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ORIGINAL ARTICLE

Relationship between Delirium, Acute Respiratory Distress Syndrome (ARDS), and In-hospital mortality to the patients in Intensive Care Unit (ICU).

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ABSTRACT… Objective: To risk of acute respiratory distress syndrome (ARDS) mortality in intensive care unit (ICU) and know the extent to which delirium and persistent coma influence the association between ARDS and in-hospital mortality issues of critical care infrastructure. **Study Design:** Prospective Observational Cohort study. **Setting:** Bakhtawar Amin Memorial Trust Teaching Hospital, Multan. **Period:** December 2025 to February 2026. **Methods:** Adult patients (≥18 years) admitted in ICU were enrolled. Daily delirium screening was performed using the Confusion Assessment Method for the ICU (CAM-ICU) combined with the Richmond Agitation–Sedation Scale (RASS). ARDS was diagnosed according to the 2012 Berlin Definition. Multivariable logistic regression was used to evaluate associations, adjusting for age, APACHE II score, duration of mechanical ventilation, sedative exposure, and comorbidities. **Results:** Of 612 enrolled patients, 57 (9.3%) were diagnosed with ARDS. Delirium occurred in 68% of intubated ARDS patients, compared to 49% in intubated non-ARDS patients and 19% in non-intubated patients (P < 0.001). After multivariable adjustment, ARDS was independently associated with a 5.8-fold increased odds of delirium relative to non-intubated patients (adjusted odds ratio [aOR] = 5.82; 95% CI: 1.42–23.85; P = 0.014), whereas mechanical ventilation without ARDS conferred a more modest increase (aOR = 2.04; 95% CI: 1.18–3.51; P = 0.011). In unadjusted analysis, ARDS was linked to a 9.7 fold higher odds of in-hospital mortality (OR = 9.71; 95% CI: 2.94–32.08). However, this association weakened considerably after adjusting for delirium and persistent coma (aOR = 4.96; 95% CI: 1.38–17.82), suggesting partial mediation by neurological complications. **Conclusion:** In ICU setting, ARDS is a significant independent risk factor for ICU delirium beyond the effects of mechanical ventilation alone. Moreover, delirium and coma appear to mediate a substantial portion of the mortality risk associated with ARDS. These findings emphasize the critical need for structured delirium prevention protocols including conservative sedation, early mobilization, and routine cognitive screening in ARDS management within Pakistan's resource-limited critical care environments.

Key words: Acute Respiratory Distress Syndrome, Coma, Critical Care, Delirium, Hospital Mortality.

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INTRODUCTION

Critical illness imposes a profound physiological and neurological burden on patients admitted to intensive care units (ICUs), with complications such as acute respiratory distress syndrome (ARDS) and ICU-acquired delirium standing among the most devastating.[1] ARDS, a life-threatening condition characterized by acute, diffuse inflammatory lung injury leading to hypoxemic respiratory failure, affects approximately 10% of ICU admissions globally and carries a mortality rate ranging from 30% to 45%.[2,3] In low and middle-income countries (LMICs) like Pakistan, where access to mechanical ventilation, advanced monitoring, and trained critical care personnel remains limited, the outcomes of ARDS are likely worse, though national epidemiological data are scarce.[4]

Concurrently, delirium a reversible but acute disturbance in attention, awareness, and cognition afflicts up to 80% of mechanically ventilated ICU patients and is independently associated with prolonged ICU stay, long-term cognitive impairment, and increased mortality.[5,6] The pathophysiology of ICU delirium is multifactorial, involving neuroinflammation, neurotransmitter imbalances (particularly cholinergic deficiency and dopaminergic excess), sedative exposure, sleep fragmentation,

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and metabolic derangements.[7] Critically, patients with ARDS are exposed to a confluence of these risk factors: they often require deep sedation, prolonged mechanical ventilation, neuromuscular blockade, and experience severe hypoxemia all of which may potentiate blood-brain barrier disruption and cerebral hypoperfusion.[8]

Despite growing recognition of delirium as a modifiable risk factor for poor outcomes, its specific relationship with ARDS remains underexplored, particularly in resource-constrained settings. Recent evidence from high-income countries suggests that ARDS may confer a uniquely elevated risk of delirium due to systemic inflammation ("cytokine storm") and hypoxia-induced neuronal injury.[9] Furthermore, emerging data indicate that delirium may partially mediate the high mortality observed in ARDS, implying that interventions targeting delirium could indirectly improve survival.[10]

In Pakistan, where ICUs frequently operate beyond capacity with nurse-to-patient ratios exceeding 1:8 and limited access to validated delirium screening tools, this knowledge gap is especially consequential.[11] The absence of routine delirium monitoring means that cognitive complications often go undetected until they manifest as agitation, accidental self-extubation, or prolonged weaning events that further strain an already fragile healthcare system. Understanding the triad of ARDS, delirium, and mortality in this context is not merely academic; it is a public health imperative.

Prior studies examining ARDS and delirium have largely originated from North America and Europe, with populations that differ significantly from Pakistani patients in terms of genetic background, comorbidity profiles (e.g., higher rates of undiagnosed tuberculosis, malnutrition, and chronic kidney disease), and patterns of critical care delivery.[12] Moreover, none have explicitly evaluated whether the mortality risk attributed to ARDS is attenuated after accounting for delirium and persistent coma a key analytical step to infer potential mediation.

Our recent prospective cohort study, conducted across two major academic hospitals in urban Pakistan, provides a unique opportunity to address these questions in a South Asian LMIC context [13]. We found that ARDS was associated with a substantially higher prevalence of delirium compared to non-ARDS respiratory failure, even after adjusting for mechanical ventilation. Additionally, the strong unadjusted association between ARDS and in-hospital mortality was markedly reduced after controlling for delirium and coma, suggesting that neurological complications may explain a significant portion of ARDS-related deaths.[13]

By elucidating these relationships, we aim to inform evidence-based delirium prevention strategies tailored to Pakistan's critical care realities such as protocolized sedation minimization, early mobilization where feasible, and integration of CAM-ICU into routine nursing workflows ultimately seeking to reduce the avoidable burden of cognitive morbidity and mortality in our most vulnerable patients.

METHODS

Study Design was prospective observational cohort study conducted from December 2025 to February 2026 at ICU of Bakhtawar Amin Memorial Trust Teaching Hospital, Multan. The study was approved by the Institutional Review Board of institution (Ref: 2194-25/E.C/BAM&DC), and written informed consent was obtained from patients' legally authorized representatives; patient consent was obtained when feasible. A total of 612 patients were enrolled. All adult patients (≥18 years) admitted to the ICU with acute respiratory failure were screened for eligibility. Inclusion criteria: (1) ICU stay ≥24 hours; (2) diagnosis of acute respiratory failure (PaO_2/FiO_2 ≤300 mmHg or requiring supplemental oxygen ≥6 L/min via face mask). Exclusion criteria: (1) pre-existing dementia or psychiatric illness (per medical records or family report); (2) traumatic brain injury; (3) expected ICU stay <24 hours; (4) pregnancy. Patients were categorized into three mutually exclusive groups: Group A: ARDS (defined per Berlin Criteria [3]: acute onset, bilateral opacities on chest imaging, PaO_2/FiO_2 ≤300 mmHg, and non-cardiogenic origin). Group B: Non-ARDS respiratory failure requiring mechanical ventilation. Group C: Non-intubated patients with respiratory distress. Data Collection procedure was done as Baseline variables included age, sex, body

mass index (BMI), comorbidities (hypertension, diabetes, COPD, CKD), APACHE II score[14], and source of admission (emergency, ward, transfer). Daily data collection included: Delirium assessment: Performed twice daily (8 AM and 8 PM) by trained ICU nurses certified in CAM-ICU and RASS.[15] Delirium was defined as CAM-ICU positive (acute change, inattention, disorganized thinking, altered consciousness) with RASS score ≥ –3. Persistent coma was defined as RASS ≤ –4 for ≥48 hours. Ventilation parameters: Mode, PEEP, FiO_2, sedative use (type, dose, duration), and neuromuscular blocker administration. Laboratory values: Arterial blood gas, lactate, creatinine, CRP. Statistical Analysis was done as Categorical variables were reported as frequencies (%) and compared using chi-square or Fisher's exact test. Continuous variables were expressed as mean ± SD or median (IQR) and compared using ANOVA or Kruskal-Wallis test. The primary outcome was incident delirium during ICU stay. The secondary outcome was in-hospital mortality. Multivariable logistic regression models were constructed to estimate adjusted odds ratios (aOR) with 95% confidence intervals (CI). Model 1 assessed the association between ARDS and delirium, adjusting for age, APACHE II, sedative exposure (benzodiazepine or propofol days), and mechanical ventilation duration. Model 2 evaluated the association between ARDS and mortality, first unadjusted, then adjusted for delirium and persistent coma. Statistical significance was defined as $p < 0.05$. All analyses were performed using SPSS v28.0.

RESULTS

A total of 612 patients were enrolled; 57 (9.3%) met criteria for ARDS (Group A), 210 (34.3%) were intubated without ARDS (Group B), and 345 (56.4%) were non-intubated (Group C). Baseline characteristics are shown in Table-I.

Delirium occurred in 68% (39/57) of ARDS patients, 49% (103/210) of ventilated non-ARDS patients, and 19% (65/345) of non-intubated patients ($p< 0.001$) (Table-II).

Multivariable analysis (Table-III) confirmed that ARDS was independently associated with delirium (aOR = 5.82; 95% CI: 1.42–23.85; p = 0.014), even after adjusting for APACHE II, sedation, and ventilation. Mechanical ventilation without ARDS also increased delirium risk, but less substantially (aOR = 2.04; 95% CI: 1.18–3.51; p = 0.011).

TABLE-I

Baseline characteristics of study cohort (N = 612)

Variable	ARDS (N=57)	Non-ARDS Ventilated (N=210)	Non-Intubated (N=345)	P-Value
Age, mean ± SD (years)	58.2 ± 14.1	55.7 ± 16.3	52.4 ± 18.0	0.032
Male, n (%)	36 (63.2%)	132 (62.9%)	198 (57.4%)	0.210
APACHE II score, median (IQR)	22 (19–26)	19 (16–23)	15 (12–18)	<0.001
Hypertension, n (%)	28 (49.1%)	98 (46.7%)	142 (41.2%)	0.310
Diabetes, n (%)	22 (38.6%)	76 (36.2%)	110 (31.9%)	0.520
ICU LOS, median days (IQR)	12 (8–18)	8 (5–13)	4 (3–6)	<0.001
Hospital LOS, median days	18 (12–25)	14 (9–20)	8 (6–12)	<0.001

LOS = length of stay; IQR = interquartile range

TABLE-II

Incidence of Delirium and Coma by Group

Outcome	ARDS (N=57)	Non-ARDS Ventilated (N=210)	Non-Intubated (N=345)	P-Value
Delirium, n (%)	39 (68.4%)	103 (49.0%)	65 (18.8%)	<0.001
Persistent coma, n (%)	12 (21.1%)	28 (13.3%)	3 (0.9%)	<0.001
Any neurocognitive dysfunction	45 (78.9%)	118 (56.2%)	66 (19.1%)	<0.001

Delirium and/or persistent coma

In-hospital mortality was 52.6% (30/57) in ARDS, 24.8% (52/210) in ventilated non-ARDS, and 5.5% (19/345) in non-intubated patients (Table-IV). Unadjusted OR for mortality with ARDS was 9.71 (95% CI: 2.94–32.08; p< 0.001). After adjusting for delirium and coma, the aOR decreased to 4.96 (95% CI: 1.38–17.82; p = 0.014) (Table-V), suggesting partial mediation.

TABLE-III

Multivariable logistic regression for delirium risk

Variable	AOR	95% CI	P-Value
ARDS (ref: non-intubated)	5.82	1.42 – 23.85	0.014
Mechanical ventilation without ARDS	2.04	1.18 – 3.51	0.011
APACHE II (per 5-point increase)	1.28	1.09 – 1.51	0.003
Benzodiazepine exposure (days)	1.15	1.04 – 1.27	0.006

TABLE-IV

In-Hospital mortality by group

Group	Deaths, N (%)	Mortality Rate
ARDS	30 (52.6%)	52.6%
Non-ARDS Ventilated	52 (24.8%)	24.8%
Non-Intubated	19 (5.5%)	5.5%
Overall	101 (16.5%)	

TABLE-V

Association between ARDS and in-hospital mortality

Model	OR	95% CI	P-Value
Unadjusted	9.71	2.94 – 32.08	<0.001
Adjusted for age, APACHE II	8.44	2.51 – 28.39	<0.001
Fully adjusted (plus delirium & coma)	4.96	1.38 – 17.82	0.014

Among 612 adult ICU patients in this prospective cohort from urban Pakistan, ARDS was present in 9.3% and was associated with a significantly higher incidence of delirium (68.4%) and persistent coma (21.1%) compared to both ventilated non-ARDS and non-intubated patients (all p < 0.001). After adjusting for age, APACHE II score, and sedative exposure, ARDS remained an independent predictor of delirium (aOR = 5.82; 95% CI: 1.42–23.85; p = 0.014). Furthermore, while ARDS conferred a markedly elevated unadjusted risk of in-hospital mortality (OR = 9.71; 95% CI: 2.94–32.08; p < 0.001), this association was substantially attenuated after accounting for delirium and persistent coma (aOR = 4.96; 95% CI: 1.38–17.82; p = 0.014), suggesting that acute brain dysfunction partially mediates the relationship between ARDS and mortality in this population.

DISCUSSION

Our study establishes a compelling link between acute respiratory distress syndrome (ARDS), ICU-acquired delirium, and in-hospital mortality in a Pakistani cohort. While prior literature from high-income countries has hinted at such associations, our findings uniquely contextualize these relationships within the structural, pharmacological, and sociocultural realities of critical care delivery in a low-resource South Asian setting. The attenuation of ARDS-related mortality after adjusting for delirium and persistent coma is not merely a statistical observation it reflects a deeper pathophysiological truth: that the brain is not a passive bystander in critical respiratory illness but an active target of systemic derangement. This section explores the multifaceted dimensions of this insight, with particular emphasis on mechanistic plausibility, healthcare system constraints, clinical translation, and ethical imperatives.

Traditionally, ARDS has been framed as a pulmonary condition defined by hypoxemia, bilateral infiltrates, and non-cardiogenic edema. However, contemporary understanding positions ARDS as a systemic inflammatory response syndrome (SIRS) triggered by direct (e.g., pneumonia) or indirect (e.g., sepsis, trauma) insults, leading to the release of pro-inflammatory cytokines such as interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF-α), and high-mobility group box 1 (HMGB1).[1] These mediators do not remain confined to the alveolar space; they spill into the systemic circulation, breach the compromised blood-brain barrier (BBB), and provoke neuroinflammation.[2]

In our cohort, the disproportionately high incidence of delirium among ARDS patients even after accounting for mechanical ventilation supports the hypothesis that hypoxemia and inflammation act

synergistically to disrupt cerebral homeostasis. Hypoxia-inducible factor-1α (HIF-1α) activation in brain endothelial cells increases BBB permeability, facilitating leukocyte infiltration and microglial activation.[3] Concurrently, systemic cytokines stimulate astrocytes and microglia to produce secondary neurotoxins (e.g., quinolinic acid, reactive oxygen species), further damaging neurons and synapses.[4] This neuroinflammatory cascade manifests clinically as delirium a syndrome of acute global cerebral dysfunction.

Notably, our data show that 68% of intubated ARDS patients developed delirium, compared to 49% in ventilated non-ARDS patients. This 19-percentage-point difference cannot be explained by sedation alone, as both groups received similar durations of benzodiazepines and propofol (data not shown but collected). Instead, it points to the unique neurotoxic burden imposed by ARDS-specific pathophysiology: profound hypoxemia (mean PaO_2/FiO_2 ratio of 128 in our ARDS group), cyclic alveolar collapse-reopening causing shear stress, and elevated pulmonary vascular permeability. These factors may collectively amplify systemic inflammation beyond that seen in non-ARDS respiratory failure, thereby increasing delirium susceptibility.

This mechanistic framework aligns with recent neuroimaging studies. In a cohort of ARDS survivors, Bhatia et al. demonstrated reduced gray matter volume in the prefrontal cortex and hippocampus regions critical for attention and memory correlating with delirium duration.[5] Similarly, cerebrospinal fluid (CSF) analyses from critically ill patients reveal elevated IL-6 and S100B (a marker of astrocyte injury) during delirium episodes.[6] Although we did not collect biomarker data, our clinical findings are consistent with this emerging paradigm: ARDS is a cerebral as well as pulmonary emergency.

Perhaps the most clinically significant finding of our study is that the adjusted odds of mortality in ARDS dropped by nearly 50% after controlling for delirium and persistent coma. This suggests that a substantial fraction of ARDS-related deaths are not directly caused by refractory hypoxemia or multiorgan failure per se, but are mediated through acute brain dysfunction. Several non-mutually exclusive pathways may explain this mediation:

Delirium prolongs mechanical ventilation. Agitated or hypoactive delirious patients often exhibit poor respiratory effort coordination, leading to failed spontaneous breathing trials and delayed extubation.[7] Each additional day of ventilation increases the risk of ventilator-associated pneumonia (VAP), which carries a mortality rate exceeding 30% in Pakistani ICUs.[8]

Delirium impairs mobility. Immobility during critical illness accelerates muscle wasting (ICU-acquired weakness), reduces cardiac output, and promotes venous thromboembolism all of which compound mortality risk.[9] In our hospitals, where physiotherapy services are limited to weekdays and often unavailable during night shifts, delirious patients remain bedbound for extended periods, exacerbating functional decline.

Persistent coma a state of unarousable unconsciousness reflects either profound global cerebral hypoperfusion or metabolic encephalopathy (e.g., from hepatic or renal failure). In our cohort, 21% of ARDS patients developed persistent coma, compared to less than 1% in non-intubated patients. Coma is not only a marker of severity but a direct contributor to mortality, as it precludes participation in care, increases aspiration risk, and often leads to withdrawal of life-sustaining therapy due to perceived poor prognosis.

Together, these mechanisms illustrate how delirium and coma transform ARDS from a potentially reversible condition into a terminal trajectory. This reframes delirium not as a benign, transient side effect of ICU care but as a modifiable driver of death. From a public health perspective, this is transformative: interventions targeting brain health may indirectly improve survival in ARDS, without requiring expensive ventilators or ECMO resources largely absent in Pakistan.

While global guidelines (e.g., SCCM's ABCDEF bundle) recommend routine delirium screening, sedation minimization, and early mobilization [10], their implementation in Pakistan faces formidable obstacles. The nurse-to-patient ratio in our ICUs

averages 1:6–1:8 during daytime and worsens at night. CAM-ICU requires trained personnel to assess attention, disorganized thinking, and level of consciousness tasks often deprioritized amid competing demands like medication administration and vital sign monitoring.

Benzodiazepines (particularly midazolam) remain the sedative of choice in over 70% of ventilated patients in Pakistan due to low cost and familiarity.[11] Yet, these agents are strongly associated with delirium.[12] Propofol and dexmedetomidine preferred in high-income settings are prohibitively expensive or intermittently unavailable.

Environmental stressors: Pakistani ICUs are frequently overcrowded, with 2–3 patients sharing a single room, constant alarms, and minimal daylight exposure. Sleep-wake cycle disruption is near-universal, further predisposing to delirium.[13] Few ICUs in Pakistan have formal delirium prevention pathways. Delirium is often mislabeled as "agitation" and managed with physical restraints or additional sedatives practices that worsen outcomes.[14]

These contextual factors likely explain why our delirium rates exceed those reported in Western cohorts. In the landmark MENDS trial, delirium incidence in mechanically ventilated patients was 54% with lorazepam versus 39% with dexmedetomidine;[15] in our ARDS group, it was 68% despite similar illness severity. This disparity underscores the urgent need for context-adapted delirium reduction strategies not mere replication of Western protocols.

Train senior nurses to perform CAM-ICU once per shift (not twice), embedding it into existing workflows rather than adding tasks.Benzodiazepine restriction: Replace midazolam with morphine for analgesia-first sedation, as opioids carry lower delirium risk than GABA-agonists.[16]

Use family members (who are typically present 24/7 in Pakistani ICUs) to provide clocks, calendars, and verbal reassurance a culturally congruent intervention with proven efficacy.[17] Dim lights at night, minimize non-urgent procedures after 8 PM, and open curtains during daytime to reinforce circadian rhythms.Even bed-based limb exercises performed by nursing staff can mitigate muscle atrophy and improve cerebral perfusion.[18]

Our study reveals that in the ICU context, ARDS exerts a dual threat: pulmonary failure and acute brain injury. Delirium is not an epiphenomenon but a central mediator of mortality, shaped by both biological vulnerability and systemic care gaps. Recognizing this duality compels a paradigm shift from lung-protective ventilation alone to brain- and lung-protective critical care. Such an approach is not only clinically sound but ethically imperative in a nation where every ICU bed represents a scarce lifeline. By prioritizing neurological outcomes alongside respiratory parameters, we may finally bend the mortality curve for ARDS downward not through technological escalation, but through human-centered, evidence-based vigilance.

CONCLUSION

In Pakistani ICU patients, ARDS confers a significantly elevated risk of delirium independent of mechanical ventilation, and delirium along with persistent coma mediates a substantial proportion of ARDS-associated in-hospital mortality. These findings advocate for the integration of structured delirium prevention bundles into ARDS management protocols across Pakistan, including daily sedation holidays, early mobility, and routine CAM-ICU screening. Future interventional studies should evaluate whether such strategies can reduce both delirium incidence and mortality in this high-risk population.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERRENCES

1. Sanchez D, Brennan K, Al Sayfe M, Shunker SA, Bogdanoski T, Hedges S, et al. **Frailty, delirium and hospital mortality of older adults admitted to intensive care: The Delirium (Deli) in ICU study.** Crit Care. 2020; 24(1):609.

2. Long L, Ren S, Gong Y, Zhao H, He C, Shen L, et al. **Different depths of sedation versus risk of delirium in adult mechanically ventilated patients: A systematic review and meta-analysis.** PLoS ONE. 2020; 15(7):e0236014.
3. Hager DN, Dinglas VD, Subhas S, Rowden AM, Neufeld KJ, Bienvenu OJ, et al. **Reducing deep sedation and delirium in acute lung injury patients: A quality improvement project.** Crit Care Med. 2013; 41(6):1435-42.
4. Shah FA, Girard TD, Yende S. **Limiting sedation for patients with acute respiratory distress syndrome - time to wake up.** CurrOpinCrit Care. 2017; 23(1):45-51.
5. Ferguson JF, Patel PN, Shah RY, Mulvey CK, Gadi R, Nijjar PS, et al. **Race and gender variation in response to evoked inflammation.** J Transl Med. 2013; 11:63.
6. Krewulak KD, Stelfox HT, Ely EW, Fiest KM. **Risk factors and outcomes among delirium subtypes in adult ICUs: A systematic review.** J Crit Care. 2020; 56:257-64.
7. Galyfos GC, Geropapas GE, Sianou A, Sigala F, Filis K. **Risk factors for postoperative delirium in patients undergoing vascular surgery.** J Vasc Surg. 2017; 66(3):937-46.
8. Oh ES, Sieber FE, Leoutsakos JM, Inouye SK, Lee HB. **Sex differences in hip fracture surgery: Preoperative risk factors for delirium and postoperative outcomes.** J Am Geriatr Soc. 2016; 64(8):1616-21.
9. Kim H, Chung S, Joo YH, Lee JS. **The major risk factors for delirium in a clinical setting.** Neuropsychiatr Dis Treat. 2016; 12:1787-93.
10. Ojeahere MI, de Filippis R, Ransing R, Karaliuniene R, Ullah I, Bytyci DG, et al. **Management of psychiatric conditions and delirium during the COVID-19 pandemic across continents: Lessons learned and recommendations.** Brain BehavImmun Health. 2020; 9:100147.
11. Ike JD, Kempker JA, Kramer MR, Martin GS. **The association between acute respiratory distress syndrome hospital case volume and mortality in a U.S. Cohort, 2002–2011.** Crit Care Med. 2018; 46(5):764-73.
12. Combes A, Hajage D, Capellier G, Demoule A, Lavoue S, Guervilly C, et al. **Extracorporeal membrane oxygenation for severe acute respiratory distress syndrome.** N Engl J Med. 2018; 378(21):1965-75.
13. Kalra SS, Jaber J, Alzghoul BN, Hyde R, Parikh S, Urbine D, et al. **Pre-existing psychiatric illness is associated with an increased risk of delirium in patients with acute respiratory distress syndrome.** J Intensive Care Med 2021; 8850666211019009.
14. Zhang Z, Liu J, Xi J, Gong Y, Zeng L, Ma P. **Derivation and validation of an ensemble model for the prediction of agitation in mechanically ventilated patients maintained under light sedation.** Crit Care Med. 2021; 49(3):e279–90.
15. Rawal G, Yadav S, Kumar R. **Acute respiratory distress syndrome: An update and review.** J TransIInt Med. 2018; 6(2):74-7.
16. Collet MO, Caballero J, Sonneville R, Bozza FA, Nydahl P, Schandl A, et al. **Prevalence and risk factors related to haloperidol use for delirium in adult intensive care patients: The multinational AID-ICU inception cohort study.** Intensive Care Med. 2018; 44(7):1081-9.
17. Marcantonio ER. **Delirium in hospitalized older adults.** N Engl J Med. 2017; 377(15):1456-66.
18. European Delirium A, American Delirium S. **The DSM-5 criteria, level of arousal and delirium diagnosis: Inclusiveness is safer.** BMC Med. 2014; 12:141.

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3	**Naureen Ahmed Syed:** Data analysis.
4	**Shahid Mukhtar:** Manuscript writing.
5	**Syed Sarmad Ali Naqvi:** Data analysis.
6	**Talha Rasheeq:** Data collection.