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Original Research Article

THE PREVALENCE, RISK FACTORS, AND OUTCOMES OF DELIRIUM AMONGST ICU PATIENTS. A STUDY FROM THE LOCAL POPULATION OF PAKISTAN

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ABSTRACT

Background: *Patients admitted to intensive care units (ICUs) often experience delirium, which is associated with adverse outcomes including prolonged ICU stays, increased mortality rates, and elevated healthcare costs. Despite its significance, delirium in Pakistan remains understudied.* ***Objectives:*** *To assess the delirium prevalence, identify predisposing factors and precipitating events, determine predictors of delirium, and explore its impact on ICU length of stay and mortality.* ***Study Design:*** *The study utilized a prospective observational design.* ***Setting:*** *The study was conducted at Bahria International Hospital ICU in Lahore, Pakistan.* ***Duration of Study:*** This study was conducted from September 2022 to March 2023. ***Material and Methods:*** *Utilizing the Intensive Care Delirium Screening Checklist (ICDSC), bedside nursing staff evaluated 140 patients twice daily. Data on predisposing factors, precipitating events, and clinical parameters were collected. Regression analysis was performed to identify predictors of delirium.* ***Results:*** *The study found a delirium prevalence of 29.2%, significantly affecting ICU length of stay. Regression analysis identified sepsis, metabolic acidosis, nasogastric tube use, and APACHE II score as independent predictors of delirium among ICU patients.* ***Conclusion:*** *Given the detrimental effects of delirium, implementing multidisciplinary preventive strategies targeting modifiable risk factors are Precommended to improve patient outcomes.*

Keywords: Cancer Patients, Intensive Care Units, Critical Illness, Prognosis, Mortality, Malignancy

INTRODUCTION

Delirium has significant cost consequences for the healthcare industry. In the US, delirium-related healthcare costs range between $38 billion to approximately $152 billion annually. This includes expenditures related to Readmission and Continuous Care (1, 2). Delirium affects up to 46.3% of ICU patients (3), prompting a study into prevention methods (3). The Society of Critical Care Medicine developed recommendations for managing delirium in the Intensive Care Unit, including proven screening methods for critically sick patients (4). The 2018 guideline recommends screening adult patients in intensive care units for delirium every eight hours utilizing an accurate and trustworthy method (5).

Daily delirium evaluation effectively prevents delirium in 30-40% of instances by earlier detection of signs (6).

Delirium is an acute neuropsychiatric condition involving changes in consciousness, interest, and focus evolving over a brief period. It can be caused by a combination of underlying medical issues, drug intoxication or withdrawal, and a variety of other factors(7). The International Classification of Diseases, 11th Revision defines delirium as an abrupt onset of diminished arousal, cognitive deficits, disruptions of attention, motor activity, & cycles of sleep and wakefulness (8).

Several tests have been established for evaluating delirium in hospitalized patients, such as the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU), Cognitive Test for Delirium, Delirium Detection Score, Intensive Care Delirium Screening Checklist (ICDSC), and Nursing Delirium Screening Scale (9). The CAM-ICU and ICDSC are the most trustworthy methods for assessing delirium in critically sick patients, according to psychometric properties research (9)

Although the specific etiology of delirium is unknown, it is mainly caused by ischemic brain damage, chemical imbalance, and peripheral brain inflammation(10). A previous study suggests that delirium is caused by a combination of variables, including pre-existing conditions, acute conditions, and attributable or environmental factors (11). The baseline parameters were age (3), severity of disease (12), and the existence of comorbidities (13). Hospital variables included sedation, vasopressors, the duration of the ICU stay, ventilatory therapy, oxygen deprivation, fever, elevated bilirubin, and creatinine levels, physical restrictions, and infection (13-15). Delirium poses a considerable danger to the health of patients and is a strong indicator of the risk of falls (16). Delirium increases the risk of removal of invasive catheters, tracheal tubes, and urine catheters compared to non-delirious individuals (13). Delirium can lead to prolonged mechanical breathing, hospitalization, and higher morbidity and death rates (2). Furthermore, it has both immediate and long-term deleterious effects on patient quality of life (17) and memory impairment among ICU survivors (18).

Pakistan and other Asian nations have distinct cultures and ethnicities compared to other industrialized and developing countries. There is a lack of research on the relationship between culture and delirium. We aim to explore these links in this study to assist healthcare practitioners in Pakistan in establishing a prediction model to identify people at increased risk of delirium.

METHODOLOGY

A prospective observational study was conducted at Bahria International Hospital ICU in Lahore 2023 to find the frequency of delirium, establish the relationship between selected variables and delirium, determine the extent to which the selected variables predict delirium, and evaluate the effect of delirium on ICU duration of stay and mortality among ICU patients. The study was approved by the hospital's ethics committee and included 140 patients who met the

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selection criteria and were admitted to adult ICUs, coronary care units, and post-cardiac surgery units from September , 2022 to March 2023. The Intensive Care Delirium Screening Checklist was used to identify patients with delirium. Bergeron and his colleagues created this checklist, which consists of eight items based on DSM criteria. The items include altered consciousness, lack of focus, confusion, psychomotor agitation or retardation, hallucinations, delusions, inappropriate conduct or mood, sleep-wake cycle disorder, and symptom fluctuation. The checklist is suitable for screening patients in crowded ICUs and can be used by medical personnel without any psychiatry expertise. Patients received a score for each symptom that appeared during the allotted time A score of four or higher out of eight was indicative of delirium, and the doctor was informed if the patient scored higher than four. The checklist had a sensitivity of 81.0%, specificity of 87.7%, and good diagnostic accuracy with a Cronbach α of 0.839. The Acute Physiology and Chronic Health Evaluation II (APACHE II) score was used to assess the severity of the condition. The APACHE II score was developed by Knaus et al. in 1985, and it ranges from zero to 71, with increasing scores indicating a higher risk of hospital death. A risk factor checklist tailored to this study was created based on the literature research on risk factors for delirium among ICU patients. The list includes variables such as age, gender, tobacco use, concurrent conditions, trauma or emergency surgery before ICU admission, SOFA score, use of sedation, sepsis, mechanical ventilation, creatinine levels, metabolic acidosis, and bladder catheter usage.

Before the research began, the ICU staff were trained to use the ICDSC to assess delirium. The study included patients who were admitted for at least 24 hours, were at least 18 years old, were able to understand and speak Urdu or English, and were moved from another hospital, ICU, or ward. The risk factor checklist marked off the use of sedatives, the use of mechanical ventilators, sepsis, bladder catheter use, and nasogastric tube insertion during the previous 24 hours. The worst laboratory results obtained within 24 hours after ICU admission were used to compute the APACHE II, SOFA, and SAPS II scores. The duration of the ICU stay was determined by the number of days from the day of admittance to the date of ICU discharge.

The data were organized and analyzed using SPSS software version 23. Data cleansing and verification were performed before the analysis. Continuous variables were represented by mean and standard deviation, and nominal variables were evaluated using contingency tables and the χ test, which were displayed as a number and a percentage. The first regression model included every independent variable that showed bivariate-level correlation with delirium. A p-value less than or equal to 0.05 was considered significant.

RESULTS

The study was conducted from September, 2022 to March 2023. With 200 patients selected from intensive care units during the research period. However, 60 participants had to be removed from the study due to various reasons. Thirty-one participants had an RASS score of less than -3, 14 stayed for less than 24 hours, 5 had neurological disorders, and 15 underwent neurosurgery. After removing these participants, the study included 140 patients. The demographic details of the participants are provided in Table 1, Figure 1,2.

In the study population, 92% had sepsis, and 75.7% were put on ventilator support. 6.4% had no comorbid condition, 27.8% had one disease, and 49.2% had three associated diseases. The average age of the participants was 54 ± 18.5 years. Around 63.5% of them had documented medical problems, while 36.5% had surgical issues. The mean APACHE II score of the subjects, which indicates the severity of the disease, was 19 ± 5.2, and their mean organ dysfunction score (SOFA) was 9 ± 3.25. The length of ICU stay was 14 ± 9 days. (Table 1).

Delirium was found in 29.2% of the study population, while 70.8% were without delirium. (Table 2)

The association between the chosen clinical and sociodemographic variables—age, comorbidity, APACHE II score, SOFA score, sedative usage, creatinine level, and delirium—was ascertained using a point-biserial correlation. The findings showed a favorable relationship between delirium, high creatinine levels, sedative usage, SOFA scores, and APACHEII scores.

A point-biserial correlation was constructed to investigate the relationship between delirium, ICU duration of stay, and ICU mortality. The results indicated a positive correlation between delirium, ICU duration of stay, and predicted ICU mortality rate.

The analysis identified several predictors of delirium among ICU patients. Sepsis (B = 2.512, p = 0.007), metabolic acidosis (B = 1.541, p = 0.025), nasogastric tube usage (B = 2.141, p < 0.001), and APACHE II score (B = 0.223, p = 0.002) showed significant positive correlations with delirium. Patients with these conditions were respectively 9.87, 4.25, 10.29, and approximately 25% more likely to develop delirium. However, sedation use (p = 0.801) and creatinine level (p = 0.211) did not exhibit significant associations.

Table 1: Demographic of the participants

Variables	Total sample (n = 140) n,%
Gender	
Male	94(67)
Female	46(33)
Diagnosis	
Medical	89(63.5)
Surgical	51(36.5)
Emergency surgery or trauma	
Yes	19(13.5)
No	121(86.5)
Comorbidity	
None	9(6.4)
One disease	39(27.8)
Two disease	23(16.4)
Three disease	69(49.2)
Sepsis	
Yes	129(92.1)
No	11(7.9)
Ventilator use	
Yes	106(75.7)
No	34(24.3)
Metabolic acidosis	
Yes	113 81)
No	27 (19)
Bladder catheter use	
Yes	116(82.8)
No	24(17.2)
Nasogastric tube use	
Yes	44(31.5)
No	96(68.5)
Age (years)	54 ± 18.5
APACHE-II (points)	19 ± 5.2
SAPS II (points)	49 ± 15.8
ICU length of stay (days)	14 ± 9

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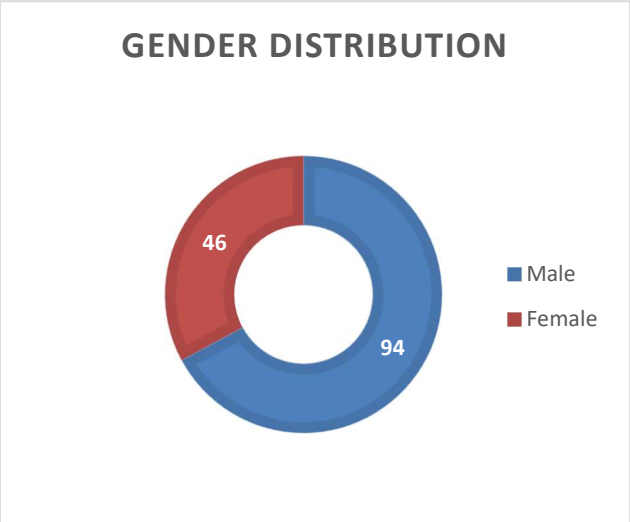

Figure 1: Distribution of gender in the study population

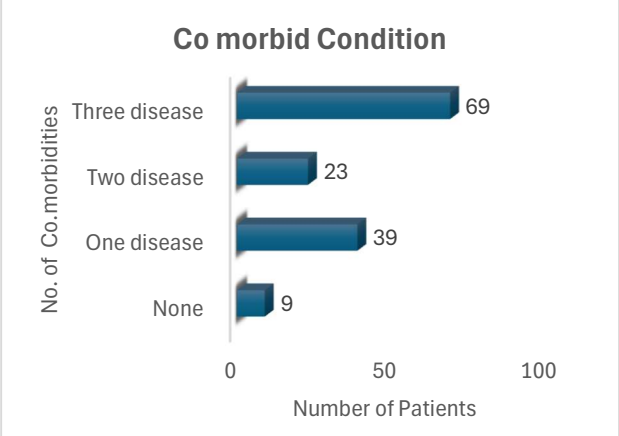

Figure 2: Distribution of co-morbid conditions in the study population

The constant term indicated a very low likelihood of delirium in the absence of these predictors ($p < 0.001$). These findings emphasize the importance of monitoring and managing factors such as sepsis, metabolic acidosis, nasogastric tube usage, and APACHE II score to mitigate delirium risk in ICU patients (Table 4)

Table 2 Delirium prevalence among the study population

Variable	Total sample (n = 140) n,%
ICDSC	
Delirium	41(29.2)
No delirium	99(70.8)

Table 3. Findings of a point-biserial correlation analysis comparing continuous factors with delirium.

VARIABLE	point-biserial correlation	p-value
Age	−0.121	0.172
Comorbidity	0.035	0.625
APACHE II score	0.414	<0.01
SOFA score	0.321	<0.01
Sedation	0.147	0.014
Creatinine	0.154	0.018

Table 4: Delirium predictors in the research sample

VARIABLE	B	Wald	P	Exp (B)	95% Confidence limit
Sepsis	2.512	7.478	0.007	9.87	1.85–48.56
Metabolic acidosis	1.541	5.269	0.025	4.25	1.24–11.65
Nasogastric tube use	2.141	17.698	0.00	10.29	3.58–28.87
APACHEII score	0.223	12.258	0.002	1.25	1.14–1.24
Sedation use	0.024	0.056	0.801	1.10	0.35–2.25
Creatinine level	−0.004	1.789	0.211	1.01	0.91–1.02
Constant	−5.254	33.658	0.00	0.004	

DISCUSSION

To the extent of our knowledge, this is a landmark study that examines the frequency of delirium, investigates delirium-related variables, and assesses how delirium affects ICU patient mortality and duration of hospitalization in Pakistan. The incidence of delirium among ICU patients was found to be 29.2%, which is less than the incidence found in other studies carried out in (19), Saudi Arabia (20), and Italy (21). Several pharmaceutical and nonpharmacological delirium prevention strategies, such as sedation weaning, pain control, and early mobility, may be connected to the lower rate estimated in the present investigation. By focusing on the delirium risk factors, these therapies are highly successful in lowering the occurrence of delirium.

According to the data, there was no discernible age difference between the delirium-free and delirium-affected people. This finding contradicted previous research demonstrating a strong correlation between delirium and increasing age (22, 23). This disparity may be connected to the kind of ICU research and patient selection.

According to the current study's results, smoking was not associated with delirium, which is consistent with earlier research (24). The SOFA score and the APACHE II score indicate organ dysfunction and the severity of the sickness, respectively. The APACHE II and SOFA ratings of the study individuals with delirium were more significant than those without delirium. Delirium may be more likely to occur in patients with severe illnesses and organ malfunction, suggesting a link between delirium and severe disorders.

This study confirms previous research findings (25, 26) that the use of sedative medicines is strongly associated with triggering delirium. One potential reason might be a neurotransmitter system disturbance brought on by central nervous system depression (27).

The use of a mechanical ventilator and delirium are correlated, according to the current study ($p < 0.001$). Sedation may be why delirium is linked with mechanical ventilation(20).

The current study's findings align with other research (28, 29), which found a substantial correlation between metabolic acidosis and the onset of delirium. The results of this investigation are consistent with those of other studies (29), which identified a strong link between metabolic acidosis and the development of delirium.

The findings showed a correlation between delirium and the existence of renal impairment measured by a high creatinine level. The results align with the existing body of research (30). This finding adds to the body of research regarding the impact of waste product buildup on the brain in cases of renal impairment, namely the induction of inflammation and the consequent discharge of pro-inflammatory substances that may hasten the onset of delirium.

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It was shown that there was a strong correlation between sepsis and the onset of delirium. The current study's findings were consistent with the theory that sepsis triggers the systemic inflammatory response and releases cytokines that may damage the barrier between the blood and the brain, resulting in cerebral metabolic alterations, hypoxia, and insufficient cerebral perfusion, which ultimately causes delirium (31, 32). Previous research has revealed similar findings about the strong correlation between sepsis and ICU delirium (32)**.** It was noted—and this was also seen in other studies—that the presence of a bladder catheter was linked to delirium (33). It is important to recognize several limitations when evaluating the findings of this study. Convenience sampling was employed which limited the universality of the results. Also, a relatively small sample size of study participants may have impacted the statistical analysis. To determine the effect of adopting preventive strategies to lower the frequency of delirium among ICU patients in Pakistan, more research is required.

CONCLUSION

Delirium is a common condition among patients in intensive care units (ICUs), which can negatively affect patient outcomes in healthcare systems in Pakistan and internationally. In our center, the incidence of delirium was found to be 29.2% among ICU patients. Various factors were independently associated with delirium, including nasogastric tube usage, metabolic acidosis, sepsis, and APACHE II score. Identifying significant risk variables associated with delirium in Pakistani ICU patients can help develop new prevention techniques that focus on modifiable risk factors. Prevention is always better than treatment, therefore it is important to take measures to prevent delirium from occurring in the first place.

DECLARATIONS

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (BTIH/

Consent for publication

Approved

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CONFLICT OF INTEREST

The authors declared absence of conflict of interest.

AUTHOR CONTRIBUTION

RIZWAN PERVAIZ
Conception of Study, Final approval of manuscript.
Manuscript revisions, critical input.
Coordination of collaborative efforts.
TAYYABA SARWAR
Conception of Study, Development of Research Methodology Design, Study Design,, Review of manuscript, final approval of manuscript.
BUSHRA ARIF
Study Design, Review of Literature.
SHAH BANO
Data entry and Data analysis, drafting article.
Data acquisition, analysis.
MUHAMMAD AHMED NAYYAR
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Conception of Study, Development of Research Methodology Design, Study Design,, Review of manuscript, final approval of manuscript.
WAEL GHALY ELMASRY
Coordination of collaborative efforts.
Study Design, Review of Literature.
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Manuscript revisions, critical input.
Coordination of collaborative efforts.

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