

Children with acute on chronic liver failure or high native MELD/PELD scores have higher waitlist mortality and lower transplant rates

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INTRODUCTION

- Children requiring liver transplantation (LT) are listed as Status 1A, Status 1B, or by MELD/PELD scores (“native” or by adding “exception” points) on the United Network for Organ Sharing (UNOS) waitlist.
- Hypothesis:** Children with acute on chronic liver failure (ACLF) (listed as Status 1B) have higher prevalence of extra-hepatic organ failure and increased mortality on the waitlist when compared to children with high native or exception MELD/PELD scores.

METHODS

- Data source:** UNOS database
- Inclusion criteria:**
 - Age 0-17y at listing
 - Status 1B (with ACLF) or MELD/PELD score ≥ 25 (native or exception) at waitlist removal
- Exclusion criteria:**
 - Acute liver failure (Status 1A)
 - Metabolic disease/malignancy (non-ACLF Status 1B)
 - MELD/PELD score (native or exception) < 25
- Subjects were categorized into **3 groups**:
 - ACLF: Status 1B (except as above)
 - High native MELD/PELD (nMELD/PELD): ≥ 25
 - High exception MELD/PELD (eMELD/PELD): ≥ 25
- Statistical analyses:** Chi-square/Fisher's exact, Kruskal-Wallis, post-hoc analyses with Bonferroni correction (corrected p < 0.00167)

LIMITATIONS

- Retrospective, database review, limited variables, some organ failure definitions per UNOS

RESULTS

TABLE 1: Demographic Characteristics

	ACLF (n = 478)	nMELD/PELD (n = 790)	eMELD/PELD (n = 2220)	Overall p-value
Median Age (IQR)	0 y (0 - 1 y)	0 y (0 - 3 y)	2 y (0 - 9 y)	< 0.0001
Male	45.8 %	48.9 %	46.8 %	0.5022

TABLE 2: Prevalence of Organ Failures

	ACLF (n = 478)	nMELD/PELD (n = 790)	eMELD/PELD (n = 2220)	Overall p-value
Liver †	62.8%	100.0%	10.5%	< 0.0001
Renal ‡	31.2%	15.7%	5.4%	< 0.0001
Neurologic §	12.6%	7.0%	0.7%	< 0.0001
Cardiorespiratory ^	33.5%	4.8%	1.5%	< 0.0001
3+ Organ Failures	16.1%	3.2%	0.2%	< 0.0001

† Liver failure: native MELD/PELD score ≥ 25

‡ Renal failure: serum creatinine $\geq 2x$ upper limit of normal for age

§ Neurologic failure: presence of grade 3-4 hepatic encephalopathy

^ Cardiorespiratory failure: on “life support” or mechanical ventilation

TABLE 3: Transplant Characteristics

	ACLF (n = 478)	nMELD/PELD (n = 790)	eMELD/PELD (n = 2220)	Overall p-value
Median MELD/PELD (IQR)	28 (20 - 35)	31 (28 - 37)	11 (1 - 19)	< 0.0001
Median Days on Waitlist (IQR)	56 (20 - 131)	46 (14 - 117)	114 (45 - 272)	< 0.0001
Received LT	79.3%	67.3%	91.2%	< 0.0001
Waitlist Mortality	19.9%	25.3%	1.7%	< 0.0001
Waitlist Removal for Clinical Improvement	0.0%	2.5%	0.5%	< 0.0001
Re-Transplant Within 6 Mo	1.7%	2.8%	3.2%	0.1925
Post-LT Mortality Within 6 Mo	7.1%	4.2%	3.0%	0.0001

RESULTS

- Most common underlying diagnosis:** biliary atresia (ACLF = 41%, nMELD/PELD = 38%, eMELD/PELD = 40%)
- Extra-hepatic organ failure prevalence:** highest in ACLF compared to nMELD/PELD and eMELD/PELD
 - Renal: overall p < 0.0001 , all groups significantly different in post-hoc analysis
 - Neurologic: overall p < 0.0001 , no difference between ACLF and nMELD/PELD in post-hoc analysis (p=0.0035)
 - Cardiorespiratory: overall p < 0.0001 , all groups significantly different in post-hoc analysis
- Rate of LT:** lowest in nMELD/PELD, followed by ACLF, then eMELD/PELD (overall p < 0.0001 , all groups significantly different in post-hoc analysis)
- Waitlist mortality:** higher in ACLF and nMELD/PELD compared to eMELD/PELD (overall p < 0.0001 , no difference between ACLF and nMELD/PELD in post-hoc analysis [p= 0.085])

CONCLUSIONS

- Children with ACLF have higher prevalence of extra-hepatic organ failure than those with high native or exception MELD/PELD scores.
- Children with ACLF or high native MELD/PELD scores have lower transplant rates and higher waitlist mortality compared to those with high exception MELD/PELD scores.
- While further study is needed to determine other factors that may affect outcomes in children with ACLF or high native MELD/PELD scores, our data have important policy implications for when and how exception points are allocated.