

Determinants of Liver Transplantation in Critically Ill Patients with Acute-on-Chronic Liver Failure Transferred from Outside Hospitals for Urgent Transplant Evaluation

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Introduction

- Acute-on-chronic liver failure (**ACLF**) is a rapidly progressive condition characterized by systemic inflammation, multi-organ dysfunction, and high mortality.¹
 - For patients at outside hospitals (OSH) who fail to improve despite maximal therapy, transfer for **urgent liver transplant evaluation** (LTE) represents a final attempt at definitive treatment.
 - Many transferred patients ultimately do not undergo liver transplant (LT) due to rapid clinical decline or new contraindications identified after arrival.
 - Little is known about which factors drive transplant eligibility and **pre-transplant decisions** in patients transferred to higher level centers for urgent LTE, as existing literature primarily explores post-transplant outcomes and mortality predictors in ACLF.²
 - Understanding the factors influencing LT eligibility in this high-risk population is essential for improving patient selection, optimizing ICU management, and increasing access to LT.
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- Goal:** We aim to identify clinical and systemic variables associated with LT in this patient population.

Methods

- Single-center retrospective study including all adult patients with ACLF transferred from OSH for urgent LTE at **William P. Clements Jr. University Hospital** (tertiary academic center).
- Study period: **January 1, 2021 – December 31, 2024**
- Patients were identified using ICD-10 diagnosis codes for ACLF, then transfer for urgent LTEs was confirmed via manual review of the patients' medical chart.
- The primary outcome was **receipt of liver transplantation**.



Figure 1. Cohort flow diagram

Key Predictors of Liver Transplant Receipt

- MELD score** was independently associated with higher odds of receiving a transplant (OR 1.12, 95% CI 1.03–1.24).
- Albumin administration** (OR 6.17, 95% CI 1.42–32.0) and history of **spontaneous bacterial peritonitis (SBP)** (OR 14.93, 95% CI 2.47–124.1) were strong positive predictors of transplant eligibility.
- Dexmedetomidine** exposure was the strongest negative predictor of transplantation, with an odds ratio approaching zero (OR 0.01, 95% CI 0–0.17).
- Markers of **multiorgan failure**, including **septic shock** (OR 0.25, 95% CI 0.06–0.98) and **acute respiratory failure with hypoxia** (OR 0.28, 95% CI 0.08–0.98), were associated with significantly decreased odds of transplant.
- The final LASSO-selected logistic model demonstrated excellent performance (**AUC = 0.92**).

Demographics of Critically Ill Adult Patients with ACLF Transferred From OSH For Urgent LTE			
	Transplanted (n = 76)	Not Transplanted (n = 77)	p-value
Variable			
Age, years, mean (SD)	51.63 (10.40)	55.78 (11.03)	0.048
Male, n (%)	43 (56.6%)	48 (62.3%)	0.575
Race, n (%)			0.152
White	60 (78.4%)	65 (84.4%)	
Black	2 (2.6%)	4 (5.2%)	
Asian	6 (7.9%)	0 (0%)	
Other/unknown	8 (10.5%)	8 (10.4%)	
Ethnicity			0.477
Hispanic	52 (68.4%)	50 (64.9%)	
Non-Hispanic	24 (31.6%)	25 (32.5%)	
Unknown	0 (0%)	2 (2.6%)	

Table 1. Transplanted patients were significantly younger than non-transplanted patients, with no major demographic differences in gender, race, or ethnicity.

Results

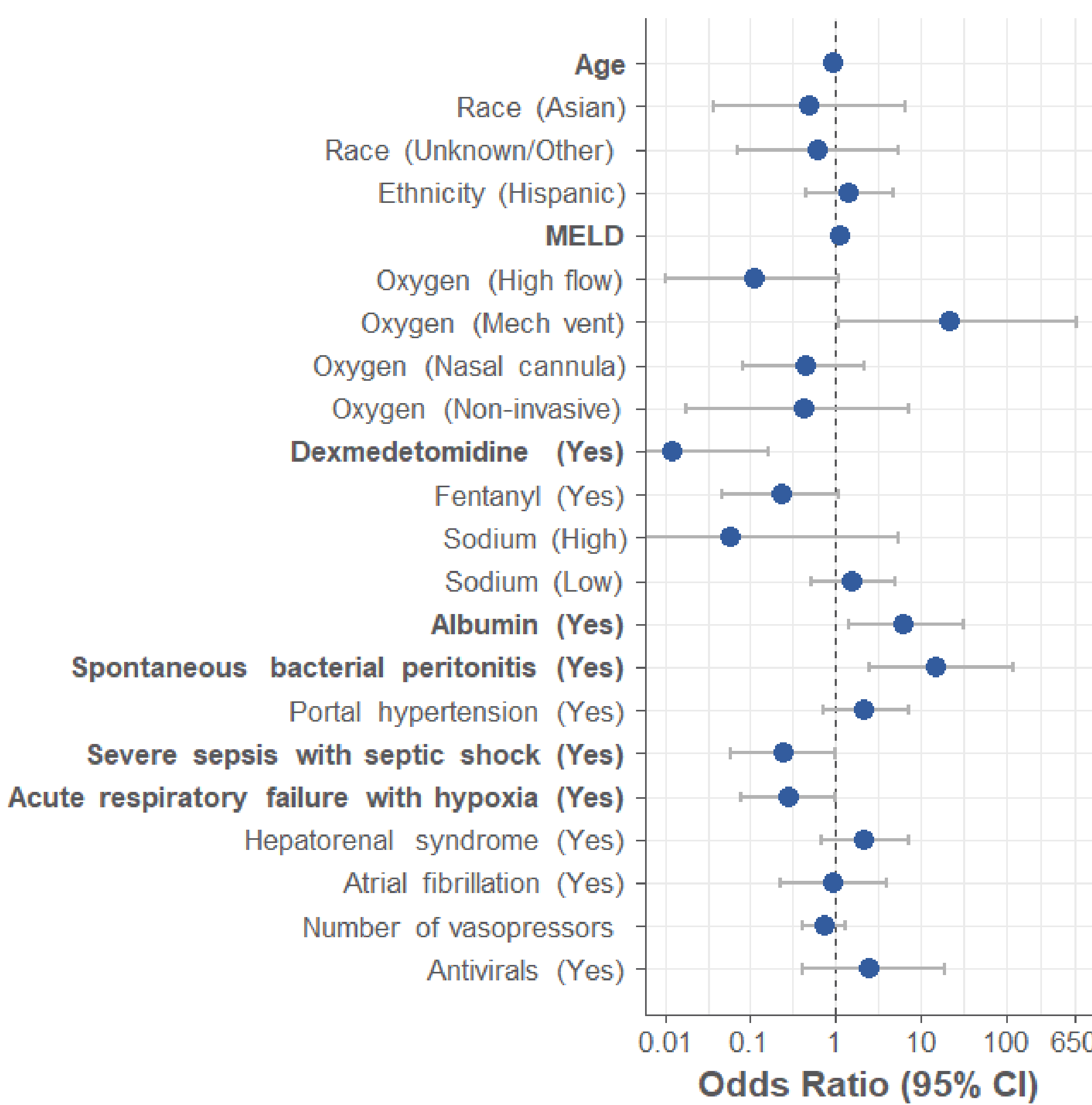


Figure 2. Odds ratios with 95% CIs for LASSO-selected predictors show that transplant eligibility was driven by higher MELD and reversible liver-specific factors, while multiorgan failure markers sharply decreased the likelihood of transplantation.

Conclusion

- Transplant eligibility reflects both hepatic severity and extrahepatic physiologic stability.**
- Higher **MELD** scores increase the likelihood of transplantation, prioritizing patients with advanced hepatic failure when extrahepatic systems remain recoverable.
- Reversible complications** (specifically, **SBP** and **albumin-responsive physiology**) are strongly associated with transplant eligibility.
- Markers of physiologic instability** are associated with lower odds of transplant.
- Dexmedetomidine exposure is a strong negative predictor, as patients requiring continuous sedation are rarely considered appropriate candidates due to limited neurologic assessment and concern for irreversible encephalopathy.
- Takeaway:** Reversible liver-specific issues favor candidacy, whereas progressive multiorgan dysfunction strongly predicts ineligibility.

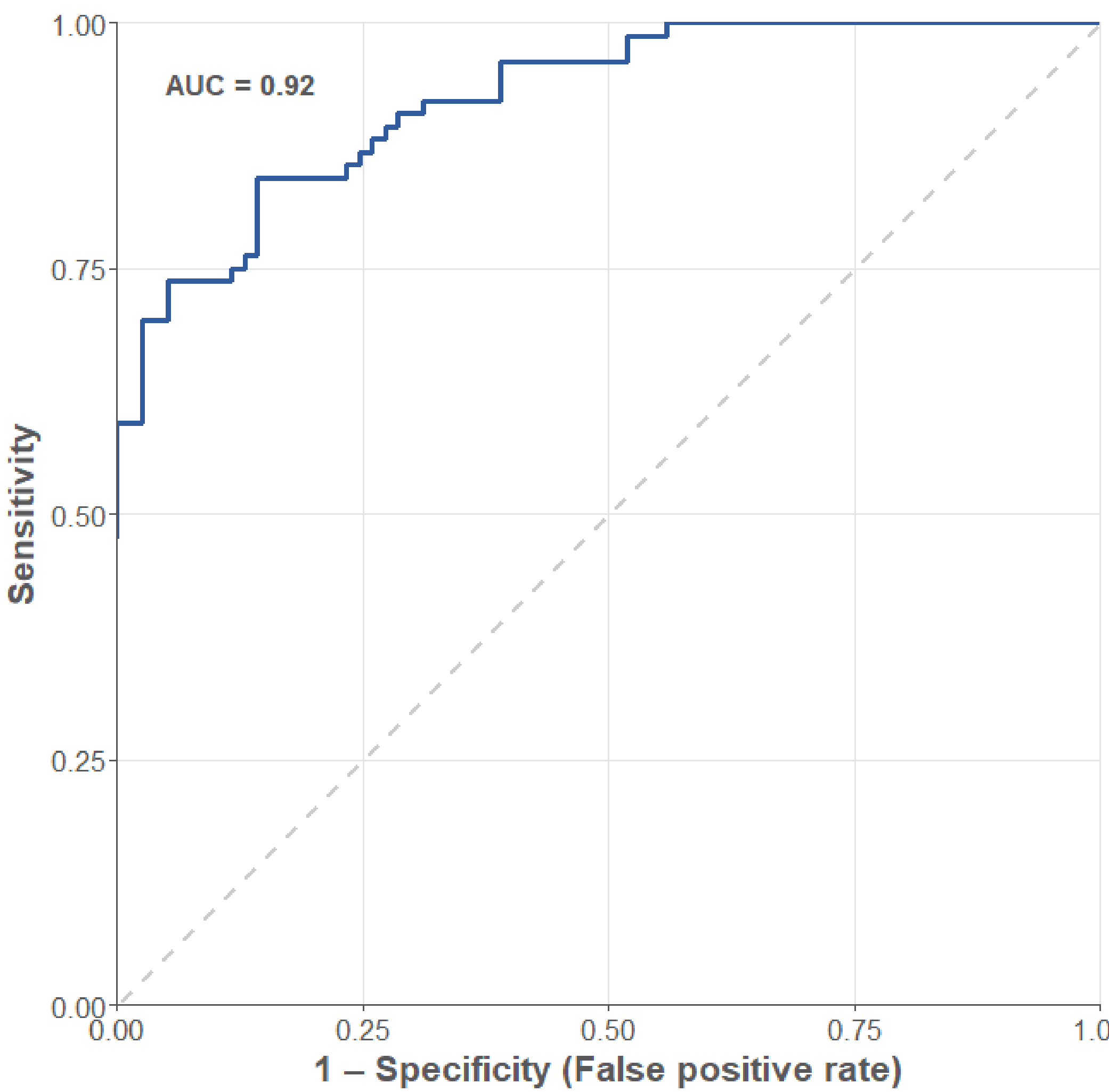


Figure 3. ROC curve demonstrating excellent model performance (AUC = 0.92) in predicting transplant eligibility among critically ill ACLF patients.

References: ¹Moreau R, Jalan R, Gines P, et al. Acute-on-chronic liver failure is a distinct syndrome that develops in patients with acute decompensation of cirrhosis .Gastroenterology. 2013;144(7):1426–1437.e9. doi:10.1053/j.gastro.2013.02.042

²Sacleux SC, Lemoine M, Durand F, et al. Liver transplant selection criteria and outcomes in critically ill patients with ACLF. JHEP Reports. 2023;6(1):100929. doi:10.1016/j.jhepr.2023.100929