Can MELD Be Improved: Implications of HCV Therapy and CKD

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Outline

1) MELD historical background
2) MELD impact
3) Shortcomings of MELD model
4) Improving MELD model
5) Improving future MELD allocation policy
Important Concepts from the Final Rule

**OPTN/UNOS Allocation Performance Goals**

- Allocation should be based upon **objective and measurable medical criteria**
- Allocation in the order of **medical urgency**
- Avoid **futile** transplants
- Promote patient **access to transplantation**
Important Concepts from the Final Rule

**OPTN/UNOS Allocation Performance Goals**

- **Minimize** role of waiting times
- Allocation **shall not** be based on the candidate’s **place of residence** or place of listing
- Organs shall be distributed over as **broad a geographical area** as feasible
MELD Model

Developed in TIPS patient
Bilirubin, INR, Creatinine (etiology)
Validated in UNOS patients
Validated around the world—Europe, S. America, China
Accurately predicts survival in advanced liver disease
Used to allocate deceased donor livers since Feb. 27, 2002
Has held up to intense scrutiny
Deceased Donor Liver Allocation

February 2002 Changes:

Child-Turcotte-Pugh Score → → MELD Score

- Ascites
- Encephalopathy
- Bilirubin
- Protime INR
- Albumin

- Creatinine
- Bilirubin
- Protime INR (sodium)

MELD Score = $0.957 \times \log_{e}(\text{creatinine mg/dL}) + 0.378 \times \log_{e}(\text{bilirubin mg.dL}) + 1.120 \times \log_{e}(\text{INR}) + 0.643$
ROC Curve for 3-Month Mortality on UNOS Waiting List

MELD
CTP

MELD Area = 0.83
CTP Area = 0.76

p < 0.001
MELD

What does it do?
Urgency Model

Estimates the probability of dying over time in patients with chronic liver disease

C-statistic 0.83 – 0.86
Impact of MELD

- Decreased deaths on waiting list
- Transplanted sicker patients (higher MELD 17-21)
- Increase HCC patients transplanted
- Post-transplant survival unchanged/improved
- Better defines survival benefit
- Allowed evidence-based decision-making
Challenges

- Restricted by geography and exceptions
- 15% prioritized wrong
- Exception MELD scores – non standardized
- HCC over prioritized
- Regional Review Boards
- Geographic disparity
- Increasing female disadvantage
- Increasing number of liver/kidney transplants
- Increased cost – High MELD
Approach to Further Reducing Deaths on the Waiting List

1) Increase number of donors
2) Improve MELD Model
3) Improve MELD Allocation Policy
Can We Improve MELD Model?

- Variable not used, ascites, encephalopathy, objective
- Add sodium
- INR measurement
- Use direct bilirubin measurement
- Better measurement of renal function (females)
- Re-weigh and cap variable in MELD
Significant Variables That Could NOT be Used in Model

- Etiology
- Recipient age
- Race
- Gender
- Transplant Center

Final Model – Creatinine, INR, Bilirubin
Sodium

- Hyponatremia associated with ascites and independent predictor of 3-month survival
- MELD Na—would affected 23%
- 7% of deaths on waiting list might have been prevented using MELD Na
- More important at lower MELD level (12-23)
Additional MELD Points Using Updated MELD-Na Equation
INR

- Variability – laboratories
- Standardized for patients on Warfarin
- Need accurate, reproducible measure of coagulopathy in liver patients
- Costs of developing INR standard for liver disease
- Treating chronic PVT with Coumadin to increase MELD score
Direct Bilirubin

- Use of total bilirubin may overestimate degree of liver dysfunction
- 10% of population have Gilberts – indirect bilirubin
- Hemolysis not uncommon in liver disease
Creatinine

• Inpatients with high serum bilirubin, serum creatinine can be overestimated.
• In females – underestimated degree of renal dysfunction
Gender Disparity

- Females associated with a 15% increased risk of death on the wait list and 20% decrease in probability of receiving a liver transplant
- Serum creatinine underestimates renal dysfunction in females
- Better measurement of renal function and addition of sodium may attenuate this difference
Waitlisted Women 20% Less Likely Than Men to Undergo Liver Transplantation

[Graph showing the probability of transplant and death over years since activation for males and females. UNOS 2002-2011.]

Women Receive Fewer Creatinine-MELD Points Than Men With Similar Renal Function

MELD-Na Worsens The Disparity

Women Receive fewer Than Expected Transplants at all MELD Scores


*adjusted for region, allocated MELD, recipient/donor height differences of ± 20 cm
Adding 1 Point to Biological MELD in Women Corrects Disparity


*adjusted for region, allocated MELD, recipient/donor height differences of ± 20 cm
Summary

• Women are disadvantaged in the current allocation system
• Serum creatinine underestimates renal dysfunction in women, resulting in 1-2 fewer MELD points
• Addition of Na to MELD worsens the disparity
• 1 MELD point deficit has considerable impact on women’s success to available livers, but the exact extent should be further assessed with simulation models
Re-Weighing MELD Variables

- Changing boundaries for creatinine (0.8 – 3.0 mg/L and INR 1-3)
- Weight of bilirubin increases
- Weight of INR and creatinine decreases
- Sodium is added
Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Concordance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original MELD</td>
<td>0.8653</td>
</tr>
<tr>
<td>Refit MELD</td>
<td>0.8675</td>
</tr>
<tr>
<td>MELD Na</td>
<td>0.8758</td>
</tr>
<tr>
<td>Refit MELD Na</td>
<td>0.8778</td>
</tr>
</tbody>
</table>

Would affect ~ 12% of transplantations and 29 fewer deaths per year
Conclusion

- Changes only lead to a small improvement of MELD model C-statistic
- Expense to re-program
- Unlikely to get concordance greater than 0.9 given random events that occur on wait list
Number of SLK transplants by Year
Survival Advantage of Receiving an SLK vs. Liver Alone Transplant

- **Renal failure groups (2+ month dialysis or serum creatinine 2.5+ mg/dl)**
  - LI alone (N=4,803) vs. SLK (N=2,385)
  - p-value = 0.0007

- **Non-renal failure groups**
  - LI alone (N=43,885) vs. SLK (N=682)
  - p-value = 0.0147
New Criteria for SLK

1) On dialysis regularly administered
2) GFR $\leq 30$ ml/min at listing and one of following for 6 wks or more:
   a) dialysis $\geq$ once per week
   b) Cr Cl $\leq 25$ ml/min measured once per week

Need to confirm eligibility every 7 days for 6 weeks
New Criteria for SLK (cont.)

- Local recipient who meets MELD kidney criteria
- OPO is required to offer kidney along with liver

- Regional recipient who meets MELD kidney criteria and MELD is $\geq 35$ or Status 1, Regional OPO required to offer kidney along with liver
Safety Net

Chronic kidney disease 2-12 months after liver transplant

1) on kidney list or GFR $\leq 20$
2) confirmed every 30 days
3) will receive additional priority for kidney transplant
Hepatitis C In DAA Era

- Decreased indications for liver transplant in HCV
- Should HCV patients with decompensated disease be treated pre or post transplant?
- Using Hep C (+) donors
- Using older donors for HCV patients
SVR in Hepatitis C Patients

- Decreased all cause mortality
- Decreased liver-related mortality
- Decreased need for liver transplant in some
- Lowered portal pressures
- Lowered frequency of HCC
Which preliver transplant patients will benefit and which will not benefit from treatment with DAA
SVR in Decompensated Cirrhotic with Hepatitis C

Change in MELD Score from Baseline to Follow-up Wk 12 in CPT B & C Patients

Improvement in MELD Score…

Left with patients who are not sick enough for liver transplant (lower MELD Score), but too sick for life.
Transplant Purgatory
Treatment Considerations HCV MELD ≥ 20

1) Diminish threat of death on waiting list
2) Not much data on long-term followup ? prevent liver transplant
3) Decrease response in cirrhotics to DDA
4) Hepatitis C (+) donors
5) Good results with post-transplant treatment
Post Transplant SVR Rates

- Pegylated Interferon + Ribavirin: 10%-30% SVR
- Pegylated Interferon + Ribavirin + PI: 40%-60% SVR
- All-Oral DAA Agents: 90%-95% SVR

Use of Hepatitis C Positive Donor in DAA Era
HCV (+) Donors – Weighing Benefits vs Risks

1) Shorten waiting time
2) May prevent complications or death on waiting list
3) Good results in treating HCV post-transplant
Using Hepatitis C Positive Donor

No difference in outcomes vs Hep C negative donors
a) Graft survival
b) Severity of hepatitis recurrence
c) Fibrosis formation
d) May be dominate genotype
Percent of HCV(+) Recipients Who Received an HCV(+) Donor By Year

Percent of HCV(+) Donor Livers Discarded By Year
Improving Meld Allocation Policy

Evidence-based Modifications to MELD Allocation

1) HCC
2) Share 15
3) Share 35
4) Geographic disparity
Factors Involved in Allocation Policy

Liver Allocation Policy

Status 1

MELD

Geography

Blood Type

Gender

Access

Exceptions

Local First

Size

Donor Type
MELD ALLOCATION SYSTEM FOR HCC

T2 = 1 lesion 2-5 cm, 2-3 lesions ≤ 3 cm
T1 = 1 lesion < 2 cm

Patients eligible for upgrade of MELD score every 3 months on waitlist

Yao, Mayo Clinic Transplant Grand Rounds: Sept 2010
Died or Removed From the List

Waitlist Dropout of HCC Patients

LDOR = 1 tumor <3 cm
Complete Response AFP < 20

Recent HCC Consideration

Waiting period before activated Cap Hep C at MELD 34
Share 15 Went Into Effect 2005

What was the impact?
Mortality Risk of Liver Transplantation Vs Waiting Based on MELD

Distribution of Livers Post Share 15

<table>
<thead>
<tr>
<th>Region</th>
<th>Pre-Share15</th>
<th>Post-Share15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>71.5%</td>
<td>69.8%</td>
</tr>
<tr>
<td>Regional</td>
<td>21.3%</td>
<td>21.2%</td>
</tr>
<tr>
<td>National</td>
<td>7.2%</td>
<td>9%</td>
</tr>
</tbody>
</table>

SRTR

Slide courtesy of R. Merion
Why did Share 15 Not Increase Regional Sharing?
Applications for MELD 15 Exception

Before Share 15  5
After Share 15  452 (74% approved)

81% transplanted at MELD <15 (Median 11)

Bitterman et al., Liver Transplantation 2012; 18:1302
Reason Applying for MELD 15 Exception

- Ascites 57%
- Encephalopathy 32%
- Pruritus 3%
- Cholangitis 3%
- Hydrothorax 1%

All accountable in MELD Score
Regional Differences

Region 3  44%
Region 10  29%
Region 8  1.5%
Region 5  2.2%

53% were from single center OPO’s
Conclusion

• Play-to-Keep local organs and prevent sharing for sicker patients
• Points to need for National Review Board to normalize criteria for MELD exceptions
• Single-center OPO’s should be eliminated
Or is it more about the Benjamin??
Most Important Impediment to MELD Allocation Policy is Geography
Regional Share 35

Started 6/18/2013
Help deal with geographic disparity
MELD/PELD 35+ Waiting List Outcomes: Competing Risks Analysis

Pre 35: N = 3764
- Other/Still Waiting
- Transplant
- Death

Post 35: N = 4796
- Other/Still Waiting
- Transplant
- Death

Post 6/18/2013-6/18/2015

P < 0.05
Share 35 Allocation

Gentry et al, Am J Transpl 2016 Jan
Adult Deceased Donor Liver Transplant Recipients, by Region and MELD Score at Transplant
Transplant Rates @ 365 Days
All Candidates Listed for a DD Liver Transplant
1/1/2007-6/30/09
Adults only, No Exceptions

* DSAs with <10 Txs during 2008 excluded
Proposal

- Broaden sharing
- 8 district model
- 4 district model
4 districts reduce disparity
## Optimized redistricting plans

<table>
<thead>
<tr>
<th>Districts</th>
<th>Standard deviation of tx MELD</th>
<th>% MELD &lt;15</th>
<th>% MELD &gt;25</th>
<th>% Pediatric</th>
<th>Net total deaths</th>
<th>Net waitlist deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1.87</td>
<td>2.5%</td>
<td>64.3%</td>
<td>8.7%</td>
<td>-553.8</td>
<td>-581.1</td>
</tr>
<tr>
<td>8</td>
<td>2.08</td>
<td>3.7%</td>
<td>59.6%</td>
<td>8.1%</td>
<td>-332.4</td>
<td>-342.1</td>
</tr>
<tr>
<td>Local first</td>
<td>3.01</td>
<td>5.8%</td>
<td>50.1%</td>
<td>7.5%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Regional</td>
<td>3.26</td>
<td>5.5%</td>
<td>54.3%</td>
<td>7.7%</td>
<td>-164.6</td>
<td>-122.4</td>
</tr>
<tr>
<td>National</td>
<td>1.66</td>
<td>1.9%</td>
<td>83.3%</td>
<td>10.4%</td>
<td>-343.6</td>
<td>-509.9</td>
</tr>
</tbody>
</table>
# Financial Impact of Redistricting

<table>
<thead>
<tr>
<th></th>
<th>Share 35</th>
<th>8 District</th>
<th>4 District</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Transplant (Per Month)</strong></td>
<td>6,038</td>
<td>5,934</td>
<td>5,928</td>
</tr>
<tr>
<td><strong>Transplant + 1 yr (Per Patient)</strong></td>
<td>187,120</td>
<td>191,811</td>
<td>195,228</td>
</tr>
<tr>
<td><strong>Transportation Costs (Per Patient)</strong></td>
<td>8,988</td>
<td>11,874</td>
<td>14,552</td>
</tr>
<tr>
<td><strong>Post-Trx Care (Patient / month)</strong></td>
<td>1,214</td>
<td>1,235</td>
<td>1,248</td>
</tr>
</tbody>
</table>
Conclusion

• MELD Model is excellent at prioritization of patient on the wait list based on survival

• MELD can be tweaked – adding sodium, re-weighting variables, but impact would be minimal, expensive, and cumbersome

• Broad sharing and a National Review Board to standardized exceptions would have the largest impact in reducing deaths on the waiting list

• Better define who needs liver/kidney transplant

• HCC prioritization
Ideal Model

Small number of variables
Objective parameters
Readily available
Standardized – Reproducible
Continuous score reflects disease severity
Applicable equally to all etiologies
Internal/External Validation
Evidence-based modification
Significant Variables That Could NOT be Used in Model

• Etiology
• Recipient age
• Race
• Gender
• Transplant Center

Final Model – Creatinine, INR, Bilirubin
Factors That Disadvantage Women

**WOMEN**

- Shorter
  - Small body ≠ big liver

- Less muscle mass
  - Lower creatinine = lower MELD

**MEN**

- More hepatocellular carcinoma = MELD exception points

MELD exceptions
Can MELD be Improved: Implications of HCV Therapy and CKD

Could Share 35 Disadvantage Women?

Alina M. Allen MD\textsuperscript{1}, Julie K. Heimbach MD\textsuperscript{1},
Joseph J. Larson\textsuperscript{1}, W. Ray Kim MD\textsuperscript{2}, Patrick S. Kamath MD\textsuperscript{1}, Terry M. Therneau PhD\textsuperscript{1}

\textsuperscript{1}Mayo Clinic, Rochester, MN
\textsuperscript{2}Stanford University, Stanford, CA
Women Disadvantaged in MELD Era

- Equitable allocation for liver transplant framed on principles of utility and justice
- Organ allocation based on MELD/MELD-Na and exception scores
- **Women less likely than men to undergo liver transplantation**
- Disparities more obvious in MELD era

Moylan C. JAMA 2008
Lai J. AJT 2010
Mathur AK. AJT 2014
Could Share 35 Disadvantage Women?

AIMS
To Determine

1. The difference in number of MELD points ("X") derived from serum creatinine in men and women with similar measured glomerular filtration rate (GFR)

2. Whether MELD-Na corrects the disparity between sexes

3. Whether addition of “X” number of MELD points improves women’s deficit in liver transplantation
Aim 1

Creatinine-derived MELD points in men vs women with similar renal function
Methods

- Adults listed for LT at Mayo Clinic, Rochester MN 2002 - 2014

- GFR measured in all subjects by iothalamate clearance (gold standard)
Could Share 35 Disadvantage Women?
## Patient Characteristics at Listing

<table>
<thead>
<tr>
<th></th>
<th>Women N=262</th>
<th>Men N=349</th>
<th>Total N=611</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (median, IQR)</td>
<td>55 (47-61)</td>
<td>54 (44-59)</td>
<td>54 (45-60)</td>
</tr>
<tr>
<td>Bilirubin (mg/dl)</td>
<td>2.5 (1.3-5.0)</td>
<td>2.6 (1.3-4.5)</td>
<td>2.5 (1.3-4.7)</td>
</tr>
<tr>
<td>INR</td>
<td>1.2 (1.1-1.4)</td>
<td>1.2 (1.1-1.5)</td>
<td>1.2 (1.1-1.5)</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>0.8 (0.7-1.2)</td>
<td>1.0 (0.8-1.2)</td>
<td>0.9 (0.7-1.2)</td>
</tr>
<tr>
<td>Measured GFR (ml/min/BSA)</td>
<td>68 (45-97)</td>
<td>80 (55-103)</td>
<td>75 (50-101)</td>
</tr>
<tr>
<td>MELD</td>
<td>13 (9-18)</td>
<td>14 (10-19)</td>
<td>14 (10-18)</td>
</tr>
<tr>
<td>MELD-Na</td>
<td>16 (11-20)</td>
<td>16 (12-21)</td>
<td>16 (11-21)</td>
</tr>
</tbody>
</table>
90-Day Mortality on Waiting List C-Statistics

MELD 0.896
MELD-Na 0.912*
MELD-Albumin 0.913*
MELD-Na-Albumin 0.922*

* P < 0.01

Myers, et al.  PlusOne   January 2013
Removed Because Mortality / Too Sick on List
Chronic Liver Disease vs HCC (90 Days)

SRTR Analysis, Jan 2004
Dropout of HCC Patients with $T_2$ Lesion

![Graph showing dropout rates over months](image-url)
Percent of Transplant Recipients with MELD/PELD $\geq 15$ by DSA
Reason for Removal from the Liver Wait List
Among Candidates with MELD/PELD at Removal ≥ 15
Removal Date During Pre- or Post-Period

- **Pre-Share15**
- **Post-Share15**

<table>
<thead>
<tr>
<th>Reason for Removal</th>
<th>Pre-Share15</th>
<th>Post-Share15</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXP - DD</td>
<td>77.8%</td>
<td>81.5%</td>
</tr>
<tr>
<td>Died</td>
<td>11.7%</td>
<td>8.5%</td>
</tr>
<tr>
<td>Recovered</td>
<td>0.4%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Too sick</td>
<td>3.3%</td>
<td>3.0%</td>
</tr>
<tr>
<td>TXP - LD</td>
<td>2.4%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Other</td>
<td>4.5%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>
Summary: Post Share 35 Era Data

- Increased number / percent of MELD / 35+ transplants
- Increased regional sharing
- No impact of overall liver discard rate
- No impact to overall waiting list mortality
  - No impacts to waiting list mortality by age, ethnicity
- MELD / PELD 35+ waiting list candidates
  - Increased transplant rate
  - Decreased mortality rate
- Liver-Intestine candidates
  - Increased transplant rate
  - Mortality rate unchanged
- Post-transplant survival
  - No overall change
  - No change to outcomes for MELD/PELD 35+ recipients
Existing geographic disparity

Median Transplant MELD

- None
- MELD > 28
- MELD 25-28
- MELD 23-25
- MELD < 22

Map of the United States showing varying levels of MELD across different states.
Death Rates* @ 365 Days
Candidates Listed for a DD Liver Transplant
By DSA within Region

*Adults only, No Exceptions, Initial MELD>=15, Candidates with an Initial Status of 1A/1B Excluded, DSAs with fewer than 10 events excluded
MELD / PELD Allocation Summary

- Excellent predictor of pretransplant survival
- Decreased registrations (MELD < 10)
- Decreased death rate on waiting list
- Transplant sicker patients
- Increase transplant of HCC patients
- Post transplant survival unchanged
- Resource utilization correlates with MELD
- Better defining impact of donor-recipient matching
- Better defining survival benefit - optimal timing
- Evidence-based decision-making
How to Improve Allocation Policy

1) Larger sharing area – eliminate single-center OPO’s
2) Allow only recognized exceptions: HCC, HPS
3) National unbiased Review Board
4) Standardize INR for liver disease
5) Add sodium to MELD score
6) Better define those who need Liver/Kidney transplant
7) Better define Donor-Recipient matching to optimize outcomes
8) Pursue transplant – Benefit Model
MELD $\geq 35$: Pre 19%  Post 29%

Cost Difference
Pre 35  -  Post 35

Pre Tx Cost  7,076
Post Tx Cost 2,602

- Pre Tx cost reduction may offset increased cost of transplant patients with MELD $\geq$35 (19-28%)
Eight Districts

Gentry et al. Am J Transpl 2016 Jan
Four Districts

Gentry et al, Am J Transpl 2016 Jan
### Share 35 Regional Percentage January 2013

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>New 35 List</td>
<td>9.2% - 9.7%</td>
</tr>
<tr>
<td>DAA ≥ 35</td>
<td>23.7% - 30.1%</td>
</tr>
<tr>
<td>Regional Share</td>
<td>18.9% - 30.4%</td>
</tr>
</tbody>
</table>

- No change CPT
- Mortality ↓ 30% MELD > 30
- Post-Trx loss, mortality
- Few died

**Acceptance Rate**

<table>
<thead>
<tr>
<th>DAA</th>
<th>22.3%</th>
<th>10.3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3</td>
<td>1.4</td>
<td></td>
</tr>
</tbody>
</table>
MELD Exceptions

• Liver “diseases” whose natural history is not quantified by MELD
  - Hepatocellular carcinoma
  - Cholangiocarcinoma
  - Neuroendocrine

• Complications of cirrhosis that change the natural history of the disease, independent of liver function
  - Hepatopulmonary syndrome
  - Portopulmonary hypertension

• Diseases expressed in the liver, that do not cause liver disease
  - Familial amyloidosis
  - Hereditary oxalosis
  - Polycystic liver disease
MELD Exceptions 2013

- HCC – Not criteria: 1185
- Hepatopulmonary: 249
- Portopulmonary: 81
- Hepatic artery thrombosis: 63
- Metabolic disease: 66
- Primary oxaluria: 23
- Familial amyloid: 22
- Other: 2098
  - (PSC, ascites, encephalopathy)
Risk of Waitlist Mortality

Summary: Key Points

- Regional sharing increased from 19.4% to 30.4% of deceased donor transplants
- MELD/PELD 35+ transplants increased from 19.9% to 25.2%
- Liver-intestine transplants increased from 12 to 44
- Liver discards decreased
- Waiting list mortality decreased 7%
- Import/export dynamics by DSA was similar between eras

OPTN
Liver Waiting List Death Rates: Deaths/100 Patient-Years

- **Pre:**
  - Adults: 19.6 (1536)
  - Pediatrics: 7 (17)
  - Overall: 19.2 (1553)

- **Post:**
  - Adults: 18.2 (1419)
  - Pediatrics: 8 (20)
  - Overall: 17.9 (1439)

Relative Risk: Post vs. Pre

*Pre: 12/17/2012 – 6/17/2013*
*Post: 6/18/2013 – 12/17/2013*

OPTN

UNOS | EMBRACE LIFE

*Relative Risk: Post vs. Pre*
Proportion of Liver Transplant Recipients with a Waiting Time of 90 Days or Less by Region

SRTR: Analysis Data as of May 2009
Decrease in Total Deaths vs. Percent Shared

- Current
- R35_Current
- Share 15 National
- R35_S15National
- R35 w/ S15N
- R35 w/ Current

Percent Shared (not local)
Impact of MELD

- Reduction in waiting list registration (12%)
- Reduction in deaths on waiting list (3-5%)
- Decreased median waiting time (6-416 days)
- Transplanted within 30 days (23% 2001 to 37% 2008)
So is this really about looking out for the needs of John Q. Public?
# Impact of Share 35

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocated MELD ≥ 35</td>
<td>23.1%</td>
<td>30.1%</td>
</tr>
<tr>
<td>Regional Share</td>
<td>18.9%</td>
<td>30.4%</td>
</tr>
<tr>
<td>CIT (hours)</td>
<td>6.0%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Waitlist Mortality MELD ≥ 30</td>
<td>17.6%</td>
<td>16.3%</td>
</tr>
<tr>
<td>Post Tx Mortality</td>
<td>Unchanged overall except 4, 10</td>
<td></td>
</tr>
<tr>
<td>Post Tx Length of Stay</td>
<td>Unchanged</td>
<td></td>
</tr>
</tbody>
</table>


8 districts reduce disparity

Median Transplant MELD

- None
- MELD > 28
- MELD 20-28
- MELD 23-25
- MELD < 23

Map showing the distribution of median transplant MELD across different districts in the United States.