Section: Miscellaneous

Original Research Article

STUDY OF CRITICAL CARE OUTCOME IN DE-COMPENSATED LIVER DISEASE

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ABSTRACT

Background: Decompensated cirrhosis is a serious condition that significantly increases the risk of death, especially in critical care environments. This study aimed to assess the outcomes of intensive care treatments for these patients. **Materials and Methods:** We conducted a retrospective observational study in a tertiary ICU from March 2024 to March 2025. Our analysis included 250 adults diagnosed with decompensated cirrhosis. We gathered data on demographics, causes of the condition, existing health issues, severity scores (SAPS II, SOFA, APACHE II, Child-Pugh), the need for organ support, and mortality rates. **Results:** The majority of patients were male (62.4%) and middle-aged, with an average age of 59.6 years (± 12.3). Most had an overweight BMI (30.36 kg/m² ± 4.6). The leading causes were alcohol use (62.4%) and hepatitis C (27.6%). Common comorbidities included diabetes (66.0%) and hypertension (58.8%). The severity scores indicated a critical state: SAPS II 60.3, SOFA 11.2, APACHE II 32.0, and Child-Pugh 12.0. Mortality rates were alarmingly high: 76.8% at 28 days, 81.6% at 90 days, and 82.8% at one year. Mortality increased with the level of organ support: 76.3% for mechanical ventilation alone, 88.6% for ventilation plus vasopressors, and 92.7% for ventilation, vasopressors, and renal replacement therapy. Non-survivors had higher severity scores and more frequent limitations on treatment (34.78% vs. 6.97%, $p<0.001$). The average ICU stay lasted 28.67 days (± 7.63). **Conclusion:** Patients with decompensated cirrhosis in the ICU face extremely high mortality rates, particularly when experiencing multi-organ failure that requires advanced support. Prompt intervention and thoughtful ethical decision-making are essential.

INTRODUCTION

Cirrhosis is the final stage of chronic liver disease, marked by widespread liver scarring and a distorted liver structure, and it poses a serious health challenge worldwide. Each year, it leads to around 1.16 million deaths, making it the 11th leading cause of death globally.[1] Liver cancer, which is often associated with cirrhosis, contributes an additional 788,000 deaths. Together, these conditions account for about 3.5% of all deaths around the world. In India, the situation is particularly dire, with liver disease causing 259,749 deaths, which is about 2.95% of total deaths and nearly one-fifth of the global cirrhosis mortality.[2,3] The causes of cirrhosis in India are changing; alcohol use has surged, and the rise of non-alcoholic fatty liver disease (NAFLD) is alarming, driven by obesity and metabolic syndrome issues, along with shifts in how viral hepatitis is treated.[4,5] The journey of cirrhosis starts with a phase where the body manages to compensate, but eventually, it leads to decompensation, which brings along complications such as portal hypertension and liver dysfunction, happening at an estimated rate of 5%-7% each year.[6] When acute decompensation strikes, it can result in serious issues like gastrointestinal bleeding and hepatic encephalopathy, both of which are linked to high chances of multiple organ failure and significant short-term mortality. As a result, around 10% of hospitalizations due to cirrhosis end up requiring intensive care unit (ICU) admission, making up about 3% of all ICU admissions.[7] Managing critical care is essential for stabilizing both liver and other organ failures, helping patients either recover or get ready for a transplant. Historically, the

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outlook for patients with decompensated cirrhosis needing ICU support has been grim, with mortality rates reported to vary between 29% and 87%. While recent studies hint at possible improvements, the applicability of these findings is often limited due to differences in the populations studied, the practices of various institutions, and frequently small sample sizes. Hence, this study was initiated to thoroughly assess and analyze the outcomes of critical care interventions specifically for patients facing decompensated cirrhosis.[8]

MATERIALS AND METHODS

Study Design and Setting

This retrospective observational study took place in the Intensive Care Units (ICUs) of the Department of Critical Care Medicine at Shri Satya Sai University of Technology and Medical Sciences in Sehore, Madhya Pradesh, which is a tertiary care hospital. We got the green light for our study protocol from the Institutional Ethical Committee. Before we started collecting and analyzing data, we made sure to obtain written informed consent from either the patients themselves or their legal representatives.

Study Duration and Participants

The study spanned a year, from March 2024 to March 2025. We included a total of 250 adult patients, all aged 18 and older, in our study group. To qualify, patients needed to have a diagnosis of decompensated cirrhosis and must have been admitted to the ICU. We enrolled patients who were experiencing acute complications typical of decompensation, such as variceal hemorrhage, hepatic encephalopathy, ascites, spontaneous bacterial peritonitis, or hepatorenal syndrome. On the flip side, we excluded patients with non-cirrhotic liver diseases and those who were admitted for elective procedures or primarily for issues unrelated to the liver. The sample size was determined based on the prevalence of decompensated cirrhosis among ICU admissions during the specified period.

Data Collection

We carefully gathered detailed patient information from medical records. This included a thorough history of the underlying liver disease—like its cause, how long it's been around, and any previous episodes of decompensation—as well as any relevant comorbidities such as diabetes, hypertension, and cardiovascular issues. We also recorded demographic details like age, gender, and body mass index (BMI). The main reason for the ICU admission was noted, along with clinical and biological parameters needed to calculate severity scores. These scores included the Child-Pugh score (calculated upon admission), the ICU-specific scores SAPS II and APACHE II (assessed after the first 24 hours in the ICU), and the organ failure-specific SOFA score (calculated on the first day after admission). We kept track of the number of organ failures, defined as a SOFA score of 3 or more for the relevant organ, which indicates the need for vasopressors, mechanical ventilation, elevated serum bilirubin levels, oliguria lasting over 24 hours, or the need for continuous renal replacement therapy (CRRT). We also noted the use of specific critical care interventions, including vasopressors like terlipressin, mechanical ventilation, and CRRT. Additionally, we documented any therapeutic limitations during the ICU stay, such as withholding treatment, withdrawing therapy, or 'Do not resuscitate' orders. Finally, we tracked patient outcomes, specifically focusing on ICU mortality, hospital mortality, 90-day mortality, and 1-year mortality.

Statistical Analysis

In this study, we carried out data management and analysis using Microsoft Excel and SPSS software (version 23.0). We used descriptive statistics to provide a clear summary of the baseline characteristics of the patients and the outcome measures. For categorical variables, we reported frequencies and percentages, while continuous variables were presented as mean ± standard deviation (SD) or median with range, depending on what was most appropriate. To compare survivors and non-survivors regarding categorical variables, we utilized the Chi-square test or Fisher's exact test, based on the expected frequencies. To pinpoint independent predictors of ICU mortality, we conducted a multivariate logistic regression analysis. We estimated survival rates over time using Kaplan-Meier survival analysis, and we considered a p-value of less than 0.05 to indicate statistical significance for all our analyses.

RESULTS

We took a close look at 250 patients suffering from decompensated cirrhosis who were admitted to the ICU. You can find a summary of their demographic details in Table 1. On average, the patients were around 59.6 years old, with most of them (36.4%) falling into the 51–60 age range. The group was predominantly male, making up 62.4% of the cohort, and the average body mass index stood at 30.36 kg/m², with a standard deviation of 4.6.

Table 1: Demographic Characteristics of Study Cohort

Variable	Value
Age (years)	
- 51–60	91 (36.4%)
- 41–50	83 (33.2%)
- 31–40	48 (22.0%)
Gender	
- Male	156 (62.4%)

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- Female	94 (37.6%)
BMI (kg/m²)	30.36 ± 4.6 (mean ± SD)

The clinical characteristics indicated that alcohol-related cirrhosis was the leading cause, accounting for 62.4%, while hepatitis C virus infection followed at 27.6% (see Table 2). Comorbidities were quite common, with diabetes affecting 66.0% of patients and hypertension at 58.8%. On average, patients had been living with liver disease for about 7.42 years, with a standard deviation of 3.5 years, and they experienced an average of 4.36 prior episodes of decompensation, with a standard deviation of 5.3.

Table 2: Clinical Profile and Etiology

Parameter	Value
Etiology	
- Alcohol-related	156 (62.4%)
- Hepatitis C	69 (27.6%)
Comorbidities	
- Diabetes	165 (66.0%)
- Hypertension	147 (58.8%)
- Chronic kidney disease	77 (30.8%)

Baseline severity scores indicated critical illness, with mean SAPS II of 60.3, SOFA (day 1) of 11.2, APACHE II of 32.0, and Child-Pugh score of 12.0 (Table 3).

Table 3: Admission Severity Scores

Score	Mean	Range
APACHE II	32	25–36
SAPS II	60.3	45–72
SOFA (day 1)	11.2	8–14

The mortality outcomes were strikingly high (see Table 4). The rates for mortality at 28 days, 90 days, and 1 year stood at 76.8%, 81.6%, and 82.8%, respectively. On average, patients spent about 28.67 ± 7.63 days in the ICU. Figure 1 shows the Kaplan-Meier curve for 90-day survival, highlighting a steep decline in survival during the first month.

Table 4: Mortality Outcomes and ICU Stay

Outcome	Mortality Rate
28-day	192 (76.8%)
90-day	204 (81.6%)
1-year	207 (82.8%)
ICU Stay (days)	28.67 ± 7.63

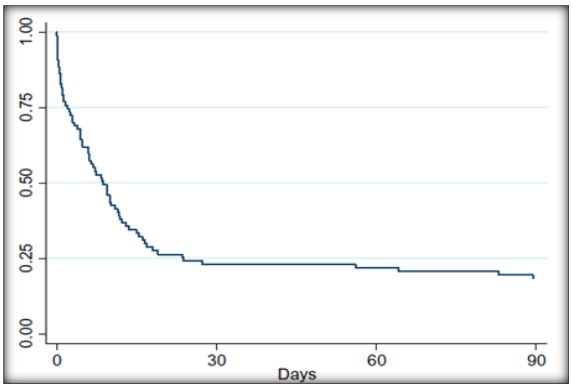

Figure 1: Kaplan-Meier Survival Analysis at 90 Days

When we looked at the differences between the 90-day survivors (n=43) and those who didn't make it (n=207), some significant contrasts stood out (see Table 5). The non-survivors had notably higher APACHE II scores (34 compared to 26, p=0.0012), SAPS II scores (65 versus 40, p=0.0005), and SOFA scores (12 against 6.5, p=0.0054). They also needed mechanical ventilation more often (79.22% vs. 55.81%, p=0.0012), vasoactive agents (58.93% vs. 30.23%, p=0.0005), and renal replacement therapy (27.05% vs. 6.97%, p=0.0047). Additionally, therapeutic limitations were more prevalent among non-survivors (34.78% vs. 6.97%, p=0.0002).

Table 5: Survivor vs. Non-Survivor Parameters at 90 Days

Parameter	Survivors	Non-Survivors	p-value
APACHE II	26	34	0.0012
Mechanical Ventilation	55.81%	79.22%	0.0012
Vasoactive Agents	30.23%	58.93%	0.0005
Therapy Limitations	6.97%	34.78%	0.0002

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DISCUSSION

This study takes a deep dive into the outcomes for patients with decompensated cirrhosis who need intensive care, and it paints a sobering picture. Despite the use of advanced treatments, the mortality rates remain alarmingly high, with a 28-day mortality rate of 76.8% and a 90-day rate of 81.6%. These numbers highlight the grim reality for these patients, echoing global statistics that show an 80% mortality rate in similar groups. This situation not only underscores the serious nature of decompensation but also points to the shortcomings in our current critical care approaches for liver failure.[9]

Looking at the demographic details, we see that the majority of these patients are middle-aged men with a higher-than-normal BMI (averaging 30.36 kg/m²), reflecting the changing landscape of liver disease causes in India. Alcohol-related cirrhosis is the leading cause at 62.4%, while the burden of Hepatitis C is also significant at 27.6%. This trend aligns with the national increase in alcohol consumption and related health issues. Research by Shah, Amarapurkar, and Swaroop supports the idea that alcohol use and metabolic syndrome are key factors in decompensation. The high rates of comorbidities—66% with diabetes, 58.8% with hypertension, and 30.8% with chronic kidney disease—further complicate treatment, creating overlapping health challenges that speed up organ failure.[10,11]

When we look at the severity scores at admission, they indicate a dire situation: SAPS II (60.3), SOFA (11.2), and APACHE II (32.0) all surpass the thresholds that suggest more than 80% mortality in typical ICU settings. The Child-Pugh score (12.0) consistently points to end-stage disease (Class C). Together, these metrics confirm the critical condition of this group, aligning with Moreau's findings that a SOFA score over 11 suggests a greater than 90% mortality risk in cirrhosis cases. The higher APACHE II scores compared to historical data might indicate stricter criteria for ICU admissions or a higher baseline severity in our patient population.[12]

It's striking how mortality rates soar when organ support is needed Just mechanical ventilation: 76.3% mortality within 90 days, Ventilation combined with vasopressors: 88.6%, The combination of ventilation, vasopressors, and CRRT: a staggering 92.67%.

This ranking really highlights that multiorgan failure is the key factor affecting survival. The 92.67% mortality rate for patients needing all three treatments backs up Drolz's findings of over 90% fatality in cirrhosis patients requiring renal replacement. The average ICU stay of 28.67 days, compared to Arabi's 14-day standard, further illustrates the heavy resource demands and clinical challenges of managing sequential organ failures.[13,14]

Those who survived had notably lower severity scores (APACHE II 26 vs. 34; SOFA 6.5 vs. 12) and needed less organ support. Even more revealing is the six-fold increase in therapy limitations (DNR/withholding) among non-survivors (34.78% vs. 6.97%), which aligns with Levesque's observations of frequent palliative care transitions in cases deemed futile. This trend highlights the critical need for early prognostication—using tools like SOFA and CLIF-C ACLF scores—to steer conversations about care goals.[15]

While advancements in liver support systems and transplantation bring some optimism, our findings emphasize that preventing decompensation is crucial. Initiatives focused on reducing alcohol consumption, managing metabolic syndrome aggressively, and broadening viral hepatitis screening could help lower ICU admissions. For critically ill patients, protocols that prioritize quickly addressing triggering events (like controlling infections and managing hemorrhages) before multiorgan failure sets in may lead to better outcomes. Still, the consistently disheartening survival rates beyond 28 days call for more intense research into innovative critical care strategies for this vulnerable group.

CONCLUSION

This retrospective study involving 250 critically ill patients suffering from decompensated cirrhosis in a tertiary care ICU highlights the serious prognosis tied to this condition, especially when advanced organ support becomes necessary. The mortality rates observed—76.8% at 28 days and 81.6% at 90 days—underscore just how vulnerable this group is, with outcomes deteriorating significantly for those needing mechanical ventilation (76.3% mortality), facing combined respiratory and circulatory failure (88.6%), or experiencing multi-organ failure that requires ventilation, vasopressors, and renal replacement (92.7%). The high prevalence of alcohol-related causes, along with a heavy burden of comorbidities (particularly diabetes and hypertension), and severely abnormal admission scores (SOFA 11.2, APACHE II 32.0) all point to the challenges in managing these patients. The strong link between elevated organ failure scores, limitations in treatment options, and mortality further emphasizes the necessity for early, aggressive interventions and realistic prognostic assessments. These findings highlight the vital need for preventive measures, prompt escalation of care, and careful ethical considerations in handling decompensated cirrhosis within the ICU environment.

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