

Thesis on Prevalence and risk factors of delirium in intensive care unit and,  
emergency department of Tikur Anbessa specialized university hospital.



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## Abstract

**Background:** Delirium is becoming prevalent in hospitalized patients especially in ICU and emergency. In spite of the fact delirium having a negative impact on patient outcome, the condition often times stays unrecognized and untreated.

**Objective:** The Objective of this study was to determine the prevalence of delirium in ICU and emergency and to assess associated risk factors.

**Method:** Cross sectional prospective study was done on 120 patients in a setting of 14-bedded ICU and in emergency department of university-affiliated hospital.

**Results:** Out of 825 patients, 120 (14.5%) had delirium in emergency (12.6%) and ICU (27.3%) respectively. The mean  $\pm$  SD age of patients was  $45.8 \pm 17$  years. Sepsis holds 22.5% of a reason for admission. The mean time in days  $\pm$  SD until the occurrence of delirium for ICU is  $4.12 \pm 2.9$  and emergency is  $2.4 \pm 1.5$  days. There was a significant relationship between mechanical ventilation and development of delirium after 24 hours ( $\chi^2 (1, N=120) = 7.68, p=0.006$ ). Most patients, 72.5% had polypharmacy and just over a half of patients had a restraint applied to them. There is a significant relationship between benzodiazepine use and development of delirium after 24 hours,  $\chi^2 (1, N=120) = 4.83, p=0.003$ .

**Conclusion:** Delirium was found to be prevalent in emergency and ICU. And clinicians caring for patients in both units should assess for delirium and make it an integral part of daily patient evaluation. Given the significant association, clinicians should monitor modifiable risk factors.

**Key words:** delirium, ICU, emergency, risk factor, Tikur Anbessa

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## ACRONYMS

AOR: Adjusted odds ratio

CAM: Confusion assessment method

CAM-ICU: Confusion assessment method- Intensive care unit

CI: Confidence interval

ED: Emergency department

ICU: Intensive care unit

RA: Research assistant

RASS: Richmond Agitation-Sedation Scale.

SD: Standard deviation

TASH: Tikur Anbesa specialized hospital

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## **1. CHAPTER ONE INTRODUCTION**

### **1.1 BACKGROUND**

The term delirium is derived from the Latin word delirare, which literally means to go out of the furrow or figuratively crazy or danger.[17] Delirium is an acute brain dysfunction defined as a mental disorder of acute onset with a fluctuating course, characterized by a disturbance in consciousness, attention, orientation, memory, thought, perception, and behavior.[20]

Delirium is a syndrome of several different etiologies and patients with delirium have disturbance of consciousness with accompanying change in cognition. Characteristic features include impaired short-term memory, impaired attention, disorientation, development over a short period of time, and a fluctuating course.[20] Not all described features need to be present for the diagnosis of delirium, and the degree of the symptoms ranges widely among patients in which case some may present with hypoactive and some with hyperactive state.[21] Physiologically, delirium is characterized by a derangement of cerebral metabolism with cerebral dysfunction and is usually caused by a general medical illness, intoxication, or substance withdrawal.

## 1.2 STATEMENT OF THE PROBLEM

Delirium is a common cause of acute brain dysfunction in patients admitted to the intensive care unit (ICU) or emergency department. It may develop secondary to multiple precipitating or predisposing causes in critically ill patients. Although it can be of a brief time and reversible, its occurrence in patients may be associated with long-term cognitive dysfunction. [20]

Delirium is a crucial diagnosis, both because it is difficult to manage and because it signifies a poor prognosis in the hospital and beyond. Several studies have demonstrated that delirium is associated with increased hospital length of stay and costs. The effect of delirium on relevant clinical outcomes is not restricted to the hospital setting, as delirium is also an independent predictor of mortality and long term cognitive impairment.[19]

Delirium is unnoticed, misdiagnosed, and its significance undermined by healthcare providers in intensive care unit. Delirium has been reported as one of the most common type of organ dysfunction encountered in ICU though its prevalence varies across different studies.

Different studies have shown the incidence of delirium in mechanically ventilated patients to be as high as 85%. Delirium in ICU patients is associated with increased duration of mechanical ventilation, prolonged hospitalization, and increased rate of self-extubation. Despite the growing knowledge of the pathophysiology, risk factors and outcomes associated with delirium, it is still undiagnosed, and modifiable risk factors related to its occurrence are often times disregarded. [19]

Unrecognized delirium in the emergency department is also a problem to a significant degree. The ED is engaged in so many activities, noisy, distracting and time-pressured compared to other environments, which can influence both the patient's cognitive state and the clinician's ability to carefully evaluate cognition.

Prior studies carried out in various clinical settings have showed that over 50% of cases are left undetected. According to Han *et al*, the situation is worse as approximately 75% of cases are missed in the ED. According to Han *et al*, Physicians in emergency department have identified Lack of knowledge about delirium and its clinical importance as a factor associated with non-detection of delirium. [21]

### 1.3 SIGNIFICANCE OF THE STUDY

In spite of the fact that delirium having a negative impact on patient outcome, the condition usually stays unrecognized and untreated. Various interventions can prevent or decrease the amount of time and severity of an episode of delirium, although are resource demanding if applied widely. Yet, an approach of timely identification of delirium risk, and aiming for the interventions to those most at risk, is acceptable when compared to the substantial financial burden alone of delirious patients. [19]

Recent recommendation from the Society for Academic Emergency and The American College of Emergency Physicians identified the detection of delirium in the emergency department as a high yield research objective.

Knowledge of the true magnitude of delirium and its associated burdens in critically ill as well patients presenting to emergency would allow clinicians researchers and policymakers to allocate much needed resource toward reducing morbidity and mortality associated with delirium.

In Africa, unfortunately knowledge, epidemiology, and burden of delirium is based from studies performed in one or few centers in tertiary hospitals and academic centers where delirium awareness and adherence to best practice is probably increased.

In low income countries like Ethiopia where, malnutrition, infectious disease, sepsis and trauma are common, very little is known about the magnitude of delirium especially in critically ill and emergency patients and there is no published data of the topic under the study.

## Prevalence and risk factors of delirium

Given the scale, addressing delirium should be priority for clinicians as well researchers. To improve Delirium outcomes and hospital management, measures must include at first identifying the prevalence in our hospital, finding a validated assessment method and facilitating research in this difficult patient population.

Therefore, this study is useful to put baseline information for clinicians caring and treating patients presenting to the emergency and those who are critically ill as well as to forward recommendations other investigators to work further on the same and or other related issues.

## 2. CHAPTER TWO

### Literature Review

#### 2.1 Prevalence of delirium in ICU and Emergency Department in the world

**2.1.1 Prevalence in ICU:** A prospective study, in the tertiary care hospital of older Thai adults [16] revealed that delirium occurred in 44 of 99 patients (44.4%) with an incidence rate of 22.2%. The prevalence of delirium in mechanically ventilated patients was 62.5%.

A prospective, single-center, observational cohort study showed that among 93 patients evaluated using the CAM-ICU, 47% developed delirium (CAM-ICU+) for  $\geq 1$  day while in the intensive care unit. A statistically greater number of patients with delirium (CAM-ICU+) received continuous infusions of midazolam (59% vs. 32%,  $p < .05$ ) and physical soft-limb restraints (77% vs. 50%,  $p < .05$ ) compared with patients without delirium [2].

The majority of the patients had delirium within five days of ICU admission. Independent predisposing factors identified were age, functional status, having pneumonia, cognitive impairment, depression, or previous stroke. Numbers of additional drugs, physical restraints, use of bladder catheters, and patients with mechanical ventilators were independent precipitating factors.

Research done on ICU architectural design on the effect of delirium prevalence showed, 13.0% had delirium the risk factors associated with delirium were admission in multi bed rooms (odds ratio, 4.03; 95% CI, 2.13-7.62), older age, and ICU-acquired infection [6].

Delirium in patients admitted to a cardiac intensive care unit with cardiac emergencies in a developing country showed prevalence rate of 18.77%. The risk factors identified for delirium were, hypokalemia, , receiving more than three medications, sepsis, hyponatremia, presence of cardiogenic shock, currently receiving opioids, age more than 65 years, presence of diabetes mellitus, presence of uncontrolled diabetes mellitus, history of seizures, presence of congestive cardiac failure, currently receiving/taking benzodiazepines, higher total number of medications[9].

Another is Delirium in the cardiovascular ICU: exploring modifiable risk factors, published in 2013 April. [8] Prevalence of delirium was 26%. Of the daily occurring risk factors, patients who received benzodiazepines (2.6 [1.2, 5.7],  $p = 0.02$ ) or had restraints or devices that precluded mobilization (2.9 [1.3, 6.5],  $p < 0.01$ ) were more likely to have delirium the following day.

A study done on clinical deterioration of older adults with delirium during early hospitalization [7] showed that 38 of 260 participants (15%) were delirious at least once during the first 3 days of hospitalizations.

Delirium epidemiology in critical care (DECCA), an international study, published in November 2010 showed that a 1-day point prevalence of delirium was 32.3% median age 62 years. [17]

Incidence and risk factor of delirium among mechanically ventilated patients in African intensive care setting [14]: An observational multicenter study among Ugandan mechanically ventilated patients showed that the median time to onset of delirium was 3.7 days.

Outcome of delirium in critically ill patients: systemic review and meta-analysis. Published in June 2015. Delirium was identified in (31.8%) of critically ill patients as reported in 42 studies. [13]

**2.1.1 Prevalence in emergency department:** The prevalence, risk factors, and short-term outcomes of delirium in Thai elderly emergency department showed a prevalence of 12% in the ED. [5]

Delirium in the emergency department: an independent predictor of death within 6 months, done in 2010 identified 17.2% as delirious in the ED. [10]

Emergency Department Stay Associated delirium in Older Patients [4], a historical cohort of patients who presented to a Canadian ED showed a median age of 78.9 years (SD: 7.3). Thirty-six (18%) patients experienced ED-stay associated delirium. Nearly 50% of episodes started in the ED and within 36 hours of arrival.

Incidence of delirium in the Canadian emergency department and its consequences on hospital length of stay [1]: a prospective observational multicenter cohort study showed a mean age of 76.8 and 17.7% were aged >85 years old. The mean incidence of delirium was 12.1%.

The delirium drug scale is associated to delirium incidence in the emergency department: which was carried out in three emergency departments of tertiary care university health center showed a mean age of 83.4 years. The prevalence of delirium was 19.1%. A total of 745 patients (62) % were exposed to DDS (delirium drug scale) medication. [12]

Delirium within the emergency care setting, occurrence, and detection: a systematic review. Occurrence of delirium at admission to the ED ranged from 7% to 20% of patients. [11]

## Prevalence and risk factors of delirium

**2.1.3. Prevalence of delirium in Ethiopia:** Magnitude and Associated Factors of Delirium among Hospitalized Patients, Ethiopia [3] at St. Paul's Hospital Millennium Medical College showed a prevalence of delirium of 16.6%. Age of  $\geq 60$  years (AOR=7.8, 95% CI: 3.1, 19.5), having visual impairment (AOR=3.4, 95% CI: 1.3, 8.9), poly therapy (AOR=2.4, 95% CI: 1.2, 4.6) and benzodiazepine exposure (AOR=11.3, 95% CI: 4.9, 25.8) were positively associated with delirium. Across different units the prevalence in emergency was 22.5%, 27.8% in ICU.

### **3. CHAPTER THREE**

#### **3. Objectives of the study**

##### **3.1 General objectives**

- To assess the prevalence and risk factors of delirium in emergency and intensive care unit patients of Tikur Anbessa from the year 2019 May 1<sup>st</sup> to July 30<sup>th</sup> 2019.

##### **3.2 Specific objectives**

- To determine prevalence of delirium in emergency and ICU
- To assess socio demographic distribution of delirium emergency and ICU
- To assess associated risk factors of delirium in emergency and ICU
- To assess median time to onset of delirium occurrence in emergency ICU

## 4. CHAPTER FOUR

### 4.1 Study methodology

#### 4.1.1 Study Area and Period

**4.1.2. Study Area.** The study was carried out in emergency department and intensive care unit of a multidisciplinary tertiary care university affiliated hospital, Tikur Anbessa, which is located in capital city of Ethiopia, Addis Ababa. Each unit, emergency and ICU are managed by the Department of Emergency Medicine, and the Department of Anesthesiology and internal medicine respectively. Whenever a patient visits the emergency, emergency medicine residents provide care, and attaching residents from other department's as well. A senior emergency physician is consulted when needed. The emergency department is divided in to three areas; red, orange and green. Per year 20,000-22,000 patients are seen and per day approximately 70 patients. It is a 37-bed facility. It has 25 emergency residents, eight attending emergency physician, five emergency specializes nurses and other nurses. The ICU is a 14-bed facility, which caters to patients from medical and surgical department as well emergency department. It has three sub units, medical, surgical, pediatric. The medical sub unit is run by department of internal medicine, pulmonology and critical care unit while the surgical subunit is run by department of Anesthesia. The treating team includes specialists, fellows, residents and nurses.

### **4.1.3. Study Period**

The study was conducted in TASH from year 2019 May 1<sup>st</sup> to July 30 -2019.

### **4.1.4 Study Design**

Prospective cross sectional descriptive study design was used.

### **4.1.5 Source Population**

Patients presenting to the emergency department and, patients admitted in intensive care unit of TASH.

### **4.1.6 Sampled Populations**

All patients admitted in TASH ICU and managed in emergency department during the study period were considered as sample population.

## **4.2. Sample Size and Sampling technique**

### **4.2.1 Sample Size**

The sample size was determined by number of patients who present to the emergency department and patients admitted in ICU of TASH in the study period meeting the inclusion criteria with delirium.

### 4.2.2 Sampling Techniques

All patients admitted in TASH ICU and ED from the year 2019 may first to July 30 2019 using convenient sampling method.

## 4.3 Study variables

### 4.3.1 Independent

- Age
- Gender
- Marital status
- Residency
- Education
- Diagnosis at admission
- Administered drug during stay in hospital
- Hearing and visual impairment
- Use of restraints
- Environmental conditions
- Use of mechanical ventilator
- Place of admission

### 4.3.2 Dependent

- Prevalence of delirium in emergency and intensive care unit patients of Tikur Anbessa.
- Mean time to onset of delirium occurrence.

## **4.4 Inclusion and Exclusion Criteria**

### **4.4.1 Inclusion Criteria**

1. Patients aged 18 years and over,
2. Patients presenting to ED and needing and/or waiting for admission to any hospital ward or ICU.

### **4.4.2 Exclusion Criteria**

1. Patients who are unable to consent;
2. Patients with a history of psychiatric disorders (such as schizophrenia, psychotic symptoms, and bipolar disorder).
3. Patient with unstable medical condition requiring immediate medical or surgical management
4. Patients with RASS score <-3
5. Previously enrolled patients

#### **4.5 Data Collection Instruments and Techniques**

Data was collected using semi-structured, pretested, internationally validated data collecting format and checklist prepared for this purpose. Patients were screened for delirium during initial interview, and twelve hours apart during their entire ED stay and also in ICU until the development of delirium. The Confusion Assessment Method (CAM) for emergency department and CAM-ICU for ICU patients was used to assess delirium. The Confusion Assessment method was developed in 1988 GC and was designed to enable non-psychiatric clinicians to detect delirium quickly and accurately. It is used in over 4000 original studies and translated in to over 20 languages. Other information on medications, comorbidities and ED environment evaluation was collected in addition to sociodemographic data.

Each site's team of Research Assistants (RA) received standardized training by an experienced member of the mentoring team in the administration of the CAM. Two nurses with BSc degree attended a group training session conducted by the study coordinator and undergone a 5-hour personalized training. They were also provided with a detailed training manual. The CAM-ICU was translated in to Amharic and was tested on 5 patients.

#### **4.6 Data Processing and Analysis**

The collected data was cleaned, coded, and analyzed by SPSS 25 statistical package. First descriptive statistic such as mean, standard deviation, and range as well frequencies and percentage was used to summarize data. Inferential statistics in the form of chi square was performed. Results was narrated and expressed in tables and graphs after analysis.

#### **4.7 Data Quality Control Method**

Before starting the data collection, data-collecting format was cross-matched with available information on records; then the study questions was arranged. Daily completeness of the data was cross-checked. When an incomplete data was found, the data was reassessed. When still incomplete, then finally incomplete data was discarded.

#### **4.8 Ethical Consideration**

Before beginning data collection consent was obtained from Addis Ababa University, school of medicine emergency department. After getting consent from the responsible bodies, data was collected after an informed consent obtained from the family members of the patients prior to recruitment. Another code was given to each card numbers by RA and the patient's name or card number was never used by any means throughout the research.

#### **4.9 Dissemination of the results**

After completion of this study, result will be copied and given to regional health bureau, Addis Ababa university health Science collage library, and department of emergency and critical care medicine will be published and presented in journals of emergency medicine.

## 5. Result

A total of 1168 patients came to the emergency department within the study period of three months. Of these patients, 845 were admitted. From the 845 admitted, 126 were excluded because they did not meet the inclusion criteria. Fifty-five were under the age of 18 (Flow chart). Of these 719, 91(12.6%) had delirium.

One hundred and six patients were included in study in ICU. Thirty-five in medical ICU. Seventy-two patients were included in surgical ICU. Twenty-nine (27.3%) of 106 patients were delirious. The overall prevalence of delirium in ICU and emergency was 14.5%.

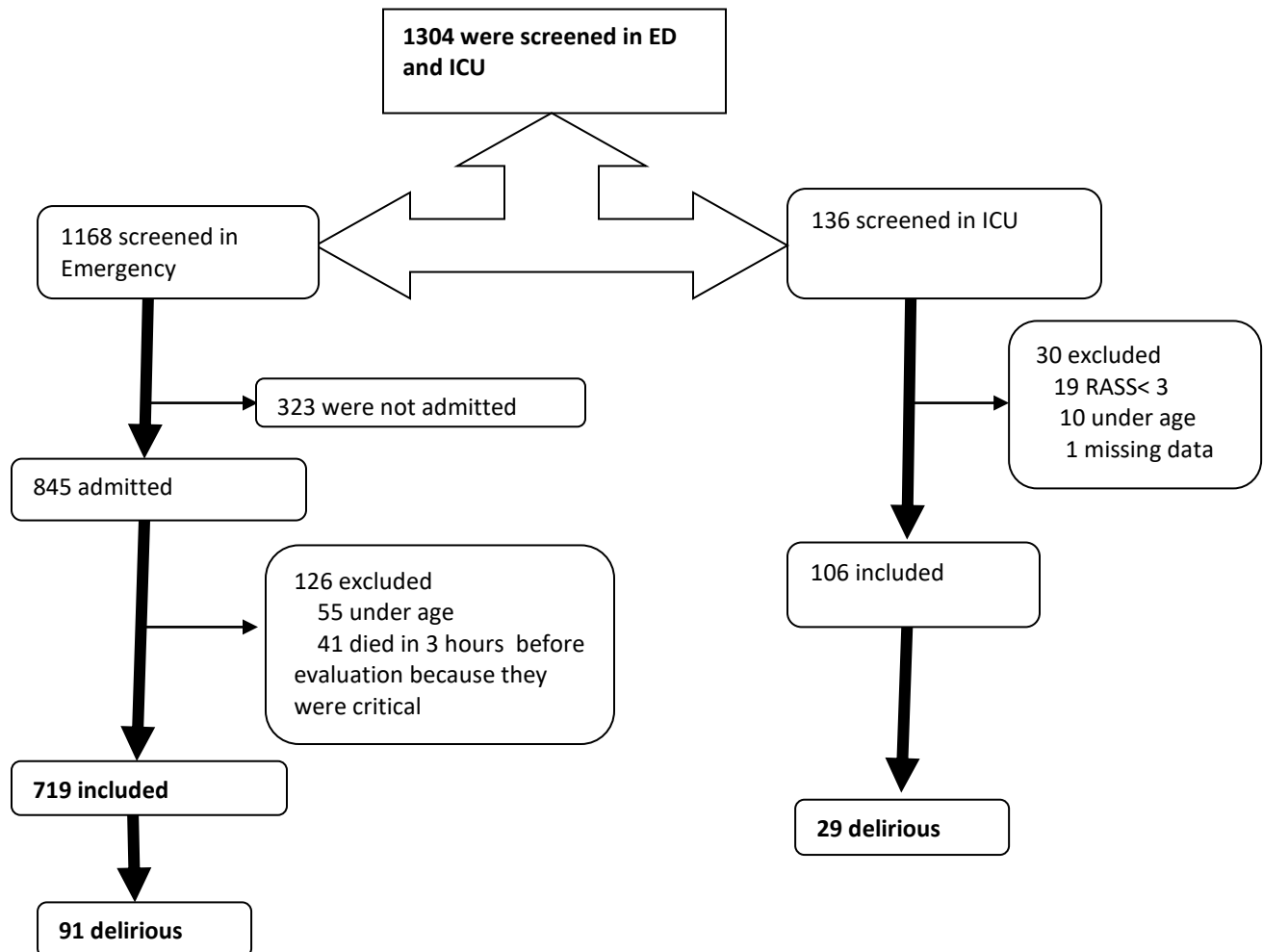


Figure one, patient recruitment in the study. Delirium in ICU and emergency department of TASH, from May 1 to July 30, 2019

**5.1 Socio-demography:** most of the study subjects are male (69%). Majority of the study subject's age range is from 35-59(40.8%) with a mean (SD) age of  $45.8 \pm 17$  years, minimum age of 18 and maximum of 80. The study shows that 50% of study subjects reside out of Addis. More than 2/3 of the patients, 88(73.3%) follow orthodox religion. The data revealed only a few, 13 (10.8) to have an educational status of diploma and above the other 87(72.5) are illiterate. Eighty-two are married.

**Table 1**

*Sociodemography of patients with delirium, TASH AAU, May 1- July 30, 2019*

| Variables          | Characteristics   | Age category |       |     |       |
|--------------------|-------------------|--------------|-------|-----|-------|
|                    |                   | 18-34        | 35-59 | ≥60 | Total |
| Gender             | Male              | 17           | 31    | 21  | 69    |
|                    | Female            | 21           | 18    | 12  | 51    |
| Religion           | Orthodox          | 24           | 35    | 29  | 88    |
|                    | Muslim            | 13           | 13    | 4   | 30    |
|                    | Protestant        | 1            | 1     | 0   | 2     |
| Educational status | Illiterate        | 18           | 40    | 29  | 87    |
|                    | Primary school    | 7            | 4     | 2   | 13    |
|                    | Secondary school  | 5            | 1     | 1   | 7     |
|                    | Diploma and above | 8            | 4     | 1   | 13    |
| Marital status     | Single            | 25           | 6     | 0   | 31    |
|                    | Married           | 11           | 43    | 28  | 82    |
|                    | Divorced          | 1            | 0     | 0   | 1     |
|                    | Widow             | 1            | 0     | 5   | 6     |
| Drinks alcohol     | Never             | 20           | 20    | 6   | 46    |
|                    | Sometimes         | 13           | 25    | 22  | 60    |
|                    | Always            | 5            | 4     | 5   | 14    |
| Smoking cigar      | Never             | 32           | 36    | 28  | 96    |
|                    | Sometimes         | 2            | 10    | 5   | 17    |
|                    | Always            | 4            | 3     | 0   | 7     |
| Chews khat         | Never             | 31           | 35    | 28  | 94    |

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**5.2 Patient and illness factors:** Sepsis was the commonest cause for admission in patients for delirium (22.5%). About 21.7% had neurologic complaints and 15.8% pulmonary (Table 1). Our finding showed that on the second day of admission, most patients (30%) developed delirium. The mean time in days  $\pm$  SD until the occurrence of delirium for ICU is 4.12  $\pm$ 2.9 and emergency is 2.4  $\pm$ 1.5 days. Thirty-five (29.9%) patients were on a ventilator support. There was a significant relationship between mechanical ventilation and development of delirium after 24 hours.  $X^2(1, N=120) = 7.68, p=0.006$ .

As summarized below in Table 3 of the total 120 delirious patients, 43 had an electrolyte abnormality. The results of this study demonstrated that 65% patients were found out to be delirious at night.

The data in study showed that only nine (7.5%) study subjects had vision and hearing problem. None of the aforementioned subjects used a hearing or vision aid.

**Substance use:** 11.7%, 6%, and 5.8% responded yes for always-drinking alcohol chewing khat and smoking cigar respectively

## Prevalence and risk factors of delirium

Table 2

*Reason for admission and day in numbers at occurrence of delirium TASH AAU May 1- July30,2019*

| Diagnosis at delirium occurrence | Percent | Date at delirium development in days | Percent |
|----------------------------------|---------|--------------------------------------|---------|
| Pulmonology                      | 15.8    | 1                                    | 25.8    |
| Cardiovascular                   | 10.0    | 2                                    | 30.0    |
| Neurology                        | 21.7    | 3                                    | 21.7    |
| Renal                            | 9.2     | 4                                    | 5.0     |
| hematology oncology              | 6.7     | 5                                    | 10.0    |
| Trauma                           | 8.3     | 6                                    | 3.3     |
| medication toxicity              | 4.2     | 7                                    | 0.8     |
| Sepsis                           | 22.5    | 8                                    | 0       |
| metabolic imbalance              | 6.7     | 9                                    | 0       |
| Endocrine                        | 2.5     | 10                                   | 1.7     |
| GI                               | 9.2     | 11                                   | 0       |
| other malignancies               | 1.7     | 12                                   | 1.7     |
| Total                            | 100%    |                                      | 100%    |

I.e. TASH (Tikur Anbessa specialized university hospital)

## Prevalence and risk factors of delirium

**Comorbidities:** 71.6% patients had at least one underlying co morbidity with 37.5% having malignancy.

**Environmental factors:** all of the study subjects were admitted in multi-bedded rooms with no clock inside the room.

**5.3 Iatrogenic factors:** most patients 72.5% had polypharmacy (24 out of 29 in ICU and 63 out of 91 in emergency). Just over a half of patients had a restraint applied to them (Table 3).

Eighteen patients out of 29 in ICU and 29 out of 91 emergency had benzodiazepine use. There is a significant relationship between benzodiazepine use and development of delirium after 24 hours,  $\chi^2 (1, N=120) = 4.83, p=0.003$ .

Table 3

*Electrolyte abnormalities in delirious patients TASH, AAU May 1-July30, 2019*

| <b>Electrolyte</b> | <b>Frequency/ Percent</b> | <b>Electrolyte</b> | <b>Frequency /Percent</b> |
|--------------------|---------------------------|--------------------|---------------------------|
| Hyponatremia       | 17(14.2)                  | Hypokalemia        | 10(8.3)                   |
| Hypernatrnia       | 10(8.3)                   | Hyperkalemia       | 6(5.0)                    |
| Normal             | 93(77.5)                  | Normal             | 104(86.7)                 |
| Total              | 120(100.0)                | Total              | 120(100.0)                |

I.e. TASH (Tikur Anbessa specialized university hospital)

Table 4

*Associated patient and illness factors in delirious patient TASH AAU May 1-July30,2019*

| Variables                | Characteristics | Age category |       |     |       |
|--------------------------|-----------------|--------------|-------|-----|-------|
|                          |                 | 18-34        | 35-59 | ≥60 | Total |
| Previous cardiac illness | Yes             | 4            | 10    | 15  | 29    |
|                          | No              | 33           | 37    | 15  | 85    |
|                          | Not Known       | 1            | 2     | 3   | 6     |
| Previous diabetes        | Yes             | 5            | 11    | 9   | 25    |
|                          | No              | 32           | 37    | 21  | 90    |
|                          | Not Known       | 1            | 1     | 3   | 5     |
| Previous renal disease   | Yes             | 2            | 14    | 15  | 31    |
|                          | No              | 35           | 34    | 15  | 84    |
|                          | Not Known       | 1            | 1     | 3   | 5     |
| Known malignancy         | Yes             | 13           | 16    | 16  | 45    |
|                          | No              | 24           | 32    | 14  | 70    |
|                          | Not Known       | 1            | 1     | 3   | 5     |
| Mechanical ventilation   | Yes             | 11           | 16    | 8   | 35    |
|                          | No              | 27           | 33    | 25  | 85    |
| Time of evaluation       | Day             | 19           | 23    | 13  | 55    |
|                          | Night           | 19           | 26    | 20  | 65    |

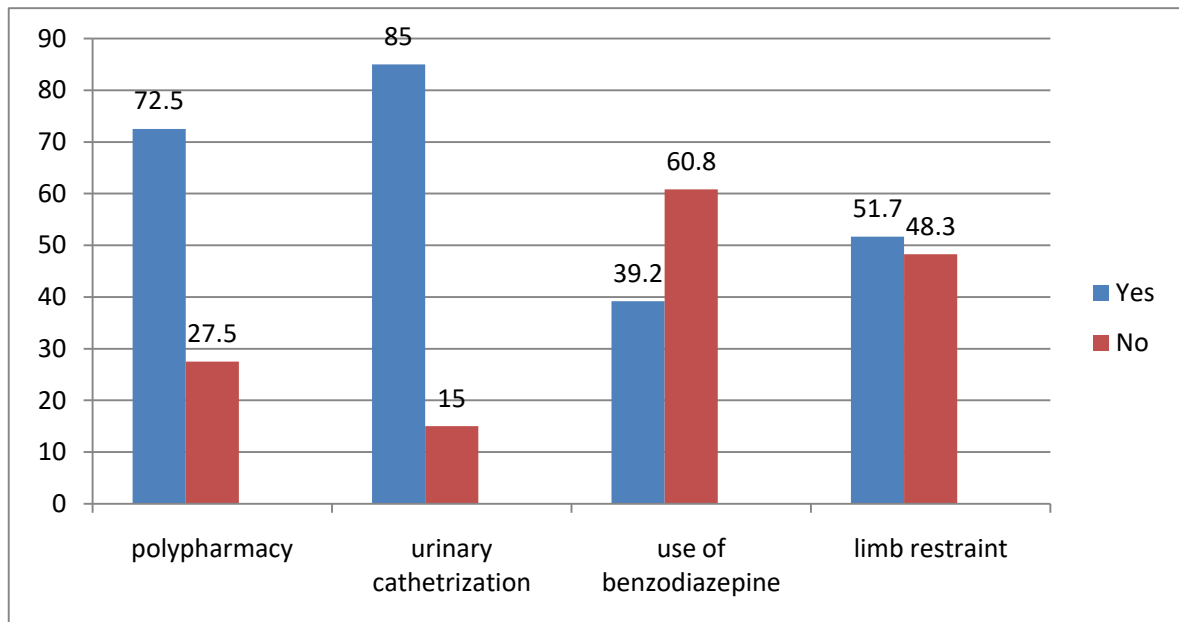


Figure two iatrogenic risk factors of patients with delirium TASH AAU, May 1- July 30, 2019

## 6. Discussion

Delirium despite of its increasing prevalence and serious adverse outcomes, the assessment and recognition remain at its infancy. The prevalence of delirium in this study was high (12.6% in emergency and 27.3% in ICU). The prevalence worldwide ranges from 12% - 22.5% in emergency and 13.3%- 47% [16, 3, 2] ICU differing with study design, patient's population and assessment method. The low prevalence in our study as compared to others may be due to the exclusion of those who are too ill and needed emergency treatment, as those with delirium are the most critically ill.

In this study, the mean age of patients was 48.5 which is lower than most of the previously done researches [17,4,1,12]. This can be because majority of researches are done on elderly patients given the epidemiology delirium. The other explanation is that patient population is different from prior studies in that the average age of patients that come to the emergency department of Tikur Anbessa is 35 years. However, study done in St. Paul hospital on magnitude and associated factors of delirium in Ethiopia [3] six years back shows the mean age to be 41.66, which is close to the mean age in our study.

The mean time in days  $\pm$  SD until the occurrence of delirium for ICU is  $4.12 \pm 2.9$  and emergency is  $2.4 \pm 1.5$  days. Which is in agreement with prior studies. In a study done in Uganda assessing incidence of delirium in mechanically ventilated [14], the median time to delirium occurrence was 3.7 days and another research on emergency department stay associated delirium in older patients [4] half of the patients developed delirium within 36 hours.

Neurology and pulmonology disease account for 21.7, and 15.8% of admission diagnosis respectively, which agrees to previous studies, prevalence and detection of delirium in elderly emergency department showed most patients with delirium to have neurologic and pulmonary disease. Thailand critical care delirium done in 2013 had similar results.

This study demonstrated that 39.2% of the delirious patients were exposed to benzodiazepines ICU patients more than emergency were. Chi analysis showed a significant relationship between benzodiazepine exposure and development of delirium after 24 hours. Researches of many have documented a relationship between delirium and benzodiazepine and support that use of benzodiazepines predicts delirium within the next 24 hour.

A study done in Nashville, Tennessee on lorazepam use and delirium [15, 8] had similar result to ours. Another study done on benzodiazepines, opioid use, and the duration of ICU delirium in an older population revealed benzodiazepine predicts development of delirium 24 hours after exposure.

Mechanically ventilated patients have a high risk of delirium when compared to others for many reasons. Our study when compared to others shows the same as we found a significant relationship between mechanical ventilation and development of delirium after 24 hours. This may be due to the high number of polypharmacy and benzodiazepine exposure in ICU seen in our study [16].

### **7. Limitation**

This study has some limitations. Non-Amharic speaking patients were included even though RA did not speak other language, which in the way of translation might affect the assessment of delirium. There was no control group, which makes it difficult for our research to assess predictors of delirium. Interrater reliability was not assessed although RA took training on delirium assessment. The study was conducted in a short period of time, only three months moreover we were not able to do in-depth association of risk factors of delirium as patients without delirium were not assessed.

## **8. Strength**

This study is the first of its type to be done in Tikur Anbessa, Addis Ababa Ethiopia casting light in to the prevalence and associated factors of delirium in critically ill patients. This study was a prospective study, which makes the data collected reliable. Our study evaluated patients for delirium every 12 hours which minimizes the chance of missing delirium and unlike other studies it included younger age groups of patients which reveals the prevalence, pattern and distribution of risk factors on this age groups.

## **9. Conclusion**

Delirium is prevalent in emergency and ICU unit of Tikur Anbessa hospital. Most of the delirious patients had co morbidities, electrolyte abnormalities and polypharmacy, restraint use. There is significant association between mechanical ventilation and exposure with benzodiazepines and development of delirium > 24 hour. Clinicians should consider modifiable risk factors and try to avoid these risk factors when possible.

## **10. Recommendation**

Based on the results of this study we recommend

- Using the CAM and CAM ICU should be an integral part of daily patient assessment in ICU.
  
- Another multicenter prospective research with a large sample size and control group should be done to better assess the associated risk factors.
  
- Delirium assessment, prevention, and management trainings is required for clinicians.
  
- Clinicians should consider modifiable risk factors and try to avoid these risk factors when possible.

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## Prevalence and risk factors of delirium

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## ANNEX 1

**Informed consent**

**Investigator:** DR Meron Anteneh

**Study title:** prevalence and risk factors for delirium in intensive care unit and emergency department of Tikur Anbessa hospital

I am a student at Addis Ababa university collage of health science. This study will be conducted as a part of my postgraduate specialization training in emergency and critical care medicine.

I am asking you to participate in a research study. Please take your time to read the information below and feel free to ask any questions before signing this document.

The purpose of this study is to know how common delirium is in critically ill patients especially in emergency department and intensive care unit of Tikur Anbessa hospital. Each participant will fill the outlined questions, which will only take 10- 15 minutes.

There will not be any direct benefit from the study participation, however I hope information learned from this study will in the future benefit patients getting care in emergency and critical care units regarding in identification and management of delirium.

Participation in this study is voluntary and you can withdraw from participating at any moment.

Under no circumstances will your name or personal profile be exposed.

**Consent to participation in the research**

Participant /participant's relative

I have read the above information and I give my permission to voluntarily participate in this research project.

Name (initials)

Signature

## Prevalence and risk factors of delirium

This questionnaire is developed to assess the prevalence and associated factors of delirium in ICU and emergency department of Tikur Anbessa specialized hospital.

Date

Time

**The confusion assessment for emergency (CAM)** yes      No

1. Acute onset of change in mental status from base line or fluctuation
2. Inattention
3. Disorganized thinking
4. Altered level of consciousness

Features 1 and 2 plus either 3 or 4, diagnose delirium.

**The confusion assessment for ICU (CAM ICU)**

1. Acute onset or fluctuating course of mental status ( assessed by RAAS)
2. Inattention vigilance A test or digit span test
3. Altered level of consciousness ( actual RAAS other than 0)
4. Disorganized thinking (yes or no questions for disorganized thinking)

Features 1 and 2 plus either 3 or 4 = CAM ICU positive.

## Prevalence and risk factors of delirium

**1. Socio-demographic status**

Age

Sex                    1.Male                    2.female

Religion

Address

Educational status

Marital status

**1. Patient and illness factors**

Days in number until the occurrence of delirium development

Diagnosis at admission

Time of evaluation                    1. Day                    2.Night

Serum electrolyte value

1. Na

2. K

3. Cl

Hearing problem                    1. Yes                    2.No

Vision problem                    1. Yes                    2.No



**3. Iatrogenic factors**

Type Number of medications

Use of benzodiazepines 1. Yes 2. No

Catheterization 1. Yes 2. No

Use of restraints 1. Yes 2. No

































































