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Delirium in patients admitted to a cardiac intensive care unit with cardiac emergencies in a developing country: incidence, prevalence, risk factor and outcome

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ABSTRACT

Aim: To assess the incidence, prevalence, risk factors and outcome of delirium in patients admitted to a cardiac intensive care unit (ICU) of a tertiary care hospital.
Methods: Three hundred nine consecutive patients admitted to a 22-bed coronary care unit were screened for presence of delirium by using Confusion Assessment Method for Intensive Care Unit (CAM-ICU), and those found positive on CAM-ICU were further evaluated by a psychiatrist to confirm the diagnosis of delirium as per *DSM-IV-TR* criteria. Patients were also evaluated for the risk factors for delirium and outcome of delirium.
Results: Incidence rate of delirium was 9.27%, and prevalence rate was 18.77%. The risk factors identified for delirium in binary logistic regression analysis were hypokalemia, Sequential Organ Failure Assessment score, presence of cognitive deficits, receiving more than three medications, sepsis, hyponatremia, presence of cardiogenic shock, having undergone coronary artery bypass grafting, left ventricular ejection fraction <30, currently receiving opioids, age more than 65years, presence of diabetes mellitus, presence of uncontrolled diabetes mellitus, history of seizures, presence of congestive cardiac failure, having undergone angioplasty, presence of atrial fibrillation, ongoing depression, currently receiving/taking benzodiazepines, warfarin, ranitidine, steroids, non-steroidal anti-inflammatory drugs, higher total number of medications, presence of raised creatinine, anaemia, hypoglycemia, Acute Physiology and Chronic Health Evaluation II score and Charlson Comorbidity Index score. About one fourth ($n=22$; 27%) of the patients who developed delirium died during the hospital stay in contrast to 1% mortality in the non-delirious group. Those with delirium also had longer stay in the ICU.
Conclusions: Delirium is highly prevalent in the cardiac ICU setting and is associated with presence of many modifiable risk factors. Development of delirium increases the mortality risk and is associated with longer cardiac ICU stay.

1. Introduction

Worldwide highest morbidity and mortality is attributed to cardiovascular diseases (CVD) [1]. Estimates suggest that there is a rising trend in CVD death worldwide. Another alarming trend suggests that cardiovascular diseases have an onset 10–15 years earlier in developing countries than in developed countries [2]. Data suggest that in developed countries, deaths related to CVD are more common in subjects with older ages, whereas in developing countries, CVD deaths are more common among the younger population [3].

A recent review suggests that, in India, cardiovascular diseases accounted for 1.4 million deaths in the year 2004, and it is projected to increase to 2.1 million in 2021 [4]. Due to this it is projected that by 2021, the number of hospitalizations due to cardiovascular diseases is going to increase by 1.62 times and the majority of these will be persons aged 25–59 years [4].

However, the reality is that developing countries like India are poorly equipped with facilities to cater to the need of all the critically ill subjects. Hence, it is expected that available resources are utilized optimally and all the needy subjects are able to receive the intensive care unit (ICU) facilities at the time of need. One way to optimally utilize available resources is to reduce the duration of ICU stay to the minimum, so that a higher number of patients can utilize the available services.

Delirium is a condition of acute brain dysfunction, which is characterized by disturbances in consciousness, orientation, memory, thought, perception, and behavior. However, delirium is often not suspected, not screened and not looked for, so it remains under-detected and misdiagnosed [5]. It is often neglected, because it is "expected" to happen in patients with severe illness, and medical resources are preferentially dedicated to managing the more immediate "life-threatening" problems. Clinicians generally give less importance to acute brain syndrome as a predictor of poorer overall outcome than acute dysfunction of other organ systems and regard it as transitory with no long-term adverse effect [6]. However, data from ICU set up including those involving patients undergoing cardiac surgery suggest that delirium is associated with longer ICU stay, and

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poorer functional and cognitive outcomes [7]. Due to delirium, ICU facilities are consumed for longer duration by those suffering from the same and, resultantly, many other needy patients suffer too.

The epidemiology of delirium in mixed cardiology and cardiac surgery ICU setup is not well established [8]. Most of the data which are available are from the Western countries, involving patients undergoing cardiac surgery or treated in the cardiology setup, and the incidence rate of delirium in such patients varies from 3% to 41.7% [7–17]. A study which evaluated 212 consecutive patients with acute myocardial infarction admitted in coronary care unit reported an incidence rate of delirium to be 5.7% [17].

However, in general, there is lack of data from India with respect to delirium, especially in patients admitted to the ICU. Only one study has evaluated the incidence and prevalence of delirium in a respiratory ICU and reported incidence and prevalence rates of 24.4% and 53.6%, respectively [18]. The risk factors identified for development of delirium included higher age, higher Acute Physiology and Chronic Health Evaluation II (APACHE-II) score and metabolic abnormalities. This study also showed that delirium was associated with significantly longer duration of ICU stay and higher mortality rates [18]. Another study which involved patients admitted to medical and cardiac ICUs, although not reporting the epidemiological data, evaluated the reliability and validity of diagnosing delirium using the Memorial Delirium Assessment Scale [19]. However, no study from India has focused on the incidence and prevalence rates, risk factors and mortality associated with delirium in cardiac ICU population. In this background, the present study aimed to (1) estimate the incidence and prevalence of delirium in patients admitted to the cardiac ICU of a tertiary care teaching hospital, (2) to evaluate the risk factors associated with development of delirium, (3) to study the outcome of delirium and (4) evaluate the factors associated with mortality in patients with delirium.

2. Methodology

The study was approved by the Institute Ethics Committee. Patients were recruited after obtaining written informed consent from patients themselves or their relatives. Informed consent was obtained from the relatives only when the patient was in delirium at the first assessment.

2.1. Setting

Study was conducted in a cardiac ICU of a tertiary care teaching hospital. The cardiac ICU is a 22-bed unit which is equipped to handle patients requiring mechanical ventilation and continuous monitoring. Usually about one third to one fourth of the patients are on ventilator at any time and others are on continuous monitoring but not requiring mechanical ventilation. Most of the patients who are not on mechanical ventilation are cooperative for clinical interview. The usual patient profile of patients in the cardiac ICU includes patients presenting to the cardiac emergency with myocardial infarction, unstable angina, congestive cardiac failure, patients in a decompensated state waiting to undergo coronary angiography or angioplasty, patients who have undergone coronary angiography or angioplasty, patients with cardiac conduction defect and patients who are waiting to undergo or have undergone balloon vulvotomy. Usually the patients stay in the cardiac ICU for 24–96 h and once stable are either shifted to cardiology ward or discharged.

2.2. Design

The study followed a prospective design. Each patient meeting the selection criteria was assessed daily throughout their cardiac ICU stay until detected to have delirium.

2.3. Selection criteria

All consecutive patients admitted to the cardiac ICU during the 2-month period (May 16, 2010, to July 16, 2010) were screened for delirium subject to fulfillment of the selection criteria. Patients who are deaf were excluded.

3. Procedure

The patients and/or caregiver of all the patients admitted to cardiac ICU and available at the particular time of the day (between 5 and 9 p.m.) were approached for consent for inclusion in the study. All the patients (in case of an uncooperative patient, a relative) who provided written informed consent were assessed. The information was collected from the patient, caregivers, treating physician and nurses to reach the final conclusion about the diagnosis of delirium and depression. Assessments were carried out at a fixed time period (5–9 p.m.) of each day for assessment of delirium. Patients were assessed every day until the time they were found to be positive for delirium during their cardiac ICU stay or discharged. Pre-existing cognitive deficits were evaluated by using short-IQCODE based on the information provided by the caregivers.

Every patient meeting the selection criteria was first evaluated on the Richmond Agitation and Sedation Scale (RASS) on the day of admission. Those patients, who were rated 3 through 4 (i.e., arousable on verbal stimulation) on RASS, were assessed for delirium by using the Confusion Assessment Method for Intensive Care Unit (CAM-ICU). If a patient was found to be positive on the CAM-ICU, she/he was further assessed on *DSM-IV-TR* criteria to confirm the diagnosis of delirium by a psychiatrist. Additionally, the psychiatrist also evaluated the patient for lifetime and current major depressive disorder as per *DSM-IV-TR* criteria based on the information provided by the caregivers, patients themselves and scrutiny of treatment records.

The APACHE-II scores were recorded on the day of admission. The risk factor checklist was completed based on the information recorded in the case notes and that provided by the caregivers, the treating team and the patient wherever possible on the day of admission and subsequently updated depending on clinical status. Sequential Organ Failure Assessment (SOFA) and Charlson Comorbidity Index scores of the day on which the patient was found to have delirium for the first time were recorded.

Any patient who was rated as unresponsive at the first assessment was reassessed on the next day and every subsequent day throughout the ICU stay to ascertain his level of sedation and agitation using Richmond Agitation and Sedation Scale. If at any stage she/he was found to be arousable, then she/he was assessed on CAM-ICU to ascertain delirium and, if found positive for delirium, was assessed on *DSM-IV-TR* criteria by a psychiatrist for delirium and depression. The risk factor checklist, SOFA score and Charlson Comorbidity Index score were updated at the time the patient was found positive for delirium.

Further, all the patients were followed up throughout their hospital stay to record their clinical outcome (i.e., delirium resolved, delirium improved, delirium persisting as before, delirium worsened and death).

4. Instruments

4.1. Richmond Agitation and Sedation Scale (RASS) [20]

The RASS was used to assess sedation and agitation. It is a 10-point scale with four levels of anxiety or agitation (+1 to +4), one level to denote a calm and alert state (0) and 5 levels to assess the level of sedation (−1 to −5). A score of −4 indicates that the patient is