



Liver Circle-Based Allocation: LSAM Modeling Results

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Introduction

- On June 25, 2018, the OPTN Board of Directors (BOD) directed the Liver and Intestinal Organ Transplantation Committee to propose changes to policy removing donation service area (DSA) and region as units of allocation.
- At the request of the Committee, we modeled two allocation frameworks: acuity circles and broader 2-circle distribution.
- Here we compare the results with the current allocation policy and the policy approved by the BOD in December 2017.

Methods

- We used the LSAM to model deceased donor liver candidates from July 1, 2013-Jun 30, 2016, and modeled each scenario 10 times.
- The “current” scenario models the policy in effect pre-May 14, 2019.
- In the acuity circle framework, organs are offered first to status 1A, then to 1B candidates in the largest circle (500 or 600 miles), and then to candidates in expanding concentric circles around the donor hospital, by descending MELD groupings.
- In the broader 2-circle distribution framework, organs are offered first to status 1A, then to 1B candidates in the largest circle (500 miles), and then to candidates with MELD ≥ 35 (or 32) within a 250-mile circle.

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Table 1. Overview of Main Metrics

Scenario	Variance in Median Allocation MELD/PELD at Transplant	Median Allocation MELD/PELD at Transplant	Median Transport Time (hours)	Median Transport Distance (miles)	Percent of Organs Flown
Current	9.97 (8.74,11.9)	29 (29,29)	1.7 (1.7,1.7)	88.5 (86.9,90)	50.7 (50.2,51.1)
Board Approved	7.41 (6.36,8.47)	29.1 (29,30)	1.7 (1.7,1.7)	100.4 (98.7,101.9)	54.4 (53.8,54.9)
Acuity 250+500	4.33 (3.23,6.27)	31 (31,31)	1.9 (1.9,1.9)	183.5 (180.4,187)	71.4 (70.6,71.9)
Acuity 300+600	4.07 (3.13,6.18)	31 (31,31)	2 (2,2)	211.3 (207.5,217)	74 (73.6,74.4)
Broader 2-Circle MELD 35	6.74 (5.85,8.83)	29 (29,29)	1.8 (1.7,1.8)	107.7 (106.1,110.2)	58.4 (58,59.1)
Broader 2-Circle MELD 32	6.54 (5.37,8)	29.5 (29,30)	1.8 (1.8,1.8)	117.1 (115.8,118.6)	60.8 (60.3,61.5)

Table 2. Overview of Additional Metrics

Scenario	Transplant Rate	Transplant Count	Waitlist Mortality Rate	Waitlist Mortality Count	Post-Transplant Mortality Rate	Post-Transplant Mortality Count
Current	0.443 (0.435,0.451)	6651 (6575,6727)	0.097 (0.095,0.1)	1455 (1425,1504)	0.077 (0.075,0.08)	686 (666,721)
Board Approved	0.438 (0.43,0.448)	6643 (6561,6728)	0.091 (0.09,0.093)	1386 (1358,1419)	0.077 (0.075,0.079)	684 (662,712)
Acuity 250+500	0.428 (0.422,0.436)	6594 (6491,6672)	0.087 (0.085,0.088)	1341 (1310,1364)	0.078 (0.076,0.08)	687 (664,718)
Acuity 300+600	0.426 (0.419,0.434)	6583 (6492,6662)	0.085 (0.083,0.086)	1318 (1278,1346)	0.079 (0.078,0.08)	688 (676,719)
Broader 2-Circle MELD 35	0.438 (0.432,0.448)	6620 (6543,6706)	0.095 (0.093,0.096)	1433 (1404,1463)	0.077 (0.073,0.08)	676 (647,717)
Broader 2-Circle MELD 32	0.437 (0.43,0.446)	6616 (6556,6692)	0.094 (0.092,0.095)	1423 (1391,1442)	0.077 (0.076,0.08)	682 (661,721)

Figure 1. Maps of Median Allocation MELD/PELD at Transplant by DSA

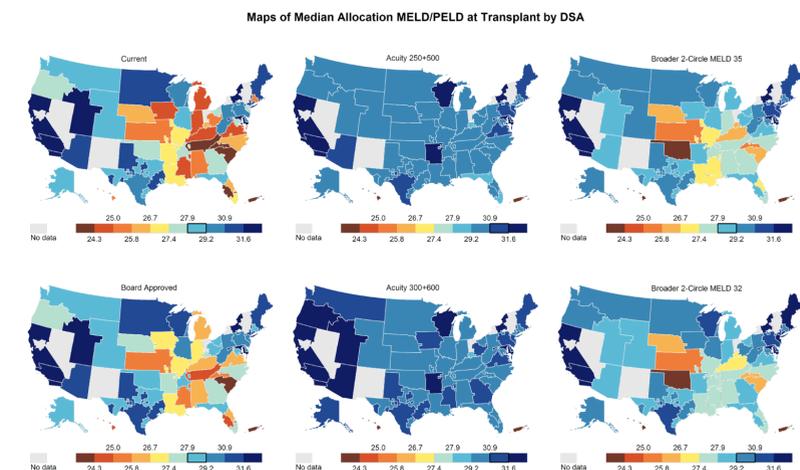


Figure 2. Maps of Percentage of Organs Flown by Transplant DSA

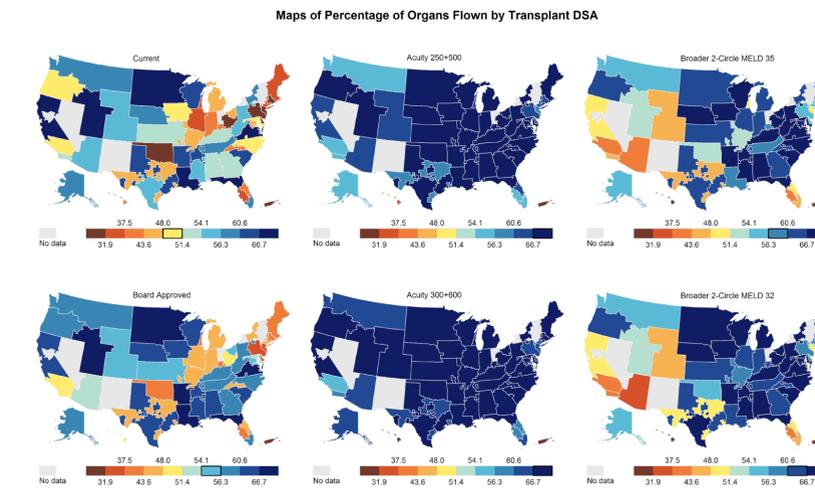
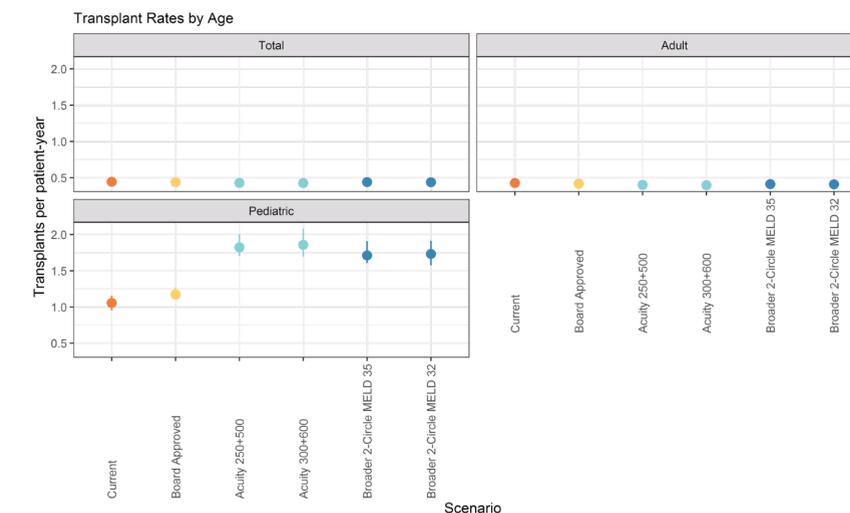


Figure 3. Transplant Rates by Age



Results

- Both acuity circle and broader 2-circle scenarios decreased variance in median MELD at transplant by DSA compared with current allocation policy (Table 1, Figure 1).
- Broader 2-circle scenarios yielded results similar to the BOD approved policy, while acuity circle scenarios decreased variance further.
- Acuity circle and broader 2-circle scenarios both increased the percentage of organs flown in most DSAs (Figure 2).
- Specifically, the percentage flown increased the most in the acuity circle scenarios.
- Furthermore, the waitlist mortality rates in the broader 2-circle scenarios were higher than in the BOD-approved policy scenario, while rates were lower in the acuity circle scenarios (Table 2).
- Transplant rates in pediatric candidates increased in acuity circle and broader 2-circle scenarios (Figure 3).
- We saw no differential impact on subgroups associated with socioeconomic status: race, insurance type, CCRS, and urbanicity.

Conclusions

- Broader 2-circle scenarios yielded similar results to the policy approved by the BOD in December 2017.
- Acuity circle scenarios showed greater magnitude of change than broader 2-circle scenarios.

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