Will's MELD Calculator

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Our Team

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Data Scientist with five years of experience in digital health

The Goal

Beth Israel Deaconess Medical Center is looking to use data science to improve outcome prediction for patients with end stage liver disease.

Model for end stage liver disease (MELD)

- Predicts if patient will die within 90 days
- Used to prioritize liver transplant patients
- Widely validated and accepted

2001

A model is developed to predict survival, is proved to generalize well

2008

Score is improved by including Sodium

2021

Model is improved by including patient gender

11,000

Patients were included in this study including lab results, patient information, and outcomes.

Cohort Identification

Cirrhosis

Patients with explicit cirrhosis or liver disease

Alcohol Abuse

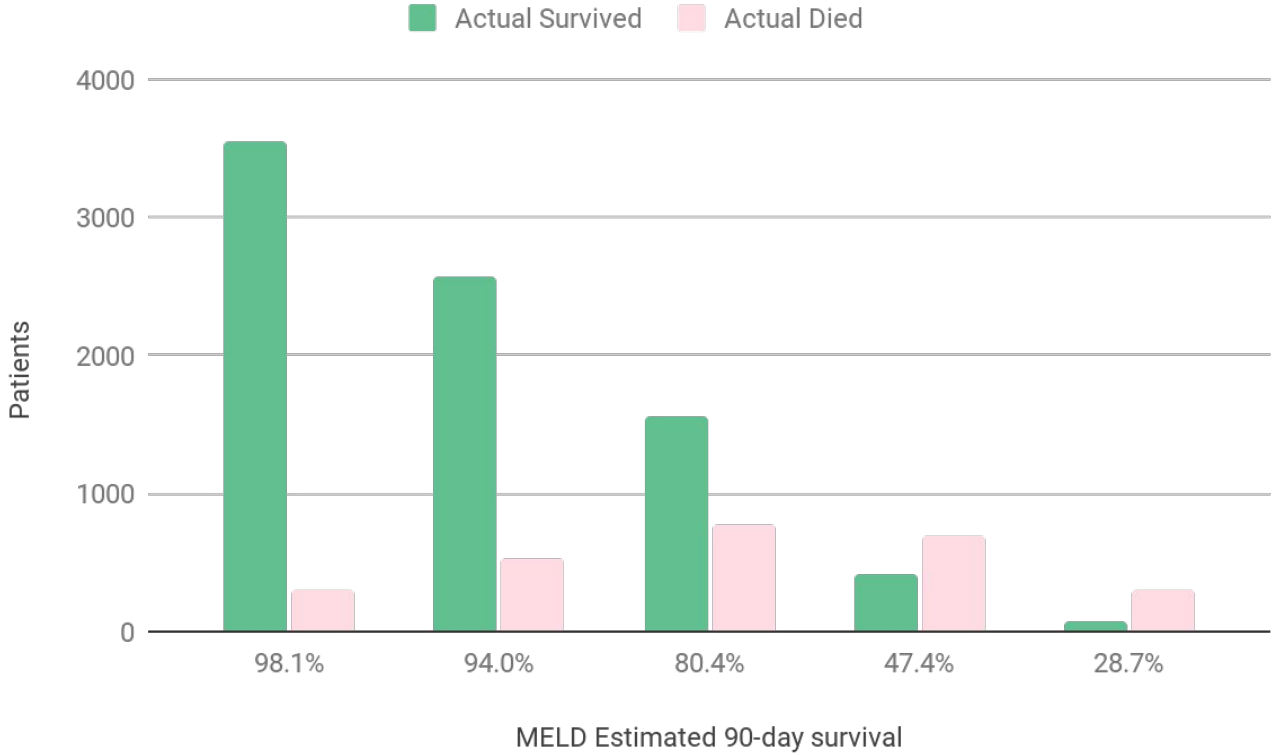
Patients admitted to the ICU with alcohol-related diagnosis

PSG/HEP

Related diseases including PSC (primary sclerosing cholangitis), Autoimmune hepatitis, & Chronic viral hepatitis

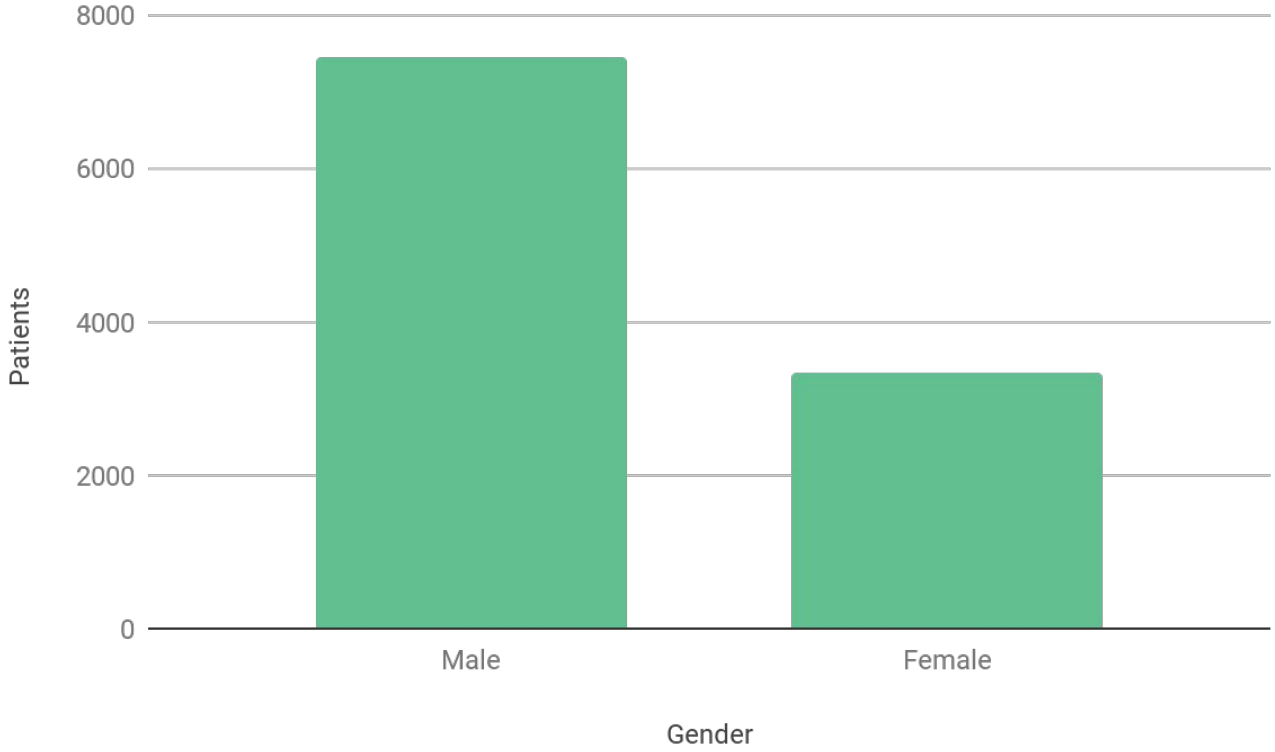
Patients that got liver transplants were excluded.

MELD is well correlated with outcomes

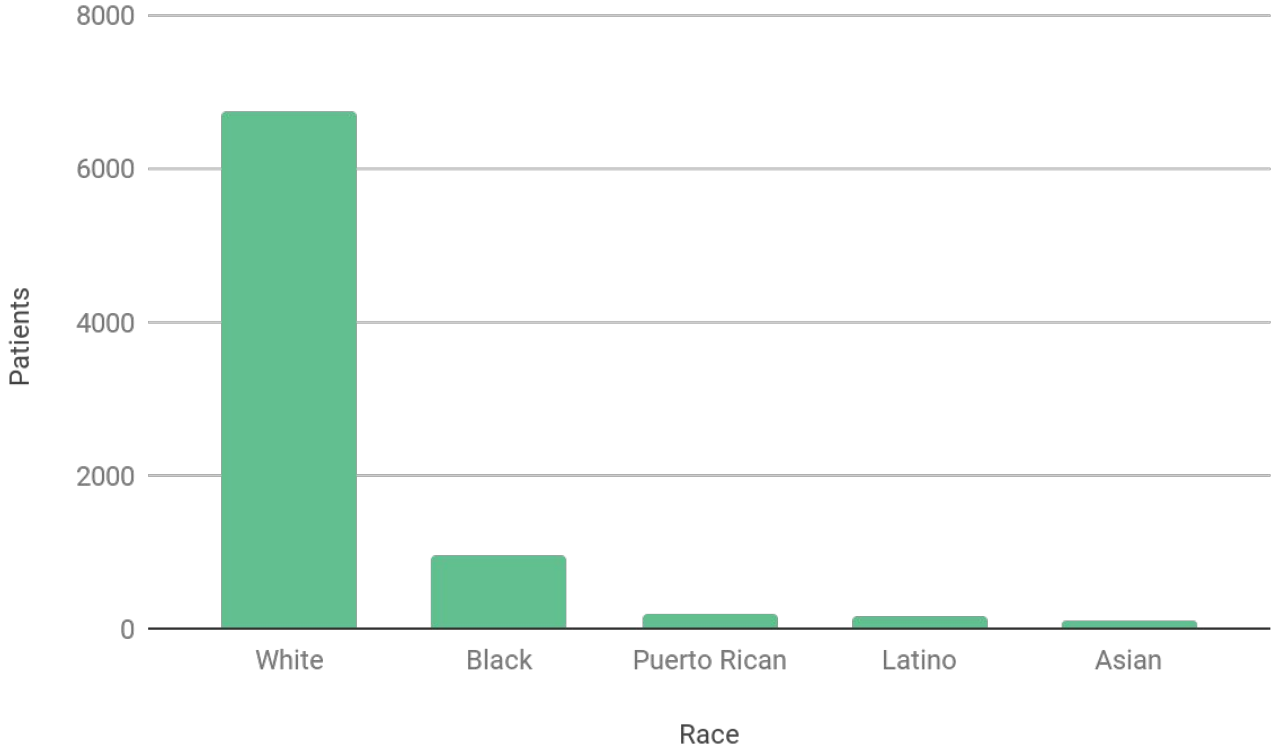


0.78
C-stat

Men outnumber women



Most of the patients are white



Two Approaches

Integrated ML

Use all laboratory data and patient information and output a prediction.

0.86
C-stat

Calculator

A simple calculator (inspired by MDCalc) is useful for clinicians to quickly input data and output a prediction.

0.82
C-stat

Saving lives without unnecessary surgeries

False Positives

Only slight increase in compared to MELD

2.2% -> 9.5%

We definitely don't want to give liver transplants to those that don't need it

False Negatives

Drastic decrease compared to MELD

79% to 50%

This would save lives.

Calculator demo

International Normalised Ratio (INR) Min

Anion Gap

Blood urea nitrogen (BUN) Min

Total Bilirubin Min

Age

Gender

Race

Will's Modified MELD Calculator

Actual outcome:

- Survived
- Perished

Patient Data:

INR Min	Anion Gap Min	BUN Min
2.3	13.0	16.0

Bilirubin Total Min	Age	Gender
11.1	76	Female

Race

HISPANIC/LATINO - PUERTO RICAN

Model predicts person will die within 90 days:

YES

Likelihood to Die Within 90 Days

78.7 %

Recommendations

01 Implement Will's MELD calculator (quick win)

02 Investigate adding race to the official MELD calculation for broader impact

03 Integrate full model with EHR to improve accuracy and reduce reliance on manual calculators

Next Steps

Work with medical professional to improve Cohort selection and model interpretation

Clinician Partnership

Investigate performance of model for different races to evaluate model bias

Investigate Racial Bias

Use OPTN data to investigate if model could replace MELD for liver transplant prioritization

Utilize OPTN

Thanks

Do you have any questions?

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