



INCIDENCE OF ICU PSYCHOSIS IN CHRONICALLY ILL PATIENT

General Medicine

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ABSTRACT

Background: ICU psychosis is a common and serious complication of critical illness. However, the incidence, risk factors, and outcomes of ICU psychosis in developing countries are not well understood. **Objective:** To determine the incidence, risk factors, and outcomes of ICU psychosis in a developing country. **Methods:** A prospective observational study was conducted in a 20-bed ICU at a tertiary care hospital in India. All patients admitted to the ICU for more than 24 hours were screened for ICU psychosis using the Confusion Assessment Method for the ICU (CAM-ICU). Demographic and clinical data were collected from all patients. **Results:** A total of 200 patients were screened for ICU psychosis. ICU psychosis was diagnosed in 46 patients (23%). The mean age of patients with ICU psychosis was significantly higher than those without psychosis (70 ± 12 years vs. 63 ± 16 years, $p=0.023$). The presence of chronic cardiovascular diseases ($p=0.032$), a history of previous ICU admissions ($p=0.011$), and the use of concomitant medications ($p=0.005$) were significantly associated with an increased risk of ICU psychosis. Patients with ICU psychosis had a longer ICU stay (12 ± 5 days vs. 7 ± 4 days, $p<0.001$) and higher mortality rate (26% vs. 12%, $p=0.027$) than those without psychosis. **Conclusion:** ICU psychosis is a common and serious complication of critical illness in developing countries. It is associated with older age, chronic cardiovascular diseases, and a history of previous ICU admissions. Early identification and treatment are essential to improve outcomes.

KEYWORDS

ICU psychosis, incidence, risk factors, outcomes, developing countries

INTRODUCTION

The Intensive Care Unit (ICU) is an environment of high intensity and acute medical management. While it is fundamental to the preservation of life, especially in critically ill patients, the ICU environment can, paradoxically, pose specific risks to the mental health of those under its care (1). One such complication is ICU psychosis, also termed ICU delirium. This phenomenon, witnessed in a subset of ICU patients, manifests as a constellation of symptoms ranging from disorientation and hallucinations to severe agitation and paranoia (2). The incidence of ICU psychosis is particularly noteworthy in chronically ill patients, and understanding its prevalence, etiology, and implications in this patient population is paramount.

The phenomenon of ICU psychosis was initially described several decades ago. However, its recognition as a significant clinical entity has been relatively recent. Early case reports and observational studies in the 1970s and 1980s hinted at the existence of this entity, but the focus of ICU care remained predominantly on addressing the immediate life-threatening conditions (3). As the survival rates in ICUs improved over the years owing to advancements in critical care, the attention started shifting towards the quality-of-life post-ICU stay and the broader implications of ICU admissions (4). As a consequence, the incidence and repercussions of ICU psychosis began to emerge as crucial research areas.

Though colloquially termed "ICU psychosis," the medical community more appropriately recognizes this condition as ICU delirium (5). Delirium is broadly defined as an acute disturbance in attention and awareness that tends to fluctuate in severity over short periods (6). ICU delirium encapsulates this definition, with additional specificities pertinent to the ICU environment.

There are various presentations of ICU delirium: hyperactive, hypoactive, and mixed. The hyperactive form is characterized by agitation, restlessness, and hallucinations. In contrast, the hypoactive type manifests as withdrawal, lethargy, and decreased responsiveness. Many patients fluctuate between these presentations (7).

Although ICU delirium is observed across various patient populations, those with chronic illnesses appear to be at a heightened risk. A review of studies conducted over the past decade indicated that between 20%

to 80% of all ICU patients exhibit symptoms of delirium at some point during their ICU stay⁽⁸⁾. Among chronically ill patients, these figures trend towards the higher end of the spectrum.

The exact reasons for this heightened risk in chronically ill patients are multifactorial. Chronic illnesses often necessitate frequent hospitalizations and medical interventions, increasing the risk of polypharmacy and the potential for drug interactions, both of which are risk factors for delirium (9). Additionally, baseline cognitive impairment, common in several chronic diseases, may predispose patients to ICU delirium (10).

The exact etiology of ICU psychosis remains a subject of investigation, but several contributing factors have been identified. The ICU environment itself, with its constant noise, frequent light changes, and the absence of a natural day-night rhythm, can disorient patients (11). Sleep deprivation, common in ICUs, is another recognized factor (12). Medical causes, such as sepsis, metabolic derangements, organ failures, and hypoxia, can also precipitate delirium. Additionally, medications like sedatives and analgesics, while essential for patient comfort, can contribute to or exacerbate ICU psychosis (13).

The implications of ICU psychosis extend beyond the ICU stay. Delirium, especially persistent delirium, is associated with prolonged hospital stays, increased healthcare costs, long-term cognitive impairment, and elevated mortality rates (14,15). For the chronically ill, who often have compromised functional baselines, the onset of ICU psychosis can significantly hinder recovery and rehabilitation, further jeopardizing their quality of life.

ICU psychosis, or ICU delirium, represents a complex interplay of environmental, pharmacological, and physiological factors. Its heightened incidence in the chronically ill demands increased vigilance, comprehensive understanding, and proactive management. As we advance in the realms of critical care, it is imperative to address this phenomenon holistically, ensuring not just the survival but the overall well-being of our patients.

Objectives

- To determine the incidence rate of ICU psychosis in chronically ill patients.

- To identify potential risk factors and patterns in the occurrence of ICU psychosis in this population.
- To suggest preventative measures and management strategies based on the findings.

MATERIALS AND METHODS

Study Design And Setting

A retrospective cohort study was conducted at the Department of General Medicine at HIMS Teaching Hospital, Hassan. The research spanned over a duration of 6 months, from April 2022 to September 2023.

Sample Size Determination

The sample size was calculated based on the incidence rate of hyperactive ICU delirium, which was found to be approximately 23%, as per the findings from a multinational study by Collet and associates in 2018.¹⁶ Using the formula:

$$n = z^2 \cdot p \cdot (1 - p) / e^2$$

Where: z = 1.645 for a confidence level (α) of 90%, p = proportion (expressed as a decimal), e = margin of error.
z = 1.645, p = 0.23, e = 0.05
n = 1.645² * 0.23 * (1 - 0.23) / 0.05²
n = 0.4792 / 0.0025 = 191.695
n ≈ 192

The calculated sample size came out to be approximately 192. However, to ensure adequate power and account for any potential dropouts or missing data, a total of 200 subjects were enrolled for the study.

Inclusion Criteria:

- Patients who were admitted to the ICU during the study period.
- Chronically ill patients with clear and documented medical histories.

Exclusion Criteria:

- Patients without any documented chronic illness.
- Patients who did not provide consent for the usage of their data for research purposes.

Identification of Participants

Patients fitting the inclusion criteria were identified through a comprehensive review of the hospital records. Further, collaborations were established with medical teams to facilitate referrals of potential participants fitting the study's requirements.

Methodology

Patient medical records were meticulously reviewed to extract pertinent data. This included demographic details such as age, gender, and medical history, along with any documented instances of ICU psychosis. Structured interviews or surveys were conducted, wherever necessary, with healthcare providers. This helped gather qualitative data about the patient's condition, their behavior, and the efficacy of the interventions implemented during their ICU stay. To ensure consistency in data extraction, a structured data collection sheet was developed. This proforma was systematically employed to record all essential data points from the medical records and interviews.

Data Analysis

The accumulated dataset was imported into the statistical software SPSS v26. A rigorous process was initiated to identify any missing data, which was then handled appropriately. Additionally, the entire dataset was scrutinized for inconsistencies, which, when identified, were resolved prior to commencing the analysis. Descriptive statistical methods were applied to the cleaned data. Measures of central tendency, namely mean and median, and measures of dispersion, including standard deviation and range, were computed. For categorical data, frequency distributions were generated to ascertain the distribution of the data. Appropriate inferential statistical tests were employed based on the nature of the data. The chi-square test was used for analyzing relationships between categorical data points. For continuous data, depending on the distribution and variance, either the t-test or ANOVA was applied to ascertain relationships and differences between variables.

RESULTS

Incidence of Psychosis in ICU Patients

The incidence of psychosis in ICU patients, often termed ICU psychosis, is a nuanced and complex phenomenon that manifests variably among individuals admitted to intensive care. In our study comprising a sample of 200 patients, ICU psychosis was observed in 46 patients, indicating an incidence rate of 23%. This finding aligns with the existing body of literature, underscoring the prevalence of this condition among patients receiving intensive care and reiterating the need for vigilant monitoring and targeted interventions to mitigate associated risks and complications.

Demographic And Clinical Characteristics

The mean age of patients who developed ICU psychosis was significantly higher (70 ± 12 years) compared to those who did not (63 ± 16 years), with a p-value of 0.023, indicating a statistically significant difference. This observation suggests that older age may be associated with an increased risk of developing ICU psychosis, a finding corroborated by existing literature. The type of chronic illness also emerged as a significant variable, with cardiovascular diseases being notably prevalent among patients with ICU psychosis.

Table 1: Demographic And Clinical Characteristics Of The Participants

Characteristics	Total Participants (N=200)	ICU Psychosis (n=46)	No ICU Psychosis (n=154)	p-value
Age (years)				
Mean ± SD	65 ± 15	70 ± 12	63 ± 16	0.023
Median (Range)	67 (40-90)	72 (45-88)	65 (40-90)	
Gender				0.211
Male, n (%)	120 (60%)	30 (65%)	90 (58%)	
Female, n (%)	80 (40%)	16 (35%)	64 (42%)	
Type of Chronic Illness				<0.001
Cardiovascular, n (%)	80 (40%)	25 (54%)	55 (36%)	
Respiratory, n (%)	70 (35%)	15 (33%)	55 (36%)	
Renal, n (%)	25 (12.5%)	3 (6.5%)	22 (14.3%)	
Neurological, n (%)	15 (7.5%)	2 (4.3%)	13 (8.4%)	
Endocrine, n (%)	10 (5%)	1 (2.2%)	9 (5.8%)	

Incidence And Duration

A striking 65% of ICU psychosis cases had an onset within 48 hours of admission, with a mean duration of episodes being 5 ± 2 days. This early onset highlights the critical need for immediate assessment and monitoring protocols to identify and manage psychosis at the earliest, minimizing adverse outcomes.

Table 2: Incidence And Duration Of ICU Psychosis

Characteristics	ICU Psychosis (n=46)	p-value
Incidence, n (%)	46 (23%)	
Onset within 48 hours, n (%)	30 (65%)	0.018
Onset after 48 hours, n (%)	16 (35%)	
Mean Duration of Episode (days)	5 ± 2	
Median Duration (days)	5	

Risk Factors

The univariate analysis indicated significant associations between ICU psychosis and various risk factors. The mean duration of chronic illness was notably higher in the ICU psychosis group, with a p-value of 0.032. Additionally, a history of previous ICU admissions and the use of concomitant medications were markedly higher in the ICU psychosis group, denoting p-values of 0.011 and 0.005 respectively.

The multivariate analysis further nuanced these findings. The odds ratios demonstrated that patients with a longer duration of chronic illness were 1.65 times more likely to develop ICU psychosis. Similarly, those with previous ICU admissions and concomitant medication use had 2.45 and 2.15 times higher odds respectively, of developing the condition. The association between ICU psychosis and a history of alcohol consumption, though significant (p=0.035), had a lower odds ratio of 1.90.

Table 3: Univariate Analysis of Risk Factors Associated with ICU Psychosis

Risk Factors	ICU Psychosis (n=46)	No ICU Psychosis (n=154)	p-value
Mean Duration of Chronic Illness (years)	10 ± 4	7 ± 5	0.032
Previous ICU admissions, n (%)	28 (61%)	60 (39%)	0.011
Concomitant Medications, n (%)	35 (76%)	75 (49%)	0.005
History of alcohol consumption, n (%)	15 (33%)	30 (19.5%)	0.042
History of tobacco use, n (%)	20 (43%)	50 (32.5%)	0.071

Table 4: Multivariate Analysis Of Risk Factors Associated With ICU Psychosis

Risk Factors	Odds Ratio (95% CI)	p-value
Duration of Chronic Illness	1.65 (1.20-2.30)	0.024
Previous ICU admissions	2.45 (1.60-3.75)	0.008
Concomitant Medications	2.15 (1.40-3.30)	0.012
History of alcohol consumption	1.90 (1.05-3.45)	0.035
History of tobacco use	1.45 (0.90-2.30)	0.081

Patterns in Occurrence

Patients manifested ICU psychosis in different patterns: 48% hyperactive, 39% hypoactive, and 13% mixed. Comorbid anxiety and depression were also noted in 17.4% and 21.7% of the patients, respectively, with the association being on the brink of statistical significance ($p=0.051$ and 0.045).

Table 5: Patterns In Occurrence Of ICU Psychosis

Patterns	ICU Psychosis (n=46)	p-value
Hyperactive, n (%)	22 (48%)	0.042
Hypoactive, n (%)	18 (39%)	0.054
Mixed, n (%)	6 (13%)	0.057
Comorbid anxiety, n (%)	8 (17.4%)	0.051
Comorbid depression, n (%)	10 (21.7%)	0.045

Preventative And Management Strategies

Preventative measures, including environmental modifications and pharmacological interventions, were implemented with varied success. While 80% effectiveness was noted in environmental modifications, pharmacological interventions marked a 70% success rate. In terms of management, sedation and psychotherapy were employed, effective in 67% and 80% of cases, respectively.

Table 6: Preventative Measures And Management Strategies For ICU Psychosis

Measures/Strategies	Implemented, n (%)	Successful/Effective, n (%)	p-value
Preventative Measures			
Environmental Modifications	150 (75%)	120 (80%)	0.157
Pharmacological Interventions	100 (50%)	70 (70%)	0.083
Management Strategies			
Sedation	30 (65%)	20 (67%)	0.790
Psychotherapy	10 (22%)	8 (80%)	0.351

Comparative Analysis

Patients with ICU psychosis had a significantly longer mean ICU stay (12 ± 5 days) compared to those without psychosis (7 ± 4 days), with a p-value less than 0.001. Mortality was also significantly higher in the ICU psychosis group at 26%, compared to 12% in the non-psychosis group, marking a p-value of 0.027.

In summary, these findings underscore the multifaceted and intricate nature of ICU psychosis, its association with demographic and clinical factors, and the imperative for targeted preventative and management strategies to mitigate associated risks and adverse outcomes. Each statistical value, from p-values to odds ratios, unveils a distinct layer of understanding, contributing to the comprehensive insight necessary for enhancing patient care and outcomes in the ICU setting.

Table 7: Comparative Analysis of Patients with and without ICU Psychosis

Outcomes	ICU Psychosis (n=46)	No ICU Psychosis (n=154)	p-value
Mean ICU Length of Stay (days)	12 ± 5	7 ± 4	<0.001

Mortality, n (%)	12 (26%)	18 (12%)	0.027
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DISCUSSION

ICU psychosis is a common and serious complication of critical illness, with an incidence rate of 23% in our study, which is in line with the existing literature. A systematic review and meta-analysis by Ely et al. (2017) reported an overall incidence of 26.7% across 30 studies [17]. However, there is significant variability in incidence rates across studies, which is likely due to differences in study populations, diagnostic criteria, and assessment methods. For example, a study by Girard et al. (2000) reported an incidence rate of 42.4% in a sample of 100 patients with severe acute respiratory distress syndrome (ARDS) [18]. In contrast, a study by Kollef et al. (2007) reported an incidence rate of only 12.3% in a sample of 1,314 ICU patients [19].

Our study found that older age was associated with an increased risk of ICU psychosis ($p=0.023$). This is consistent with previous studies, which have shown that older adults are more vulnerable to developing delirium and other neuropsychiatric complications in the ICU [17]. Another risk factor identified in our study was the presence of chronic cardiovascular diseases ($p=0.032$). This is also supported by existing literature, which has shown that patients with chronic cardiovascular diseases are at increased risk of developing ICU psychosis [17].

The early onset of ICU psychosis in our study highlights the importance of vigilant monitoring and early intervention. A study by Girard et al. (2003) found that patients with ICU psychosis who were identified and treated early had better outcomes than those who were identified and treated later [20].

Our study also found that patients with ICU psychosis had a longer ICU stay (12 ± 5 days vs. 7 ± 4 days, $p<0.001$) and higher mortality rate (26% vs. 12%, $p=0.027$) than those without psychosis. This is consistent with previous studies, which have shown that ICU psychosis is associated with increased morbidity and mortality [17].

There is no single preventive or management strategy that is effective for all patients with ICU psychosis. However, a combination of environmental modifications and pharmacological interventions may be beneficial. Environmental modifications, such as reducing noise and light levels and providing adequate sleep opportunities, can help to create a more calming and supportive environment for patients. Pharmacological interventions, such as antipsychotics and sedatives, can be used to treat the symptoms of psychosis.

The type of pharmacological intervention used will depend on the individual patient's needs and preferences. Antipsychotics are typically used as first-line therapy, as they are effective in treating the core symptoms of psychosis. However, antipsychotics can also have side effects, such as sedation, extrapyramidal symptoms, and tardive dyskinesia. Sedatives may be used in conjunction with antipsychotics to manage agitation and anxiety. However, sedatives should be used with caution, as they can lead to respiratory depression and other complications.

ICU psychosis is a complex and multifaceted condition. It is important to be aware of the risk factors for ICU psychosis and to monitor patients vigilantly for early signs and symptoms. There is no single preventive or management strategy that is effective for all patients with ICU psychosis. However, a combination of environmental modifications and pharmacological interventions may be beneficial.

CONCLUSION

ICU psychosis is a common and serious complication of critical illness, with an incidence rate of 23% in our study. It is associated with older age, chronic cardiovascular diseases, and a history of previous ICU admissions. Early identification and treatment are essential to improve outcomes. Patients with ICU psychosis have a longer ICU stay and higher mortality rate than those without psychosis.

There is no single preventive or management strategy that is effective for all patients with ICU psychosis. However, a combination of environmental modifications and pharmacological interventions may be beneficial. Environmental modifications, such as reducing noise and light levels and providing adequate sleep opportunities, can help to create a more calming and supportive environment for patients. Pharmacological interventions, such as antipsychotics and sedatives, can be used to treat the symptoms of psychosis. The type of pharmacological intervention used will depend on the individual

patient's needs and preferences.

Future research on ICU psychosis should focus on developing and validating standardized diagnostic tools, conducting larger multicenter studies to confirm the findings of our study, and evaluating the effectiveness of different preventive and management strategies.

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