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Evaluation of Demographic and Clinical Findings in Patients with Non-Traumatic Loss of Consciousness Referring to the Emergency Department of Imam Khomeini Hospital in Urmia

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Abstract

Background: Rapid identification of the underlying causes of non-traumatic loss of consciousness in the emergency department is critical because prompt diagnosis and timely intervention significantly improve clinical outcomes.

Objectives: To address the paucity of regional data from West Azerbaijan Province, this study aimed to investigate the frequency of causes of NT-LOC and their associated clinical outcomes among patients presenting to the ED at Imam Khomeini Referral Hospital in Urmia, Iran, during 2022 - 2024.

Methods: This descriptive-analytical cross-sectional study evaluated all patients with NT-LOC admitted to the ED of Imam Khomeini Hospital using a census sampling method. Demographic and clinical data—including age, sex, consciousness level score, length of stay, blood pressure, pulse rate, blood oxygen saturation (SpO_2), respiratory rate (RR), body temperature, and final clinical outcome (survival/mortality)—were extracted from medical records using a researcher-designed checklist. Data were analyzed using descriptive statistics and appropriate analytical tests in SPSS.

Results: A total of 1030 patients met the inclusion criteria, including 559 (54.3%) males and 471 (45.7%) females, with a mean age of 71 years. The mean consciousness level score was 2.32 ± 1.01, and the mean LOS was 11 days. The most common etiology of NT-LOC was cerebrovascular accidents, which accounted for 34.8% of cases. The overall in-hospital mortality rate was 20.8%. A statistically significant association was observed between the final clinical outcome and pulse rate, body temperature, and SpO_2 levels ($P < 0.05$); however, no significant association was found with baseline blood pressure ($P > 0.05$).

Conclusions: Cerebrovascular accidents are the leading cause of non-traumatic altered consciousness at our center and are associated with a substantial mortality rate. Because key vital signs—specifically pulse rate, body temperature, and oxygen saturation—are significantly associated with patient outcomes, prioritizing these parameters during initial triage and clinical assessment can facilitate faster decision-making and optimize the management of patients with NT-LOC in emergency settings.

Keywords: Altered Level of Consciousness, Non-traumatic, Emergency Department, Vital Signs, Clinical Outcome

1. Background

Nontraumatic impairment of consciousness is one of the most important and complex clinical presentations in emergency departments and intensive care units. A wide range of metabolic, infectious, drug-related, neurological, and systemic disorders may contribute to its development (1). This condition is not an independent disease but a clinical syndrome that may result from simple, reversible causes or life-threatening illnesses; therefore, rapid and accurate assessment of patients presenting to the emergency department is important (2, 3). In clinical practice, impaired consciousness is a common reason for emergency department visits and, particularly among older adults, critically ill patients, and individuals with underlying diseases, may be the initial manifestation of a serious and progressive condition (4). Evaluating patients

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with impaired consciousness requires a structured and systematic approach, because delays in identifying the underlying cause may lead to clinical deterioration, increased need for supportive interventions, prolonged hospitalization, and higher mortality (5). Immediate and treatable causes—including hypoglycemia, hypoxemia, hypotension, poisoning, electrolyte disturbances, sepsis, seizures, stroke, and intracranial hemorrhage—should first be identified and managed. Accordingly, the initial evaluation includes assessing vital signs, blood glucose level, respiratory and circulatory status, and neurological findings, followed by additional investigations guided by the clinical presentation (6).

Among the available tools for assessing the level of consciousness, the Glasgow Coma Scale (GCS) is the most commonly used and best-known clinical instrument (7). Based on three components—eye opening, verbal response, and motor response—the scale yields a score ranging from 3 to 15 and has long been used in emergency, intensive care, and prehospital settings to describe and monitor a patient's level of consciousness (8). Despite its widespread use, the GCS has several limitations; for example, a complete assessment may be difficult in intubated patients, those unable to provide a verbal response, patients with underlying cognitive impairment, or those with certain neurological disorders. In addition, the scale does not provide information on brainstem reflexes, respiratory patterns, or some other important aspects of neurological function (9). These limitations have led to the introduction of complementary tools, such as the FOUR score, in recent years to enable a more precise assessment of consciousness. Clinically, the differential diagnosis of nontraumatic impaired consciousness is very broad. In many cases, the underlying cause may be hepatic, septic, uremic, metabolic, hypoxic, or drug-induced encephalopathy, whereas structural brain lesions, ischemic or hemorrhagic stroke, meningitis, encephalitis, and poisoning should be considered in some patients (10). Previous studies have shown that the most common causes of hospitalization and emergency department presentation among patients with impaired consciousness, particularly among adults, include cerebrovascular disorders, metabolic and infectious encephalopathies, and disturbances related to drugs or toxic substances. This diversity of causes underscores the importance of carefully investigating epidemiologic patterns and common etiologies in each geographic region, because disease patterns may vary according to population structure, access to healthcare services, the prevalence of underlying diseases, and characteristics of the healthcare system (11).

Patient outcomes in the setting of impaired consciousness are strongly influenced by the underlying cause, time of presentation, speed of diagnosis, severity of impaired consciousness at admission, and the patient's hemodynamic and respiratory status (3, 6). Several simple clinical indicators, such as age, blood pressure, respiratory rate, body temperature, blood oxygen level, and GCS score, have been identified in different studies as factors associated with prognosis; however, findings have been inconsistent and, in many cases, have depended on the type of population and the patients' clinical condition (5, 10, 11). Therefore, identifying variables associated with patient outcomes may play an important role in rapid emergency decision-making, patient prioritization during triage, and prediction of the need for intensive care (6, 8). Beyond the diagnostic aspects, the emergency department, with its high-pressure environment, large patient volume, and need for immediate decision-making, presents particular challenges in managing patients with impaired consciousness. In this setting, understanding patients' epidemiologic profiles at the local and regional levels may help emergency physicians navigate the differential diagnostic process more rapidly by relying on a more accurate pretest probability. Many diagnostic errors in the emergency department result from failure to consider common causes or excessive focus on rare etiologies; therefore, findings from such studies can provide a roadmap for developing local protocols for managing impaired consciousness. This knowledge not only helps reduce medical errors and cognitive biases but also contributes to more efficient use of hospital resources, shorter waiting times, and ultimately lower unnecessary treatment costs by guiding laboratory and imaging requests more purposefully.

In this context, the importance of education, accurate documentation, and the use of standardized tools to assess the level of consciousness should not be overlooked. The use of validated scales, accurate recording of vital signs, and early identification of changes in a patient's status can facilitate more rapid diagnosis and more effective intervention (7, 9). Despite their importance, local data on the frequency of causes of non-traumatic impaired consciousness and factors associated with outcomes remain limited in some regions, including academic emergency departments in Iran. This information gap

limits the generalizability of findings from international studies and highlights the ongoing need for local research (6, 11). Therefore, systematically evaluating the causes of non-traumatic impaired consciousness and the variables associated with patient outcomes can help enhance the quality of care, improve clinical decision-making, reduce treatment delays, and optimize the allocation of healthcare resources (5, 6).

2. Objectives

Accordingly, this study aimed to investigate the causes of non-traumatic impaired consciousness and the factors associated with outcomes among patients presenting to the emergency department.

3. Methods

This descriptive-analytical study evaluated patients with impaired consciousness unrelated to trauma who were admitted to the emergency department of Imam Khomeini Hospital, Urmia, in 2022 and 2023. The study population included all patients who presented with a reduced level of consciousness, had no history of trauma, and were evaluated during the specified period. Inclusion criteria were a clinical diagnosis of impaired consciousness and sufficient documentation in the medical records. Patients who left the emergency department against medical advice before completion of the diagnostic workup and final disposition, those who presented with cardiopulmonary arrest of unknown cause at admission, and cases with major missing data in their medical records were excluded. Data were collected using a structured checklist developed in accordance with the study objectives. Data extraction focused on demographic variables, including age and sex, prognostic indicators, and final hospital outcome. Clinical parameters, including blood pressure, heart rate, oxygen saturation (SpO_2), respiratory rate, body temperature, and level of consciousness based on standard scales, were extracted from the patients' medical records and recorded in the checklist. The collected data were entered into SPSS version 27 for analysis. Quantitative variables were summarized as mean ± standard deviation, whereas qualitative variables were summarized as frequencies and percentages. The chi-square test was used to examine associations between categorical variables, and the independent-samples t test was used to compare quantitative variables. In all analyses, a P value of less than 0.05 was considered statistically significant.

4. Results

According to the findings presented in Table 1, 559 patients (49.6%) were male and 571 (50.4%) were female, representing a relatively balanced gender distribution. The mean age was 67.39 ± 19.19 years, and the mean level of consciousness score (GCS) at admission was 10.11 ± 3.32, indicating a significant presence of middle-aged and elderly patients with varying degrees of impaired consciousness.

Table 1. Demographic and Clinical Characteristics of the Study Patients [a]

Variables	Values
Sex	
Male	559 (49.6)
Female	571 (50.4)
Causes of impaired consciousness	
Cerebrovascular accidents	455 (39.8)
Poisoning	124 (11.1)
Systemic infection / Sepsis	121 (10.6)
Pneumonia	89 (8)
Seizure	76 (6.6)
Meningitis and encephalitis	60 (5.3)
Diabetic ketoacidosis	42 (3.5)
Malignancy	34 (3.1)
Severe renal failure	33 (3)
Cardiac diseases	30 (2.8)
Severe gastrointestinal bleeding	29 (2.7)
Hypoglycemia	19 (1.9)
Pulmonary embolism	18 (1.8)
Patients' hospital outcomes	
Recovery	896 (79.2)
Mortality	234 (20.8)
Age (years)	67.39 ± 19.19
Level of consciousness)	10.11 ± 3.32

[a] Values are expressed as No. (%) or mean ± SD.

Regarding the etiology of impaired consciousness, cerebrovascular accidents (CVA) were the most common cause, with 455 cases (39.8%), followed by poisoning, with 124 cases (11.1%), and systemic infection/sepsis, with 121 cases (10.6%). Pneumonia (8%), seizures (6.6%), and meningitis/encephalitis (5.3%) were other major causes, whereas diabetic ketoacidosis, malignancy, severe renal failure, cardiac events, severe gastrointestinal bleeding, hypoglycemia, and pulmonary embolism accounted for a

Table 2. Association Between Systolic Blood Pressure and Hospital Outcome in Patients with Non-Traumatic Impaired Consciousness Presenting to the Emergency Department

Outcome	Systolic Blood Pressure (Mean ± SD; mmHg)	Max	Min	P value
Recovered	133.31 ± 25.36	230	80	0.001
Deceased	100.10 ± 23.19	160	70	

smaller proportion of cases. Regarding hospital outcomes, 896 patients (79.2%) were discharged with clinical improvement, whereas 234 patients (20.8%) died. These findings highlight the high burden of the condition and the critical importance of rapidly assessing underlying causes and prognostic factors in these patients.

As shown in Table 2, the mean systolic blood pressure was 133.31 ± 25.36 mmHg in patients who were discharged/recovered and 100.10 ± 23.19 mmHg in deceased patients. The minimum and maximum systolic blood pressure values were 80 and 230 mmHg, respectively, in the recovered group and 70 and 160 mmHg, respectively, in the deceased group. The difference between the groups was statistically significant (P = 0.001). Thus, higher systolic blood pressure at presentation was associated with a more favorable hospital outcome.

As shown in Table 3, the mean heart rate was 89.4 ± 19.96 beats per minute in recovered patients and 85.45 ± 15.65 beats per minute in deceased patients. The minimum and maximum heart rates were 50 and 140 beats per minute, respectively, in the recovered group and 47 and 140 beats per minute, respectively, in the deceased group. However, the difference between the groups was not statistically significant (P = 0.170). Therefore, heart rate at presentation was not significantly associated with hospital outcome.

As shown in Table 4, the mean oxygen saturation (SpO_2) was 93.54 ± 4.01 in recovered patients and 83.53 ± 6.55 in deceased patients. The minimum and maximum oxygen saturation values were 78% and 100%, respectively, in the recovered group and 70% and 98%, respectively, in the deceased group. The difference between the groups was statistically significant (P = 0.015). Thus, higher oxygen saturation at presentation was associated with a more favorable hospital outcome.

As shown in Table 5, the mean respiratory rate was 17.91 ± 3.53 breaths per minute in recovered patients and 18.26 ± 3.44 breaths per minute in deceased patients. The minimum and maximum respiratory rates were 10 and 32 breaths per minute, respectively, in the recovered group and 10 and 26 breaths per minute, respectively, in the deceased group. However, the difference between the groups was not statistically significant (P = 0.54). Therefore, respiratory rate at presentation was not significantly associated with hospital outcome.

As shown in Table 6, the mean body temperature was 36.50 ± 3.57 °C in recovered patients and 36.82 ± 0.46 °C in deceased patients. The minimum and maximum body temperatures were 10 and 32, respectively, in the recovered group and 10 and 26, respectively, in the deceased group. However, the difference between the groups was not statistically significant (P = 0.305). Therefore, body temperature at presentation was not significantly associated with hospital outcome.

5. Discussion

The findings of this study demonstrate that non-traumatic impaired consciousness in patients presenting to the emergency department occurs primarily in middle and late adulthood, with a relatively balanced gender distribution. This pattern is consistent with the pathophysiology of the underlying conditions that affect consciousness. As age increases, the prevalence of cerebrovascular diseases, metabolic disorders, infections, organ failure, and polypharmacy rises, thereby increasing the likelihood of impaired consciousness (10, 11). From this perspective, advanced age is not only a demographic characteristic but also a key indicator of clinical vulnerability that can affect the severity of clinical presentation and the final outcome (3, 11). In the present study, the most common cause of impaired consciousness was CVA, followed by poisoning and sepsis. This finding is consistent with many previous studies. For example, Sharifi et al. reported that the common causes of impaired consciousness in Mashhad included CVA, stroke, infections, myocardial infarction, hepatic encephalopathy, and alcohol intoxication (10). Similarly, Mateso et al. reported that the most common causes of non-traumatic coma in the Congo were stroke, acute metabolic disorders, meningoencephalitis, cerebral malaria, and infectious complications (3). Adan Ali et al. reported CVA, sepsis, diabetic emergencies, epilepsy, and shock as common

Table 3. Association Between Heart Rate and Hospital Outcome in Patients with Non-Traumatic Impaired Consciousness Presenting to the Emergency Department

Outcome	Heart Rate (Mean ± SD; beats per minute)	Max	Min	P value
Recovered	89.4 ± 19.96	140	50	0.170
Deceased	85.45 ± 15.65	140	47	

Table 4. Association Between Oxygen Saturation (SpO_2) and Hospital Outcome in Patients with Non-Traumatic Impaired Consciousness Presenting to the Emergency Department

Outcome	Oxygen Saturation (Mean ± SD; %)	Max	Min	P value
Recovered	93.54 ± 4.01	100	78	0.015
Deceased	83.53 ± 6.55	98	70	

causes in Somalia (12). This consistency suggests that non-traumatic impaired consciousness in many emergency departments primarily reflects vascular, infectious, and metabolic diseases rather than a phenomenon limited to a specific population (3, 9, 11).

The predominance of CVA in this study is clinically significant because both ischemic and hemorrhagic strokes can rapidly impair consciousness and lead to poor outcomes if diagnosis is delayed (13, 14). The high prevalence of poisoning in the studied region, on the other hand, may be associated with local patterns of drug, substance, and toxin consumption, as well as the socioeconomic characteristics of the area (15, 16). Sepsis (systemic infection) is also a common and important etiology because sepsis and septic shock are reversible yet highly dangerous causes of impaired consciousness that require immediate diagnosis and intervention (17, 18). Therefore, understanding the pattern of common causes in each clinical center can help physicians prioritize critical differential diagnoses during the initial minutes of presentation and initiate therapeutic interventions more rapidly (19, 20).

One significant finding of this study was the relatively higher mortality rate among patients. In the present study, the mortality rate was 20.8%, which is higher than that reported in some similar studies. For instance, mortality among patients with non-traumatic coma was reported at 35.2% by Mateso et al. in the Congo (3), 13.5% by Kim et al. in South Korea (21), 8.2% by Duyu et al. in Turkey (22), and 18.8% by Sharifi et al. in Isfahan (11). These discrepancies are likely due to differences in the patterns of underlying causes, illness severity at presentation, access to diagnostic and therapeutic facilities, and patient referral systems (21, 22). Furthermore, the high mortality rate in the current study may indicate that patients presented with more critical clinical conditions or experienced delays in diagnosis and treatment, underscoring the vital importance of rapid triage and precise primary assessment (11).

The findings of the present study also revealed that systolic blood pressure was significantly associated with hospital outcomes, as deceased patients exhibited lower blood pressure levels. This result is consistent with the study by Sharifi et al. in Mashhad, in which deceased patients also had lower systolic blood pressure (11). Similarly, Sharifi et al. reported that low blood pressure was associated with higher mortality. This association is physiologically plausible, as hypotension can indicate shock, hemorrhage, sepsis, or heart failure. In patients with impaired consciousness, hypotension leads to decreased cerebral perfusion and exacerbates neurological damage (11). Therefore, low systolic blood pressure at admission should be regarded as a serious warning sign and carefully considered in treatment decisions and when determining the required level of care (10, 11).

Additionally, blood oxygen saturation was lower in patients with unfavorable outcomes, and this variable also showed a significant association with hospital mortality. This finding is consistent with the study by Sharifi et al. (11) and the study by Mateso et al. (3). In patients with impaired consciousness, hypoxemia is one of the most critical and correctable risk factors for secondary brain injury and can rapidly worsen the patient's condition (3, 11). Sharifi et al. also reported an association between low oxygen saturation and mortality. This highlights the importance of continuous SpO_2 monitoring and rapid intervention in the

Table 5. Association Between Respiratory Rate and Hospital Outcome in Patients with Non-Traumatic Impaired Consciousness Presenting to the Emergency Department

Outcome	Respiratory Rate (Mean ± SD, breaths per minute)	Max	Min	P value
Recovered	17.91 ± 3.53	32	10	0.54
Deceased	18.26 ± 3.44	26	10	

Table 6. Association Between Body Temperature and Hospital Outcome in Patients with Non-Traumatic Impaired Consciousness Presenting to the Emergency Department

Outcome	Body Temperature (Mean ± SD, °C)	Max	Min	P value
Recovered	36.50 ± 3.57	32	10	0.305
Deceased	36.82 ± 0.46	26	10	

event of oxygen desaturation, especially in the emergency department setting, where delays in oxygenation can lead to irreversible consequences (11).

In contrast, heart rate, respiratory rate, and body temperature did not show a significant association with hospital outcomes in the present study. This finding is partially consistent with that of Sharifi et al., who also reported no significant association between heart rate, respiratory rate, body temperature, and patient outcomes (11). However, some other studies have shown that tachypnea, fever, and tachycardia can be indirect signs of sepsis, shock, or a critical state (3, 12). Therefore, the lack of a significant association in this study might be related to the sample size, the diversity of underlying causes, or the specific timing of vital sign recording at admission. In other words, although these indices are important in the primary assessment, they were not independent predictors of hospital outcome in this specific study (11).

From a practical perspective, a strength of this study is its reliance on real-world data from emergency patients, reflecting the local pattern of causes of impaired consciousness at a referral medical center in Northwestern Iran. Such data are valuable to emergency physicians because they help identify common regional etiologies and support more accurate prioritization of differential diagnoses and earlier treatment initiation. However, the present study has certain limitations. Its single-center design limits the generalizability of the findings, and retrospective data collection from medical records may be affected by incomplete documentation or errors in the recorded information. Furthermore, the descriptive-analytical design does not allow definitive causal inferences. Nevertheless, these limitations highlight the need for future multicenter studies with larger sample sizes and a broader range of prognostic variables.

Accordingly, it is suggested that future research evaluate additional indicators, such as the GCS, FOUR score, lactate levels, blood glucose, electrolytes, arterial blood gases, and the time delay from symptom onset to hospital presentation, to design more accurate predictive models for hospital outcomes. Moreover, developing a localized algorithm for the rapid triage and assessment of patients with impaired consciousness could help reduce diagnostic delays, enhance the quality of care, and improve overall patient outcomes.

5.1. Conclusions

In conclusion, the findings of this study demonstrate that CVA are the most common cause of non-traumatic impaired consciousness, accounting for 39.8% of cases. Clinical evaluation at admission showed that the patients' mean GCS score was 10.11 ± 3.32pm, and the overall hospital mortality rate was 20.8%. Statistical analysis revealed that systolic blood pressure and blood oxygen saturation (SpO_2) at presentation were significantly associated with patient survival and hospital outcomes. Conversely, vital signs such as heart rate, respiratory rate, and body temperature did not show any statistically significant relationship with the final hospital outcome.

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Footnotes

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