

## Clinical Profile of Patients Presenting with Altered Sensorium to Emergency Department

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### Abstract

Altered sensorium is a frequent presentation in emergency department, but the exact etiology of many altered sensorium patients is unknown. Patients present with vague symptoms, thus altered sensorium diagnosis and treatment are highly challenging for emergency physicians. The aim of this study is to provide a framework for the assessment of altered sensorium patients. This assessment should allow providers to better understand the etiology of mental status changes and therefore improve diagnostic skills and management.

This is a retrospective record based study. The research duration was from January, 2016 to December 31, 2016. The study involved 9,800 emergency patients, in which 524 (5.34%) were altered sensorium patients. Demographic characteristics, clinical manifestations, assessment approaches, causative factors, emergency treatments and outcomes were collected.

In 524 patients with altered sensorium patients recruited, accounting for 5.34% of all emergency department patients, 316 (60%) were male, and 208 (40%) female. Etiologic factors were neurological ( $n=225$ ; 42.93%) & non-neurological ( $n=299$ ; 57.07%).

Patients with altered sensorium pose a diagnosing difficulty for ED physicians. The most frequently encountered diagnostic categories causing altered sensorium patients were primary CNS disorders, intoxication, organ system dysfunction, and endocrine/metabolic diseases. Altered sensorium is an important warning signal for ED patients because of its potentially fatal and reversible effects. Prompt evaluation and treatment are essential to decrease morbidity and mortality associated with altered sensorium patients.

**Keywords:** Altered Sensorium; Clinical Profile; Demographic Characteristics; Emergency Department; Etiology.

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### Introduction

Altered sensorium comprises a group of clinical symptoms rather than a specific diagnosis, and includes cognitive disorders, attention disorders, arousal disorders, and decreased level of consciousness [1]. Altered sensorium is a very common emergency encountered. Patients often manifest with vague history. Hence diagnosis and treatment of patients presenting with altered

sensorium can be highly challenging for emergency physicians. An in-depth understanding of the pathogenesis of altered sensorium and complete patient assessment will help increase the diagnosis rate and ensure treatment accuracy.

Current epidemiological studies rarely focus on altered sensorium with very few studies worldwide [2]. Altered sensorium syndrome is important where timely diagnosis and efficient treatment will improve the outcome significantly [3]. This study aims to

determine the demographic characteristics, clinical assessment methods, etiology, clinical prognosis that are implemented among emergency altered sensorium patients.

## Methods

### *Research Design and Subjects*

This research was a retrospective record based study. The subjects of the study were emergency patients at the medical centre, a 750-bed teaching hospital. The research duration was from January, 2016 to December 31, 2016. The study involved 9,800 emergency patients, in which 524 (5.34%) were altered sensorium patients.

### *Research Protocol*

In this study, the clinical records of altered sensorium patients in the emergency department were collected by a previously designed case registration form which contained patient demographics, time and manner of admission, medical history, signs and symptoms upon admission (including vitals), laboratory tests, imaging data, diagnosis, clinical assessment methods, and emergency intervention/ outcome.

All altered sensorium patients were treated in the emergency department and subjected to observation for at least 24 hours from the time of admission.

### *Inclusion Criteria*

The subjects of the study needed to meet one of the following criteria [2]:

1. Glasgow coma score <15;
2. Drowsy
3. Confused.

### *Exclusion Criteria*

1. Children aged <1 years were excluded because of difficulty in assessing the mental status.
2. Chronic altered sensorium patients such as those with Alzheimer's, schizophrenia and other psychiatric conditions.
3. Those who had cardiac arrest during emergency treatment were excluded.

A total of 524 patients with altered sensorium of varying duration were included in this study. All

the patients attended emergency department from January 2016 to December 2016 are included in the study.

### *Research Grouping*

The patients were divided into groups according to age, gender & aetiology

1. Age - children (1-14 years), 15-60 years & elderly (>60 years)
2. Gender - male/female
3. Aetiology - primary neurological and non-neurological factors.

### *Statistical Analysis*

- Data was entered, compiled and analysed using Microsoft Excel 2010. Proportion, Chi-square test were used for statistical analysis, where  $P < 0.05$  was considered statistically significant.

Statistical software Epi-info version 3.5.4 was used for analysing the data.

## Results

### *Demographic Characteristics*

The age of the patients in this study ranged from 1 to 90 years. 22 patients were 1-14 years, 324 were 15-60 years and 178 were >60 years. Figure 1 shows the age distribution of patients in our study.

According to age out of total 524 pts

1. 1- 14 yr - 22 (4.19%)
2. 15- 60 yrs - 324 (61.8%)
3. >60 yrs - 178 (33.9%)

The predominant age group in our study was 7 between 15-60 years.

In the 524 AMS patients studied, 316 were male (60%) and 208 female (40%).

Gender distribution out of total 524; Male were 316 (60%) & female were 208 (40%).

Etiological analysis of altered sensorium classification and composition.

Patients of altered sensorium were classified on the basis of system involved- Neurological 225 (42.93%) & Non Neurological 299 (57.07%).

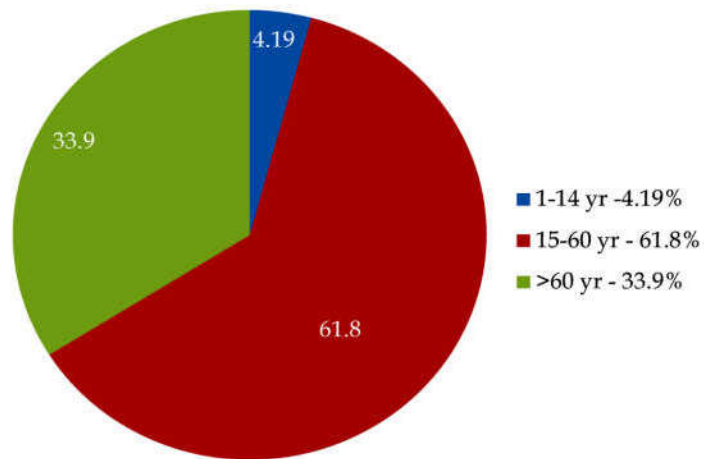


Fig. 1: Age distribution

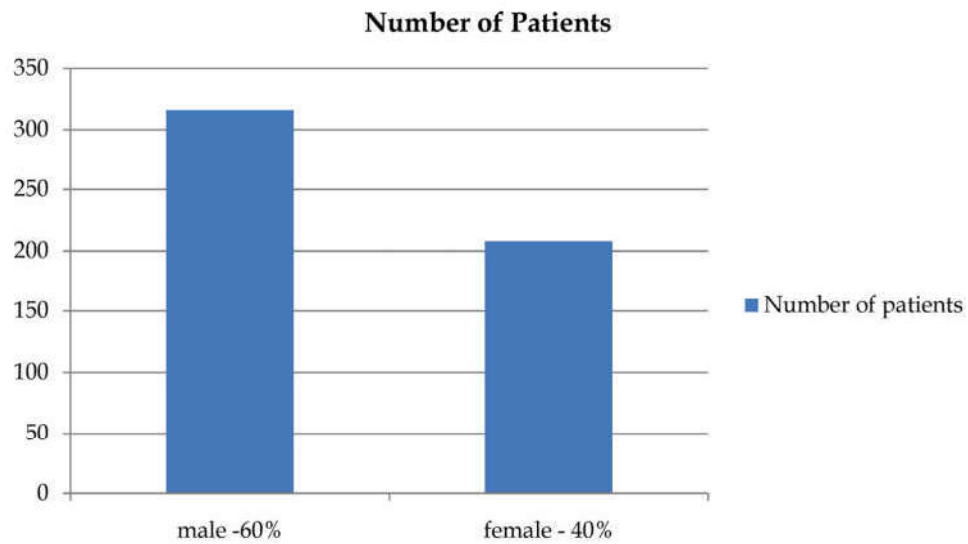


Fig. 2: Gender distribution

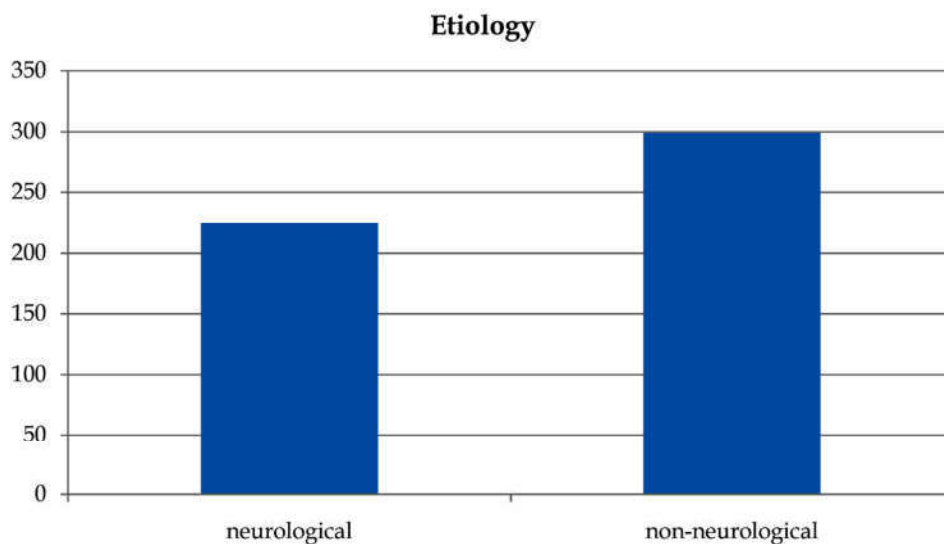


Fig. 3: Etiological division

**Table 1:** Etiological analysis of altered sensorium classification and composition

<b>Etiology</b>	
<b>Neurological:</b>	<b>225(42.93%)</b>
CVA	82
Traumatic Brain Injury	64
Meningo Encephalitis	49
Seizures	30
<b>Non - neurological</b>	<b>299(57.07%)</b>
Pharmacologic/ toxic	69
SEPSIS with MODS	45
CVS	28
RS	38
RENAL	31
HEPATIC	39
METABOLIC	49

The causes of 524 altered sensorium patients were divided into neurological & non neurological causes. The Neurological causes such as stroke, head trauma, neuroinfection & seizures accounted for 42.93% ( $n=225$ ), whereas 57.07% originated from non-neurological factors ( $n=299$ ).

#### *Emergency Assessment of Altered Sensorium*

Analysis of the assessment methods used for the diagnosis of altered sensorium in patients showed that routine emergency assessment methods were important for accurate diagnosis. The clinical values of the diagnostic evaluation were as follows: patients were diagnosed by 4 steps:

1. Detailed History
2. Physical examination
3. Laboratory tests (included arterial blood gas, blood chemistry, urinalysis, complete blood count, coagulation studies, Chest X ray, ECG & ECHO).
4. Neuroimaging.

We observed that 150 patients had positive results after neuroimaging.

#### **Outcome**

The duration of hospital stay varied with an average of 3.8 days.

During the study, 524 altered sensorium patients were treated and 20 patients died.

The mortality rate was 3.81%, during the hospital stay. The main causes of death were multi system and organ failure (MODS), cerebrovascular accident and trauma.

#### **Discussion**

Altered sensorium may be found in 4%–10% of Emergency Department patients<sup>4</sup>, this proportion may be higher in special subgroups (such as in the elderly patients) [5]. In our study, altered sensorium patients represented 5.34% of total emergency patients which was similar to other studies.

Gender distribution out of total 524; Male were 316 (60%) & female were 208 (40%). Though there was statistical difference this was mainly in middle age group. Male preponderance was seen because of road traffic accidents which resulted in traumatic brain injury.

Our data showed that etiology of altered sensorium was different among the three age groups paediatrics, middle age & elderly group [6,7]. Neuroinfection was common in paediatrics [8]. Metabolic diseases [9,10], trauma and poisoning [11]. were often found in young people, whereas cerebral vascular disease, and multi organ/system failure were frequently seen in the elderly. In acute altered sensorium, this pattern of age distribution was similar to Kanich and his colleague's research [4].

Among the neurological factors CVA was seen in most of our patients (15.64%) next being traumatic brain injury (12.21%) [12].

Poisoning was observed to be the most important cause in non-neurological factors of altered sensorium (13.16%). Metabolic factors and sepsis with MODS were next in number (9.35% & 8.58% respectively).

The emergency assessment of altered sensorium is very difficult because of incomplete and inaccurate disease histories provided by the patient.

A study showed that the medical history and physical examination [13,14] are more important than

laboratory testing and imaging in the diagnostic evaluation of altered sensorium. Physical examination [15,16] also helps determine the development of the condition. The medical history, physical examination, past history, and treatment responses of patients are important in assessing the causes of altered sensorium. Neuroimaging can reveal several intracranial space-occupying diseases, intracranial bleeding, and structural brain damage. However, more patients with AMS exhibited negative CT/MRI results [17,18,19].

Though neuroimaging [13] was important in the diagnosis of altered sensorium, 150 patients were diagnosed with the help of imaging which constituted upto 20%. Therefore history physical examination & lab reports are also important. And hence emphasizing the importance of good history taking, thorough physical examination & laboratory reports in 80% of the patients diagnosis.

An over reliance on neuroimaging scan probably lead to serious negative impacts on the assessment and treatment of non-neurological causes involved in the pathogenicity of altered sensorium, such as hypoglycaemia. However, it will help to rule out any associated brain injury in a case of poisoning or seizure.

Altered sensorium assessment remains highly challenging among emergency physicians in terms of combining the four basic assessment tools and reasonably choosing methods of imaging, blood biochemistry, cerebrospinal fluid [20], and EEG [21,22,23] assessment for the diagnosis of altered sensorium. Thus, further related explorations are necessary.

The causes of altered sensorium could be varied ranging from traumatic to easily correctable metabolic factors, hence it is important to find the correct cause and to give effective treatment. Generally, the etiology of emergency altered sensorium is categorized into two factors: primary neurological and non-neurological factors [2]. A recent study [14] considered neurological events to be the most important factors that cause altered sensorium, and account for about 28% of altered sensorium patients.

In our study the altered sensorium proportion caused by primary neurological was 42.93%. Despite the events in the nervous system as the most common reason for acute altered sensorium, more than half of the altered sensorium patients were caused by non-nervous system factors. We also found that in the elderly group, the top three causes of altered sensorium were cerebrovascular disease, multi organ/systemic failure, and infection. In the middle age group,

the top three causes were drugs and toxins, systemic and organ failure, and metabolic and endocrine disorders. Whereas in paediatrics neuroinfection [8] was the most frequently encountered cause of altered sensorium.

Emergency physicians have difficulty in understanding of altered sensorium because of its complex clinical features & inadequate information given at the time of presentation, which results in some missed altered sensorium patients, particularly in elderly patients with chronic cognitive impairment. Secondly, this study was only a single-center investigation. Our data may not represent the same situation encountered in other emergency departments. Thus, emergency physicians need to be cautious in the application and interpretation of results. Therefore, further research is needed to assess the risk of death of altered sensorium patients.

## Conclusion

In our study, we found that non neurological causes for altered sensorium were more common than primary neurological diseases. And neuroimaging was helpful in 20% of the cases, highlighting the importance of good history, thorough physical examination & laboratory reports in 80% patients. And hence their importance cannot be overemphasized.

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