Risk Factors of Delirium among Patients Admitted in Critical Care Unit

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Abstract

Delirium is a common problem in intensive care unit (ICU) patients. The present study was conducted to identify the risk factors of delirium among patients admitted in critical care unit. The research design used was prospective descriptive design. The sample constituted 124 patients who were admitted in intensive care units and were selected using a consecutive sampling technique. The results showed that 17.7 percent of critically ill patients developed delirium. Out of this, 31.8 percent of patients developed severe delirium and 68.2 percent had mild-moderate delirium. Most of the patients developed delirium on the second or third day of ICU stay. The predisposing factors of delirium were current alcoholism (OR=5.211, CI=0.977-27.787, p=0.034), comorbidities such as seizures (OR=5.211, CI=0.977-27.787, p=0.034), and chronic kidney disease (OR=2.857, CI=1.038-7.866, p=0.037). The precipitating factors of delirium were severe pain (OR=29.400; CI=7.970-108.452), sleep disturbance (OR=20.563, CI=6.646-63.618), restraints (OR=19.603, CI=6.237-61.616), benzodiazepines (OR=15.947, CI=1.574-161.568), movement restriction due to tubes and catheters (OR=10.100, CI=0.873-116.799), invasive mechanical ventilation (OR=9.927, CI=3.485-28.277, antiarrhythmics (OR= 9.706, CI=2.121-44.423), head injury (OR=5.857, CI=3.968-8.646), alkalosis (OR=5.444, CI=1.247-23.779), acidosis (OR=4.727, CI=1.621-13.789), hypoxemia (OR=4.200, CI=1.596-11.051), hypercapnia (OR=4.167, CI=1.552-11.187), hypernatremia (OR=3.461, CI=1.174-10.200), vasopressors (OR=3.450, CI=1.100-10.819), corticosteroids (OR=2.884, CI=1.045-7.963), length of ICU stay (OR=0.068, CI=0.023-0.199). Nurses have an important role in the early identification and prevention of delirium by regular assessment of delirium and implementing appropriate strategies.

Key words: Delirium, Critical patients, Predisposing factors

After surviving a critical condition, patients admitted to intensive care unit (ICUs) continue to suffer from acute and chronic cognitive, functional, and emotional morbidities, which cause a decrease in the global quality of life. They may have disturbed attention and thinking during intensive ICU stay as well as post-discharge from ICUs that alter their lifestyle. Delirium is one of the most common clinical manifestations of acute brain issues in patients admitted to the ICUs. Delirium is an acute and temporary brain dysfunction that causes disruption in the level of attention and arousal (Girard et al, 2008).

Many studies have shown a higher prevalence (5.15%-80%) of delirium among critically ill patients (Girard et al, 2008; Salluh et al, 2010; Van Rompaey et al, 2008; Kumar & Patel, 2019; Kwizera et al, 2015). Studies have shown that nearly half of patients with delirium are discharged from the acute hospital setting with persistent symptoms of brain dysfunction (Wass et al, 2008). Patients who had prolonged delirium during critical care unit stay showed poor cognition after discharge and there are greater risks of dementia and long-term cognitive impairment. So, delirium can be considered as a predictor of long-term cognitive impairment in survivors of critical illness.

As the problem of delirium and its complications are more in critical care units (Mattar et al, 2013; Tilouche et al, 2018; Armugam et al, 2017), it is important to recognize and diagnose this problem early and to treat critical conditions that may result in delirium. Early diagnosis of delirium and recognition of factors causing delirium may help the nurses to implement preventive strategies and also help the patients to recover soon and leave the critical care unit.

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Objectives

The study sought to identify the risk factors of delirium among patients admitted in critical care unit.

Review of Literature

Several literatures highlighting the incidence and risk factors of delirium among patients admitted in critical care unit were reviewed.

An article by Girard et al (2008) pointed out that delirium is occurring in up to 80 percent of the sickest intensive care unit (ICU) populations. They highlighted predisposing and precipitating risk factors associated with delirium that have been identified in both ICU and non-ICU studies. These factors included age, alcoholism, cognitive impairment, polymorphism, depression, hypertension, smoking, vision/hearing impairment, factors of critical illness like acidosis, anaemia, infection/fever/sepsis, hypotension, metabolic disturbances, respiratory disease, and iatrogenic factors such as immobilisation due to catheters, restraints, medications like benzodiazepines, opioids, and sleep disturbance.

A one-day point prevalence study conducted among 975 patients from 104 ICUs in South and North America and Spain found that 32.3 percent of critically ill patients had delirium during their critical care unit stay. The modifiable risk factors which were statistically significant and so associated with delirium were the use of invasive devices ($p \leq 0.0001$) and midazolam (0.009) (Salluh et al, 2010).

While comparing with a multicentre prospective study which was conducted among mechanically ventilated patients in Uganda, the delirium was positive in more than half of the subjects. Out of 160 patients, 81 (51%) had delirium. The factors associated with delirium were a history of mental illness, anaemia, sedation, endotracheal tube use, and respiratory acidosis (Kwizera et al, 2015).

Materials and Methods

This study was done with a prospective descriptive design and the setting was Intensive Care Units of Baby Memorial Hospital, Kozhikode. Participants were 124 patients admitted in Multidisciplinary Intensive Care Unit, Neuro Intensive Care Unit and Cardiac Intensive Care Units. Subjects were selected using consecutive sampling technique. Patients in intensive care units who were staying for more than 24 hours, above 18 years of age, able to comprehend English or Malayalam and willing to participate were included in this study. Patients with known baseline mental or cognitive disorders, who had altered sensorium, in whom assessment was impossible, who had complete hearing loss, who had alcohol intoxication/ withdrawal symptoms, and who had been readmitted to the ICU were excluded from this study. The tools used were: baseline data sheet, Richmond Agitation and Sedation scale (RASS) was used to assess sedation and agitation of adult ICU patients, CAM-ICU scale for delirium assessment and a check list for assessment of risk factors for delirium. All tools were found reliable in all critical care units.

Ethical clearance for the study was obtained from the institutional ethics committee of the hospital. The pilot study was conducted in Baby Memorial Hospital, Kozhikode among 13 critically ill patients admitted in Multidisciplinary Intensive Care Unit, Cardiac Intensive Care Units, and Neuro Medical Intensive Care Unit during January 2021. The main study was done during the period of 04 January, 2021 to 20 February, 2021. After obtaining informed consent from the subjects or families of those who were not able to give informed consent, all consecutive patients were assessed for level of sedation within 24 hours of admission to the critical care unit and the patients who scored -3 to +4 level of sedation were assessed for delirium. Follow-up of the subjects were done daily by assessing delirium and medical record review to collect data regarding clinical variables till discharge from the critical care unit.

Results

The data collected were organised, tabulated, and analysed using descriptive statistics and inferential statistics such as Odds ratio and Chi-square test. The data collected were entered into a computerised database and statistical analysis was done using statistical package for social science, version SPSS 18.

All delirious and non-delirious patients were above 39 years of age, with majority above 60 years of age. Majority (59.1%) were males (Table 1). Out of 124 subjects studied 22 (17.7%) subjects developed delirium during their stay in the ICU. Out of this, 36.4 percent developed delirium on second and another 36.4 percent on third and 22.7 percent on fourth day of their ICU stay. Among the subjects who developed delirium, 68.2 percent showed mild-moderate delirium, and 31.8 percent showed signs of severe delirium (Table 2).

Current alcoholism (OR=5.211, p=0.034),

comorbidities such as seizures (OR=5.211, p=0.034), and chronic kidney disease (OR=2.857, p=0.037) were identified as the predisposing factors of delirium among patients admitted in critical care unit. Other factors like age, gender, marital status, ex-alcoholism, ex-smoking, current smoking, substance abuse, comorbidities like hypertension, diabetes mellitus, dyslipidemia, cancer, COPD, chronic liver disease, cerebrovascular accident, cardiac diseases, endocrine disorders, anaemia, pancreatitis were not predisposing to delirium among critically ill patients (Table 3).

Severe pain (OR=29.400, p=0.000), sleep disturbance (OR=20.563, p=0.000), restraints (OR=19.603, p=0.000), benzodiazepines (OR=15.947, p=0.002), restriction of movement (OR=10.100, p=0.025), IMV (OR=9.927, p=0.000), antiarrhythmics (OR= 9.706, p=0.001), alkalosis (OR=5.444, p=0.014), acidosis (OR=4.727, p=0.003), hypoxemia (OR=4.200, p=0.002), hypercapnia (OR=4.167, p=0.003), hypernatremia (OR=3.461, p=0.019), vasopressors (OR=3.450, p=0.027), corticosteroids (OR=2.884, p=0.035), length of ICU stay (OR=0.068, p=0.000), head injury (OR=5.857, p=0.031) were identified as precipitating factors of delirium. Other factors like previous admission to ICU, medical diagnoses, alteration in vital signs, alteration in blood sugar, hyponatremia, hyperkalaemia, hypokalaemia, alteration in liver function parameters, infection, mild and moderate pain, paralysis, non-invasive mechanical ventilation, medications like barbiturates, opioids, anticonvulsants, β2 agonists, antihistamines, anticholinergics, antibiotics, antihypertensives, diuretics, anticoagulants, antiplatelets and statins were not precipitating delirium among critically ill patients (Table 3).

Table 1: Baseline characteristics

Characteristics	Frequency (%)	
	Delirious	Non-delirious
Age		
<20	0	0
20-39	0	0
40-59	8 (36.4)	27 (26.5)
60-79	12 (54.5)	66 (64.7)
≥ 80	2 (9.1)	9 (8.8)
Gender		
Male	13 (59.1)	60 (58.8)
Female	9 (40.9)	42 (41.2)
Transgender	0	0
Marital status		
Married	22 (100)	90 (88.2)
Unmarried	0	12 (11.8)

Table 2: Development of delirium

Delirium	Frequency (%)
Presence of delirium	
Yes	22 (17.7)
No	102 (82.3)
Day of delirium development	
1	0
2	8 (36.4)
3	8 (36.4)
4	5 (22.7)
5	1 (4.5)
Severity of delirium	
Mild – moderate	15 (68.2)
Severe	7 (31.8)

Table 3: Identification of risk factors of delirium

Risk factors	OR	95% CI	x^2(p)
Predisposing factors of delirium in critically ill patients			
Current alcoholism	5.211	0.977-27.787	4.496 (0.034)
Seizure	5.211	0.977-27.787	4.496 (0.034)
Chronic kidney disease	2.857	1.038-7.866	4.362 (0.037)
Precipitating factors of delirium in critically ill patients			
Severe pain	29.400	7.970-108.452	41.268 (0.000)
Sleep disturbance	20.563	6.646-63.618	38.600 (0.000)
Restraints	19.603	6.237-61.616	36.491 (0.000)
Benzodiazepines	15.947	1.574-161.568	9.285 (0.002)
Restriction of movement	10.100	0.873-116.799	5.042 (0.025)
IMV	9.927	3.485-28.277	22.939(0.000)
Antiarrhythmics	9.706	2.121-44.423	11.739 (0.001)
Alkalosis	5.444	1.247-23.779	6.097 (0.014)
Acidosis	4.727	1.621-13.789	9.126 (0.003)
Hypoxemia	4.200	1.596-11.051	9.259 (0.002)
Hypercapnia	4.167	1.552-11.187	8.805 (0.003)
Hypernatremia	3.461	1.174-10.200	5.609 (0.019)
Vasopressors	3.450	1.100-10.819	4.914 (0.027)
Corticosteroids	2.884	1.045-7.963	4.222 (0.035)
Length of ICU stay	0.068	0.023-0.199	31.813 (0.000)
Head injury	5.857	3.968-8.646	4.674 (0.031)

Discussion

The current study revealed that delirium was present in 17.7 percent of ventilated and non-ventilated critically ill patients. Similar and contrary findings were observed in literature. Reviewed studies showed a wide range in the incidence. Among

non-ventilated patients, the incidence ranged from 17 to 68 percent (Van Rompaey et al, 2008; Mc Nicoll, 2005; Vyveganathan et al, 2011) and in ventilated patients, the incidence was varying from 5 to 50 percent. Among post-operative patients, literatures showed the incidence of delirium range from 4 percent to 8 percent.

In the present study, factors like current alcoholism, chronic kidney disease and seizures were identified as the predisposing factors of delirium among critically ill patients. Other factors like age, gender, marital status, ex-alcoholism, ex-smoking, current smoking, substance abuse, comorbidities like hypertension, diabetes mellitus, dyslipidemia, cancer, COPD, chronic liver disease, cerebrovascular accident, cardiac diseases, endocrine disorders, anaemia, pancreatitis were not predisposing to delirium among critically ill patients. A hospital-based cross-sectional study done in a tertiary care centre in western region of Nepal observed alcohol use as a predisposing factor of delirium. Contrary to the findings of this study, the above study identified history of stroke as a predisposing factor of delirium (Thapa et al, 2014). Another prospective study which was conducted in medical ICU setting observed that tobacco use, chronic liver disease, and previous episodes of delirium are predisposing factors of delirium (Jayaswal et al, 2019).

Severe pain, sleep disturbance, restraints, benzodiazepines, restriction of movement, IMV, antiarrhythmics, alkalosis, acidosis, hypoxemia, hypercapnia, hypernatremia, vasopressors, corticosteroids, length of ICU stay, head injury were identified as precipitating factors of delirium in the current study. Other factors like previous admission to ICU, medical diagnoses, alteration in vital signs, alteration in blood sugar, hyponatremia, hyperkalaemia, hypokalaemia, alteration in liver function parameters, infection, mild and moderate pain, paralysis, non-invasive mechanical ventilation, medications like barbiturates, opioids, anticonvulsants, β_2 agonists, antihistamines, anticholinergics, antibiotics, antihypertensives, diuretics, anticoagulants, antiplatelets and statins were not precipitating delirium among critically ill patients. Mechanical ventilation, hypoxia, fever, raised levels of bilirubin, creatinine, and benzodiazepine administration significantly precipitated delirium in another setting (Grover et al, 2014).

The precipitating risk factors identified in Coronary Care Unit of a tertiary care teaching hospital were: warfarin, frusemide, ranitidine, more than four medications, presence of sepsis, presence of cardiogenic shock, having undergone coronary artery bypass grafting, left ventricular ejection fraction below 30 percent, and use of benzodiazepine, opioids. High serum cortisol level was significantly associated with an increased risk of post-operative delirium among patients after CABG (Mu et al, 2010). Another study done at a hospital in Malaysia found some environmental factors as risk factors of delirium like the absence of daylight exposure and visible clocks (Vyveganathan et al, 2005).

Limitations

- Few patients were not willing to participate in the study and that might have affected the generalisability of the study.
- Due to time shortage, the study was limited to a single setting and so it might have affected the generalisability of the study.

Recommendations

- A study can be done to determine the clinical presentation based on the severity of delirium among critically ill patients.
- A study can be conducted to identify the short-term and long-term outcomes of delirious patients.
- A study can be conducted to develop a protocol to manage delirium among critically ill patients.

Implications

- Nurses must use their clinical judgment to identify predisposing and precipitating factors of delirium in their patients.
- Encourage nurses to actively involve patients' family members in the prevention and identification of delirium.
- Each critical care unit should develop and validate delirium management strategies.

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