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ETIOLOGIES, DEFINITIVE DIAGNOSIS AND PATIENT OUTCOMES IN ALTERED LEVEL OF CONSCIOUSNESS IN THE EMERGENCY DEPARTMENT

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Abstract

Objectives: *To determine the common and definitive etiologies of altered level of consciousness in emergency department.To find GCS scores with different etiological classes and sub classes.To determine Patient outcomes based on GCS scores.*

Material and Methods: *In this study Prospective observational design was adopted. The study was conducted in Superior University for duration of 4 months. Data was collected from CMH Rawalakot AJK. This study evaluated the GCS sores based on age, etiologies,etiology subclasses .Definitive diagnosis and patient outcomes. inclusion was age 18-90 years and GCS <15. Data was collected through a slightly modified performa.*

Results: *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).The findings emphasize that extra-cranial causes, particularly ischemic stroke, tonic-clonic seizures, and sepsis, are significant contributors to altered levels of consciousness and highlight the importance of timely and accurate diagnosis and management.*

Conclusion: *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. Timely intervention is crucial to improving outcomes in patients with severe presentations.

INTRODUCTION

New-onset altered level of consciousness (ALOC) is a common issue for people coming to the emergency department (ED). It refers to a change in a person's usual awareness or attention, not due to just feeling sleepy, but often indicating a deeper issue. ALOC can happen for many reasons, both neurological and related to other medical conditions. Studies show that ALOC affects anywhere from 5% to 40% of patients in the ED, depending on the group being studied. For example, in a study , the most common causes of ALC were neurological issues (28%), followed by intoxication (21%), trauma (21%), psychiatric problems (14%), and infections (10%). Another study found that about a quarter of cases were due to cerebrovascular diseases (24%), with other causes including infections (12%), seizures (12%), psychiatric issues (8%), metabolic problems (7%), and intoxications (7%).This study highlight just how varied the reasons for ALOC can be and how important it is for medical teams to carefully assess patients to figure out the cause [1].

Achieving this awareness requires an individual to be awake and capable of accurately receiving, perceiving, and processing both external and internal stimuli. Altered consciousness, specifically, is characterized by reduced alertness or an inability to arouse, leading to diminished awareness of the environment. This can present in various clinical conditions such as coma, agitation, hallucinations, or the inability to communicate. Impaired consciousness accounts for over 5% of hospital admissions, with a higher prevalence among the elderly, where it significantly impacts mental functioning. Approximately 10% of elderly individuals arriving at the Emergency Department (ED) experience altered consciousness. Most literature on this topic focuses on delirium in the elderly, which is often caused by systemic, metabolic, or toxic factors, with or without pre-existing cognitive impairment. While both structural and non-structural causes are common in the elderly, non-structural causes are more prevalent among younger adults. Common causes for ED presentations involving impaired consciousness include metabolic disorders, trauma, strokes, medications, infections, tumors, and seizures. Since many of these causes are non-traumatic, diagnosis becomes challenging for emergency physicians, who must conduct thorough evaluations. Given the difficulty in obtaining a detailed medical history directly from the patient, the assessment process is time-consuming, requiring information from the patient's family, a review of medical records, and the use of laboratory and radiological tests, often with additional consultations [2].

Tests like blood work, brain scans, and EEGs (a test that checks brain waves) are really helpful to rule out causes and decide on the best treatment. There is also a world-wide scale called GCS (Glasgow comma scale) through which the altered level of consciousness is measured. This scale has a score up to 15. Anything < than 15 will be considered as altered consciousness or alter level of consciousness. GCS is a standard method to check the level of consciousness by inspection of eye, motor and verbal actions[3].

The emergence of the highly pathogenic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) led to shifts in national health policies and changes in healthcare utilization patterns. Emergency room (ER) visits decreased significantly in the period following COVID-19 (AC) compared to before the pandemic (BC), with reductions from 72% to 22% in the U.S. 13% to 5.7% in Europe , and 50% to 37% in South Korea . Utilization of emergency medical services also declined and remained below pre-pandemic levels through the first quarter of 2022. Given the critical nature of altered level of consciousness (ALC), which often necessitates ER visits, healthcare providers must stay vigilant about changes in the etiology and clinical presentation of ALC cases in the ER [4].

There is a significant amount of literature on managing specific medical disorders that present as altered mental status (AMS), but limited data on how emergency physicians should approach patients with undifferentiated AMS in the emergency department.

The incidence of altered level of consciousness (ALOC) reported in previous international and local literature ranges from 8% to 30%. In Pakistan, however, there is no available data on the causes of ALOC in our hospitals. This information could be highly valuable in the context of overcrowded emergency departments, helping emergency physicians more efficiently diagnose ALOC cases and guide initial or empirical treatment toward the most common underlying conditions [5].

The time-sensitive nature of ALOC further complicates things. Given the complexity and urgency surrounding ALOC, a collaborative approach is essential for improving patient outcomes. Ultimately, the complexity of ALOC and the urgency involved in treating it make a collaborative approach essential. By coming together, healthcare providers can overcome the challenges posed by ALOC and improve survival rates, as well as overall quality of care [6].

In short, because people act differently or aren't fully awake for many reasons, doctors in the ED need to use a lot of different ways to figure out what's going on and how to help. This study looked into the different definitive reasons to help doctors to check exactly with which etiologies ALOC actually happen and try to be better at finding out what's wrong which helps patients get better care quickly in emergency settings and also checked what outcomes the patients of ALOC will obtain like (surgery, shifted to intensive care unit or ICU , reffered to any other hospital, resuscitation or ultimately death) .

GCS	Etiological Class		Etiology Subclass									Age of Patients (Yrs)				Definitive Diagnosis																	Patient Outcomes						
	Intra-Cranial	Extra-Cranial	Metabolic	Oxygen Insufficiency	Vascular	Endocrine	Seizers	Uremia	Psychatric	Infection	Drugs/ Poisoning	18-39	40-59	60-79	80-90	Hypoglycemia	Hyperglycemia	Hyponatrimia	Hypoxic Brain Injury	Pulmonary Embolism	Copd	Ischemic Stroke	Haemorrhagic Stroke	Thyroid Storm	Adrenal Insufficiency	Tonic-Clonic Seizure	Status Epilepticus	CKD	Dialysis	Psychosis	Catatonia	Sepsis	Meningitis	Organophosphate	Alcohol Intoxication	Death	ICU	Resicucitation	Surgical Intervention	Admission	Reffered	Discharged
3-5	24	13	5	4	14	0	6	0	0	4	4	14	2	14	7	3	0	2	4	0	0	5	9	0	0	3	3	0	0	0	0	4	0	3	1	7	22	2	3	1	1	1
6-8	15	29	10	8	5	3	4	6	0	6	2	11	1	16	16	4	4	3	2	3	3	5	0	3	0	4	4	2	2	0	0	3	3	1	1	0	15	0	0	19	4	6
9-11	17	22	9	2	9	4	6	1	5	2	1	9	2	19	9	2	4	3	0	0	2	6	3	0	4	4	2	1	0	3	2	0	2	1	0	0	1	0	0	1	0	37
12-14	11	19	1	6	3	3	0	3	6	8	0	6	0	12	12	0	1	0	1	3	2	0	3	2	1	0	0	0	3	2	4	6	2	0	0	0	0	0	0	1	2	27
P=	0.031		0.001									0.423				0.001																				0.001						

METHODOLOGY:

The study was conducted after successful approval from institutional ethical committee and ethical approval of Superior university Lahore. Prospective observational design was adopted and CMH Rawalakot was used for the clinical setting of this study. Sample size was 150 [5]. and convienence sampling technique was used for this study. Duration of study was approximately 4 months and inclusion criteria was those patients having age 18 to 90 years and GCS < 15 in the Emergency department of hospital and exclusion criteria was GCS =15. Data was collected through a slighltly modified pre designed performa. Refrence point for data collection was the time of the discharge of patients from emergency department. Data analysis was done through SPSS 27th version and M.S EXCEL 2021. Descriptive statistics,Chi square test and crosstabs were used for the analysis.

RESULTS:

150 patients were taken for this study and their Age, GCS score, etiology class, etiological subclass , definitive diagnosis and outcomes were carefully examined.

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

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 haemorrhagic 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-clonic seizures (12 cases in the moderate group) and sepsis (12 cases, predominantly in the severe and moderate groups).

Age Distribution:
The age of patients ranged from 18 to 90 years, with the highest incidence in the 40-59 and 60-79 age groups. The severe GCS group (3-5) had a notable number of patients aged 60-79 (14 cases) and 80-90 (7 cases), indicating that older patients were more likely to present with severe ALOC.

Patient Outcomes:
Patient outcomes were tracked across several categories, including ICU admissions, resuscitation efforts, surgical interventions, and discharge status. ICU admissions were most frequent in the moderate GCS group (19 cases), reflecting the critical care needs of these patients. Deaths were predominantly recorded in the severe GCS group (7 cases), highlighting the high mortality risk associated with severe ALOC. Discharges were more common in the higher GCS groups, with 27 cases in the 12-14 range, indicating better recovery prospects for patients with less severe 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 emphasizes the critical nature of extra-cranial causes in ALOC and the significant impact of ischemic stroke, seizures, and sepsis on patient outcomes. Timely intervention and management are crucial to improving patient prognosis.

DISCUSSION:
This study aimed to explore the common etiologies, Glasgow Coma Scale (GCS) scores, and patient outcomes among patients presenting with altered levels of consciousness in the emergency department of CMH Rawalakot. The duration of the study was approximately 4 months, and data analysis was conducted using SPSS 27th version and M.S. Excel 2021, applying descriptive statistics and the Chi-square test to assess associations among variables. The analysis revealed that all variables, except age, were statistically significant.
The results of the study highlighted that vascular and metabolic disorders were the most common etiologies of altered consciousness observed in the emergency department. Ischemic and hemorrhagic strokes emerged as the leading vascular causes, accounting for a significant portion of cases, particularly in the lower GCS score ranges (3-5). Additionally, metabolic disturbances such as hypoglycemia and hyponatremia were found to be major contributors to altered consciousness, with hypoglycemia being the most frequent metabolic etiology. Other notable causes included infections like sepsis, psychiatric conditions such as psychosis and catatonia, and drug intoxications, particularly 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 were concluded by kekcec et all 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 [7].

In another study Kim kt et all 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%)[8].

In another study thaganda MS et all concluded that , a significant portion of the cohort reported substance use, with 34.2% consuming alcohol, 11.9% [9].

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 he 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 GCS score relates to mortality in head-injured patients, its nonlinear nature raises concerns about its effectiveness in outcome prediction. Additionally, survivors with low GCS scores often show good FIM scores, complicating the use of the GCS score for predicting poor outcomes early on [10].

In another study author Brazinova A et all found Patients with GCS scores of 3 or 4 who are older than 65 years have a poor, but not hopeless, prognosis [11].

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 he states 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 [12].

The strength of this study lies in the the use of a prospective observational design allowed for real-time data collection and analysis, making the findings more reflective of the actual clinical environment. The inclusion of a wide range of etiologies and the

assessment of patient outcomes based on GCS scores allowed for a comprehensive examination between clinical factors and patient outcomes. However, there were some limitations to the study. First, the use of a convenience sampling technique may have introduced selection bias, as patients who presented to the ED at certain times may have been more likely to be included in the study. Additionally, the study excluded patients with GCS scores of 15, which limited the ability to examine mild cases of altered consciousness and their outcomes.

In comparing the study's findings to existing literature, the results align with several key studies that have examined the role of GCS scores in predicting patient outcomes. Numerous studies have demonstrated that lower GCS scores are associated with worse outcomes, including higher mortality rates and longer ICU stays, which is consistent with the results found in this study. Similarly, the association between specific etiologies, such as strokes, metabolic disturbances, and psychiatric conditions, with altered levels of consciousness has been well-documented in the literature. The present study contributes to this body of research by providing additional insights into how GCS scores interact with different etiologies to influence patient outcomes in an emergency department setting.

For future research, it would be beneficial to conduct multi-center studies that include a broader patient population to enhance the generalizability of the findings. Furthermore, exploring the impact of various treatment interventions on patient outcomes based on different etiologies could provide valuable information for improving clinical management. Longitudinal studies that track patient outcomes over an extended period could offer deeper insights into the long-term prognosis of patients with altered consciousness.

In conclusion, this study provides valuable insights into the common etiologies of altered consciousness in the emergency department and their association with GCS scores and patient outcomes. It reinforces the role of GCS as a critical tool in predicting patient prognosis and highlights the importance of identifying the underlying causes of altered consciousness in order to guide clinical management. The study's findings emphasize the need for targeted interventions based on the etiology of altered consciousness and the severity of neurological impairment, particularly in patients with lower GCS scores. The results have significant implications for clinical practice, as they suggest that improving early recognition and management of patients with altered levels of consciousness could lead to better patient outcomes.

CONCLUSION:

In conclusion, this study on Altered Level of Consciousness (ALOC) in emergency department patients reveals that ALOC is more prevalent in elderly patients, with extra-cranial factors such as drug poisoning and metabolic disturbances being the most common etiologies. The Glasgow Coma Scale (GCS) scores were crucial in assessing the severity and predicting patient outcomes, with lower scores indicating more severe cases and poorer prognosis. The study highlights the importance of early GCS assessment and identifying the underlying cause of ALOC, particularly in elderly individuals. These findings suggest that targeted interventions and a thorough diagnostic approach are essential for improving outcomes in ALOC patients.

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