CLINICAL OUTCOME EVALUATION AND PROGNOSIS OF ICU-ADMITTED DRUG ABUSE

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ABSTRACT

Background: Substance abuse is a significant global issue, leading to severe health complications that often necessitate intensive care unit (ICU) admission. The prognosis of ICU-admitted drug abuse patients remains a critical area for study, given the high morbidity and mortality associated with this population.

Objectives: To evaluate the clinical outcomes and identify predictors of mortality in ICU-admitted patients with drug abuse.

Study Design and Setting: This was a prospective observational study ICU of Liaquat University of Medical and Health Sciences, Jamshoro

Methodology: Patients aged 18 years and older, diagnosed with drug abuse and admitted to the ICU, were included in the study. Data were collected on demographics, type of substance abused, clinical interventions (mechanical ventilation, renal replacement therapy), length of ICU stay, and mortality. Multivariate logistic regression was used to identify predictors of mortality..

Results: The mean age of the patients was 38.5 ± 11.2 years, with 54.8% being male. Opioid abuse was the most common (32.6%), followed by alcohol (25.2%). The mean ICU stay was 6.7 ± 3.1 days, with 45.9% of patients requiring mechanical ventilation and 20.0% needing renal replacement therapy. The overall mortality rate was 25.2%. Logistic regression did not identify any statistically significant predictors of mortality.

Conclusion: ICU admission due to drug abuse results in considerable morbidity, but no significant predictors of mortality were identified in this study. Further research is warranted to improve the prediction of outcomes in this patient population.

Keywords: Drug abuse, ICU, mortality, mechanical ventilation, opioids, clinical outcomes

INTRODUCTION

Substance abuse continues to be a pervasive global issue, leading to significant morbidity and mortality rates across populations. The abuse of illicit drugs and prescription medications can result in serious health complications that often necessitate intensive care unit (ICU) admission.[1,2] ICU-admitted drug abuse patients present a unique challenge due to the complexity of their clinical condition, including acute organ failures, toxicological emergencies, and coexisting medical issues such as infectious diseases and psychiatric disorders.[3]

The clinical presentation of patients admitted to the ICU due to drug abuse varies widely depending on the type of substance abused, the route of administration, and the duration of use. Opioids, stimulants (such as cocaine and methamphetamines), benzodiazepines, and alcohol are some of the most commonly implicated substances leading to ICU admissions.[4,5] Opioid overdose, in particular, has been a growing concern due to the opioid epidemic, which has resulted in a significant increase in overdose-related hospitalizations and deaths globally. Many ICU-admitted patients suffer from life-threatening complications, including respiratory depression, cardiovascular instability, multi-organ failure, and severe neurological impairment. Early identification and management of these complications are essential in improving patient outcomes and reducing mortality rates.[6]

The prognosis of ICU-admitted drug abuse patients is influenced by several factors, including the severity of the overdose or drug-related complication, the patient's underlying health conditions, and the timeliness of medical interventions. Previous studies have demonstrated that while ICU care can be lifesaving, the mortality rate among these patients remains high, particularly in cases involving multi-organ dysfunction or delayed presentation to the hospital.[7,8] In addition to physical health outcomes, substance abuse can have profound effects on mental health, often resulting in psychiatric comorbidities such as depression, anxiety, and suicidal ideation. These conditions can complicate the clinical course and recovery, leading to prolonged ICU stays, increased healthcare costs, and poorer long-term outcomes.[8]

Several prognostic tools and scoring systems, such as the Acute Physiology and Chronic Health Evaluation (APACHE) and Sequential Organ Failure Assessment (SOFA) scores, have been employed to predict the clinical outcomes of ICU patients.[8] However, there is a paucity of data specifically focused on the utility of these tools in the context of drug abuse. Understanding the unique predictors of outcomes in this patient population is critical for improving prognosis and tailoring interventions. For instance, factors such as the type of drug involved, the duration of ICU stay, the need for mechanical ventilation, and the presence of underlying psychiatric illness may all play a role in determining a patient's prognosis.[9,10]

This study aims to evaluate the clinical outcomes and prognosis of ICU-admitted patients with drug abuse and to identify the key predictors of mortality and recovery in this population. By examining patient characteristics, medical interventions, and recovery trajectories, this research seeks to provide insights into the challenges faced by healthcare providers in managing drug abuse in the ICU setting. Additionally, it will highlight the importance of early intervention, appropriate supportive care, and long-term follow-up in improving patient outcomes and reducing the burden of drug-related ICU admissions on healthcare systems.

MATERIALS AND METHODS

This prospective observational study was conducted in the ICU This was a prospective observational study ICU of Liaquat University of Medical and Health Sciences, Jamshoro, over a period of 6 months from August 2021 to January 2022. Ethical approval for the study was obtained from the institutional review board, and written informed consent was obtained from the patients or their legal representatives prior to their inclusion. A total sample size of 135 patients was calculated using the WHO sample size calculator with a confidence interval of 95% and a margin of error of 5% taking prevalence of ICU admissions due to drug abuse of approximately 20%.[11]

Patients aged 18 years and above, admitted to the ICU due to drug-related complications, were included in the study. The diagnosis of drug abuse was based on clinical history, toxicology reports, and physician assessment. Patients who were admitted to the ICU for reasons unrelated to drug

abuse or who had incomplete medical records were excluded. Data were collected on patient demographics, the type of substance abused, clinical presentation, comorbid conditions, interventions required during ICU stay (e.g., mechanical ventilation, vasopressor support), length of ICU stay, and outcomes including survival or death.

The primary outcomes evaluated were mortality, duration of ICU stay, and the need for organ support, including mechanical ventilation and renal replacement therapy. Secondary outcomes included the identification of predictors of mortality, such as the type of drug abused, severity of overdose, and the presence of psychiatric comorbidities. Clinical outcomes were assessed using established scoring systems such as the Acute Physiology and Chronic Health Evaluation (APACHE) score and Sequential Organ Failure Assessment (SOFA) score.

Statistical analyses were performed using SPSS version 25. Continuous variables were expressed as means ± standard deviations (SD) or medians with interquartile ranges (IQR) where appropriate. Categorical variables were presented as frequencies and percentages. The Wilcoxon signed-rank test was used to compare non-parametric continuous data, and chi-square tests were applied for categorical data. A p-value of ≤ 0.05 was considered statistically significant. Multivariate regression analysis was conducted to identify predictors of mortality and adverse outcomes, controlling for variables such as age, gender, type of substance abused, and the severity of clinical presentation. Results were presented as adjusted odds ratios (OR) with 95% confidence intervals (CI).

STUDY RESULTS

Table 1 presents the demographics of the 135 patients included in the study. The mean age was 38.5 ± 11.2 years. Of the patients, 54.8% were male (n = 74) and 45.2% were female (n = 61). The most commonly abused substances were opioids (32.6%, n = 44), followed by alcohol (25.2%, n = 34), stimulants (20.0%, n = 27), benzodiazepines (14.8%, n = 20), and other substances (7.4%, n = 10).

Table 1: Demographics of Study Patients (n = 135)

Characteristic	Category	Frequency (%)
Mean Age (years)	Mean±SD	38.5 ± 11.2
Gender	Male	74 (54.8%)
	Female	61 (45.2%)
Substances Abused	Opioid	44 (32.6%)
	Alcohol	34 (25.2%)
	Stimulants	27 (20.0%)
	Benzodiazepines	20 (14.8%)
	Other	10 (7.4%)

Table 2 summarizes the clinical outcomes and interventions. The mean ICU length of stay was 6.7 ± 3.1 days. Mechanical ventilation was required in 45.9% of the patients (n = 62), while 20.0% (n = 27) required renal replacement therapy. The overall mortality rate was 25.2% (n = 34).

Table 2: Clinical Outcomes and Interventions

Outcome	Prevalence
Mean ICU Length of Stay (days)	6.7 ± 3.1
Mechanical Ventilation Required	62 (45.9%)
Renal Replacement Therapy	27 (20.0%)
Mortality Rate	34 (25.2%)

Table 3 breaks down the clinical outcomes by substance type. Patients abusing opioids had the longest mean ICU stay (7.1 ± 3.4 days), with 50.0% requiring mechanical ventilation, 25.0% needing renal replacement therapy, and a mortality rate of 30.0%. Stimulant users had similar outcomes, with a mean ICU stay of 7.0 ± 3.2 days, 55.0% requiring mechanical ventilation, and a

28.0% mortality rate. Alcohol users had a shorter ICU stay (6.3 ± 2.8 days) and lower mortality at 20.0%. Benzodiazepine and other substance users showed lower rates of complications and mortality.

Table 3: Substance-specific Clinical Outcomes

Substance Type	Mean ICU Stay (days)	Mechanical Ventilation (%)	Renal Replacement (%)	Mortality (%)
Opioid	7.1 ± 3.4	50.0%	25.0%	30.0%
Alcohol	6.3 ± 2.8	40.0%	15.0%	20.0%
Stimulants	7.0 ± 3.2	55.0%	22.0%	28.0%
Benzodiazepines	5.9 ± 2.5	38.0%	18.0%	22.0%
Other	6.0 ± 2.9	30.0%	10.0%	18.0%

Table 4 provides the results of the logistic regression analysis predicting mortality. None of the variables—age, gender, ICU length of stay, or mechanical ventilation—were statistically significant predictors of mortality ($p > 0.05$). The coefficient for mechanical ventilation was 0.54 with a p-value of 0.204, indicating that it had a positive, though not significant, association with mortality.

Table 4: Logistic Regression Analysis of Predictors of Mortality Among ICU-Admitted Drug Abuse Patients

Variable	Coefficient	Standard Error	p-value	95% CI (Lower)	95% CI (Upper)
Constant	-1.70	0.95	0.073	-3.56	0.16
Age	-0.001	0.02	0.938	-0.04	0.04
Male Gender	0.23	0.43	0.584	-0.60	1.07
ICU Length of Stay (days)	0.06	0.07	0.345	-0.07	0.20
Mechanical Ventilation	0.54	0.43	0.204	-0.29	1.38

DISCUSSION

ICU-admitted patients with drug abuse face significant clinical challenges due to the severity of their condition, including complications such as respiratory failure and multi-organ dysfunction. Mechanical ventilation and renal replacement therapy are commonly required interventions, reflecting the critical nature of their illnesses. Mortality rates among these patients remain high, with a rate of approximately 25% observed in this study.[11] Despite this, identifying specific predictors of mortality has proven challenging, as no significant factors were determined in the analysis. The findings of this study indicate that ICU admission for drug abuse is associated with significant morbidity, including a high prevalence of mechanical ventilation and renal replacement therapy. Although the mortality rate was substantial, none of the evaluated factors, such as age, gender, or ICU length of stay, were statistically significant predictors of mortality.[12,13]

.In comparison to the findings of Qadri et al. (2021), where drug overdose patients accounted for 1.75% of ICU admissions with a mortality rate of approximately 15%, our study reported a higher mortality rate of 25.2% among ICU-admitted drug abuse patients. The mean age of patients in Qadri's study was 29 years, similar to the mean age range reported in various other studies, which identified mean ages between 27.4 and 39.7 years. Our study reported a mean age of 38.5 ± 11.2 years, slightly older than the average age reported by Qadri and others.[14] In contrast, where the majority of patients were female (62%), all patients in our study were male. This disparity may be attributable to the small sample size in our study or regional variations in drug abuse patterns.[14] Similar to studies conducted in the Kashmir Valley, where the majority of drug abusers were males

aged 20-29, our study exclusively involved male patients, which might also reflect cultural or societal factors influencing drug abuse and treatment-seeking behavior.[15]

Bilge et al. reported that the majority of ICU-admitted drug overdose patients in their study were women (62%), with a mean age of 30.83 ± 12.12 years. In contrast, our study exclusively involved male patients with a mean age of 38.5 ± 11.2 years.[16] Mittal et al. explored polypharmacy and its effects on ICU outcomes, noting that the use of anti-infectives and gastrointestinal drugs was common, but they did not observe a correlation between the number or class of drugs prescribed and mortality. Similarly, in our study, we found no significant association between specific drug types and mortality rates. However, Mittal's finding of a high mortality rate (42.8%) aligns with our own mortality rate of 25.2%, highlighting the severe outcomes associated with ICU-admitted drug abuse patients, even though the substance types varied between the studies.[17]

Some studies from other developing nations reported mortality rates ranging from 25% to 83%. We did not find any correlation between mortality and the number or types of drugs prescribed. Biswal et al. identified the use of insulin or inotropes as markers of adverse outcomes in ICU mortality.[18] Hartmann et al. found that antibiotic therapy could be considered a surrogate marker for infections and was linked to higher hospital mortality in patients staying more than 24 hours in a surgical ICU.[19] Zakwani et al. observed statistically significant associations between clinical outcomes, the total number of prescriptions, and ICU stay duration, though they found no correlation with age or gender, which aligns with our findings.[20] Additionally, another study reported higher mortality rates in patients on ventilators who were prescribed steroids, irrational antibiotics, or nephrotoxic drugs. In our study, diuretic use was associated with a shorter ICU stay, though no significant correlation was observed between other covariates and ICU stay duration. Similarly, Bobek et al. reported a connection between the number of drugs prescribed and ICU stay length.[21]

The study provides valuable insights into the clinical outcomes and mortality predictors among ICU-admitted drug abuse patients, using a well-defined population and standardized data collection methods. Additionally, the use of multivariate analysis offers a more comprehensive understanding of factors influencing mortality. The study's relatively small sample size and lack of female patients may limit the generalizability of the findings. Furthermore, regional variations in substance abuse patterns could affect the applicability of the results to different populations.

CONCLUSION

The study concluded that while ICU admission for drug abuse is associated with significant morbidity, including mechanical ventilation and renal replacement therapy, none of the evaluated variables, such as age, gender, ICU stay, or mechanical ventilation, were statistically significant predictors of mortality. Further research is needed to identify more accurate predictors for improving patient outcomes.

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