

# Unknown Patients and Neurology Casualty Services in an Indian Metropolitan City: A Decades Experience

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## Abstract

**Objectives:** A large number of unknown patients without any personal, family, or other identification details represent a unique problem in the neurological emergency services of developing countries like India in a context of legal, humanitarian, and treatment issues. These patients pose a diagnostic and management challenge to treating physicians and staff. There are sparse data on these patients. The objective of this study was to know the clinical, socio-demographic, and investigational profile of “unknown” patients. **Materials and Methods:** We did retrospective chart review of all “Unknown” patients from January 2002 to December 2011, who was admitted under Neurology Emergency Service at a Tertiary Care Neuropsychiatry Center in South Indian Metropolitan City. Clinical and sociodemographic characteristics and clinical outcome of the sample were analyzed. **Results:** A total of 151 unknown patients were admitted during the 10 years. Out of these, 134 (88.7%) were males with the mean age of  $43.8 \pm 14.8$  years and 95 (63%) were aged >40 years. Among them, 147 (97.4%) were from the urban vicinity, 126 (83.6%) were brought by police and 75 (49.7%) were registered as medico-legal cases. Out of these, only 3 (2%) patients had normal sensorium, whereas 101 (66.9%) presented with loss of consciousness. Forty-one (27.2%) unknown patients had a seizure disorder, 37 (24.5%) had metabolic encephalopathy, 26 (17.2%) had a stroke, 9 (6%) had neuro-infection, and 17 (11.3%) had a head injury. Deranged liver functions were seen in 65 (43%), renal derangement in 37 (24.5%), dyselectrolytemia in 42 (27.8%), and abnormal brain imaging finding in 95 (62.9%) patients. Furthermore, there were 14 (9.3%) deaths. **Conclusions:** Our findings demonstrate seizures, metabolic causes, and neuro-infections were the primary reasons for admission of unknown patients to neuro-emergency service. This novel Indian study data show the common causes of admission of unknown patients in neurology. This pattern can be useful to guide the approach of healthcare providers in India.

**Keywords:** Emergency department, emergency medical services, neuro epidemiology, neurological services, unknown

## INTRODUCTION

A large number of patients are admitted to government hospitals in large metropolitan cities without personal, family details, or any identifications details (especially at the time of admission). These patients get admitted under the name “unknown.” Thus, an unknown patient can be defined as “the patient whose identity cannot be ascertained at the time of arrival to the hospital.”<sup>[1]</sup> Little would be known about his/her personal/family details at the first point of contact with the emergency treating team. It is also synonymous with an unnamed patient, nameless patient, and unidentified patient. Unknown patients are patients who are unable to provide identifying information at the initial point of contact in the facility due to following reasons; it includes irrelevant speech,

poor comprehension, altered sensorium, and mutism due to various neuropsychiatric disorders. Common neuro-psychiatric disorders presenting as unknown are usually with a seizure disorder, postictal state, head injury, and severe psychotic disorganization. Their names would remain the same until their identity gets established during the treatment process. It may be quite impossible for clinicians to get patient’s medical history/medications use status and allergic status etc., so it

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creates many difficulties in making a decision for clinician under legal, ethical, and financial contexts. These patients represent a unique problem in developing countries such as India in the context of medico-legal aspects, humanitarian grounds, and treatment and rehabilitation issues. Addressing the problem of unknown patients who are attending neurology emergency requires a proper understanding of its size and association with neurological disorders, as well as factors such as patient's access to care, adherence to treatment, and follow-up.

The neurological emergency is commonly associated with high rate of morbidity and mortality.<sup>[2]</sup> Cerebro vascular disease (CVD), headache and epilepsy accounted for almost half of all acute admissions related to neurological diseases in western countries.<sup>[2-5]</sup> It is associated with high and increasing public-health costs.<sup>[6]</sup>

To the best of our knowledge, there is no data on unknown patients presenting to neurology emergency service in India. There are no systematic studies in world literature on this subgroup of unknown patients. With this in mind, we set out to assess the spectrum of unknown patients presenting to neurology emergency in our hospital. The aim of this study was to evaluate sociodemographic, clinical profile, and short-term follow-up of unknown patients admitted in the emergency department and studied the factors influencing course and outcome of illness.

## MATERIALS AND METHODS

We conducted a retrospective review of case files from January 1, 2002 to December 31, 2011. During this decade, the patients admitted with a name of "unknown" in the neurology emergency services of a tertiary neuro-psychiatric institute, referral center in a large metropolitan city in South India were recruited. Emergency clinical services were available with on duty neurologist of the hospital 24 h a day, 7 days a week and this caters the majority of both urban and rural population of South India and other parts of the country. Details were collected in a preform a developed for this purpose and it consisted of a mode of presentation, sociodemographic profile, scan findings, hospital course and outcome at discharge.

All patients were admitted as unknown, from police or public other relevant information was collected. Detailed general and a neurological clinical evaluation were done. All patients underwent routine laboratory investigation such as renal function test, liver function test, serum electrolytes, blood sugar, hemogram, and neuroimaging (Computerized tomography [CT] brain or magnetic resonance imaging [MRI] brain) if required. Some patients underwent another set of investigations such as lumbar puncture for cerebrospinal fluid (CSF) analysis, X-rays, digital subtraction angiography, electroencephalography, or electromyography with nerve conduction study (nerve conduction velocity), based on clinician's advice. Initially, the patient was seen by Casual

Medical Officer then referred to neurology service of an emergency department based on his/her assessment.

## Ethical considerations

Institutional Ethical Committee approved the study.

## Statistical analysis

Statistical analysis was performed using the level of statistical significance set at  $P < 0.05$ . Clinical and sociodemographic characteristics were analyzed by descriptive statistics. Independent sample *t*-test and paired samples *t*-test were used to assess continuous variables. Chi-square test was used to assess discrete variables.

## RESULTS

During the study period, from January 1, 2002 to December 31, 2011. A total of 247,621 patients attended the emergency services of the hospital. Of these, 21,310 were psychiatry patients, 116,561 were neurosurgery patients and 109,750 were neurology patients. One hundred and fifty-one (0.14%) patients were admitted as unknown under neurology department in an emergency. Tables 1 and 2 present the baseline sociodemographic and clinical characteristics of the sample. The mean age of the sample was  $43.8 \pm 14.8$  years and 65.6% ( $n = 99$ ) of the unknown patients belonged to age

**Table 1: Sociodemographic and clinical characteristics of unknown patients**

Variable	<i>n</i> = 151, <i>n</i> (%)
Approximate age (years)	
Mean±SD	43.8±14.8
<30	23 (15.2)
30–60	99 (65.6)
>60	29 (19.2)
Gender	
Male	134
Female	17
Brought by/pathway to care	
Police	126 (83.4)
Public	8 (5.3)
Health care worker/social worker/NGO	11 (7.3)
Others	6 (4)
Place	
Karnataka-within Bangalore	145 (96)
Karnataka-outside the Bangalore	4 (2.6)
Others	2 (1.4)
Location	
Urban	147 (97.4)
Rural	4 (2.6)
Registered as MLC case	
Yes	75 (49.7)
No	49 (32.5)
Not mentioned	27 (17.9)

MLC = Medico legal case, NGO = Nongovernmental organization, SD = Standard deviation

group of 30–60 years. Nearly 88.7% ( $n = 134$ ) of patients were males ( $n = 134$ , 88.7%). Unknown were admitted by police 83.4% ( $n = 126$ ), brought by public 6% ( $n = 9$ ) and 6.6% ( $n = 10$ ) by ambulance staff. About 49.7% ( $n = 75$ ) of these were registered as medico-legal cases (MLC). Nearly 97.4% ( $n = 147$ ) were from the urban vicinity and 96% ( $n = 145$ ) were found from Bengaluru city. Details about employment, education status, religion, family details, and socioeconomic status could not found. Nearly 66.9% ( $n = 101$ ) had received some form of primary care and referred before attending the hospital casualty. At admission 42.4% ( $n = 64$ ) were unconscious and 50.3% ( $n = 76$ ) had unstable vitals.

Random blood sugar was abnormal in 50 (33.1%) patients and CSF analysis with abnormal finding were seen in 9.9% ( $n = 15$ ) patients. A total of 147 patients were managed conservatively. About 23.2% ( $n = 35$ ) of these treated with antiepileptic drugs,

5.3% ( $n = 8$ ) received anti-edema drugs, 3.3% ( $n = 5$ ) required antibiotics and thiamine with glucose given to 3.3% ( $n = 5$ ) of patients. About 2.6% ( $n = 4$ ) were treated with aspirin, 21.2% ( $n = 32$ ) needed insulin and parenteral (intravenous) fluids. A majority of patients 24.5%, ( $n = 37$ ) were treated with multiple combinations of drugs and a parenteral route was preferred in 81.5%, ( $n = 123$ ). On admission, certain complications such as pneumonia 1.3% ( $n = 2$ ), septicemia 0.7% ( $n = 1$ ), and cardiorespiratory arrest 1.3% ( $n = 2$ ) were observed. Overall 84.8% ( $n = 128$ ) were referred to a general hospital on the same day or night after complete neurological evaluation and stabilization of patients condition. The mean duration of in hospital care was 1.38 days. A total of 143 patients underwent CT scan brain and MRI brain was done in two patients. Significant findings in neuroimaging were seen in 62.9% ( $n = 95$ ) of patients [Tables 1 and 2].

Figure 1 shows the diagnosis of unknown patients, 27.2% ( $n = 41$ ) were diagnosed as seizure disorder, 27.2% ( $n = 41$ ) had metabolic encephalopathy, 17.2% ( $n = 26$ ) had cerebro vascular accident (ischemic/hemorrhagic), 6% ( $n = 9$ ) neuro infection, and 11.3% ( $n = 17$ ) had traumatic brain injury.

Tables 3 and 4 show diagnosis and recovery status of unknown patients and correlation. Good or complete recovery at the time of discharge was seen in 11.9% ( $n = 18$ ); among these patients with seizure disorders (44.4% [ $n = 8$ ]) and alcohol-related disorders (38.9% [ $n = 7$ ]) showed good recovery with statistical significance ( $P < 0.05$ ) compared to other disorders. Death occurred in 9.3% ( $n = 14$ ) patients. There were 24.5% ( $n = 3$ ) metabolic encephalopathy cases and among these deaths occurred in 42.9% ( $n = 6$ ) patients out of 14 with significant association ( $P < 0.05$ ) compared to other causes.

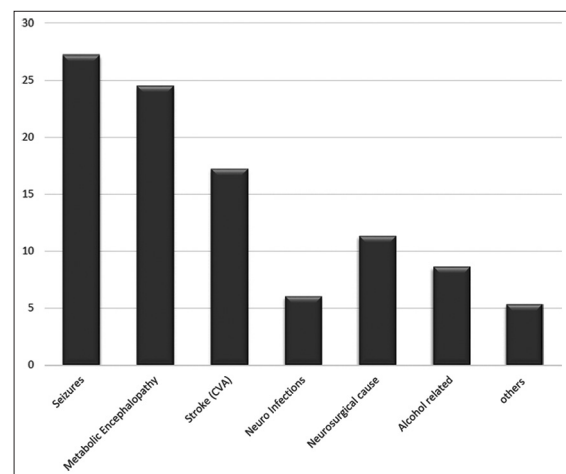
**Table 2: Clinical characteristics of unknown patients**

Variable	$n=151, n (%)$
Presenting symptoms	
Altered sensorium	37 (24.5)
Fits (abnormal body movements)	41 (27.2)
Loss of consciousness	64 (42.4)
Others	9 (5.9)
GCS at admission	
13-15	3 (2)
8-12	14 (9.3)
<8	25 (16.6)
Not recorded	109 (72.2)
Vitals	
Stable	75 (49.7)
Unstable	76 (50.3)
Imaging (CT/MRI brain finding)	
Normal finding	56 (37.1)
Abnormal finding	95 (62.9)
Electrolytes	
Abnormal	42 (27.8)
Normal	109 (72.2)
Hemogram	
Normal	34 (22.5)
Significant finding	10 (6.6)
Not done	107 (70.9)
Liver profile	
Normal	47 (31.1)
Significant finding	65 (43)
Not done	39 (25.8)
Renal profile	
Normal	76 (50.3)
Significant finding	37 (24.5)
Not done	38 (25.2)
Outcome	
Complete recovery	11 (7.2)
Referred to general hospital for inpatient care	130 (86.1)
Death	14 (9.3)

CT = Computerized tomography, MRI = Magnetic resonance imaging, GCS = Glasgow Coma Scale

## DISCUSSION

This study was conducted at Tertiary Neuro-Psychiatric Institute facility, which is one of the largest government run



**Figure 1:** Final diagnosis in unknown patients presenting to neurological emergency

**Table 3: Diagnosis and recovery status of unknown patients**

Diagnosis	Good recovery (%)	Mild disability (%)	Mod disability (%)	Severe disability (%)	Death (%)	Not known (%)
Seizures	8	2	1	0	3	27
Metabolic encephalopathy	1	1	0	5	6	24
Stroke	1	1	0	2	1	22
Neuroinfections	1	1	0	3	1	4
TBI/SDH/EDH	0	0	1	2	3	9
Alcohol related	0	0	1	0	0	5
Others	0	1	0	0	0	7
Total (151)	11 (7.3)	6 (3.9)	3 (1.98)	12 (7.95)	14 (9.27)	98 (64.9)

TBI = Traumatic brain injury, SDH = Subdural hematoma, EDH = Extradural hematoma

**Table 4: Correlations of recovery status and death with other variables**

Variable	Correlation coefficient (r)	P
Age	0.2	0.011*
Gender	0.04	0.6
GCS at admission	-0.27	0.001*
Vitals at admission	0.28	0.0001*
Brain imaging abnormality	0.06	0.44
Hemogram	-0.2	0.01*

\* $P < 0.05$ . GCS = Glasgow Coma Scale

facility in South India. This study provides one of the first large data on unknown patients from neurology emergency department's perspective in India. Very few studies have addressed the condition of unknown patients in India in neuropsychiatric care.<sup>[6-9]</sup> Furthermore, there is no guideline for the protocol based or hospital based treatment of unknown patients in government hospitals.

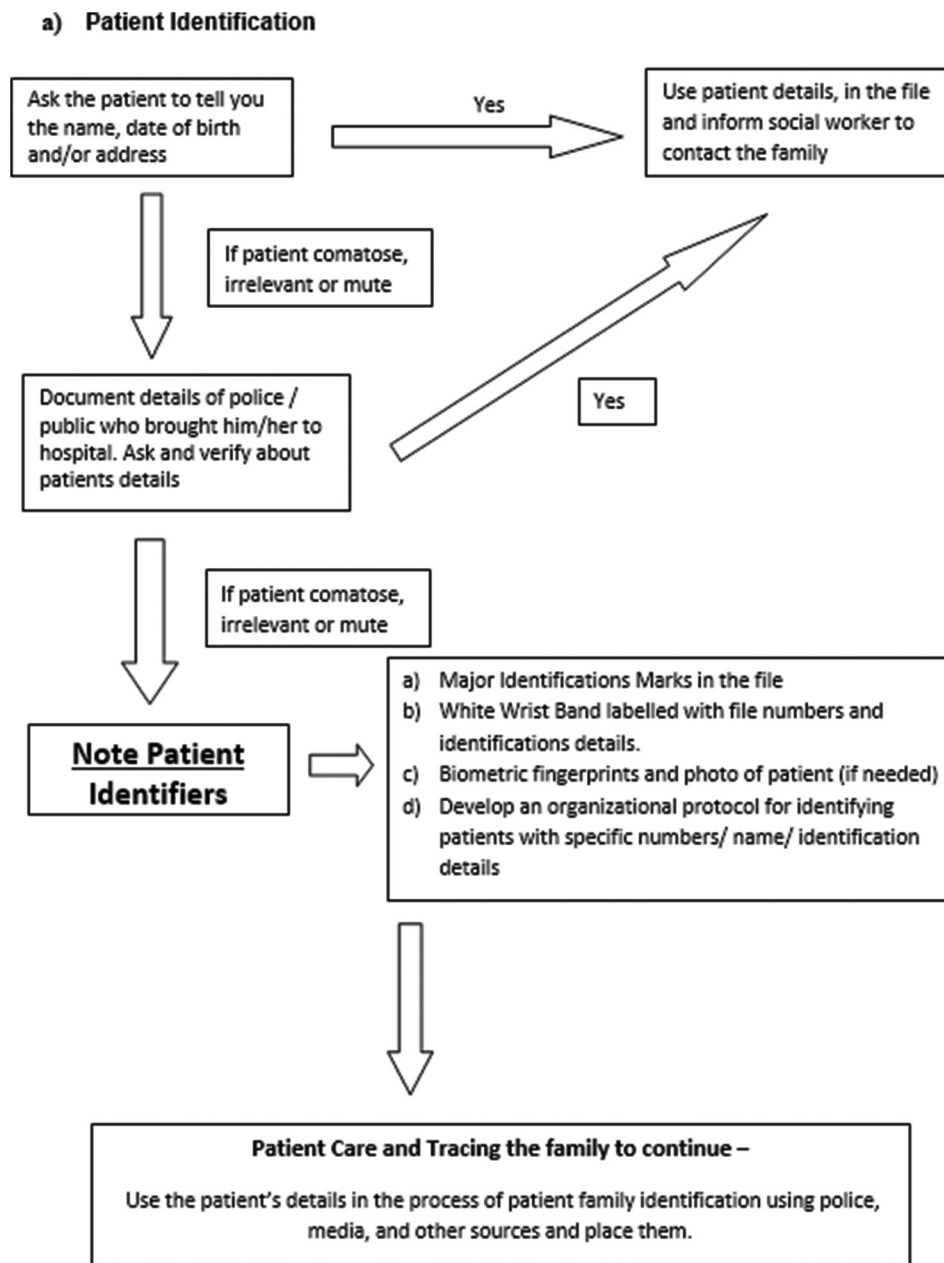
India lacks an efficient emergency service system. Society and bystander can play a crucial role in providing assistance to care. However, in our study, a majority of the unknown patients were brought and admitted by police compared to public and ambulance services compared to public/bystander. It reflects that public may worry about, (1) responsibility of the unknown patient, (2) afraid of legal and court procedures and consequences related to unknown patient (3) patient hospital charge and guardianship of unknown patient. Recently, Government of Karnataka approved the bill called "Karnataka Good Samaritan and Medical Professional (Protection and Regulation during Emergency Situations) Bill." As per bill (a) good Samaritans who help the victims promptly will be awarded ₹1500. (b) They will be exempted from repeated attendance in courts and police stations. (c) In case the attendance is mandatory, expenses of such "running around to courts and police stations" will be taken care through the proposed Good Samaritan Fund. (d) After admitting the victim to the hospital the Good Samaritan can leave immediately after he/she has furnished their details, such as name, contact number, and address. (e) All hospitals will be made to give first aid to the victims. (f) A corpus of ₹5

crore will be created under the Health and Family Welfare Department for disbursing the compensation amount to Good Samaritans.<sup>[11,12]</sup>

The government has to take the initiative to develop "central helpline" facility and "mobile emergency units" to handle unknown population and which may reduce delay in seeking treatment and improve the health service of the country. At individual hospitals/institutions, a level also there is a need for guidelines, protocol/supervised operating procedure to handle this subgroup of the population in emergency department based on their resources. A Recent study from Scandinavian country shows the interdisciplinary team (collaboration with neurology, anesthesiology, trauma surgery and neurosurgery with standardized laboratory tests and imaging) standard operating procedure (SOP) for patients presenting with nontraumatic coma of unknown origin helped in the appropriate and efficient management of it.<sup>[13]</sup> Majority of the unknown patient, were referred from secondary care centers with first aid treatment. However, who sought help in our center was critical, with unstable medical status. Therefore, there is scope to improve the facility to handle an emergency at the secondary care center.

Even though, the entire unknown patient has to be registered as MLC as per our hospital's SOP, only 49.7% ( $n = 75$ ) of these were registered as MLC. Those who were registered as MLC were brought to our hospital by public or police without a reference letter. If the unknown patient was brought by police with a reference letter to a hospital from a government hospital where he or she is registered as MLC then they are not re-registered as MLC in our center.

In our study shows, most of the unknown came to the care were adult males. Our study shows that most of the unknown patients brought to the care were adult males. The adult males are the ones who are travelling more than females due to the social structure of our society. Males have to go out for work and there are higher chances of addictions and health emergencies happening when they are away from home. A common pattern of neurological emergency and frequency across the world varies. A study by Lange *et al.* in 2011 from Brazil shows CVD (42.69%), primary headache (7.1%), and seizure disorder (12%).<sup>[2]</sup> Furthermore, one more study by Carroll and Zajicek from the UK showed that stroke, headache, multiple



**Figure 2:** Standard operating procedure - Unknown

sclerosis, and seizures were the most common emergency care patients and it accounted for 63% of cases.<sup>[4]</sup> Another study from Spain report most frequent diagnoses made were a headache, stroke, and epilepsy and accounted for 39% of emergency neurology care.<sup>[5]</sup> These results were similar among high-income countries. However, in our emergency department, the most common diagnosis made were seizure disorder followed by metabolic encephalopathy, stroke, and head injury and it accounted for 80.2% of these patients. This shows seizure disorder, stroke is common across the world, and metabolic encephalopathy and head injury were unusually more common at our center compared with the other centers in the world.<sup>[2-5,10]</sup> It may be due to the following

reasons (1) referral bias of general medical causes causing encephalopathy (2) unknown patients subgroup (3) it is tertiary care and referral center for neuropsychiatry care rather than a multispecialty general hospital.

The mortality rate in our sample in emergency care was 14 (9.3%) and 10 out of 14 deaths occurred in the age group of 30–60 years. Metabolic encephalopathy was the major cause leading to death, contributing nearly half of the mortality among unknown patients. The unknown patients with metabolic encephalopathy had multiple co-morbid medical conditions and those who died in emergency service had come with multiple organ dysfunctions compared to those who did not. Even though, the metabolic encephalopathy is a treatable

condition, it had high mortality rate compared to the other neurological emergency conditions. There was no literature available on mortality in the emergency neurology department. Closer was a mortality rate in neurology Intensive Care Unit which was around 52.4% and a common cause being head injury followed by tetanus and hypertensive encephalopathy.<sup>[3]</sup>

Maximum numbers of unknown patients were referred to general hospital after emergency care with final diagnosis and management plan and only five of them came for follow-up. Hence, it is difficult to predict short-term outcome and functionality of unknown patients due to low follow-up rate. This study describes not only the clinical status of unknown patients but also challenges imposed on managing team as most of these were MLC associated with high mortality, morbidity, and complications. In this study MLC was done in nearly 50% of unknown patients. However, only 2% of study population were having normal sensorium. We recommend MLC to be done in all unknown patients especially who are in altered sensorium. There were total 14 cases who died in the hospital. Postmortem examination of each case has been done but the details of postmortem reports were not available in the case files. It would have been better if comparison of ante mortem and postmortem diagnosis was made.

There is a need for the development of new supervised operational procedure or policy/guidelines to register unknown patient data to ensure safety, care and to provide appropriate management and to prevent potential medico-legal problems. This should be done with the cooperation of hospitals and the government.

In our institute, we follow the following procedure. When an unknown patient arrives at emergency care, medical record number will be generated as per chronological order and we labeled them as unknown and registered as MLC. Information is collected from a local person who had brought the patient to emergency and then the identification and injury marks are documented in the file. The identification (ID) band that states “unknown” is affixed to the patient at the time of triage. As soon as the patient name and other personal details are confirmed, data in the system would be changed and the old registration number is continued. Change in data will be done by the medical record personal both in electronic and paper case records. The social worker will be assisting in tracing the family and assisting social care. This is almost similar to data record systems that are used worldwide. There is a need to upgrade ourselves in term of taking fingerprints and biometric to improve identification accuracy of unknown.

The police/public, who brought these patients to the hospital, commonly assist us in the identification of the unknown by checking pockets of shirt and trouser for an identity card, aadhar card or any proof of identity. Sometimes, the lockets worn by patient/tattoo in the body help to know the cultural and religious background of the unknown person and help in the identification of the person and in few cases performing the last rites in case the patient expires. Clinician in charge

performs the complete general physical examination and documents moles, scar marks, or tattoos on the body for personal identification. The smell of breath can help us the treating clinician to some extent to know any intoxication of substance like alcohol. The burns at fingertips of dominant hand can indicate inhalational use psychoactive substance.

(Proposed standard operating procedure for management of unknown patients [Figure 2]).

### Strengths and limitations

To the best of our knowledge, this is the first study in India that has looked into a clinical profile of unknown patient seeking neurological emergency department service and short-term treatment outcome. The study also has some methodological limitations. It was a retrospective chart review and larger prospective studies are required to improve and validate these results.

### Implications

Our study highlights about the clinical profile, the pathway of care, mortality and morbidity of a neurological disorder in the unknown subgroup of patients, who seek treatment from the neurological emergency department. The finding from this study will help in the development of guidelines, decreasing the morbidity and mortality of unknown patients by improving resources and to develop training in handling this special group.

### CONCLUSIONS

Our study-demonstrated police brought a majority of unknown patients. Seizure disorder followed by metabolic encephalopathy, stroke, and head injury were conditions represented the majority of the neurological evaluations in the emergency department. There is a need for national guidelines for emergency department teams regarding the management of unknown patients.

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### Conflicts of interest

There are no conflicts of interest.

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