Sodium does not improve prognostic value of model for end stage of liver disease (MELD) in TIPS patients with refractory ascites Hiro Sparks, BS; Sammy Saab, MD, MPH; Fady Kaldas, MD; Edward Wolfgang Lee, MD, PhD



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Introduction

- Transjugular intrahepatic portosystemic shunt (TIPS) may be used to treat complications of end stage liver disease, such as refractory ascites and variceal hemorrhage.
- Several studies have validated both the Model for End-Stage Liver Disease (MELD) and MELD-Sodium (MELD-Na) scores for predicting mortality following TIPS.¹⁻³
- However, prior research directly comparing prognostic value of MELD-Na versus MELD are limited and have revealed conflicting results.^{1,2,4}
- This single center retrospective study aims to compare the prognostic utility of MELD and MELD-Na scores for post-TIPS survival, with the hypothesis that inclusion of sodium does not improve model accuracy within the refractory ascites population.

Methods

- Retrospective electronic medical records at a single liver transplant center were reviewed during the years 2007 to 2019.
- A total of 203 patients were included in this study for analysis.
- The standard TIPS technique was used in all cases.
- Correlation between MELD or MELD-Na with post-TIPS survival was performed using logistic regression and cox proportional hazards (CPH) models.
- To directly compare model fit, Akaike Information Criteria (AIC) and area under the curve (AUC) of receiver operator characteristic (ROC) plots were calculated for 30 day, 90 day, 1 year, and all time survival.

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Results

Table 1 - Logistic regression model demonstrating correlation between MELD or MELD-Na and 30 day, 90 day, 1 year mortality. Cox proportional hazard survival analysis correlating MELD or MELD-Na with all time mortality. Fitting of models were compared using area under the curve of receiver operator characteristic plots and/or akaike information criteria.

	Logistic Regression			Cox Proportional Hazard
	30 day mortality,	90 day mortality,	1 year mortality,	All time mortality,
Model Fit	n = 191	n =176	n = 141	n = 203
MELD	OR = 1.12 (1.02 - 1.24),	OR = 1.15 (1.08 - 1.25),	OR = 1.11 (1.05 - 1.18),	HR = 1.08 (1.04 - 1.12),
	P = 0.016	P < 0.001	P < 0.001	P < 0.001
MELD-NA	OR = 1.11 (1.01 - 1.23),	OR = 1.12 (1.05 - 1.21),	OR = 1.10 (1.04 - 1.17),	HR = 1.07 (1.04 - 1.11),
	P = 0.035	P = 0.001	P = 0.001	P < 0.001
MELD ROC AUC	0.743	0.732	0.685	-
MELD-Na ROC AUC	0.708	0.700	0.679	_
P Value, ∂AUC,	0.045*	0.046*	0.41	_
MELD AIC	76.4	123.02*	161.23	597.45*
MELD-Na AIC	77.4	128.21*	162.71	599.5
AIC, akaike information criteria: HR, hazard ratio: MELD, model for end stage liver disease: ROC AUC, area under the curve of				

receiver operator characteristic plot; OR, Odds ratios

- Higher scores in both MELD and MELD-Na significantly correlated with increased risk of post-TIPS mortality at 30 days, 90 days, and 1 year in logistic regression models and all time survival in CPH models.
- The effects of MELD and MELD-Na were greatest on 90 day mortality with associated odds ratios of 1.15 (1.08 - 1.25) and 1.12 (1.05 - 1.21), respectively.
- ROC AUC was larger for MELD relative to MELD-Na at all logistic regression model endpoints, and was statistically significantly greater in 30 and 90 day mortality models.
- Relative to MELD-Na, AIC comparisons demonstrated significant improvement in fit for modeling 90 day and all time mortality using MELD.



Figure 1 – Receiver operator characteristic (ROC) plots demonstrating sensitivity and specificity of MELD or MELD-Na for predicting 30 day, 90 day, and 1 year survival. Area under the curve (AUC) values are displayed which assess overall model performance.

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Results (continued)



Figure 2 – Kaplan Meyer (KM) plot displaying survival amongst "high risk" or suprathreshold patients relative to "low risk" or subthreshold patients. P-values were obtained using log-rank tests. A MELD/MELD-Na threshold of 25 was arbitrarily selected for this display in order to qualitatively demonstrate differences in survival discrimination

KM plots revealed that all time survival was significantly different across high risk and low risk groups when using all MELD/score thresholds >10.

Similar results were observed when using MELD-Na thresholds; however, survival amongst patients was not significantly different at MELD-Na thresholds of 23, 24, and 25.

At each tested threshold, MELD-Na classified a significantly higher proportion of patients into the high risk group relative to MELD.

Conclusion

- Critically, results presented here demonstrate that MELD and MELD-Na thresholds cannot be used interchangeably.
- MELD score is superior to MELD-Na in predicting 30 and 90 day mortality and all time survival in patients undergoing TIPS for refractory ascites.

References

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