

## Supplemental Content

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**Supplemental Methods.** Identification of patients with cirrhosis and calculation of prognostic scores

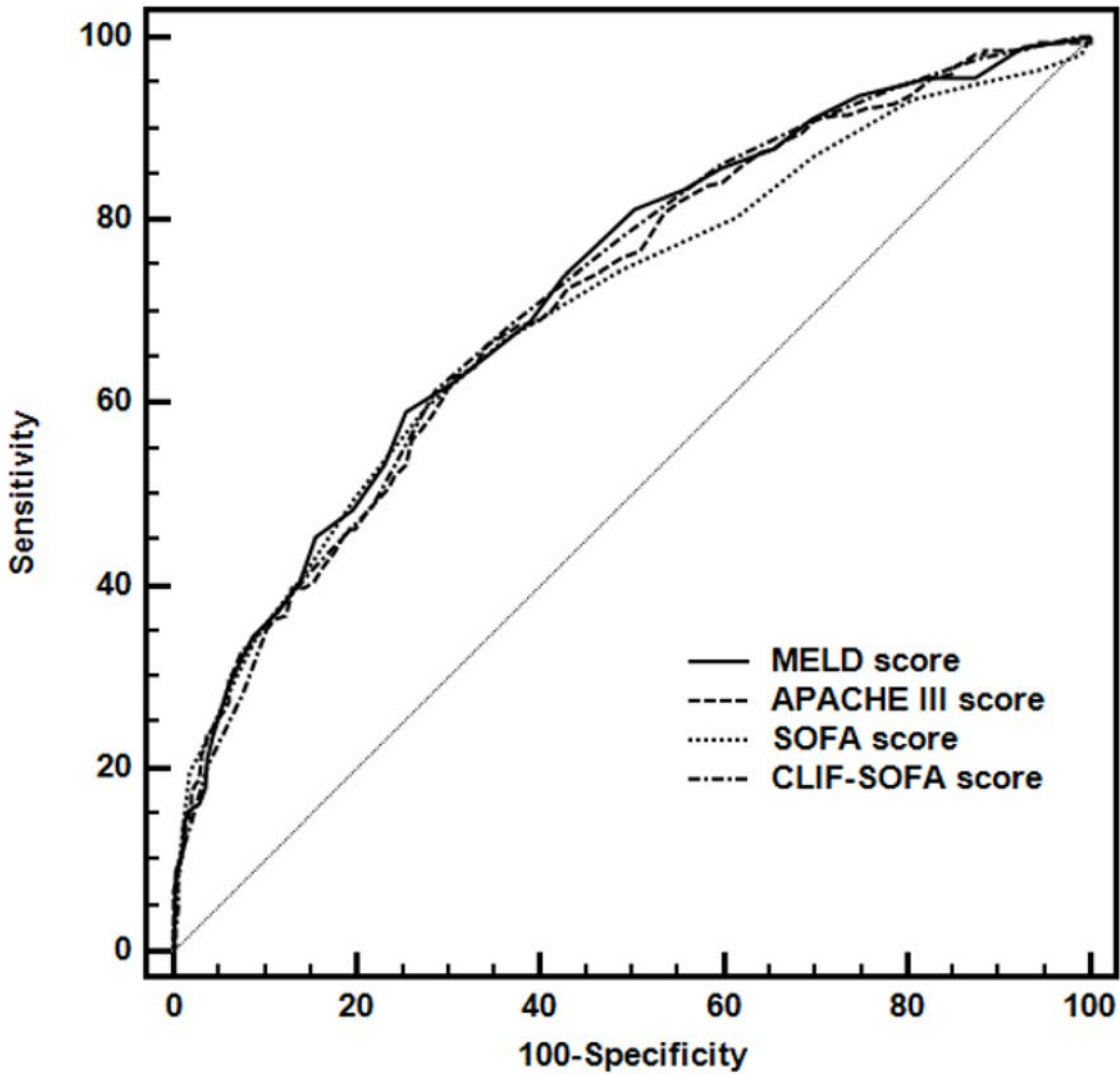
### **Identification of patients with cirrhosis**

Text search algorithm includes the key word “cirrhosis” in the past medical history section of clinical notes. To ascertain the specific diagnosis of cirrhosis, exclusion terms, i.e. “no”, “do not”, “none”, “denies”, or “family history”, in the same sentence as “cirrhosis” were applied.

### **APACHE III, SOFA and CLIF-SOFA scores calculation**

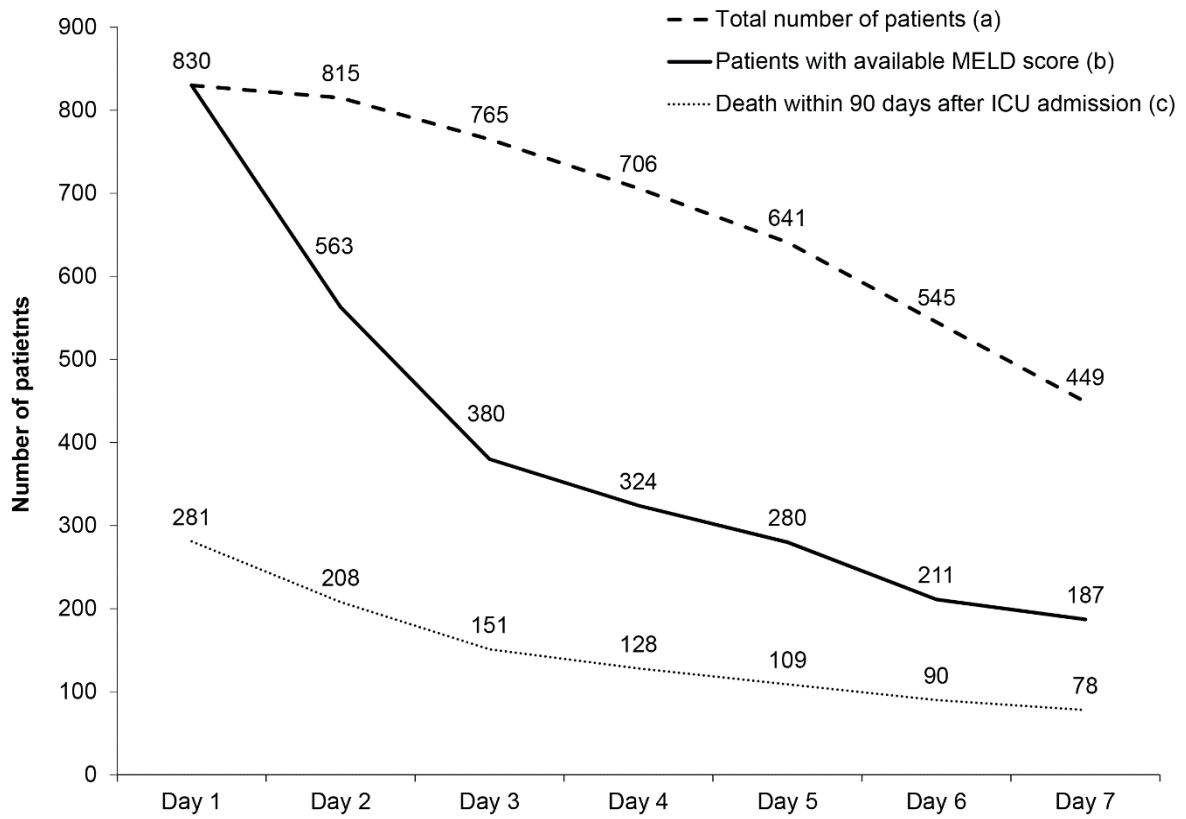
APACHE III score was pre-calculated and available in the ICU database for all patients admitted to the ICU after January 1 2006, thus 185 patients who were admitted to the ICU before 2006 had missing APACHE III score. There were no missing values for SOFA and CLIF-SOFA scores.

**Supplemental Figure 1.** Performance of initial MELD, APACHE III, SOFA and CLIF-SOFA scores



Scores at admission	AUC (95% CI)	<i>P</i> value
MELD score	0.72 (0.69-0.76)	NA
APACHE III score	0.72 (0.68-0.75)	0.67
SOFA score	0.70 (0.67-0.74)	0.99
CLIF-SOFA score	0.72 (0.68-0.76)	0.75

**Supplemental Figure 2.** The total number of patients on day 1 – 7 after ICU admission (a), the number of patients with available MELD score (b), and the number of patients who had died within 90 days after ICU admission (c)



**Supplemental Table 1.** ICD-9-CM code of diagnosis and cause of cirrhosis

Variable	ICD-9-CM code
<u>Diagnosis during ICU stay</u>	
Acute kidney injury	584.9
Hepatic encephalopathy	572.2
Acute variceal bleeding	456.0, 456.1, 456.2, 456.21
Septic shock	785.52
Hepatorenal syndrome	572.4
Spontaneous bacterial peritonitis	567.23
Cardiogenic shock	785.51
<u>Cause of cirrhosis</u>	
Alcohol	571.1, 571.2, 571.3, 291.0, 291.1, 291.2, 291.81, 291.89
Viral hepatitis C	070.41, 070.44, 070.51, 070.54, 070.70, 070.71
Nonalcoholic fatty liver disease	571.8, 571.5
Primary biliary cirrhosis	571.6
Autoimmune hepatitis	571.42
Viral hepatitis B	070.20, 070.21, 070.22, 070.23, 070.30, 070.31, 070.32, 070.33
Alpha-1 antitrypsin deficiency	273.4
Hemochromatosis	275.01, 275.03
Wilson disease	275.1

**Supplemental Table 2.** Odds ratio and performance of combined MELD score and  $\Delta$ -MELD score for predicting 90-day mortality after ICU admission using different definitions of  $\Delta$ -MELD score

Variable	Definitions of $\Delta$ -MELD score								
	Subtraction of the MELD score on the current day from the most recent prior MELD score (original)			Subtraction of the MELD score on the current day from the day one MELD score			Subtraction of the MELD score on the current day from the immediately previous day MELD score		
	AOR (95% CI)	<i>P</i> value	AUC	AOR (95% CI)	<i>P</i> value	AUC	AOR (95% CI)	<i>P</i> value	AUC
MELD Day 1	-	-	-	-	-	-	-	-	-
MELD Day 2 $\Delta$ -MELD Day 2	1.11 (1.08-1.14) 0.99 (0.94-1.05)	<.001 .69	0.72	1.11 (1.08-1.14) 0.99 (0.94-1.05)	<.001 .69	0.72	1.11 (1.09-1.13) 0.98 (0.93-1.03)	<.001 .42	0.73
MELD Day 3 $\Delta$ -MELD Day 3	1.10 (1.07-1.13) 1.03 (0.96-1.10)	<.001 .42	0.70	1.10 (1.07-1.13) 1.01 (0.96-1.06)	<.001 .77	0.70	1.09 (1.06-1.13) 1.06 (0.98-1.15)	<.001 .16	0.70
MELD Day 4 $\Delta$ -MELD Day 4	1.10 (1.07-1.13) 1.01 (0.93-1.09)	<.001 .81	0.70	1.09 (1.06-1.13) 1.03 (0.97-1.09)	<.001 .32	0.70	1.08 (1.05-1.12) 1.04 (0.94-1.15)	<.001 .49	0.67
MELD Day 5 $\Delta$ -MELD Day 5	1.10 (1.07-1.14) 1.00 (0.92-1.08)	<.001 .94	0.71	1.10 (1.06-1.14) 1.03 (0.98-1.09)	<.001 .22	0.72	1.11 (1.07-1.15) 1.05 (0.92-1.19)	<.001 .50	0.73
MELD Day 6 $\Delta$ -MELD Day 6	1.09 (1.05-1.13) 1.01 (0.95-1.08)	<.001 .83	0.68	1.08 (1.04-1.13) 1.01 (0.96-1.07)	<.001 .68	0.68	1.09 (1.05-1.14) 0.94 (0.79-1.12)	<.001 .49	0.68
MELD Day 7 $\Delta$ -MELD Day 7	1.09 (1.05-1.13) 1.06 (0.95-1.19)	<.001 .28	0.70	1.08 (1.04-1.13) 1.04 (0.99-1.11)	<.001 .12	0.70	1.08 (1.03-1.13) 1.26 (1.02-1.60)	<.001 .03	0.71

<sup>a</sup>AOR = Adjusted odds ratio

**Supplemental Table 3.** Odds ratio and performance of combined MELD score and  $\Delta$ -MELD score for predicting 90-day mortality after ICU admission using different definitions of  $\Delta$ -MELD score coded as categorical variable<sup>b</sup>

Variable	Definitions of $\Delta$ -MELD score								
	Subtraction of the MELD score on the current day from the most recent prior MELD score (original)			Subtraction of the MELD score on the current day from the day one MELD score			Subtraction of the MELD score on the current day from the immediately previous day MELD score		
	AOR (95% CI)	<i>P</i> value	AUC	AOR (95% CI)	<i>P</i> value	AUC	AOR (95% CI)	<i>P</i> value	AUC
MELD Day 1	-	-	-	-	-	-	-	-	-
MELD Day 2 $\Delta$ -MELD Day 2	1.11 (1.08-1.13) 1.17 (0.80-1.70)	<.001 .42	0.72	1.11 (1.08-1.13) 1.17 (0.80-1.70)	<.001 .42	0.72	1.11 (1.08-1.13) 1.17 (0.80-1.70)	<.001 .42	0.72
MELD Day 3 $\Delta$ -MELD Day 3	1.10 (1.07-1.13) 1.18 (0.74-1.87)	<.001 .48	0.70	1.10 (1.07-1.13) 1.01 (0.64-1.58)	<.001 .98	0.70	1.10 (1.06-1.13) 1.15 (0.70-1.87)	<.001 .57	0.70
MELD Day 4 $\Delta$ -MELD Day 4	1.10 (1.07-1.13) 1.18 (0.71-1.96)	<.001 .52	0.70	1.10 (1.07-1.13) 0.92 (0.56-1.52)	<.001 .76	0.70	1.08 (1.05-1.12) 1.26 (0.72-2.21)	<.001 .41	0.67
MELD Day 5 $\Delta$ -MELD Day 5	1.10 (1.07-1.14) 1.28 (0.73-2.21)	<.001 .39	0.72	1.10 (1.07-1.14) 1.11 (0.64-1.93)	<.001 .70	0.72	1.11 (1.07-1.15) 1.41 (0.77-2.57)	<.001 .26	0.73
MELD Day 6 $\Delta$ -MELD Day 6	1.09 (1.05-1.13) 0.73 (0.39-1.35)	<.001 .32	0.68	1.09 (1.05-1.13) 0.92 (0.50-1.68)	<.001 .79	0.68	1.09 (1.05-1.14) 0.76 (0.39-1.47)	<.001 .42	0.68
MELD Day 7 $\Delta$ -MELD Day 7	1.09 (1.05-1.13) 1.48 (0.75-2.92)	<.001 .25	0.70	1.09 (1.04-1.13) 1.21 (0.62-2.34)	<.001 .57	0.69	1.09 (1.04-1.14) 1.41 (0.67-2.95)	<.001 .36	0.70

<sup>a</sup>AOR = Adjusted odds ratio

<sup>b</sup>Increase in MELD [coded as 1] vs. no change or decrease in MELD [coded as 0]