Clinical Appraisal

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Clinical Scenario: 47 yo man with cirrhosis and ESLD from HCV being evaluated for possible liver transplant. Patient's family would like to know what his short-term mortality risk is and how it will be decided where he is on the transplant list?

Clinical Question: Best method of predicting mortality (and thus transplant listing) in an adult with cirrhosis and ESLD?

Search Method: Used PubMed and AASLD website.
- MeSH terms: MELD, MELD-Na, MELD sodium, Model for end stage liver disease, ESLD
- Combined with: mortality, prognosis
- Narrowed: Reputable journals in the field and articles published since 2009.

Article: Leise MD, Kim R, Kremers WK, Larson JJ, Benson JT, Therneau TM. A revised model for end-stage liver disease optimizes prediction of mortality among patients awaiting liver transplantation. Gastroenterology. 2011 Jun;140(7):1952-60. Epub 2011 Feb 18.

A Quick Summary

Background: MELD was created to predict mortality in patients undergoing TIPS and was later found to be applicable to ESLD patients awaiting transplantation. Much research has been done to see if this model can be improved to better predict patient prognosis and decrease wait-list mortality.

Objectives: 3 separate objectives.
- Optimize coefficients and upper/lower bounds
- Determine if addition of serum Na adds discrimination after MELD is optimized
- Compare final optimized model to current models (MELD, MELDNa, SRTR MELD)

Methods:
Study type: Retrospective cohort to evaluate prognosis.
Patient data:
- Population: adult primary liver transplantation candidates (cirrhotic patients awaiting 1st transplant)
- Retrospective, enrollment: January 2005- December 2008
- *Inclusion*: >18 yo, listed on Organ Procurement and Transplantation Network
- *Exclusion*: metastatic or primary liver malignancy, status 1 listing for acute liver failure
- Outcome: mortality within 90-days of listing (including if withdrawn from list); censored at time of transplant
- 28,131 pts included (14,190 and 13,941)

Statistical analysis:
- Divided into model-derivation dataset (2005-2006) and validation data set (2007-2008)
- Cox regression models evaluating mortality within 90 days to optimize coefficients

- Upper/lower bounds determined: "limits beyond which linearity of the relationships break down" (smoothing splines)
- Used 2005-2006 dataset with multivariable Cox regression model to determine if Na added to discrimination of optimized MELD
- Compared new to previous model using independent dataset (2007-2008), not used in derivation of coefficients: evaluated models ability for discrimination (concordance statistic)

Results:

- Main outcome measure: Ability to predict 90-day mortality of pts on the liver transplant wait list.
- Updated coefficients and upper and lower limits for variables were calculated.
- Serum Na predicted mortality even after accounting for updated MELD.
- Statistically significant gain in discrimination with new model.

Clinical Appraisal Tool

Are the Results Valid?

- Was the sample of patients representative? *Yes.*
- Were the patients sufficiently homogenous with respect to the prognostic risk? *Yes.*
- Was the follow-up sufficiently complete? *Maybe (reasonable for the study, but would need additional validation prior to implementation).*
- Were objective and unbiased outcome criteria used? *Yes.*

What Are the Results?

- How likely are the outcomes over time? *No survival curve given, but able to calculate likelihood of death over time (90 days) using ReFit MELD (estimate relative risk of death).*
- How precise are the estimates of likelihood? *Concordance is good (0.878).*

How Can I Apply the Results to Patient Care?

- Were the study patients and their management similar to those in my practice? *Yes.*
- Was the follow-up sufficiently long? *Maybe (reasonable for the study, but would need additional validation prior to implementation).*
- Can I use the results in the management of patients in my practice? *Maybe (would need to be accepted by the AALSD and UNOS for it to become clinically significant).*

Conclusion: This study was well designed and seems to have significant clinical implications. Implementation would likely have a statistically significant effect on liver transplant allocation and wait-list death. This model will not likely change our practice unless it is adopted universally. Further verification would need to be completed prior to this occurring.

Any questions?