

## Delirium in critical care unit patients: prevalence and associated risk factors

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### Abstract

A large number of critically ill patients experience physical and mental distress, resulting from systemic illness, multiple interventions, and environmental factors, during their stay in the Intensive Care Unit (ICU). Delirium is a common medical problem related to prolonged critical care. ICU delirium is linked to higher mortality as well as morbidity. The majority of patients suffering from delirium in the ICU experience hypoactive delirium, which remains relatively undiagnosed. Multiple tools have been devised for ICU delirium screening and early diagnosis. This short report aimed to assess the prevalence of delirium using a validated screening tool in medical ICU patients and determine the associated modifiable and non-modifiable risk factors.

**Keywords:** Psychomotor agitation, Anxiety, Delirium, Critical illness..

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### Introduction

A healthy mind resides in a healthy body but when the body becomes sick enough that the person reaches the ICU, the mind too gets sick. Delirium is the commonest manifestation of brain dysfunction in critically ill patients, affecting 45-87% of patients on mechanical ventilation. According to the American Psychiatric Association, delirium is defined as a "disturbance of consciousness characterized by a sudden onset (hours or days) and a fluctuating course of attention accompanied by a change in perception or cognition."<sup>1</sup> Delirium may present with cognitive symptoms including disorientation, reduced attention span, short-term memory impairment, visual and spatial disability, and altered consciousness or behavioral symptoms, including disturbance of sleep-wake cycle, irritability, hallucinations, and delusions. However, it is quite difficult to diagnose delirium in ICU patients as it may manifest in different forms. Symptomatically, delirium can manifest as hyperactive

delirium with agitation, apprehension, and attempts to remove the external devices; or hypoactive delirium, with disengagement and somnolence; or the combination of the two.

Multiple pathophysiological phenomena are linked to the development of delirium in ICU, which include alteration in neuronal networks, neuroinflammation or aberrant neurotransmitter responses. Many predisposing, as well as precipitating factors, are associated with delirium in critical care units. The predisposing factors include advanced age, baseline cognitive dysfunction, alcoholism, drug abuse, and severity of the primary disease. Factors precipitating the development of delirium are metabolic disorders, electrolyte disturbances, haemodynamic instability, sepsis, inadequate pain management, certain commonly used drugs like Benzodiazepines, long-acting opioids, and anticholinergic agents,<sup>2</sup> prolonged invasive ventilation, sleep disorders, and complicated surgeries. ICU delirium is an independent predictor of higher mortality at six months, longer ICU stay, and prolonged mechanical ventilation<sup>3</sup> Patients experiencing delirium in the ICU have been shown to be more prone to long-term cognitive impairment and the long-term need for healthcare facilities.

Keeping in view the short- and long-term effects of delirium in critical care patients, prevention, early diagnosis, and prompt treatment of the problem is of utmost importance. This can be achieved with frequent monitoring by applying the ABCDEF bundle of ICU care<sup>4</sup>. Treatment options like antipsychotics or melatonin have shown promising results<sup>5</sup> Non-pharmacological interventions such as early mobilization, improving sleep quality, family involvement, reorientation measures, and improvement of ICU design have also been proven to directly affect the course and outcome of patient care.

Currently, no study is available in Pakistan to assess the disease burden of delirium in critical care patients. Therefore, this study aims to bring to attention the morbidity and mortality associated with delirium in critically ill patients so that they can be better managed, thereby improving patient outcomes.

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## Methods and Results

This short report is based on the data of patients admitted to the Medical ICU, Department of Emergency and Critical Care, Holy Family Hospital, Rawalpindi, Pakistan. The sample size was determined via the G-power software<sup>6</sup> using the proportions from the reference study which yielded a minimum sample size of 67.

A total of 105 patients admitted to the ICU were studied for three months (March 2022 to May 2022). The inclusion criterion was all patients of the age group 18-75 years admitted to the ICU for more than 24 hours regardless of the need for ventilatory support. Patients < 18 years of age, brain-dead patients, and patients with a pre-defined illness like dementia, Alzheimer's, or schizophrenia, or pre-diagnosed causes for delirium such as acute intoxication, alcohol withdrawal, head trauma, cerebrovascular accidents, and metabolic disturbances were excluded. After considering the above-mentioned criteria, 17 patients were excluded from the study population; out of these eight patients had CT scan proven cerebrovascular accident, three had persistent hyponatraemia, four patients had baseline cognitive impairment, and the remaining two patients had a history of illicit drug abuse. Therefore, the study was conducted on 88 patients.

Patients were assessed for delirium using Neecham Confusion Scale<sup>7</sup> (mnshospitals.org) every day. An additional self-designed questionnaire was used for recording new clinical developments, duration of ICU stay, baseline cognitive impairment, visual and hearing impairments, and the medications being used. A general survey using ABCDEF (Assessing Pain, Both Spontaneous

Awakening and Breathing Trials, Choice of Drugs, Delirium Monitoring/Management, Early Exercise/Mobility, and Family Empowerment) protocol was also included.

Data obtained was analysed via SPSS version 25. Patient's demographic and clinical characteristics were expressed as mean  $\pm$  SD (standard deviation). The prevalence of delirium in the sample population was calculated. The characteristics of the two subsets of the study population were compared via comparison of means. The evaluation of correlations was performed by the chi-square test. Odds ratios (OR) were obtained using linear regression with 95% CIs (confidence intervals).  $p \leq 0.05$  was considered significant.

The mean age of the participants was  $44.17 \pm 14.35$  years; 52 (59.09%) were women and 36 (40.90%) were men. 38 (43.18%) patients were known cases of hypertension and diabetes mellitus, out of which only 26 (68.42%) were compliant with medications. 74 (84.09%) patients were only hypertensive, 11 (12.5%) had baseline cognitive impairment, while 7 (7.9%) out of the total study population had visual and/or hearing impairment before admission to the hospital due to unrelated causes. The average duration of hospital stay was  $24.68 \pm 4.56$  days, with the greatest number of patients i.e., 45 (51.2%) staying in the ICU for two to four weeks. 83 (94.3%) patients had tube feeding; 86 (97.5%) had nasogastric tubes and 02 (2.4%) had a feeding jejunostomy. All the patients had a Foley catheter inserted at the time of admission. 76 (86.3%) patients were mechanically ventilated, out of which 64 (84.2%) were ventilated via an endotracheal tube, and the rest of the 12 (15.8%) had a

**Table-1:** Demographic and Clinical Characteristics of Patients with Various Levels of Confusion in ICU.

	Moderate to severely confused patients	Patients with mild to early confusion	Patients not confused, but at high risk of confusion	Patients not confused and functioning normally	p-value
Allocated Neecham Score	0-19	20-24	25-26	27-30	
Number of patients (%age)	18 (20.4%)	31 (35.2%)	34 (38.6%)	05 (5.6%)	
Mean Age (years)	$59.71 \pm 14.77$	$46.89 \pm 13.89$	$32.09 \pm 15.63$	$33.8 \pm 14.33$	0.01
Gender					
Men	06 (33.3%)	20 (64.5%)	16 (47.0%)	01 (20%)	0.516
Women	12 (66.67%)	11 (35.48%)	18 (52.9%)	04 (80%)	
Type of Delirium					
Hyperactive	09 (56.25%)				
Hypoactive	06 (37.5%)				
Mixed	02 (18.75%)				
Mean Duration of ICU Stay (Days)	$35.76 \pm 6.23$	$33.91 \pm 3.96$	$18.35 \pm 4.04$	$10.70 \pm 4.02$	0.001
Visual/Hearing Impairment	5 (33.3%)	2 (6.4%)	0 (0%)	0 (0%)	0.030
Tube Feeding	18 (100%)	29 (93.5%)	32 (94.11%)	04 (80%)	0.804
Indwelling Catheters	18	31	34	05	--
Use of Sedation more than twice daily	11 (61.1%)	25 (80.6%)	27 (79.4%)	02 (60%)	0.141

tracheostomy tube. In addition, 04 (4.5%) patients also had post-operative drains in place Table.

Of the total population, 49 (55.68%) were diagnosed with delirium as per Neecham Confusion Scale—18 (20.4%) had moderate to severe confusion (mean Neecham score 14) and 31 (35.2%) had mild confusion with a mean score of  $21 \pm 2.67$ , 34 (38.6%) patients were at high risk of confusion and the remaining 5 (5.6%) patients showed no signs and symptoms of delirium. The mean Neecham Confusion Scale score was  $24.6 \pm 21.9$ . Out of the 18 patients who had moderate to severe delirium, 09 (56.25%) showed hypoactive delirium, and 06 (37.5%) showed hyperactive type, with half of them requiring soft restraints. The remaining 3 (18.75%) patients showed mixed-type delirium.

There was a significant correlation between the severity of delirium and age ( $r = 175.558$ ,  $p = 0.01$ ). Similarly, there was a positive correlation with the duration of ICU stay ( $r = 27.206$ ,  $p = 0.001$ ) and pre-existing visual/hearing impairment ( $r = 41.454$ ,  $p = 0.030$ ). There was no significant association between the severity of delirium and co-morbid disorders ( $p = 0.752$ ), tube feeding ( $p = 0.614$ ), indwelling catheters ( $p = 0.544$ ), and the use of sedatives ( $p = 0.141$ ).

## Discussion

Delirium is a rapid onset, yet reversible, brain dysfunction resulting in a confused state of mind. It is a common endpoint of multiple diseases, drugs, or intoxication. On clinical as well as research grounds, delirium and its implications in ICU patients have always been overlooked in Pakistan. This short report has been put forward to gauge the extent of the problem in local settings. Further investigation into the matter was suggestive of inadequate knowledge, a lack of monitoring, and timely management. However, the problem is not limited to developing countries, rather the matter is now of global concern.

A systematic review of risk factors has shown that age, duration of mechanical ventilation, duration of hospital stay, immobility, chronic and uncontrolled hypertension, and metabolic acidosis are closely related to delirium in the ICU<sup>8</sup> Sedatives like Benzodiazepines, especially Midazolam, are considered potential inducers of delirium, essentially increasing the prevalence of delirium by up to three folds.<sup>9</sup>

For the diagnosis of delirium, a consultant psychiatrist should be present according to the DSM guidelines<sup>10</sup>. However, due to a lack of feasibility, alternative methods are being employed. Strict monitoring should be carried

out on a daily basis with general examination at least twice a day. Several diagnostic tools, including Richmond Agitation-Sedation Scale (RASS)<sup>11</sup>, have been devised to evaluate the patients. However, the Society of Critical Care Medicine has recommended the use of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) or the Intensive Care Delirium Screening Checklist (ICDSC)<sup>12</sup>. However, to this day, none of the above-mentioned scales have been translated into native languages, depicting a wide gap between the knowledge, attitude, and practice of health professionals.

Most of the factors leading to delirium are non-modifiable, that is why the main focus has shifted to primary prevention. A number of psychotropic drugs like Haloperidol, Quetiapine, Olanzapine, and Dexmedetomidine have been conventionally used for the prevention and treatment of delirium. However, antipsychotics have shown more adverse effects than benefits, namely extrapyramidal effects, excessive sedation, prolongation of QTc interval, and neuroleptic malignant syndrome. Because of this, The Pain, Agitation, and Delirium Guidelines from 2013 (Society of CCM) do not recommend the use of drugs to prevent delirium.<sup>13</sup> Hence, the role of non-pharmacological measures becomes a strong alternative. The best intervention is the implementation of the ABCDEF bundle. This bundle includes Awakening and Breathing Coordination, Delirium Monitoring/Management, Early Exercise/Mobility, and frequent family visitations. A study published in 2011 revealed a significant reduction in the prevalence of delirium, i.e., from 62.3% to 48.7%, as well as a reduction in the duration of delirium after the application of the ABCDEF care bundle.<sup>14</sup> It is also necessary to highlight the importance of sleep hygiene and daily rehabilitation in this regard. Strategies to improve sleep quality, noise limitation, maintenance of daily circadian rhythm, exposure to sunlight, managing room temperature, as well as justified use of pharmacological agents, have proven quite effective.

Based on the results obtained from the current study, certain proposals are put forward by the authors. There is a need for thorough education of health care professionals regarding delirium. Clinicians should keep themselves up-to-date regarding the recent guidelines of standard practices. There should be a vigilant assessment for the development of delirium, preferably a reliable scoring system in the native language. The best option for the management of delirium is early rectification of the core problem. A holistic approach towards patient care following the biopsychosocial model should be employed, comprising the ABCDEF bundle of patient

care, daily rehabilitation, better sleep hygiene, and prompt psychological therapy. A large-scale, multi-centric study in Pakistan is required to further explore the dimensions of delirium and its various risk factors.

## Conclusion

This short report based on an observational study carried out in a single ICU setting has shown that delirium is quite common in the ICU with the majority of patients experiencing hypoactive delirium. Old age, prolonged ICU stay, and excessive use of sedatives have shown an increase in the prevalence of delirium. There is a need for frequent monitoring of the patients to diagnose delirium in its early stages and adjust the modifiable risk factors to mitigate its effects, thus shortening the misery of the patients.

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**Conflict of Interest:** None.

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## References

1. American Psychiatric Association (APA). DSM-5TM: Diagnostic and Statistical Manual of Mental Disorders, 5th ed. Arlington, VA: American Psychiatric Association, 2013.
2. Pandharipande PP, Pun BT, Herr DL, Maze M, Girard TD, Miller RR, et al. Effect of sedation with dexmedetomidine vs lorazepam on acute brain dysfunction in mechanically ventilated patients: the MENDS randomized controlled trial. *JAMA* 2007;298:2644-53. Doi: 10.1001/jama.298.22.2644.
3. Ely EW, Shintani A, Truman B, Speroff T, Gordon SM, Harrell FE, et al. Delirium as a predictor of mortality in mechanically ventilated patients in the intensive care unit. *JAMA* 2004;291:1753-62. Doi: 10.1001/jama.291.14.1753.
4. Marra A, Ely EW, Pandharipande PP, Patel MB. The ABCDEF Bundle in Critical Care. *Crit Care Clin* 2017;33:225-43. Doi: 10.1016/j.ccc.2016.12.005.
5. Baumgartner L, Lam K, Lai J, Barnett M, Thompson A, Gross K, et al. Effectiveness of Melatonin for the Prevention of Intensive Care Unit Delirium. *Pharmacotherapy* 2019;39:280-87. Doi: 10.1002/phar.2222.
6. Kang H. Sample size determination and power analysis using the G\*Power software. *J Educ Eval Health Prof* 2021;18:17. Doi: 10.3352/jeehp.2021.18.17.
7. Immers HEM, Schuurmans MJ, de Bijl JVV. Recognition of delirium in ICU patients: a diagnostic study of the NEECHAM confusion scale in ICU patients. *BMC Nurs* 2005;4:7. Doi: 10.1186/1472-6955-4-7.
8. Zaal IJ, Devlin JW, Peelen LM, Slooter AJC. A systematic review of risk factors for delirium in the ICU. *Crit Care Med* 2015;43:40-7. Doi: 10.1097/CCM.0000000000000625.
9. Pandharipande P, Cotton BA, Shintani A, Thompson J, Pun BT, Morris JA, et al. Prevalence and risk factors for development of delirium in surgical and trauma intensive care unit patients. *J Trauma* 2008;65:34-41. Doi: 10.1097/TA.0b013e31814b2c4d.
10. Nelson-Gray RO. DSM-IV: empirical guidelines from psychometrics. *J Abnorm Psychol* 1991;100:308-15. Doi: 10.1037//0021-843x.100.3.308.
11. Sessler CN, Gosnell MS, Grap MJ, Brophy GM, O'Neal PV, Keane KA, et al. The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care unit patients. *Am J Respir Crit Care Med* 2002;166:1338-44. Doi: 10.1164/rccm.2107138.
12. Krewulak KD, Rosgen BK, Ely EW, Stelfox HT, Fiest KM. The CAM-ICU-7 and ICDS-C as measures of delirium severity in critically ill adult patients. *PLoS One* 2020;15:e0242378. Doi: 10.1371/journal.pone.0242378.
13. Barr J, Fraser GL, Puntillo K, Ely EW, Gélinas C, Dasta JF, et al. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Crit Care Med* 2013;41:263-306. Doi: 10.1097/CCM.0b013e3182783b72.
14. Luetz A, Grunow JJ, Mörgeli R, Rosenthal M, Weber-Carstens S, Weiss B, et al. Innovative ICU Solutions to Prevent and Reduce Delirium and Post-Intensive Care Unit Syndrome. *Semin Respir Crit Care Med* 2019;40:673-86. Doi: 10.1055/s-0039-1698404.