

MELD 3.0: AN UPDATED MODEL FOR PREDICTION OF MORTALITY AMONGST PATIENTS WITH CIRRHOSIS VALIDATED IN A LARGE TERTIARY HOSPITAL IN SINGAPORE

Lin Hong-Yi¹, Loi Pooi Ling², Jeanette Ng², Teo Wei-Quan³, Amber Chung³, Prema Raj³, Jason Pik-Eu Chang²

¹ Yong Loo Lin School of Medicine, National University of Singapore

² Department of Gastroenterology and Hepatology, Singapore General Hospital

³ SingHealth Duke-NUS Transplant Centre

Background/Objectives:

The original Model for End-Stage Liver Disease (MELD) was introduced to predict 3-month survival to prioritize organ allocation for liver transplantation and has been updated since its inception. A recent study in the United States (US) optimized the current model (MELDNa) with new variables and updated coefficients to propose MELD 3.0, the latest model which could suggest better prediction of 3-month mortality. This study aims to validate the prognostic performance of MELD 3.0 in patients with cirrhosis admitted to Singapore's largest tertiary hospital.

Methods:

Demographical, clinical, biochemical and survival data of patients with cirrhosis admitted to Singapore General Hospital (SGH) from 01-January-2018 to 31-December-2018 were studied retrospectively. Area under the receiver operating characteristic curves (AUROC) were computed to determine the discriminative effects of the 3 prognostic models (MELD 3.0, MELDNa, and MELD) to predict 1-month (30-day), 3-month (90-day) and 1 year (365-day) mortality and compared with the DeLong's test. Youden's index was used to determine the optimal MELD 3.0 cut-off for high-risk patients. Competing risk analysis was performed for patients at various risk levels.

Results:

- 862 patients were included (median age 70.0 years [IQR 63.0–78.7], 65.4% males, 75.8% Chinese).
- The proportion of patients with Child-Turcotte-Pugh classes A/B/C at admission were 55.5%, 35.5% and 9.0% respectively.
- The median scores of MELD 3.0, MELDNa and MELD were 12.2 (IQR 8.7–18.3), 11.0 (IQR 8.0–17.5), 10.3 (IQR 7.8–15.0) respectively.
- The 30-day, 90-day, 365-day mortality were 5.7%, 13.2% and 26.9% respectively.
- MELD 3.0 performed significantly better compared to MELDNa and MELD in predicting 30-day, 90-day, 365-day mortality (AUROC of MELD3.0/MELDNa/MELD: 0.823/0.793/0.783, 0.754/0.724/0.707, 0.682/0.644/0.654, in predicting 30-day, 90-day, 365-day mortality respectively, all $p < 0.05$) (Table 1, Figures 1A-C).
- Patients with a MELD 3.0 score >17 had high risk of 90-day mortality. When compared to patients with MELD 3.0 score ≤ 17 , patients with MELD 3.0 score ≥ 18 had significantly poorer survival ($p < 0.05$) and had higher 90-day mortality (46.8% vs 16.4%) (Figure 2).

Table 1: AUROC of each prognostic model at various survival timepoints. Comparison of the AUROC of the prognostic model against MELD 3.0 using the DeLong's test.

	30-day mortality (95% CI)	p-value	90-day mortality (95% CI)	p-value	365-day mortality (95% CI)	p-value
MELD 3.0	0.823 (0.761–0.886)	NA	0.754 (0.705–0.803)	NA	0.682 (0.642–0.723)	NA
MELDNa	0.793 (0.725–0.860)	0.018*	0.724 (0.673–0.776)	0.0061*	0.654 (0.611–0.696)	0.0023*
MELD	0.783 (0.717–0.849)	0.0029*	0.707 (0.655–0.759)	0.0001*	0.644 (0.602–0.686)	0.00002*

* $p < 0.05$ when compared against MELD 3.0 score implies statistical significance.

Figures 1A-C: ROC curves of the MELD 3.0, MELDNa, MELD and CTP models in predicting 30-day (A), 90-day (B) and 365-day (C) mortality respectively.

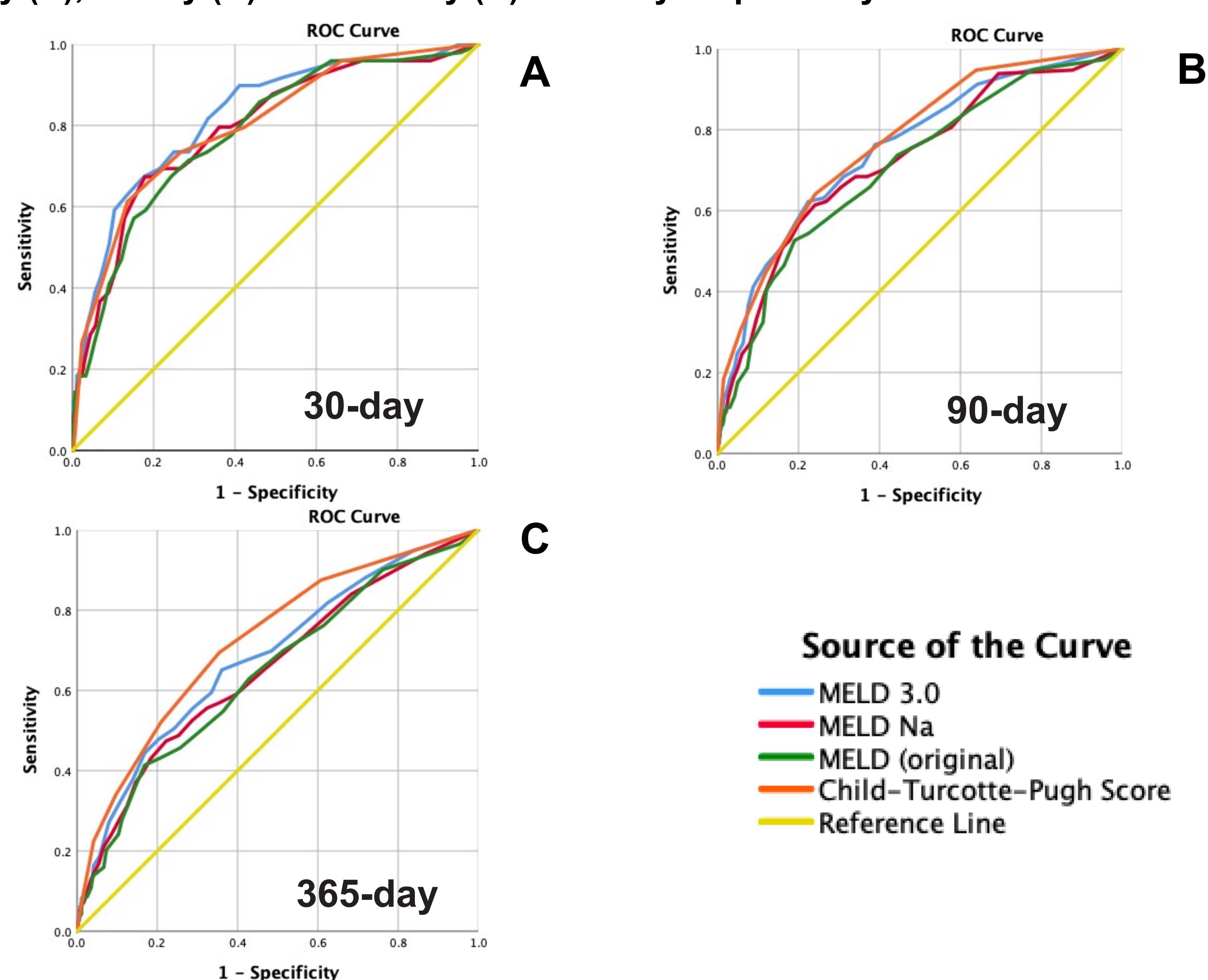
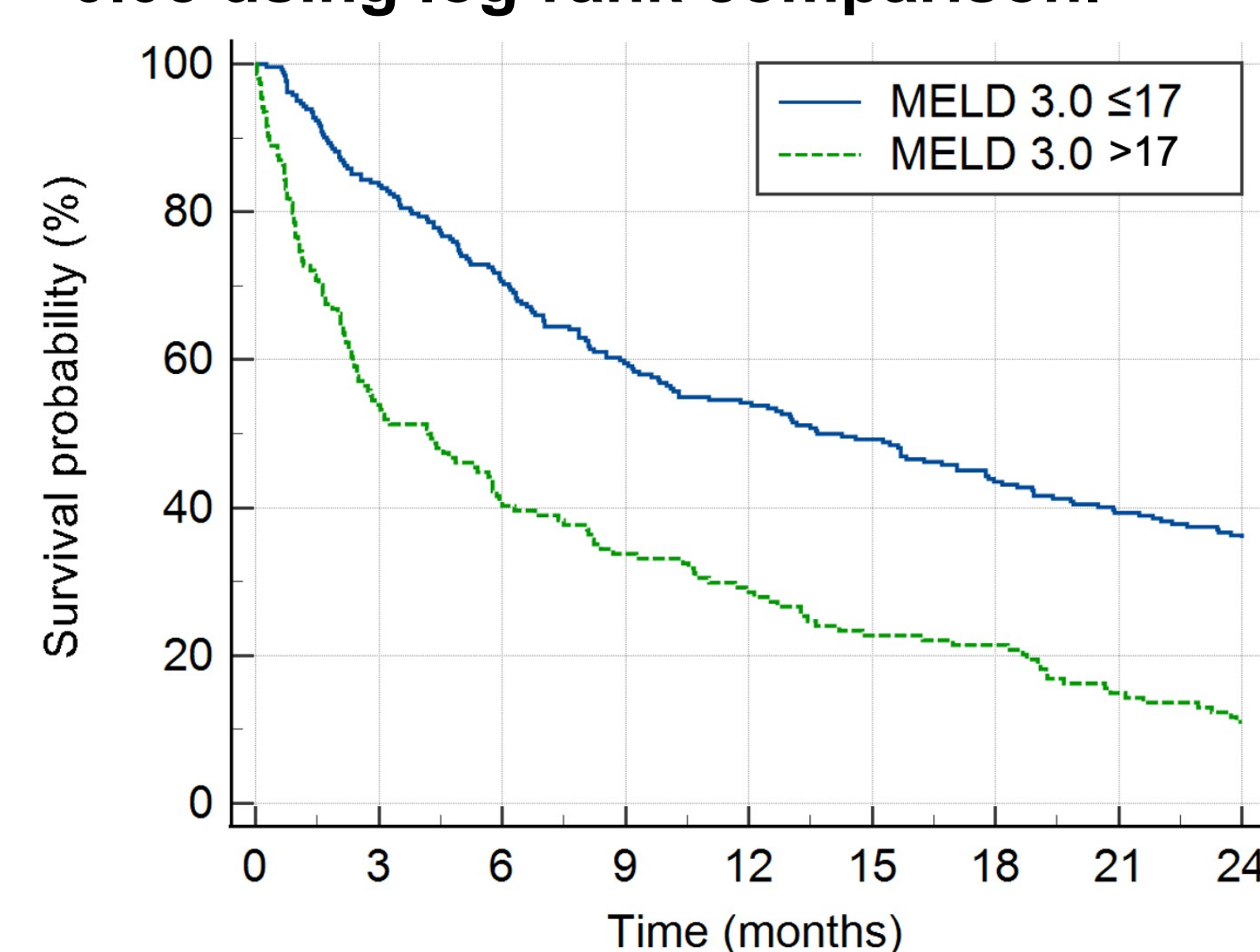


Figure 2: Survival curves of patients with cirrhosis stratified into high-risk (MELD 3.0 ≥ 18) and MELD 3.0 ≤ 17 . $P < 0.05$ using log-rank comparison.



Conclusion:

- MELD 3.0 performed better than MELDNa and MELD in predicting mortality in inpatients with cirrhosis admitted to SGH, consistent with the findings in the recent US study.
- MELD 3.0 score >17 predicts higher mortality.