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Transplant Outcomes Research Collaborative

The Hidden Burden of Liver-Related Mortality in Patients with Cirrhosis and Low MELD Score

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Background

- **The MELD-Na score is accurate at predicting of short term (<90 day) mortality**
- **Lower MELD-Na patients (score <15) have low rates of 90 day mortality, however their extended outcomes have not been studied**
- **Prior data has indicated they have an all-cause mortality rate of 18.6% in 5 years[1]**
  - **Is this related to their liver disease? Would they benefit from transplant?**
- **HealthLNK, a Chicago-wide database:**
  - **Has 2,422,433 unique patients and is linked with the Illinois Death Registry**
  - **Incorporates the de-identified electronic medical records from all liver transplant centers in Chicago:**
    - **Northwestern Medicine**
    - **University of Chicago Hospitals and Clinic**
    - **Rush University Medical Center**
    - **University of Illinois at Chicago Medical Center**
    - **Loyola University Medical Center**
    - **Cook County Health and Hospitals System**

Research Objectives

To determine the burden of *liver-related* mortality on patients with persistently low MELD.

Methods

Inclusion:

- **Adult patients seen at one of the above institutions with a diagnosis code of cirrhosis during data collection (January 1, 2006, and December 31, 2012)**
- **Died during the study period**
- **At least one lab collection to calculate MELD-Na during the study period**

Exclusion

- **Use of Coumadin during the period**

- **Manual review of 'Immediate cause of death' as listed on death certificates by two hepatologists and a transplant surgeon**
  - **Classified into "Liver related", "non-liver related", and "non-descript"**
  - **"Liver related" further sub-classified**

Example data

Sorted by 'Immediate Cause of Death' as listed on Death Certificate

METASTATIC HEPATOCELLULAR CA	Liver related	Oncologic
METASTATIC LIVER CANCER	Liver related	Oncologic
HEPATOMA	Liver related	Oncologic
INTRACRANIAL HEMORRHAGE	Non-Descript	N/A
MULTIORGAN FAILURE	Non-Descript	N/A
GASTROINTESTINAL BLEEDING	Liver related	Varices
METASTATIC BREAST CANCER	Non-liver related	N/A
ACUTE LIVER FAILURE	Liver related	Other
CARDIOGENIC SHOCK	Non-Descript	N/A
COLON CANCER	Non-liver related	N/A
CHRONIC RENAL FAILURE	Non-Descript	N/A

Table 1. Patient Demographics

	Higher MELD-Na	MELD-Na always <15	
n	5193	4309	p value
Age (mean (sd))	55.88 (11.19)	56.10 (11.38)	0.34
Female (%)	1788 (34.5)	1933 (45.0)	<0.001
Race (%)			0.014
White	2177 (41.9)	1732 (40.2)	
Black	1102 (21.2)	919 (21.3)	
Hispanic	1059 (20.4)	865 (20.1)	
Asian	123 (2.4)	148 (3.4)	
Other	732 (14.1)	645 (15.0)	
Overall Mortality	0.44 (0.50)	0.14 (0.35)	<0.001
Liver Attributable (%)			<0.001
Non-liver	277 (14.4)	151 (28.0)	
Liver	1255 (65.4)	292 (54.2)	
Non-descript	387 (20.2)	96 (17.8)	
Subcategory (%)			
Bleeding	7 (0.6)	4 (1.4)	
Infectious	283 (22.5)	57 (19.5)	
Oncologic	265 (21.1)	106 (36.3)	
Other	571 (45.5)	98 (33.6)	
Portal HTN	75 (6.0)	15 (5.1)	
Varices	54 (4.3)	12 (4.1)	

Figure 1. Causes of Death Among ALL Patients

Similar rates of Liver related death even among patients who's MELD-Na was always <15

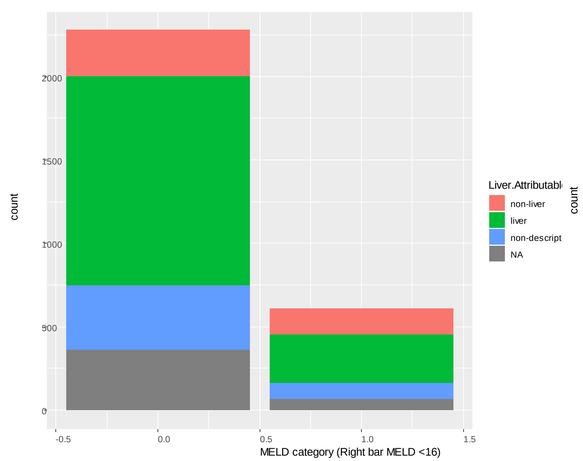
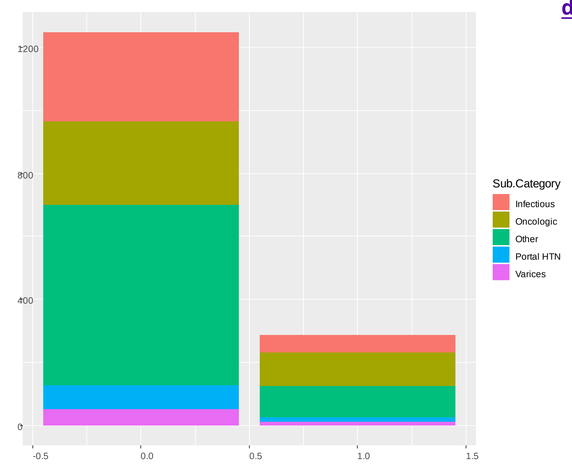


Figure 2. Subcategories of Liver-Related Cause of Death

Higher proportion of HCC related death in low MELD-Na group



Results

- 20,122 patients with cirrhosis were captured, of whom **9,502 met inclusion**
- **4,309 patients had a MELD-Na < 15** for the entire time period.
- Of this low-MELD-Na subgroup there were 607 deaths **(14.1% mortality over 6 years)**
- **Despite low MELD-Na score, a similar proportion of patients died from a liver related cause**
- Low MELD-Na patients had higher rates of HCC related death, however data missingness prevents significance testing

Conclusions

- **Select patients are at risk for liver related mortality** despite persistently low MELD-Na score
- Although a lower death rate is observed **more than 50% of deaths were liver related** in the low MELD-Na group

Future Directions

- Reclassification using secondary and tertiary causes of death to elucidate 'non-descript' or 'Other' cases
- Analyses to attempt to identify patients at risk of liver related death
- Early transplantation via high risk donors or living donors to targeted patients at high risk of liver related death

References

1. Atiemo K, Skaro A, Maddur H, et al. Mortality Risk Factors Among Patients With Cirrhosis and a Low Model for End-Stage Liver Disease Sodium Score (≤15): An Analysis of Liver Transplant Allocation Policy Using Aggregated Electronic Health Record Data. *Am J Transplant*. 2017;17(9):2410-2419. doi:10.1111/ajt.14239