolation, amongst other difficulties [8],[9].

Being close to a potential cause of mortality makes AMS closely risk associated with the wide range of potential causes and the risk of a rapid deterioration. Determining the reason of AMS and proper treatment depends on assessment, which is important on the prompt and methodical basis. It's a complicated management of AMS, it requires a complete approach i.e. not taking history only, but having a complete physical and neurological exam that includes diagnostic tests in order to expose the cause. Early identification and intervention can reduce improvement outcomes and the risk of death to this condition. Hence, any patient with AMS must be treated with urgency without any elimination by systematic way to avoid complications [9],[8].

Previous international and local literature had shown incidence of ALOC is anything from 8% to 30%. Moreover, there is no available data with regard to causes of ALOC in our hospitals in Pakistan. This information would be incredibly valuable to

emergency physicians in such a context of overcrowded emergency department to rapidly and reliably assign ALOC cases to a first emergency treatment matched with the most frequent underlying cause [10],[11].

In regions like Pakistan, where researches for ALOC almost do not exist, the matter becomes more complex. ALOC cases have occurred in our health care ED, but there has been no study on the causes and prevalence of the ALOC and plans of management in our system. It is not possible to base decisions on local research and the lack of such research is a major obstacle for health care professionals.

It is not much better on the world stage either. The reason for this being limited to research on ALOC is that ALOC is a multifactorial condition. Ultimately, ALOC is a complex problem with a sense of urgency about which to address them either collaboratively or not at all. With a well-coordinated team of experts, patients can only be diagnosed and treated, Navigating the complexities of ALOC diagnosis and treatment can only be done by a well-coordinated team of experts, to whom patients can get the best possible care [11],[10].

People do not act the same or people are not fully awake for many reasons and doctors in the ED have to figure out the what and how to help in many different ways. It was a study of various definitive reasons to aid doctors to know exactly, with one etiology or other, by which ALOC actually occurs and to help doctor to be better finding what's wrong and help patients get better care faster in emergency settings besides checking out what outcomes of patients having ALOC are i.e. (surgery, shifted to intensive care unit or ICU, referred to other hospital ,death).

AIM AND OBJECTIVES

- To determine the common and definitive etiologies of altered level of consciousness in emergency department.
- To compare GCS scores with different etiological classes and sub classes.
- To determine Patient outcomes based on etiology and GCS scores.

Chapter 2

LITERATURE REVIEW

ALOC (Altered level of conciosness) is a complex and difficult to treat condition that is very common in emergency departments and therefore needs a quick and correct response. Precise diagnosis is necessary since it is possible to have from a different neurological disease, metabolic imbalance, infection, or exposure to toxins. Only averting misunderstanding or overlooking those underlying causes and their impact on patients will help in effective management. We review here the actions to take when faced with ALOC, including causes, specific diagnosis approaches and prognostic outcomes in an emergency care context.

Altered mental status incidence among emergency department patients and all patients were included in analysis of prospective study (790 patients). Those 52.3% were male (n=414), 47.7% female (n=376) and in general aged on average age 45.65 ± 15.5 years. Neurological (71.6, n = 566) were the most common causes of the condition. Head trauma (10.4%, n=82), endocrine and metabolic disorders (6.1%, n=48), cardiovascular and pulmonary factors (6.2%, n=49), infections (3.8%, n=30), gynecologic and obstetric causes (0.4%, n=2), toxicologic (1.5%, n=12) and the many other important causes accounted for each of these cases. There were different mental statuses of the patients: Deep coma in 40 percent, confused in 11 per cant, agitated confusion in 20 per cent, lethargy in 15 per cent and in stupor in 14 per cent. Hypertension was observed in 18% of the patients. The mortality was 20.1 % (159) and the leading causes of death were cerebrovascular disease and trauma. These results indicate that AMS is not rare in geriatric and cerebrovascular incidents are most common cause with high mortality in emergency care setting. However, it is quite important that timely and appropriate diagnosis of AMS should take place in the emergency setting as its etiology varies very much and it is deadly. Presence of neurological causes is relatively predominant with which it is important to have enhanced neuroimaging and prompt neurological assessment with AMS management. This is followed in close by the fact that so many patients present in deep coma is indicative for both the severity of the cases that are encountered and how urgent the patients have to be treated. Finally, the great mortality that occurs in AMS requires the development of good care protocols and early intervention methods for successfully curing patients.

The management of new onset altered level of consciousness (ALC) in the emergency settings is a very difficult one as ALC is a very highly nonspecific and very highly etiologically complex one. Common problem in emergency room (ER)

and with many causes of the problem, it is difficult to make adequate diagnosis and treatment.

In a retrospective study on 4 tertiary referral centers from February 2018 to January 2020 to explore the etiologies and outcome of ALC presenting to the ER. A group of university professors and board-certified neurologists, emergency and internal medicine physicians, and a comprehensive study of ALC cases was performed. All 230 ER's were reviewed and 315,526 ER visits were represented among 7,988 patients whose arrival had been identified as resulting from an ALC. More than 53.8% were men and the prevalence was higher than 66.1% among the people older than 60 years. The overall mortality rate recorded in the cases of ALC was 13.5%, which indicated on the serious nature of case. Explanation of etiology was made into extracranial type etiology (ETC), with and intracranial (ICT) etiology (ETC, 63.1 % and ICT, 36.9 %) and by etiology as metabolic (24.7 %), lymphatic / hematopoietic (13.5 %), systemic infections (17.3 %) and immune (10,8 %).

The presence of both neurological and systemic illnesses, will make the ALC of interest in the ER, and this work shows a need to evaluate this in light of existence of such illnesses. It implies that ALC has varied and diverse causes (many of which are not intracranial), in support of which there are various hypotheses put forward. Consequently, the results indicate that for accurate etiology diagnosis and better outcome of patient complete diagnostic approaches are recommended. From a review, this paper points out that ER clinicians should have a comprehensive differential diagnosis for ALC when they see an ALC patient for timely and effective management of this important condition [13].

Variability of resources and lack of standardized protocols for diagnosis and management of unconsciousness of sudden onset in EDs is a challenge that is largely attributable to it. There is little known about the etiology, adoptive approaches or conditions of these patients while clinically unconscious with no explanation nor how to approach the patients, who are unexplained clinically unconscious. Nevertheless, this identification of this gap provides the impetus for further focus research on implementation in clinical practice and improvement of patient outcomes.

A study was made in an ED of a tertiary care hospital with designing a prospective study involving three physicians and one female nurse in the ED setting in one year (September 2014 to August 2015). Because the patients excluded were those with a clear, on arrival, diagnosis for their altered state of consciousness, the patients were those with sudden unconsciousness of unknown origin. A total of 212 patients were included in the analysis, 88% had a diagnostic conclusion in patients actively in the ED. We found that sudden unconsciousness were associated with a large number

etiologies with cerebrovascular disease comprising 24%, infection 14%, epileptic seizures 12%, psychiatric disorders 8%, metabolic problems 7%, intoxication 7%,_transient global amnesia_ 5%, cardiovascular disease 4%. These results in terms of diagnoses general were established through the use of physical examination, computed tomography (CT) scans (23%) and laboratory tests (25%), as well as of other ones; the study also presented the clinical outcome of these patients. The mean in hospital mortality rates was 11% and 59% of patients was discharged having a Glasgow Outcome Score of 2–4 and mean moderate disability to severe disability respectively. These findings show that knowing the causes and what to do in these emergencies is important but it is also of extreme importance that a neurological expert should be very keen on the diagnosis of emergency neurological causes of sudden unconsciousness as neurological causes of sudden unconsciousness are very common. For this reason, cerebral imaging e.g. CT scans are also recommended under integrated parts of the early diagnostic phase of a standardized clinical procedure. So, the study suggests that there is the demand for the adoption of standardized protocols for providing immediate exposure to neurological assessment and advanced imaging techniques in order to speed up the early and accurate diagnosis of the patient's sake. In the literature, the acute impaired awareness can't be properly managed in the ED without those interdisciplinary exploration and rapid diagnostic and specialized neuro evaluation tools. First, it is necessary to deal with the large number of potential causes of the disease and the right the most appropriate and timely treatment for patients [14].

AC is a common frequent litigant in emergency department and requires urgent diagnosis and intervention. It is a disease through some of its causative origins proving to be intracranial or extracranial with the application of their own clinical approach. Because AC is a common problem, it is important to know the common etiologies and a structured differential diagnosis for this particular patient with AC.

A retrospective review of medical records of patients presenting to ED with AC was conducted on them over the period of Jan and Aug 2004 in a medical teaching hospital. In order to identify etiologies and determine the differential diagnosis as comprehensive as possible, the etiologies were sought. A group of 350 patients was involved in the study. Among these, 19.1% ended up in the hospital, 10.9% were transferred to other facilities because it's full, 10% died in the ED, and the rest were discharged to reevaluation. The patient population was 60.3 years of mean age, male to female ratio was 52: Male (57.1%) and female (42.9%). They found some of the reason for AC and neurological disorder was most (29.1 percent). Second were infectious diseases and sepsis (18.8%), endocrine and metabolic derangements (20.8%), cardiac disease (10%), psychiatric illness (8.8%) and pulmonary disorders

(7.1%) and toxicological causes (5.1%). Taken together, these findings emphasize the diversity of AC, and indicate that the diagnostic process should account not only for intracranial, but also extracranial factors — only about one third of the cases in the emergency department were accounted for by brain disorders. A substantial proportion of AC cases in fact had an extra cranial source, in particular the effects of medications. As a result, there is a need for a systematic and comprehensive approach to the diagnosis and management of AC and it is stressed that the extracranial causes should be evaluated simultaneously with the intracranial causes in the ED. By realizing the variety of potential causes, the clinicians become better at finding and acting on it to improve 'patient outcome'. The finding also means that improving the capacity to identify and deal with a spectrum of extracranial issue early, during detection and proper handling of a patient showing altered consciousness will yield greatly enhanced [15].

The diagnostic spectrum of clinical symptoms among the patients with AMS includes cognitive deficits, attention disorders, arousal abnormalities, and decreased level of consciousness. People with drug dependence, in the case of the emergency department in particular, are propensity for to present to AMS. Although AMS is very common, its signs, described by how it shows up in patient, may include lethargy, disorientation, altered behavior and many other such terms.

A cross sectional observational study was conducted since January to December 2022 at Eeshan Hospital Department of General Medicine Hyderabad, Telangana to evaluate Adult's disease (AMS) there. Inclusion criteria for AMS included GCS score < 15, RASS zero or not zero, inappropriate behavior or hallucinations. Among the patients included were those not readmitted with the same symptoms and those who were not known to have dementia or irreversible brain damage.

'Prospective 2 week assessment post admission was done in 67 patients adjudged to have AMS during this period.' The age of the group of participants in this study was mean 49.76 years (18–91 years). In fact, not less than 58.20% of the patients had at least one co morbid condition which was most often hypertension, followed by diabetes mellitus and chronic liver disease. We further showed that diabetic mellitus patients have poorer prognosis compared to those who are not. Additionally, a large proportion of the cohort was reported using substances, including 34.2% alcohol, 11.9% tobacco, 5% of opium derivatives, possibly indicative of substance abuse on AMS incidence and amount. Possible history of poisoning in three patients indicated that in AMS patients, toxicological assessment complete is necessary. The results showed that the patients to develop from secondary AMS, strokes were associated with worse prognosis than meningoencephalitis (primary AMS) and the patients derived from primary AMS were better survived than these other two cases (as had

concluded inevitably as secondary AMS cases). The necessity for separating the underlying etiologies for targeting appropriate management strategies is an important point.

However the results signal that subjective could not be the best way to describe AMS descriptions. Implementation of standardized scoring system can standardize assessment and give important prognostic information. In the emergency department setting, the need of objective tools for the diagnosis and management of AMS is pointed out in order to improve patient outcomes during emergency situations [16].

Altered Level of Consciousness (ALOC) is a common and a serious manifestation of emergency department (ED) with a requirement for immediate assessment and treatment. A section of the research was to understand the clinical characteristics, etiology and outcomes of ALOC patients from the ALOC cohort presented to a university hospitals ED as adult patients.

The emphasis of this literature reviews is on the early recognition and intervention of patients with AMS, as the earlier is treated, the better is the outcome. A system based, approach that is comprehensive recommended so that the broad differential is narrowed efficiently and a targeted and efficient treatment plan can be made [17].

The clinical evaluation with established tests of motor function and assessment of brain stem reflexes is essential for initial diagnosis, but in clinical practice it doesn't sufficiently characterize the precise cause and extent of the injury. Neuroimaging is thus essential in confirming the cause, particularly when acutely obtaining knowledge of treatable or reversible conditions in order to improve patient outcomes is of urgent priority for acute cases. In emergency settings, particularly, neuroimaging is useful because brain lesions or abnormalities, such as hemorrhages, strokes, tumors, etc., that may result in loss of consciousness can be identified. It helps to build up a proper management strategy and prognostic estimation in patient.

Coma is a symptom of myriad pathophysiology problems that can be caused by traumatic brain injuries, strokes, metabolic and infectious conditions. To a great extent, these causes are not understood and related mechanisms are not clear on neuroimaging terms, presenting as different in investigating the ideal imaging modalities and to read the resulting image effectively.

CT scans and MRIs are necessary to assess people in coma and coma like states to establish if there are structural problems in the brain. These imaging modalities also have important diagnostic roles in the cases of suspected brain death as they are used to confirm the absence of brain activity and exclude reversible causes to coma. But neuroscience should be supplemented with the clinical examination, and if necessary, other tests. These tests should choose those that have a good specificity, safety, available, and allow for the confounding factors.

Neuroimaging must be integrated into the process of diagnosis of coma and other altered states of consciousness. By using clinical evaluation along with advanced imaging, health care providers gain improved diagnosis, discover treatable causes and more accurate prediction of their patient's outcome. This paper discusses the critical role neuroimaging plays in the evaluation of coma, brain death and related conditions noting the abundant literature regarding the use of neuroimaging in such investigations. Clinicians can address the difficulties associated with coma diagnosis and therapy using a multifarious approach , which will improve patient management and recovery [18].

Particularly within emergency departments (EDs), literature review of the complex and multifactorial nature of altered consciousness (AC), and related altered mental status (AMS), was reviewed. Intracranial and extracranial causes were repeatedly shown to make significant contributions to the presentation of AC and AMS in various studies. Most common causes were neurological disorders such as strokes, metabolic derangements, infections and intoxications. In addition, accurate and timely diagnosis is necessary, but also difficult because of the broad differential diagnosis and the time sensitivity of the AMS cases. The reviewed studies also emphasize the requirement of standardizing diagnostic protocols and management strategies, especially in emergency settings where emergency intervention has very significant impacts on patient outcomes.

Although there is a great deal of research, some are still missing. Several studies pointed out inconsistencies in diagnostic approach, especially in the resource limited setting and no region specific data, especially in Pakistan. Furthermore, while several studies have been done for the underlying causes of AMS, but none has been worked for appropriate diagnostic tool and management strategies particular to the unique patient centered health care landscape of Pakistan. In fact, these gaps illustrate the need for further research to build more reliable, evidence based guidelines for emergency care of AMS.

It is thus the purpose of this study to fill these gaps through a focus on the causes, diagnostic processes and outcomes of AMS in emergency departments of Pakistan. By exploring the regional differences and highlighting the most common causes, the result of this study will lead to developing more focused, efficient diagnostic strategies and management. The methodology used in this research is summarized in the next chapter, which details the design, data collection, and analytical approaches taken in order to look into AMS causes and management in the Pakistani ED setting.

Chapter 3

METHODOLOGY

3.1. Research Design

In this study Prospective observational design was adopted.

3.2. Clinical Settings

CMH Rawalakot AJK was used for the clinical settings of this study.

3.3. Sample Size

$n = (Z^*2 * p * (1 - p)) / E^{*2}$ is the formula for calculating sample size;

values for n=150

90 percent confidence level Z=1.96#Z-score

P=10% = 0.10

3.4. Sampling Technique

Convenience sampling technique was used for this study.

3.5. Duration of Study

Duration of the study was approximately 4 months after AS & RB or BOS approval.

3.6. Selection Criteria

3.6.1. Inclusion Criteria: Patients with GCS<15, age group 18 years to 90 years which come in emergency department due to any etiology were included in this study. **3.6.2. Exclusion Criteria** GCS = 15 were excluded from the study. Also, the patients coming in any outpatient department setting or other than emergency department and age group <18 or > 90 were excluded from this study.

3.7. Ethical Consideration

The study was conducted after successful approval from institutional ethical committee and ethical approval of Superior university Lahore.

3.8. Data Collection Procedure

Data was collected through a slight modified pre-designed Performa. For data collection procedure patients which fit into inclusion and exclusion criteria in the emergency department of the hospital were examined.

Reference point for data collection was the time of discharge from emergency department.

3.9. Data Analysis

Data analysis was done through SPSS 27th version and M.S EXCEL 2021. statistics , Chi square test and crosstabs were used .

Chapter 4

RESULTS

Table 4.1.Descriptive statistics of every variable

Graph Title	Key Findings
GCS Score Distribution by Diagnosis	- Most cases with GCS scores of 3-5 were ischemic strokes (6.00%).
	- A wide range of diagnoses such as adrenal insufficiency, psychosis, and alcohol intoxication contributed 2-4%.
Patient Outcomes	- 48.67% of patients were discharged.
	- 25.33% of patients required ICU admission.
	- 14.67% underwent surgical intervention, and 4.67% were admitted.
	- 4.67% experienced death.
Definitive Diagnosis	- Alcohol intoxication accounted for the highest percentage (10.67%).
	- Ischemic stroke and hypoglycemia contributed to 8.67% and 6% respectively.
	- A broad range of diagnoses contributed small percentages (1.33% to 6.00%) such as COPD, catatonia, and CKD.
Etiology-Subclasses	- Metabolic causes were the most frequent (16.67%), followed by drugs/poisoning (20.67%).
	- Psychiatric conditions and vascular causes contributed equally (13.33%).
	- Endocrine and infections accounted for 10.67% and 7.33%, respectively.
	- Seizure-related causes and uremia were among the least frequent (6.67%).
Etiological Class	- Extra-cranial etiologies accounted for 55.33% of cases.
	- Intra-cranial causes accounted for 44.67% of cases.
GCS Score	- The most frequent GCS range was 9-11 (26%), followed by 6-8 (29.33%).
	- GCS scores of 3-5 and 12-14 accounted for 24.67% and 20%, respectively.

The table highlights the distribution of etiologies, diagnoses, GCS scores, and patient outcomes in a diverse clinical population. Among GCS score distributions, severe scores (3-5) were most frequently associated with ischemic strokes, contributing 6.00%, while moderate scores (6-11) were linked to a broader range of conditions, including adrenal insufficiency, psychosis, and alcohol intoxication, each contributing 2-4%. Regarding patient outcomes, nearly half of the patients (48.67%)

were discharged, while 25.33% required ICU admission, reflecting the severity of some cases. Surgical intervention was necessary for 14.67%, and 4.67% experienced mortality, emphasizing the critical nature of specific conditions.

Alcohol intoxication emerged as the most frequent definitive diagnosis, accounting for 10.67%, followed by ischemic stroke (8.67%) and hypoglycemia (6.00%). A wide variety of other diagnoses, such as COPD, catatonia, and CKD, contributed between 1.33% and 6.00%. In terms of etiological subclasses, drugs/poisoning were the most common (20.67%), followed by metabolic causes (16.67%). Psychiatric and vascular conditions were equally prevalent, each contributing 13.33%, while endocrine and infections accounted for 10.67% and 7.33%, respectively. Less frequent causes included seizure-related conditions and uremia (6.67%).

When categorized into etiological classes, extra-cranial etiologies dominated with 55.33% of cases, while intra-cranial causes accounted for 44.67%. GCS score distribution showed that moderate impairment (scores 6-11) was the most common, with 29.33% of patients in the 6-8 range and 26.00% in the 9-11 range. Severe impairment (scores 3-5) accounted for 24.67%, while mild impairment (scores 12-14) contributed 20.00%. This data underscores the prominence of extra-cranial etiologies, particularly metabolic and intoxication-related causes, in clinical presentations. Although less frequent, intra-cranial causes like ischemic stroke often present more critically, requiring intensive management. The range of GCS scores and varied patient outcomes highlight the complexity of disease severity and recovery potential in this population.

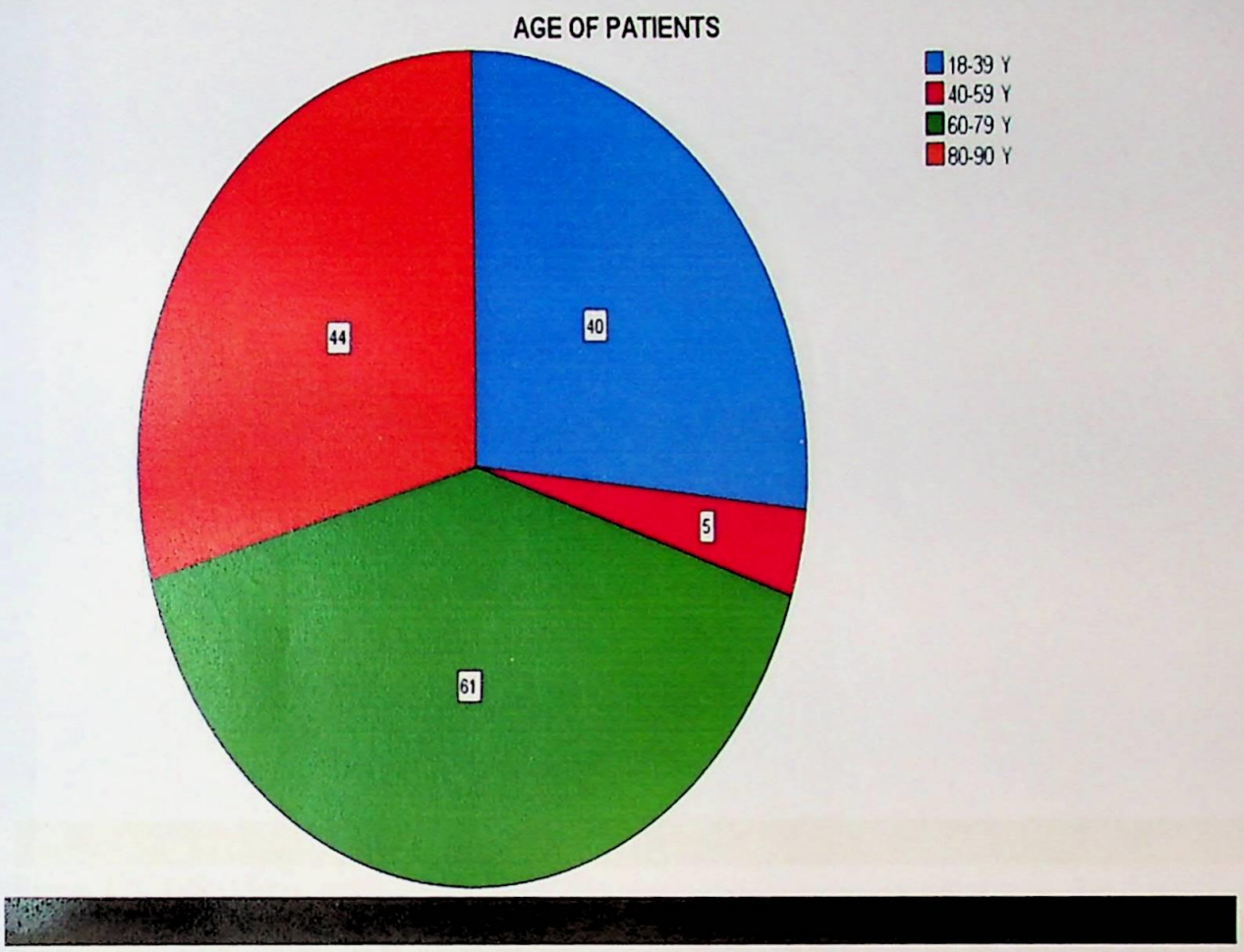


Fig 4.1. Age of patients.

The figure (pie chart) shows the distribution of patients first taken to the emergency department showing an altered level of consciousness (ALOC). A large proportion of patients have an age of 60–79 years, with 61 patients. The 80–90 years age group constitutes 44 patients who are the 2nd in the sequence. 40 patients are 18–39 years aged 40–59 years aged and only 5 cases represent this one. These findings imply that ALOC is more prevalent among the older adults, with special reference to the older adults above 60 years, indicating the increased susceptibility of this group of people to conditions that may result in the impairment of consciousness.

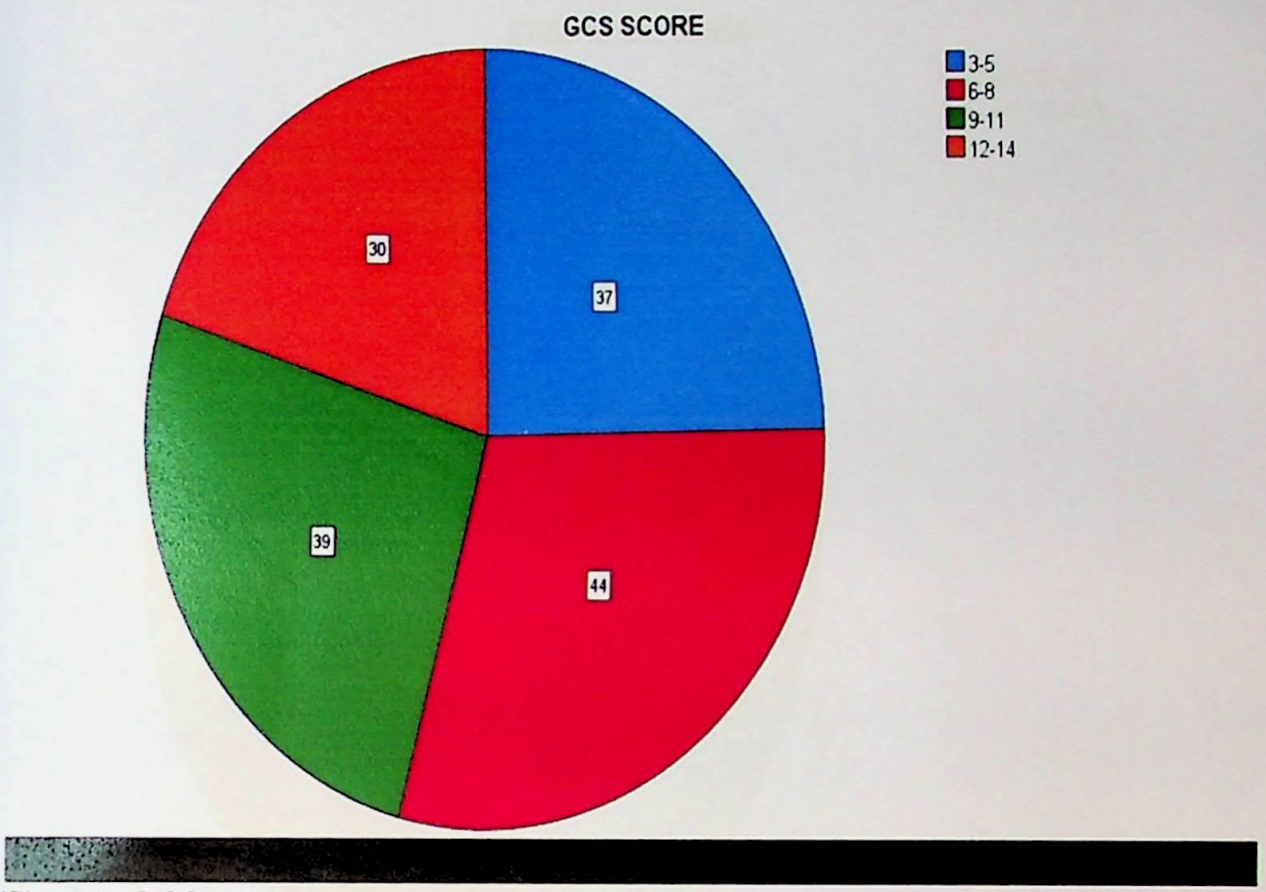


Fig 4.2. GCS score.

Glasgow Coma Scale (GCS) distribution among patients with an altered level of consciousness (ALOC) is given in a pie chart. With highest proportion of patients with 44 in the GCS score range of 6–8, the 9–11 category is very close with 39 patients. Thirty patients had GCS score in range of (12—14) and 37 patients had lowest score (3–5). Out of these patients, this implies that a proportion of them had moderate to severe impairment in consciousness on presenting for care in the emergency department.

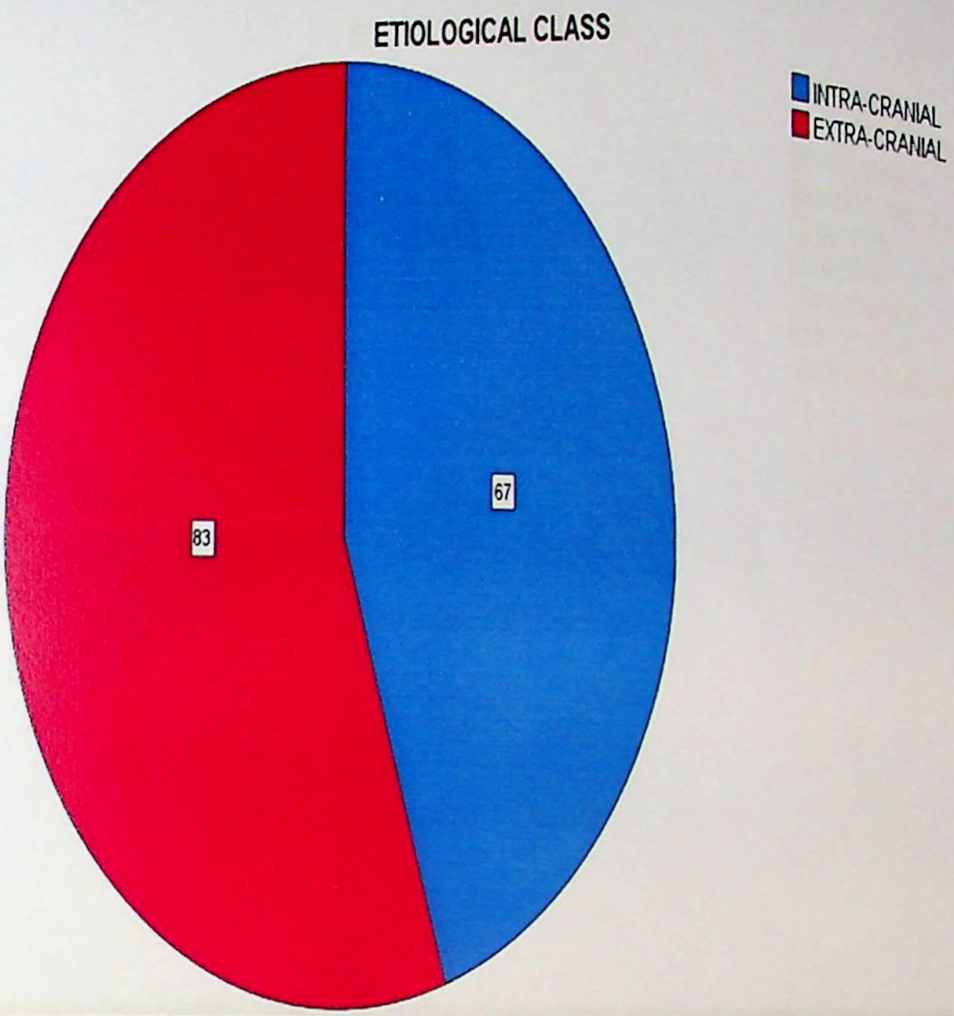


Fig 4.3. Etiological classes.

The figure presents the distribution of etiological classes in patients with altered level of consciousness (ALOC) in the emergency department. In most cases, the causes were extracranial (83 patients), and in 67 patients, intracranial. Such evidence argues that the extracranial systemic conditions, metabolic disturbances, toxicological factors and other extracranial pathologies are responsible more often for ALOC than intracranial, dir from stroke ma etc. These findings emphasise the need omp nostic cluding both neurological and system pati

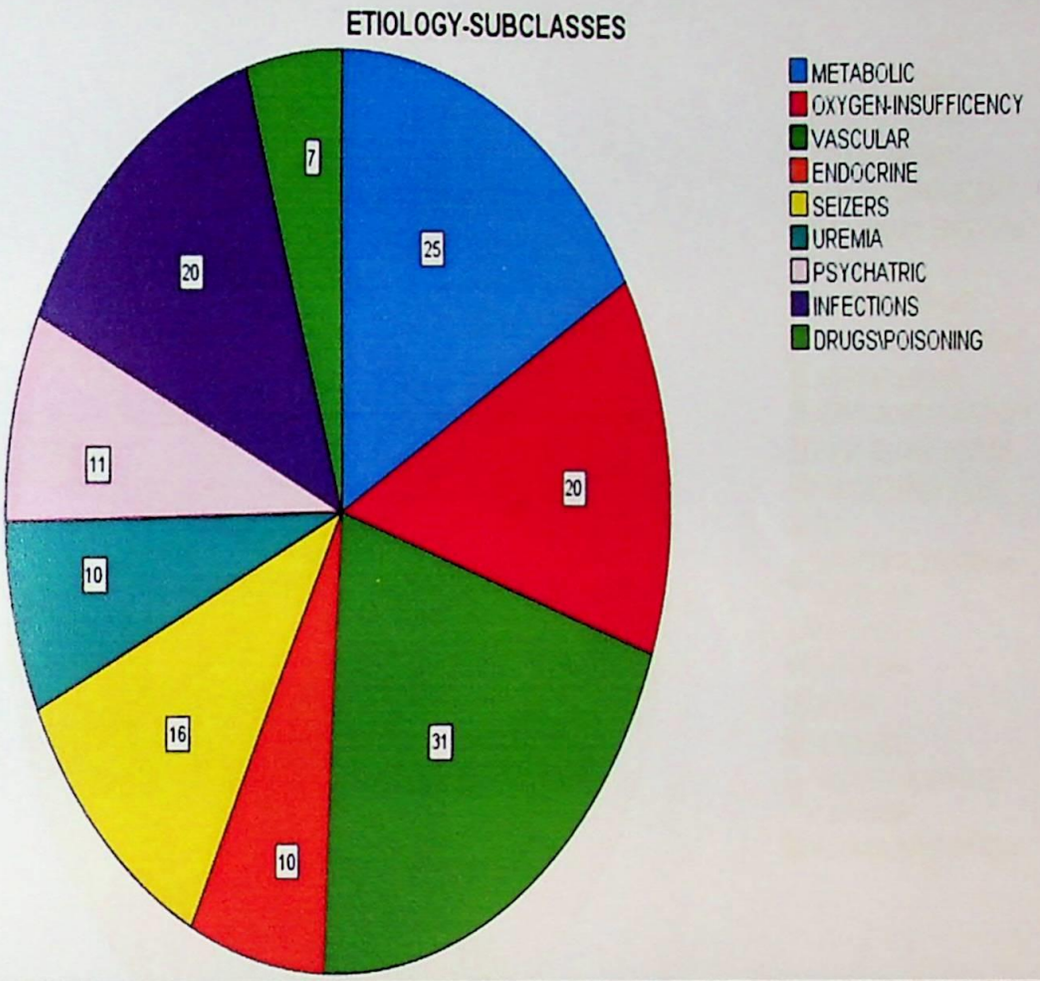


Fig 4.4. Etiology subclasses.

In this pie chart, the distribution of the etiology subclasses among the patients with an altered level of consciousness is shown. There are 31 cases in the vascular subclass, 25 cases in metabolic causes and 20 cases in oxygen insufficiency. The remainders are also a significant portion, comprising 20 cases. There are 10 cases demonstrating seizures or endocrine-related etiologies, while 11 are due to uremia. Causes of 16 infections, and the least common drug/poisoning related cause with 7 cases. However, in this distribution, vascular, metabolic and oxygen insufficiency are the most common etiologies, and hence diagnostic and management strategies are place on a foundation of these two domains.

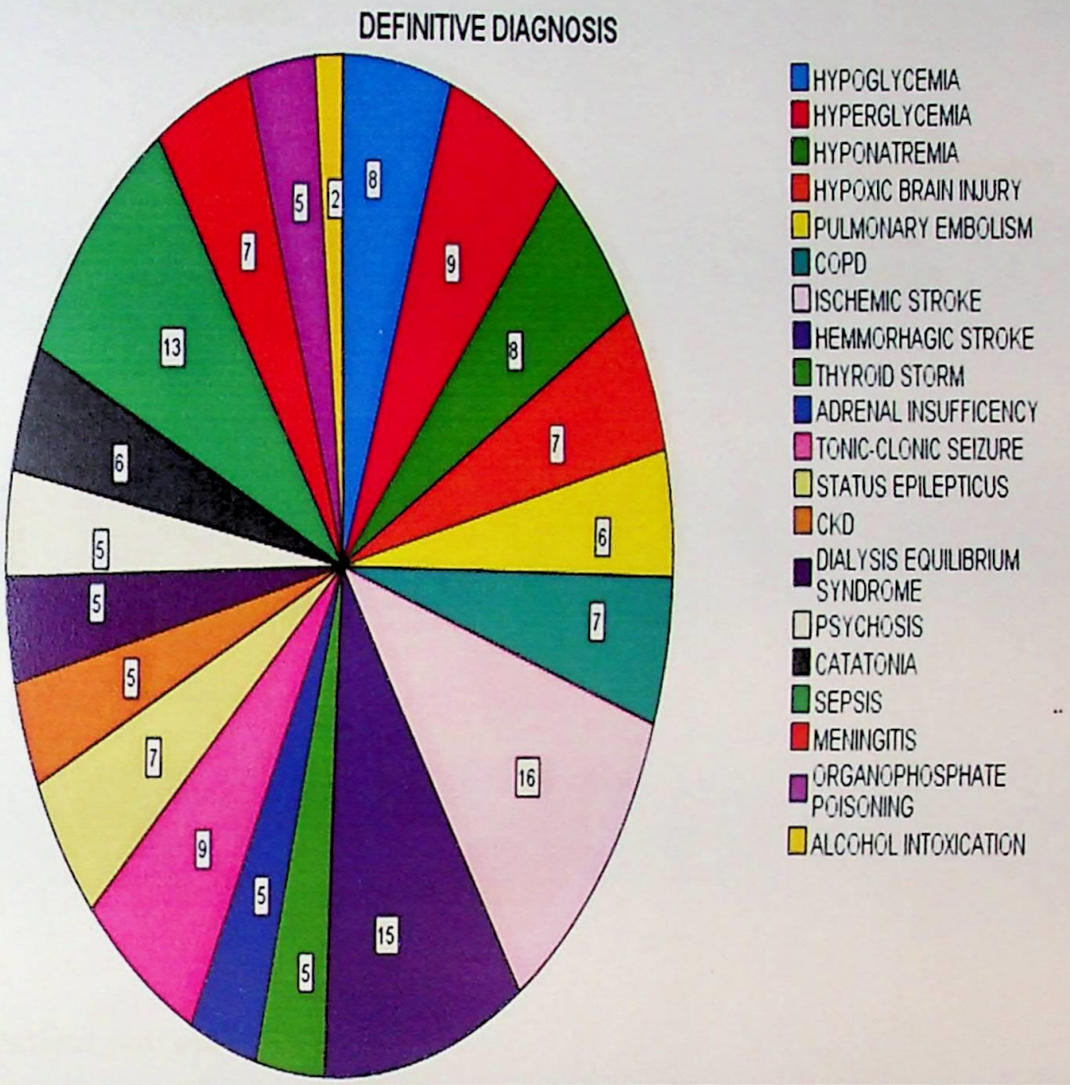


Fig 4.5.Definitive diagnosis.

This pie chart shows the distribution of the etiology sub classes among the patients having an altered level of consciousness. There are 31 cases in vascular subclass, 25 cases in metabolic causes, and 20 cases in oxygen insufficiency. A significant proportion also are the remainders, which number 20. Of these, there are 10 cases with seizures or endocrine related etiology and 11 with uremia. Causes of 16 infections, and the least common drug/poisoning related cause with 7 cases. Nevertheless, in this Etiology, the most common are vascular, metabolic and revascularization which have a broader diagnostic and management strategies based on these 2 domains.

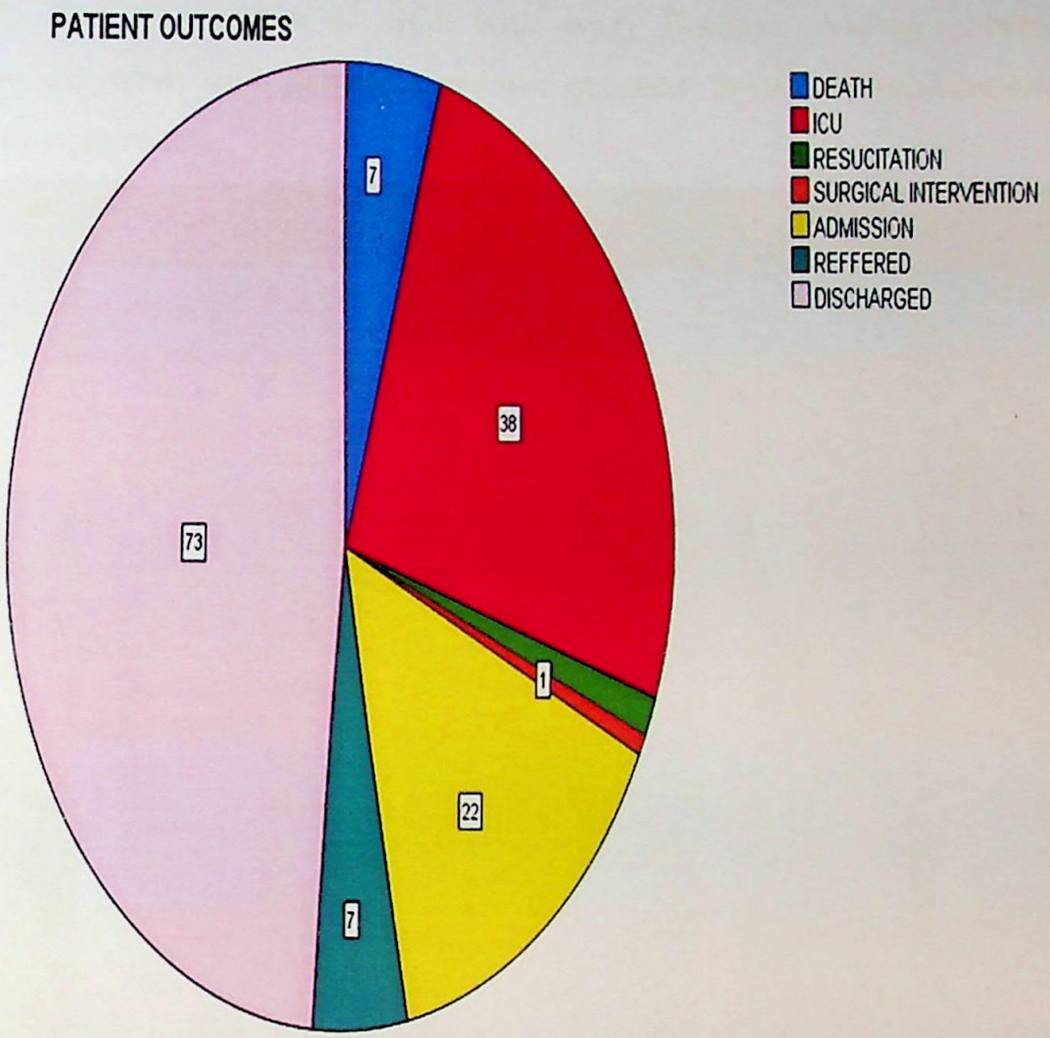


Fig 4.6.Patient outcomes.

This pie chart shows the percentage of patient outcomes in altered level of consciousness. Most patients were discharged following treatment (73 cases) but have a favorable prognosis in the majority of cases. Of the 38 cases, it was clear that most of them (38 cases) needed to be admitted to the Intensive Care Unit as it was so severe. Twenty-two remaining cases were hospital admissions for further management and 7 to other healthcare facilities. 7 had mortality, emphasizing the seriousness of some diagnoses. In addition, 1 case required surgical intervention, a small percent had been resuscitated, and 1 case required surgical intervention. Cross tabs with GCS of every property.

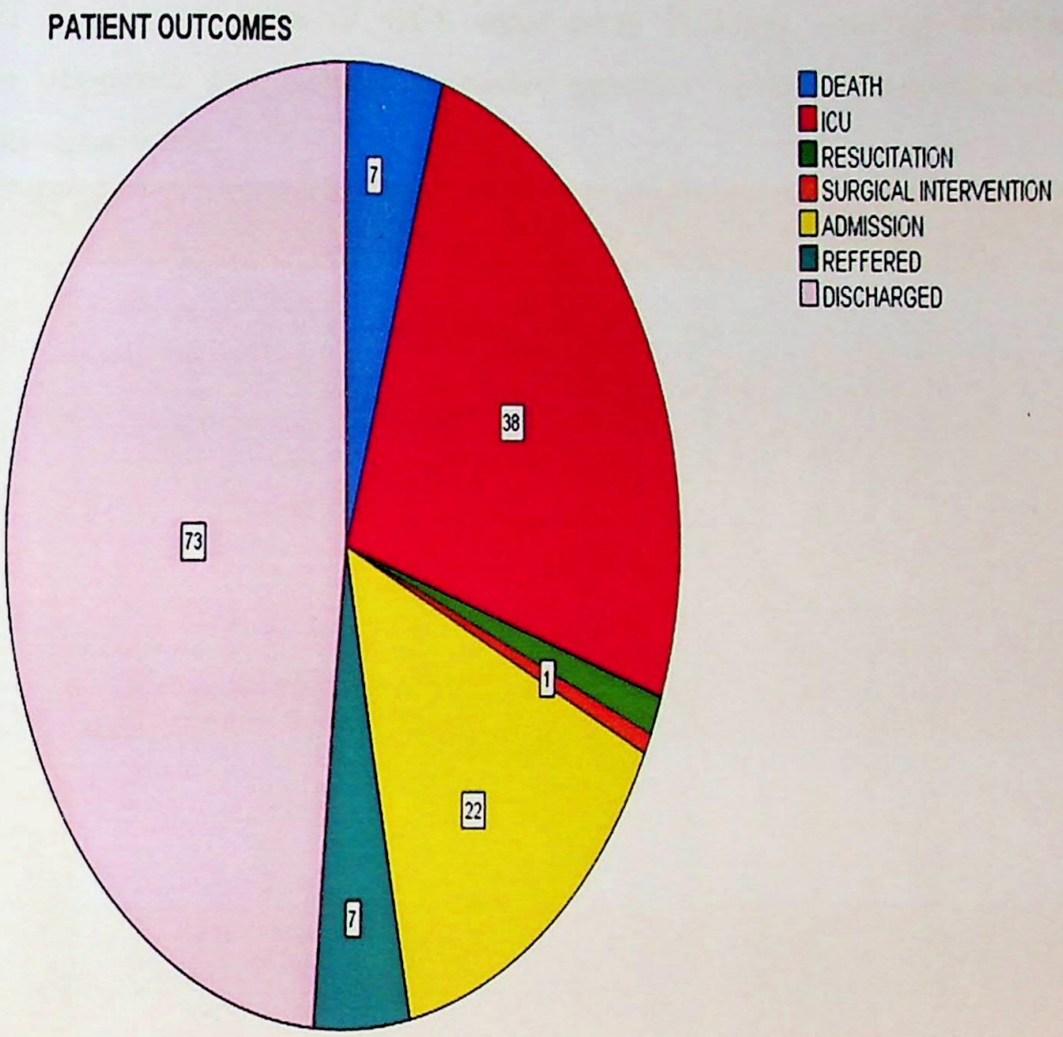


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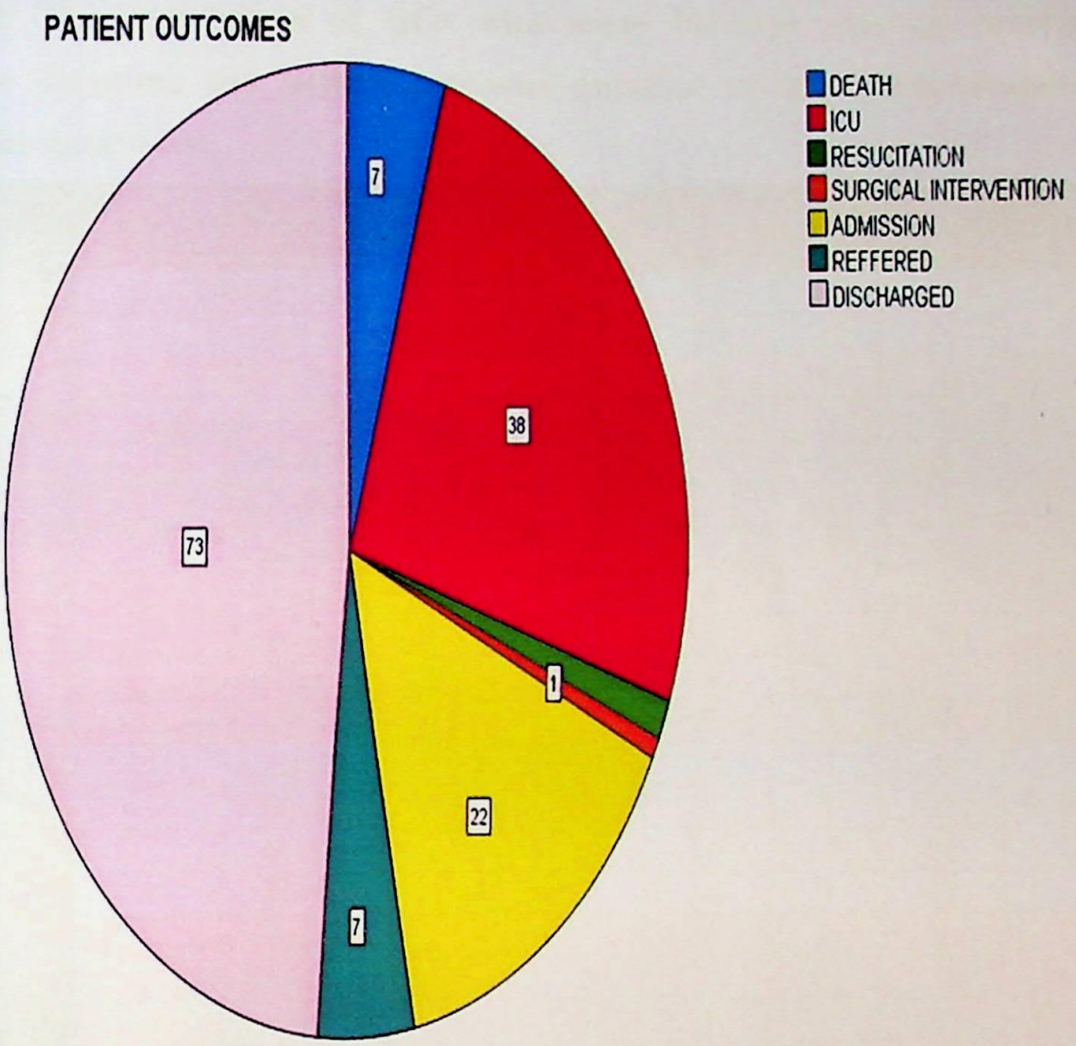


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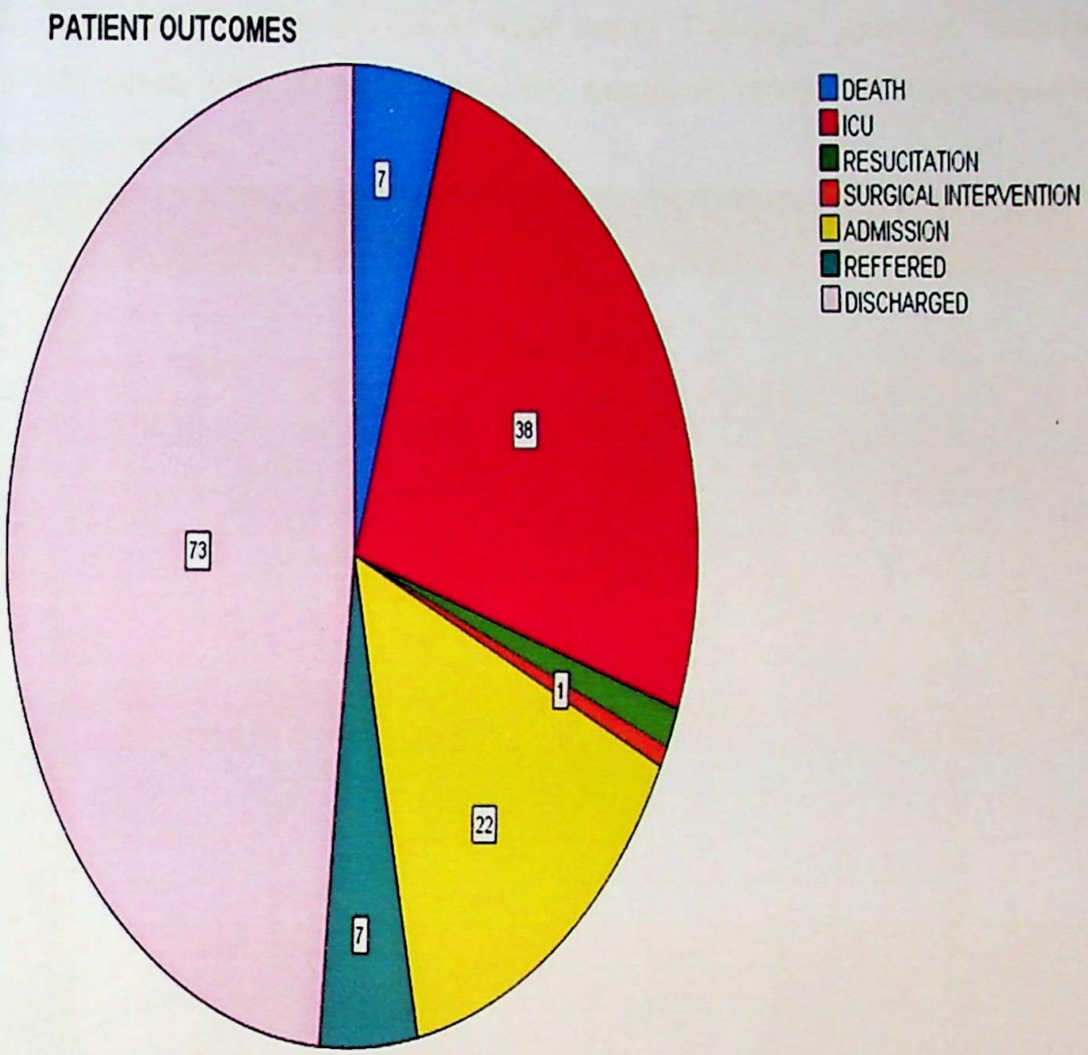


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Etiologies, Definitive Diagnosis and Patient Outcomes in Altered Level of Consciousness in the Emergency Department

SUPERIOR UNIVERSITY

Thesis Submitted to
The Superior University Lahore
In Partial Fulfillment of the
Requirement for the Degree of
Master of Science in Allied Health Sciences

By
SAMSAAM FAZAL
Roll No. SU91-MSAHW-S23-221
Session: 2023-2025
Faculty of Allied Health Sciences

(7)

Table.4.2. The comparison of GCS with every Etiology ,etiology subclass, Definitive diagnosis and patient outcomes question using a cross-tabulation with a Chi-square test.

	GCS	3-5	6-8	9-11	13-14	P Value
Etiological Class	Intra-Cranial	24	15	17	11	0.031
	Extra-Cranial	13	29	22	19	
Etiology Subclass	Metabolic	5	10	9	1	0.001
	Oxygen Insufficiency	4	8	2	6	
	Vascular	14	5	9	3	
	Endocrine	0	3	4	3	
	Seizers	6	4	6	0	
	Uremia	0	6	1	3	
	Psychiatric	0	0	5	6	
	Infection	4	6	2	8	
	Drugs/Poisoning	4	2	1	0	
Age of Patients (Years)	18-39	14	11	9	6	0.423
	40-59	2	1	2	0	
	60-79	14	16	19	12	
	80-90	7	16	9	12	
Definitive Diagnosis	Hypoglycemia	3	4	2	0	0.001
	Hyperglycemia	0	4	4	1	
	Hyponatremia	2	3	3	0	
	Hypoxic Brain Injury	4	2	0	1	
	Pulmonary Embolism	0	3	0	3	
	COPD	0	3	2	2	
	Ischemic Stroke	5	5	6	0	
	Hemorrhagic Stroke	9	0	3	3	
	Thyroid Storm	0	3	0	2	
	Adrenal Insufficiency	0	0	4	1	
	Tonic-Colonic Seizures	3	4	4	0	
	Status Epilepticus	3	4	2	0	
	CKD	0	2	1	0	
	Dialysis	0	2	0	3	
	Psochosis	0	0	3	2	
	Catatonia	0	0	2	4	
	Sepsis	4	3	0	6	
	Menengitis	0	3	2	2	
	Organophosphate	3	1	1	0	
	Alcohol Intoxication	1	1	0	0	
Patient Outcome	Death	7	0	0	0	0.001
	ICU	22	15	1	0	
	Resuscitation	2	0	0	0	
	Surgical Intervention	3	0	0	0	
	Admission	1	19	1	1	
	Referred	1	4	0	2	
	Discharged	1	6	37	27	

This table provides a comprehensive breakdown of patients with altered levels of consciousness (ALOC), categorized by Glasgow Coma Scale (GCS) scores, etiological classes, etiology subclasses, age distribution, definitive diagnoses, and patient outcomes. The GCS scores are divided into four groups: 3-5, 6-8, 9-11, and 12-14, indicating the severity of consciousness impairment, with lower scores reflecting more severe cases.

Etiological Classes and Subclasses:

Patients were classified into intra-cranial and extra-cranial etiological classes. Extra-cranial causes were more prevalent across all GCS groups, particularly in the moderate range (6-8), with 29 cases compared to 15 intra-cranial cases. Common extra-cranial etiologies included metabolic (10 cases), oxygen insufficiency (8 cases), and vascular causes (5 cases). Among intra-cranial causes, vascular incidents like ischemic stroke and hemorrhagic stroke were prominent, particularly in the severe GCS range (3-5).

Definitive Diagnoses:

Ischemic stroke emerged as a leading definitive diagnosis, particularly in the severe and moderate GCS groups, with 14 and 16 cases, respectively. Other significant diagnoses included tonic-colonic seizures (12 cases in the moderate group) and sepsis (12 cases, predominantly in the severe and moderate groups).

Age Distribution:

Patients ranged in age from 18 to 90 years and highest incidence was seen in 40 to 59 and 60 to 79 age groups. Older patients presented with the severe ALOC (the patients in the severe GCS (3-5) group had many aged 60-79 (14) and 80-90 (7), which was significant).

Patient Outcomes:

Many categories of outcomes, namely ICU admissions, resuscitation efforts, surgical intervention, and discharge status were tracked from patient outcomes. The most frequent ICU admissions were in the moderate GCS group (19 cases) as these patients had the critical care needs. Thus, deaths were monitored predominately in the severe GCS group (7 cases), with a high mortality risk in severe ALOC. Patients in the higher GCS groups tended to have more discharges, with 27 in the 12-14

range making a good recovery prospect for those who are more serious with their ALOC Summary.

- **Etiological Class**: Extra-cranial causes (83 cases) were more common than intra-cranial causes (67 cases).
- **Definitive Diagnoses**: Ischemic stroke (14 cases), tonic-clonic seizures (12 cases), and sepsis (12 cases) were the most frequent diagnoses.
- **GCS Distribution**: The moderate GCS range (6-8) had the highest number of cases (44 cases).
- **Patient Outcomes**: ICU admissions were most common in the moderate GCS group (35 cases), with 7 deaths primarily in the severe GCS range (3-5).

This detailed analysis identifies the importance of extra cranial causes in ALOC and the consequence of ischemic stroke, seizures and sepsis on patient outcome. Intervention and management need to be timely to improve patient prognosis.

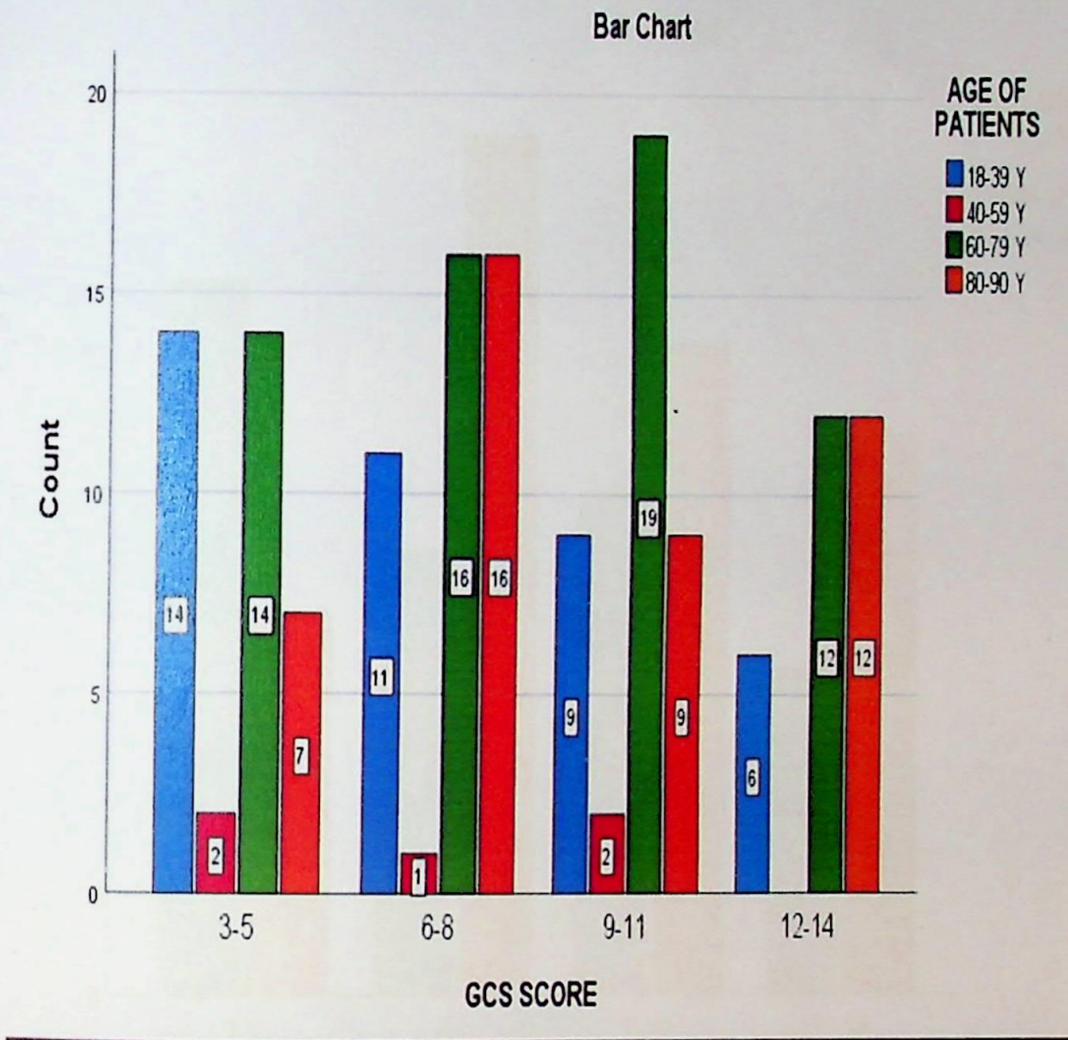


Fig 4.7. GCS VS AGE OF PATIENTS.

We demonstrate the bar chart with the distribution of Glasgow Coma Scale (GCS) scores for various age groups of patients with an altered level of consciousness (ALOC). Within the 6–8 and 3–5 GCS ranges there is a significant number of patients in the 9–11 range (16 and 14 patients, respectively) and especially in the 60–79 years age group (19 patients). There's also a big number of the cases among the 80–90 years group, n special with extension to the 6–8 and 12–14 GCS (16 and 12 patients, respectively). The dispersion of the 18–39 years group is even with 3–5 range (104 patients), 6–8 and 9–11 ranges. Only a few cases in each range, there is the smallest proportion among all GCS categories in 40–59 years. These findings suggest that ALOC affecting older adults (seniors) especially those 60 years and above is more common with varying degrees of consciousness impairment

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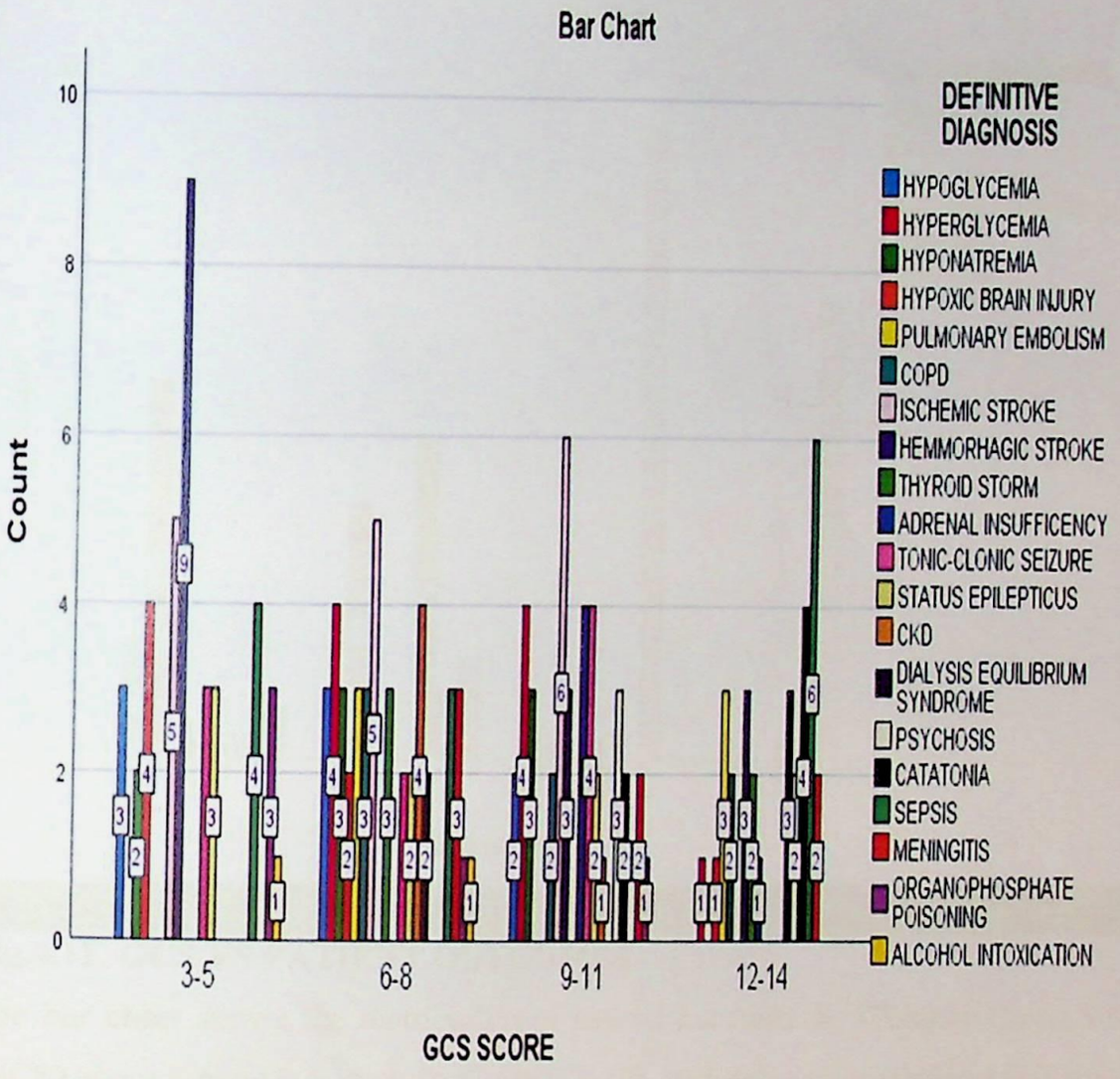


Fig 4.10. GCS VS DEFINITIVE DIAGNOSIS.

The bar chart shows the percentage of cases with definite diagnosis across the various intervals of Glasgow coma scale score (between 3-5, 6-8, 9-11 and 12-14). It illustrates the frequency of different medical conditions that result in an altered level of consciousness. Status epilepticus is most common among the cases with a GCS score of 3–5, followed by hemorrhagic stroke, ischemic stroke and sepsis. A relatively balanced distribution of diagnoses is seen across the 6-8 GCS range, with ischemic stroke, tonic colonic status, sepsis, however more common are ischemic stroke, tonic colonic status, and sepsis. Similar pattern is observed with the 9-11 category, with ischemic stroke and sepsis common, and thyroid storm and adrenal insufficiency less common. Ischemic stroke is one of the more common conditions for patients with a GCS of 12-14, along with organophosphate poisoning and psychosis. The findings reveal that patients with lower GCS scores are more likely to develop the severe neurological disease, e.g. status epilepticus or stroke, whilst patients with higher GCS scores have metabolic and toxicological causes, i.e. psychosis or poisoning.

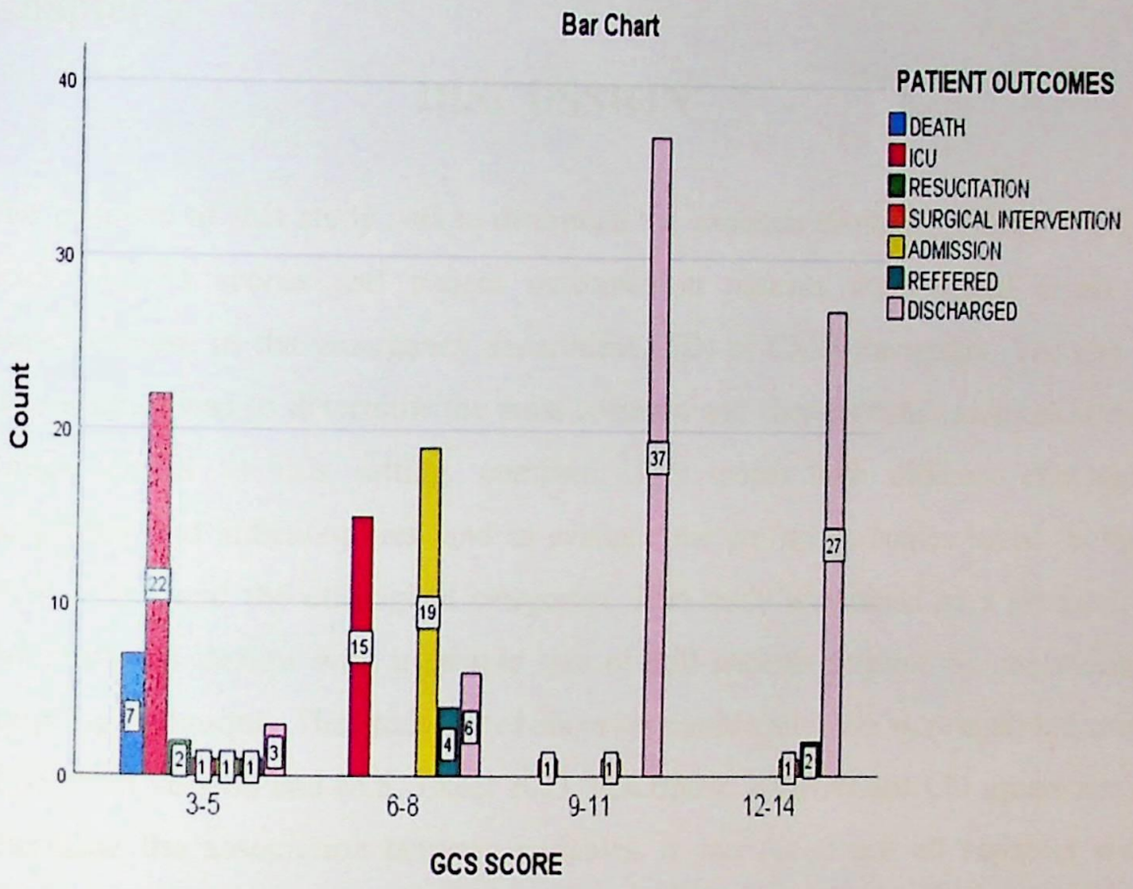


Fig.4,11. GCS VS PATIENT OUTCOMES.

The bar chart shows the distribution of patient outcomes by Glasgow Coma Scale (GCS) score range (3–5, 6–8, 9–11 and 12–14). It shows a clear cut trend that patient with lower GCS scores are more prone to severe outcome, i.e. ICU admissions and deaths. ICU admissions are the most common outcome among patients with a GCS score of 3–5 (22 cases), followed by death (7 cases), and some patients were resuscitated, underwent surgical intervention, or were referred. ICU admissions are high in the 6–8 GCS category (15 cases) but hospital admissions dramatically increase (19 cases), which would suggest that NOT all of those patients in this range of GCS were fully life support and ICU admitted, but rather they were stabilized and hospital admitted in the moderate GCS range. The most common outcome for the 9-11 GCS range is discharge (37 cases) suggesting better prognosis in this group with only few cases requiring ICU care or surgical intervention. As in the 12-14 GCS range, discharge is the predominant outcome (27 cases), with few ICU admissions and referrals. Our results show that both critical patient outcome variables critically depend on GCS scores: Lower scores are associated with ICU admission and mortality, and higher GCS scores are associated with greater chance of discharge and less need of medical interventions.

Chapter 5

DISCUSSION

The purpose of this study was to determine the common etiologies, Glasgow Coma Scale (GCS) scores and patient outcomes in patients with altered levels of consciousness in the emergency department (ED) of CMH Rawalakot. The aim of the research was to determine the most common and characteristic causes of altered consciousness in this setting, compare GCS scores with different etiological categories and subcategories, and to evaluate the patient outcomes based on both GCS scores and the etiological categories. This study was based on a prospective observational design with a sample size of 150 patients selected by convenience sampling technique. The study lasted about six months and data were analyzed using SPSS 27th version and M.S. Excel 2021, descriptive statistics and Chi square test to determine the association between variables. It was found that all variables were statistically significant, except for age.

The study results showed that the most common etiologies of altered consciousness seen in the emergency department were vascular and metabolic disorders. Ischemic and hemorrhagic strokes were the leading vascular causes, and a large proportion of cases, especially in the lower GCS score ranges (3–5). Metabolic disturbances such as hypoglycemia and hyponatremia were shown to be a major cause of altered consciousness and hypoglycemia was the most common metabolic etiology. Other important causes included infections, such as sepsis, psychiatric disorders, including psychosis and catatonia, and drug intoxications, especially alcohol related poisoning. As the GCS scores increased, extra-cranial causes, including drug poisoning, psychiatric disorders, and metabolic issues, became more prominent. This shift aligns with existing literature that suggests intra-cranial causes such as strokes are more prevalent in patients with severe neurological impairment, while extra-cranial etiologies, like intoxications and psychiatric conditions, are more common in less severely impaired patients.

Same sort of results was concluded by kekcec et all[12] which stated as research also found that metabolic disturbances, including hypoglycemia and hyponatremia, were significant contributors to ALOC, paralleling the identified role of endocrine and metabolic disorders in the referenced study. This supports the need for routine

metabolic screening in AMS patients, emphasizing the importance of rapid identification and management of metabolic etiologies to prevent severe outcomes. He also found toxicological factors (1.5%, n=12).The mental status of the patients varied widely, with 40% in a deep coma. The similarity may be due to same methodology in our study.

In another study Kim kt et all[13] stated that the etiologies of ALC were categorized into extracranial (63.1%) and intracranial (36.9%) causes, with metabolic causes being the most prevalent (24.7%), followed by systemic infections (17.3%) supporting the findings of our study.

In another study thaganda MS et all[15] concluded that , a significant portion of the cohort reported substance use, with 34.2% consuming alcohol, supporting our study results.

In our study we also found that GCS scores played a significant role in predicting patient outcomes. For patients with GCS scores in the 3-5 range, which indicate severe impairment, the prognosis was generally poor. These patients were predominantly affected by vascular and metabolic etiologies and had high rates of ICU admissions (14.67%) and deaths (4.67%). The results corroborate previous studies which suggest that lower GCS scores are associated with a higher risk of mortality and require more intensive care. As the GCS scores increased, patients were more likely to be discharged, and fewer required ICU admissions or resuscitation efforts. Specifically, for patients in the 9-11 GCS range, discharge rates were notably higher at 24.67%, and only a small proportion (1.33%) required ICU care. This is consistent with existing research that shows higher GCS scores are generally associated with better patient outcomes, lower mortality, and fewer complications.

In a study by ukedec et all[18] found that A strong correlation exists between the P-GCS score and FIM, with mortality decreasing sharply between scores of 3 and 7, then declining more gradually. Although the P-GCS score relates to mortality in head-injured patients, its nonlinear nature raises concerns about its effectiveness in outcome prediction. Additionally, survivors with low P-GCS scores often show good FIM scores, complicating the use of the P-GCS score for predicting poor outcomes early on.

Similarly, in another study author Brazinova A et all[19] found Patients with GCS scores of 3 or 4 who are older than 65 years have a poor, but not hopeless, prognosis, which supports our findings.

More over While age was hypothesized to be a potential factor influencing outcomes, the study's analysis showed that age did not have a statistically significant impact (p-value > 0.05). This suggests that age, within the studied age range (18-90 years), may not have been a major determinant in GCS scores or patient outcomes. This finding contrasts with some prior research, which suggests that older adults tend to have worse outcomes due to age-related comorbidities and a higher risk of severe neurological impairment. However, the lack of significance in this study could be attributed to the sample size and the specific clinical context of the study, where the age distribution was relatively balanced across different GCS score categories.

In a study by Rau et all[20]found that this study suggests that a bias exists in the patients with moderate TBI defined using the GCS, such that elderly patients in each GCS stratum may have worse anatomic injuries than their younger counterparts. In this study, the GCS scores of the elderly TBI patients with head AIS of 3 and 4 were 14.1 ± 2.0 and 13.1 ± 3.2, respectively, which were higher by >1 score than their younger counterparts. Therefore, the elderly population may require an alternative strategy by not only solely relying on the GCS score to ensure the appropriateness of decisions made regarding the severity of illness, triage protocol, and requirement of a transfer.

The strength of this study lies in the relatively large sample size (150 patients), which provides a robust representation of the population in the study setting. Another limitation of this study is the use of a prospective observational design that allowed for a continuous data collection and analysis which makes our findings more appropriate to the real clinical setting. Because of the inclusion of a wide variety of etiologies and the measurement of patient outcomes by GCS scores, this relationship could be examined in a comprehensive manner. However, the study had some limitations. The first limitation is that no sampling technique other than convenience was used to select patients for the study, thus potential selection bias resulting from patients who presented to the ED at specific time could have been introduced. The study also excluded patients with a GCS score of 15, which restricted the ability to study mild cases of altered consciousness and their outcomes. Despite efforts to

minimize incomplete or inconsistent data from this retrospective data collection, which was based upon existing medical records, data collection suffered from being retrospective.

The study's results are in agreement with a few key studies that have explored the use of GCS scores to predict patient outcomes. According to these results, lower GCS scores is associated with higher mortality rates and longer stay in the ICU, which is in keeping with lots of other studies that show that lower GCS scores are correlated with a worse outcome. As with the association of certain etiologies such as strokes, metabolic disturbances and psychiatric conditions with altered levels of consciousness, the literature has well documented this association. Contributions of this study to this body of work include further insight into how etiologies affect GCS scores, which are then associated with patient outcomes in an emergency department.

Future research should conduct multicenter studies that include a more general population to provide more generality to the present findings. Additionally, elucidating the effectiveness of different treatment interventions on patient outcomes depending on etiology would also be of interest as it could help in developing better clinical management. Future studies may focus on longitudinal studies that follow patient outcomes over a longer period of time to help clarify with a greater accuracy patient outcome in patients with altered consciousness. Secondly, it will be interesting to see if other factors like the comorbidities, socioeconomic status, as well as access to healthcare itself may affect the outcome of the patient in this population.

Finally, this study offers useful information regarding the most common causes of altered consciousness in the emergency department and their relationship to GCS scores and patient outcomes. It also supports GCS as an important prognosticating tool, as well as education for the underlying causes of altered consciousness to enable clinical management. The study results emphasize the requirement for targeted interventions depending on the etiology of altered consciousness and the degree of neurological impairment, especially in those with lower GCS. Importantly, the findings have important clinical implications in that better recognition and management of patients with altered levels of consciousness could have a positive

impact on patient outcome. It can make it possible to learn of the study's limitations and perform additional work to get a better grasp of this complicated clinical issue in emergency department in order to care better patient in emergency department.

Chapter 6

CONCLUSIONS

This study of Altered Level of Consciousness (ALOC) in emergency department patients finally demonstrates that ALOC is more common in elderly patients and the most common etiologies are extra cranial factors such as drug poisoning and metabolic disturbances. GCS score was very important because lower score means higher degree of severity and prognostication of the patients. The study highlights the importance of early GCS assessment and identification of the cause of ALOC in the elderly. These findings suggest that a diagnostic approach and targeted interventions are indicated for the improvement of outcome of ALOC patients.

LIMITATION

1. Single Centre Study: The study was conducted at CMH Rawalakot AJK and the findings cannot be generalized to other areas or healthcare settings.
2. Selection bias: The selection may have been biased with use of convenience sampling if the patients more easily accessible did not fully represent the larger patient population with ALOC.
3. Short Study Duration: The study itself only lasted approximately six months, leaving potentially the time needed to observe long-term trend and ALOC seasonality.
4. Exclusion: Patients with a GCS score of 15 or those under 18 or over 90 years of age were excluded, which may impact the complete understanding of ALOC in all age groups and levels of consciousness.
5. Other potential confounders (such as comorbidities or treatment interventions) did not fully control for these other variables in the study, and hence may have interacted with the study results.
6. Data Collection Tool: The study used a modified pre-designed Performa, which could have errors and inconsistencies in data collection based on the quality and comprehensiveness of the tool use
7. Observational Design: As a prospective observational study, the research could not establish causal relationships but only observed associations between etiologies and outcomes, limiting the strength of the findings.

RECOMMENDATIONS

1. Prioritize Early Identification of Metabolic Causes: Given the high prevalence of metabolic disorders as a cause of ALOC in this study, it is recommended that emergency departments (ED) prioritize rapid screening for metabolic disturbances (such as electrolyte imbalances, hypoglycemia, and renal failure) in patients presenting with altered consciousness.
2. Enhanced Neurological Evaluation: Since neurological causes (particularly stroke and traumatic brain injuries) were a significant etiology of ALOC with associated low GCS scores, it is recommended that ED teams conduct a thorough neurological assessment and consider early imaging (e.g., CT or MRI) for suspected stroke or head trauma cases to ensure timely intervention.
3. Screen for Toxic Causes in High-Risk Groups: The relatively high prevalence of toxic causes (such as drug overdoses) in younger patients suggests the need for heightened suspicion of poisoning or overdose in at-risk groups.
4. Patients presenting with altered consciousness, especially with a history of substance use, are at higher risk of cardiotoxic poisoning and early toxicology screening and appropriate antidote administration should be considered.
5. GCS can be used as a Prognostic Tool: The strong correlation between GCS scores and patient outcomes makes it advisable that healthcare providers use the Glasgow Coma Scale (GCS) as a leading tool for triaging and monitoring ALOC patients. GCS can be early and consistent evaluated to best predict the severity, providing better patient prognostication and thus aid of appropriate management strategies such as intensive care or neurological intervention.
6. Since older patients were shown to have worse outcomes, age related considerations should be included in clinical protocols for the treatment of ALOC. In geriatric patients, with lower GCS scores, special attention should be given to them as they may be at higher risk for complications, longer hospital stays, and mortality.
7. Regular training of ED staff on the common causes of ALOC and the need for early intervention should be provided to increase outcomes and reduce delay in diagnosis of ALOC. The emphasis of this training should be on the identification of subtle signs of common etiologies such as metabolic and neurological disorders.

8. Facilitate Multidisciplinary Collaboration: Early inclusion of multidisciplina team consisting of neurologist, intensivist and toxicologists could lead to bett result in complex cases of ALOC especially. Comprehensive assessment an management of patients with diverse and severe causes of altered consciousnes is achieved through a collaborative approach.
9. Future studies with larger sample size from multiple centers should be conducte to validate these findings and to look at other potential (comorbid conditions medication interactions) that may potentially influence the outcomes in the ALOC patients.
10. Establish Protocols for Regular Monitoring of Patients: GCS scores play a crucial role in predicting outcomes of these patients, which is why it is important to set up protocols for monitoring these patients during their stay in the emergency department and intensive care units. GCS can be continuously reassessed to aid in adjusting treatment plans if a patient's condition changes.
11. Public Education Awareness Campaigns: Public awareness programs to prevent common causes of ALOC, for example, proper management of chronic conditions (diabetes, hypertension) and drug misuse, should be encouraged. Preventive measures may reduce the overall burden of ALOC in emergency settings.

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APPENDICES

ENGLISH CONSENT FORM

The study you are about to participate is a randomized control trial survey titled as;

"Etiologies, definitive diagnosis and patient outcomes in altered level of consciousness in the emergency department"

The study has no potential harm to participants. All data collected from you will be coded in order to protect your identity, and should not be disclosed to anyone. Following the study there will be no way to connect your name with your data. Your answers to the questions will not affect the quality of education given to you. Any additional information about the study results will be provided to you at its conclusion, upon your request.

You are free to withdraw from the study at any time. You agree to participate, indicating that you have read and understood the nature of the study, and that all your inquiries concerning the activities have been answered to your satisfaction.

NAME _____

SIGNATURE_____

DATE_____

URDU CONSENT FORM

میں_____ تصدیق کرتا/ کرتی ہوں کہ محترم (Samsaam Fazal)نے اپنی اس تحقیق

"Etiologies, definitive diagnosis and patient outcomes in altered level of consciousness in the emergency department "

.زیرنگرانی (Dr. Chanda Naseem)کے متعلق بتا دیا ہے۔ مجھے اس تحقیق کی نوعیت، مقاصد، احداف، توقعات، فوائد اور خطرات کے متعلق ، ساری معلومات فراہم کر دی گئی ہیں اس تحقیق کے دوران ساری معلومات صیغۃ راز میں رہیں گی اور مریض کا نام اور دیگر معلومات صرف تحقیق کے لیے استعمال ہوں گی۔مجھے یہ بھی بتا دیا گیا ہے کہ میں اس تحقیق سے متعلقہ ہر قسم کے سوال پوچھنے کا مجاز ہوں اور یہ تحقیق صرف ایک شخص ک مفاد میں نہیں ہے بلکہ بحثیت مجموعی انسانیت کا مفاد اس سے وابسطہ ہے۔ تمام تفصیلات جاننے کے بعد یس تحقیق میں شامل ہونے یا نہ ہونے پر کسی کا قائل نہیں ہوں۔ اس تحقیق سے کسی بھی وقت علیحدہ ہونے پر مجھ پر کوئی پابندی نہیں ہو گی۔ میں بذاتِ خود بقائمی حوش و حواس

.اور رضا مندی سے اس تحقیقاتی عمل میں شامل ہوتی/ ہوتا ہوں

---------- دستخط محقق

---------- دستخط شرکت کار

---------- تاریخ

DEMOGRAPHICS FORM & QUESTIONNAIRES

Performa for Etiologies, Definitive Diagnosis and Patient Outcomes in altered level of Consciousness in the Emergency Department

1. **PCN No:** _____
2. **Age (years):** _____
3. **Glasgow Coma Scale (GCS):**

a) 3-5	b) 6-8	c) 9-11	d) 12-14

4. **Etiology Class:**

a) **Intra-cranial**	b) **Extra-cranial**

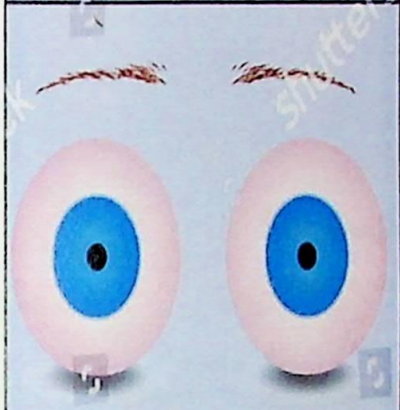
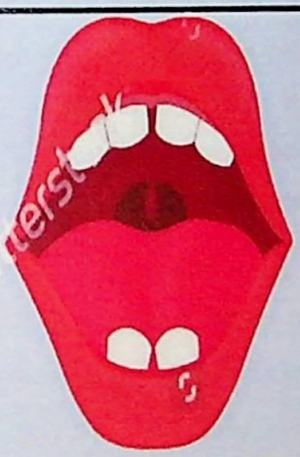
5. **Etiology Sub-Class:**

a) **Metabolic:**
b) **Oxygen Insufficiency:**
c) **Vascular:**
d) **Endocrine:**
e) **Seizers:**
f) **Uremia:**
g) **Psychiatric:**
h) **Infection:**
i) **Drugs/ Others:**

6. **Definitive Diagnosis:** _____
7. **Patient Outcomes:**

a) Surgical Intervention
b) Shifted IN ICU
c) Referred to any other hospital
d) Resuscitation
e) Death

GCS SCORE\SCALE

Behaviour	Response
 Eye Opening Response	4. Spontaneously 3. To speech 2. To pain 1. No response
 Verbal Response	5. Oriented to time, person and place 4. Confused 3. Inappropriate words 2. Incomprehensible sounds 1. No response
 Motor Response	6. Obeys command 5. Moves to localised pain 4. Flex to withdraw from pain 3. Abnormal flexion 2. Abnormal extension 1. No response

PERMISSION LETTER

To,

The Commanding Officer

CMH, Rawalakot, AJK

Subject: **Application for Permission letter for Data Collection**

Sir,

With due respect, it is stated that I am currently doing MS. (AHS) Anesthesia Technology from superior University Lahore. I need a permission letter from data collection on my thesis titled **"Etiologies, Definitive Diagnosis & Patient outcomes in altered level of consciousness in the emergency department".**

Kindly grant me this favour. I shall be thankful to you for this favour. Ethical approval letter of research committee superior University is already attached on back side.

Your's obediently
SamSaam Fazal
M.S A.H.S (AT. Technology)

Dated: **12-11-2024**

Recmended & Farwarded for permition as he is doing MS Anesthesia from Superior university

12/11/2024

CHIEF TECHNOLOGIST
DR KHALID MEHMOOD KHAN
CHIEF TECHNOLOGIST
SKBZ/CMH RAWALAKOT
SKBZ/CMH R.kot

DMS
Deputy Medical Superintendent
Sheikh Khalifa Bin Zayed
Al-Nayan Hospital/CMH R.kot

ETHICS COMMITTEE LETTER

OFFICE OF THE DEAN-FAHS

SUPERIOR UNIVERSITY

Ref: IRB /FAHS/Allied-HS/10/24/MS/RS-3525

Date: 29th October 2024

Name: Samsaam Fazal (MS Allied Health Sciences)

Registration: SU91-MSAHW-S23-221

Subject: Ethical Approval Letter

The Research Ethical Committee convened on Dated: **17th October, 2024** to discuss your protocol titled "**Etiologies, definitive diagnosis and patient outcomes in altered level of consciousness in the emergency department.**"

No further corrections and recommendations were suggested. The above-mentioned protocol has been approved after considering various research issues including ethical concerns with condition that the researcher will submit completion report at the end of his/her research.

Prof. Dr. Muhammad Naveed Babur
Dean/Convener REC
Faculty of Allied Health Sciences
Superior University, Lahore

PLAGIARISM CERTIFICATE

March 6, 2025

PLAGIARISM CERTIFICATE

For MPhil and PhD

This is certified that the thesis entitled:**Etiologies, Definitive Diagnosis And Patient Outcomes In Altered Level Of Consciousness In The Emergency Department.**

Student Name:Samsaam Fazal

Reg /Roll No:SU91-MSAHW-S23-221

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