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The impact of increased allocation priority for children awaiting liver transplant: A Liver Simulated Allocation Model (LSAM) analysis

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Abstract

Objective: To investigate the impact of prioritizing infants, children, adolescents and the sickest adults (Status 1) for deceased donor livers. We compared outcomes under two “SharePeds” allocation schema, which prioritize children and Status 1 adults for national sharing and enhanced access to (1) pediatric donors or (2) all donors <35 years old, to outcomes under the allocation

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plan approved by the Organ Procurement and Transplant Network in December 2017 (OPTN 12–2017).

Methods: The 2017 Liver Simulated Allocation Model (LSAM) and Scientific Registry of Transplant Recipients (SRTR) data on all U.S. liver transplant candidates and liver offers 7/2013–6/2016 were used to predict waitlist deaths, transplants, and post-transplant deaths under the OPTN 12–2017 and SharePeds schema.

Results: Prioritizing national sharing of pediatric donor livers with children (SharePeds 1) would decrease waitlist deaths for infants (<2 years, $p=0.0003$) and children (2–11 years, $p=0.001$), with no significant change for adults ($p=0.13$). Prioritizing national sharing of all <35-year-old deceased donor livers with children and Status 1A adults (SharePeds 2), would decrease waitlist deaths for infants, children, and all Status 1A/B patients ($p<0.0001$ for each). SharePeds 1 and 2 would increase the number of liver transplants done in infants, children, and adolescents compared to the OPTN-2017 schema ($p<0.00005$ for all age groups). Both SharePeds schema would increase the percentage of pediatric livers transplanted into pediatric recipients.

Conclusions: Waitlist deaths could be significantly decreased, and liver transplants increased, for children and the sickest adults, by prioritizing children for pediatric livers and with broader national sharing of deceased donor livers.

Keywords

pediatric liver transplantation; waitlist mortality; post-transplant mortality; organ allocation

Introduction:

Liver transplantation is a life-saving procedure for children and adolescents with end-stage liver disease and other conditions. But among pediatric patients waitlisted for liver transplant, 1 in 10 infants and 1 in 20 older children die waiting. The pre-transplant mortality rate for children <1 year at listing is higher than that of adults. Over the last several years, pediatric waitlist mortality rates have stalled for all age groups.¹

One critical barrier to reducing children's waitlist mortality is access to appropriate livers. Infants and children need either small livers from pediatric donors or high-quality livers, usually from adolescent donors, that are amenable to splitting.² Despite this need, 47% of pediatric donor livers are transplanted into adult recipients. In contrast, approximately 2% of all adult deceased donor livers are transplanted into children.³ Of pediatric livers allocated to adults, 25% are transplanted having *never been offered to a child*.⁴ Of the adult donor livers deemed split-able by strict criteria (6.3% of all transplanted livers), only 3% of the total are transplanted into children.⁵ Finally, children that die on the waitlist receive a median of 1 liver offer prior to death, versus a median 5 offers for adults who die on the waitlist.⁴

Prioritizing children's access to suitable liver donors would increase their timely transplant and prevent deaths on the waiting list. Over the past year, in efforts to broaden liver distribution and reduce geographic disparities for all liver transplant candidates, the Organ Procurement and Transplantation Network (OPTN) has created new proposals for liver allocation. An initial revision was approved by the OPTN Board in December 2017; this

scheme primarily increased priority for candidates within a 150-nautical mile proximity circle of a deceased donor to decrease “local” liver distribution to adult candidates with a lower disease severity score in the donor service area (DSA). (“OPTN 12–2017,” TABLE 1) Prior to implementation of this approved schema, OPTN created a second set of allocation schema (OPTN 11–2018) in response to ongoing criticism. The OPTN 11–2018 schema replaces DSA and region with concentric circles around the donor hospital.

Although both OPTN proposals increase pediatric priority for pediatric donor livers, initial modeling suggests that they will not substantially decrease pediatric waitlist deaths.⁶ The analysis presented here, which was initiated in response to the OPTN 12–2017 Board-approved schema, highlights (1) allocation options that would more significantly improve outcomes for children, with minimal overall impact on adults, and (2) analysis options that more fully represent the impact of allocation changes on children. For this analysis, we utilized the Liver Simulated Allocation Model (LSAM), the computer simulation program utilized by the Scientific Registry of Transplant Recipients (SRTR) and OPTN. We propose two SharePeds allocation schemes (TABLE 1) and hypothesized that (1) prioritizing national sharing of livers with the sickest children and adults and (2) giving children higher priority for all pediatric livers, would increase pediatric transplants and decrease pediatric waitlist mortality, with minimal impact on adult transplants and waitlist deaths.

Methods:

Simulation and Data Source

This study used data from the Scientific Registry of Transplant Recipients (SRTR). The SRTR data system includes data on all donors, wait-listed candidates, and transplant recipients in the US, submitted by the members of the OPTN, and has been described elsewhere.⁷ The Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services provides oversight to the activities of the OPTN and SRTR contractors.

LSAM is the software tool used by SRTR to perform discrete-event simulation modeling of the U.S. liver allocation system.⁸ The LSAM version used for this analysis included liver transplant candidates and organs offered between July 1, 2011 and June 30, 2016.⁹ The simulation time period was three years (7/1/2013–6/30/2016). LSAM settings were adjusted so the total number of transplants remained approximately the same under both schemes, as the proposed scheme was not expected to significantly change the number of transplantable livers. Primary outcomes of interest were (1) waitlist deaths, (2) transplants and (3) post-transplant deaths.

Allocation scheme proposals

To test the effects of increasing pediatric priority, we ran ten replications of LSAM 2017 under three allocation schemes: (1) **OPTN 12–2017**, the scheme approved by the OPTN Board in December 2017, (2) **SharePeds 1**, which prioritizes national sharing of pediatric deceased donor livers (<18 year old) with children and with adult Status 1A patients and (3) **SharePeds 2**, which prioritizes national sharing of both pediatric and young adult (0–34

year old) deceased donor livers with children and Status 1A adults. (TABLE 1) Following the OPTN 12–2017 schema, the SharePeds proposals prioritize patients in the Region *or* within a 150-mile circle radius of the donor hospital, with DSAs still acting as a “local” allocation area for young adult livers. In **SharePeds 2**, transplant recipients 0–11 years of age are also prioritized above adults at each geographic and acuity level in the allocation of young adult donor livers, by distributing based on PELD score and then on MELD score.

To investigate the impact of larger sharing circles of pediatric donor livers, as has been proposed in the newer OPTN allocation schemas (**OPTN 11–2018**, SUPPLEMENTARY TABLE 1) we also evaluated the primary outcomes under each scheme using circles with radius around the donor hospital increased from 150 to 500 nautical miles.⁵

Statistical analysis

Across replications, the minimum, median, and maximum for each primary outcome were calculated. Results were compared to the OPTN 12–2017 scheme via matched pairs t-tests. Although multiple-testing adjustments were not formally made in this analysis, we considered $p < 0.001$ as statistical significance given the multiple tests performed. Numbers presented in the Results represent the median value (of deaths, transplants, or miles) across the 10 LSAM iterations over the 3-year study period. To investigate the impact on all children, results were disaggregated by age group (<2, 2–11, 12–17, and 18 years). We considered the impact on outcomes by illness severity, as represented by Status 1A or 1B at transplant, and by gender among adult recipients. We examined the impact of SharePeds 1 and 2 on waitlist time and on distance traveled by donor organs.

Results:

Deaths on the liver transplant waiting list:

Prioritizing national sharing of pediatric deceased donor livers for children (SharePeds 1) would significantly decrease waitlist deaths for infants (<2 years of age, $p = 0.0003$) and children (2–11 years of age, $p = 0.0013$), with no significant change in deaths for adolescents (12–17 years of age, $p = 0.71$) or adults ($p = 0.13$), compared to the OPTN-2017 approved schema (FIGURE 1A). Prioritizing national sharing of all <35-year-old deceased donor livers for children and Status 1A adults (SharePeds 2), would decrease waitlist deaths for infants and children ($p < 0.00005$) but not for adolescents ($p = 0.07$). For adults, waitlist mortality would not change under SharePeds 1 or 2 (1: $p = 0.13$, 2: $p = 0.02$). (FIGURE 1A)

Increasing the sharing circle radius to 500 miles would decrease waitlist deaths to a similar degree as SharePeds 1 and 2 in infants ($p = 0.0002$ OPTN-2017, 150-mile circle vs. OPTN-2017, 500-mile circle FIGURE 1A). For children, although a 500-mile sharing circle alone is projected to decrease waitlist deaths ($p = 0.001$, FIGURE 1A), waitlist mortality is still lower with SharePeds 1 and 2 ($p < 0.0001$ for comparison of all SharePeds options with OPTN-2017 + 150-mile radius, FIGURE 1A). Increasing the sharing circle radius to 500 miles would decrease waitlist deaths for adults under all three schemas. (FIGURE 1A)

Liver transplants:

SharePeds would increase the number of liver transplants done in infants, children, and adolescents compared to the OPTN-2017 schema ($p<0.00005$ for all age groups, FIGURE 1B). The number of liver transplants done in adults is expected to decrease (1: $p<0.0001$, 2: $p<0.00005$). By design of the simulation, there was no change in the overall number of transplants (18,536 under the OPTN Board-Approved vs. 18,541 under SharePeds 1, $p=0.66$, and 18,501 under SharePeds 2, $p=0.51$).

Increasing the sharing circle radius to 500 miles instead of using SharePeds 1 or 2 would also increase the number of transplants done in infants, children, and adolescents ($p<0.00005$ for all age groups, FIGURE 1B). However, combining a 500-mile circle with the national sharing and enhanced pediatric priority of SharePeds again leads to a larger increase in transplants, for infants and adolescents, than increased circle radius alone. For adults, a 500-mile proximity circle is predicted to decrease the number of transplants, and this would not further decrease with either SharePeds schema. (FIGURE 1B)

Distribution of pediatric deceased donor livers:

Under SharePeds 1 and 2, a larger percentage of deceased donor livers from children and adolescents would be allocated to pediatric recipients. Adults would make up a smaller percentage of the patients receiving children and adolescent deceased donor livers. Under SharePeds 2, increasing the sharing circle radius to 500 miles is not predicted to cause additional substantial changes to the distribution of pediatric donor livers. (FIGURE 2)

Days on the liver transplant waiting list:

SharePeds would reduce median waitlist days for all pediatric age groups. Median days on the waitlist for infants would decrease from 49 under the OPTN-2017 scheme to 37 under SharePeds 1 and 33 under SharePeds 2. For children median days waiting would decrease from 79 under OPTN-2017 to 53 under SharePeds 1 and 47 for SharePeds 2. For adolescents they would decrease from 84 under OPTN-2017 to 64 under SharePeds 1 and 71 under SharePeds 2. SharePeds would not change median waitlist days for adult candidates: 76 under OPTN-2017 or SharePeds 2, and 77 under SharePeds 1.

Travel distance for deceased donor livers:

The median distance that a transplanted liver travels, from donor to recipient, is higher under the SharePeds schema, driven by increased national sharing. For infants, children, and adults who receive regionally shared liver, the travel distance actually decrease under SharePeds. Distance travelled by nationally shared organs increase for all age groups, most substantially for adolescents and adults who receive national share donor livers. (SUPPLEMENTARY FIGURE 1)

Post-transplant deaths:

Neither SharePeds 1 nor 2 would significantly change the percentage of transplanted infants, children, adolescents, or adults that die post-transplant over the three years modeled compared to OPTN-2017 ($p>0.001$ for each comparison, data not shown). Increasing the

sharing circle radius to 500-miles would not significantly change the percentage of transplanted infants, children, or adolescents that die during the three years ($p>0.001$ for each comparison, data not shown).

Impact on Status 1 patients:

For Status 1A patients, including children and adults,, SharePeds 1 would increase transplants but not improve waitlist or post-transplant mortality. SharePeds 2, with increased national sharing of all deceased donor livers <35 years old, would significantly decrease waitlist deaths, increase transplants, and decrease post-transplant deaths for Status 1A patients (TABLE 2)

For Status 1B children, both SharePeds 1 and 2 would significantly reduce waitlist deaths. (TABLE 2) SharePeds would significantly reduce post-transplant deaths only in Status 1A candidates, with no predicted change for Status 1B and MELD/PELD candidates. (TABLE 2)

Impact of SharePeds on women:

Under SharePeds with 150-mile circles, adult women are not projected to have a change in waitlist deaths (SharePeds 1: $p=0.16$, 2: $p=0.95$). Total transplants in women would decrease (6034 under OPTN-2017 vs. 5961 in SharePeds 1, $p=0.0008$, and 5932 in SharePeds 2, $p=0.0003$). Expanding the sharing circle radius to 500 miles leads to reduced waitlist deaths for women (1449 vs. 1300 in SharePeds 1, 1326 in SharePeds 2, $p<0.00005$ for both) without a significant reduction in total transplants (6034 vs. 6008 in SharePeds 1, $p=0.52$, and 5985 in SharePeds 2, $p=0.03$).

Discussion:

The SharePeds allocation—which prioritizes pediatric patients for pediatric and young adult livers and institutes broader national sharing of livers with the sickest patients of all ages—would decrease waitlist deaths for infants, children, and the sickest adults. It would increase transplants in pediatric patients of all ages and more effectively shift pediatric donor livers from adults to children than the schema that OPTN approved in 2017. Particularly for children aged 2–12, broader national sharing is predicted to have a much larger impact on transplants and waitlist deaths than increasing “sharing circle” radius alone.

The last 16 years have seen no significant updates to pediatric prioritization for deceased donor livers—despite a mandate from the National Organ Transplant Act that organ allocation criteria “address the unique health care needs of children,” recognition by OPTN that pediatric priority is justifiable,⁷ and numerous initiatives proposed and passed by the OPTN Pediatric Committee. The soon-to-be implemented National Review Board for pediatric candidates seeks to standardize MELD/PELD exception points for children nationwide, but it again was not designed to improve children’s access to livers relative to adults.

Although the new OPTN allocation schemas do increase pediatric priority for pediatric donor livers, they actually de-prioritize the national sharing of livers for the sickest

candidates and add no priority for pediatric access to adult livers. (SUPPLEMENTARY TABLE 1) Critically, available data suggest that the newer allocation schemes (OPTN 11–2018) would significantly increase transplant rates for infants and children but would have minimal to no impact on waitlist mortality rates, waitlist deaths per year, and total transplants per year. OPTN simulations also suggest that broader sharing circles could increase the variance in transplant rates for children—potentially increasing geographic disparities—as opposed to decreased variance in adults.⁶

Two differences in the SharePeds allocation schema appear to account for the significant reduction in waitlist mortality observed. First, SharePeds prioritizes national sharing of donor livers for the Status 1 children and adults higher than in OPTN 12–2017 or newer OPTN 11–2018 proposals. (FIGURE 1, SUPPLEMENTARY TABLE 1) Second, SharePeds prioritizes children above adults at each level of illness severity and geographic distribution unit, which neither the OPTN-2017 nor OPTN-2018 approved schemas do.

Our modeling does suggest that SharePeds would shift livers from adults to children, decreasing the total number of transplants for non-Status 1 adults. The National Organ Transplant Act charged OPTN, upon its creation, with addressing “the unique health care needs of children,” and subsequent ethical analysis endorsed by the OPTN/UNOS has provided justification for pediatric priority in organ allocation. Ethical justifications for pediatric priority include children’s time-limited opportunity to achieve their developmental and growth potential and their high likelihood of long-term survival post-transplant. This ethical analysis also recognizes that children are disadvantaged by their small size, which limits their pool of appropriate donor livers.¹⁰ Enhanced priority for pediatric liver transplant candidates is embedded in the allocation system of several countries outside the U.S.¹¹

We also suspect that LSAM overestimates the transplant decrease for adults because the current model cannot account for the potential split liver transplants that could be generated. In LSAM simulations, each donor liver can be transplanted into only one recipient. However, approximately 30% of transplanted children receive a split liver transplant,¹² and 84% of livers split for transplant are utilized for two recipients.¹³ Prioritizing children for young adult deceased donors will likely increase the liver sections available for a second transplant, as a whole adult liver is often too large for a small child, thus increasing the overall number of transplants performed. Increased availability of right lobe segments may help women, another group disadvantaged by the current allocation system.¹⁴ This limitation could be addressed by projecting the increase in livers available for split transplant under SharePeds; the sharing of organs could encourage increased organ utilization overall.

A key limitation of this analysis is that our baseline is the OPTN Board-approved allocation scheme from December 2017; comparison of our SharePeds proposal to the newer models approved in November 2018 is not yet available. However, of critical importance to the pediatric transplant community is that neither of the OPTN schema prioritizes nationwide sharing with children as proactively as the SharePeds proposals outlined here; and our analysis suggests that this nationwide sharing may be critical to reducing waitlist deaths in children. Neither were accompanied by LSAM modeling that consider pediatric waitlist mortality by pediatric age group or Status 1 categories—both of which are key to truly

understanding the impact of allocation changes on children. And neither examine the impact of allocation changes on other pediatric subsets that have been shown in recent work to have a higher risk of poor outcomes—including those with public insurance and of Hispanic ethnicity.¹⁵

LSAM has inherent limitations that limit its ability to fully model the impact of allocation changes on vulnerable groups of children. Categories for pediatric transplant indication are limited, such that children with non-cirrhotic diseases that are eligible for Status 1B--like urea cycle disorders and hepatoblastoma—cannot be differentiated from children with cirrhotic diseases that earn Status 1B for decompensated liver disease. LSAM has de-identified patient information that cannot be linked to the SRTR database or OPTN Standard Transplant Analysis and Registry (STAR) files, so additional categories of interest for children cannot be fully defined. LSAM also does not model multi-organ transplants or patients listed at multiple transplant centers. LSAM cannot predict changes in behavior that could impact an individual's access to a liver—including requests for MELD/PELD exception points or utilization of living donors. Furthermore, LSAM is unable to determine the impact of prioritizing children on the potential generation of increased access to split liver transplantation for adults, as each deceased donor liver can be allocated only once in LSAM.

In conclusion, this analysis highlights that although the most recent proposed allocation schema will increase transplants and lower waitlist times for pediatric liver transplant candidates, significant impacts towards eliminating waitlist mortality will require broader sharing than currently proposed, with increased consideration of national sharing. We support broader sharing for pediatric liver candidates, to meet both our ethical imperative and legal mandate to address the unique needs of children in allocation of deceased donor livers.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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What is known:

- Among pediatric patients waitlisted for liver transplant, 1 in 10 infants and 1 in 20 older children die waiting.
- One critical barrier to reducing children's waitlist mortality is access to appropriate livers. Despite this need, 47% of pediatric donor livers are transplanted into adult recipients whereas approximately 2% of adult livers are transplanted into children.
- Although the 2017 Board-Approved OPTN liver allocation proposals do increase pediatric priority for pediatric donor livers, they de-prioritize national sharing of livers and add no pediatric priority for access to young adult livers. The 2017 OPTN proposals are not projected to significantly reduce pediatric waitlist mortality.

What is new:

- Prioritizing national sharing of pediatric donor livers for children (SharePeds 1) would significantly decrease waitlist deaths for infants and children, with no significant change for adults.
- Prioritizing national sharing of all <35-year-old deceased donor livers for children and Status 1A adults (SharePeds 2), would significantly decrease waitlist deaths for infants, children, and all Status 1 patients.
- SharePeds 1 and 2 would increase the number of liver transplants done in infants, children, and adolescents.
- Both SharePeds schema would increase the percentage of pediatric livers transplanted into pediatric recipients.

A

FIGURE 1:

(A) Deaths on the liver transplant waiting list and (B) liver transplants, by age group, over three years. Figures show median number predicted by LSAM, with maximum and minimum numbers generated in 10 simulation trials, under the allocation schema approved by OPTN in 2017 ("OPTN 12-2017") and SharePeds allocation schemas. SharePeds 1 prioritizes national sharing of pediatric deceased donor livers with children; SharePeds 2 prioritizes national sharing of livers from deceased donors <35 years with children and prioritizes children above adults at each illness severity level (see Table 1). Results shown

for proximity circles with 150-mile (solid line, on left of each pair) and 500-mile (dashed line, on right of each pair) radii. Asterisk denotes $p < 0.001$ for difference, compared to OPTN 12–2017 with 150-mile proximity circle radius.

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FIGURE 2:

Predicted distribution of deceased donor livers, by age group of deceased donor and recipient, under the OPTN 12–2017 vs. SharePeds 2 allocation scheme. Graph illustrates distribution under SharePeds 2, which prioritizes national sharing and pediatric priority of both pediatric and adult donor livers. From SharePeds 1 to 2, no percentage in the distribution changes by >1%, except for a 2% increase in donors 2–11 years old going to adults under SharePeds 2.

OPTN Board-approved and SharePeds allocation schema as utilized for LSAM modeling in this analysis, by donor age group

TABLE 1:

Liver donor 0-11 years old				Liver donor 11-17 years old				Liver donor 18-34 years old							
OPTN 12-2017		SharePeds 1 and 2		OPTN 12-2017		SharePeds 1 and 2		OPTN 12-2017		SharePeds 2 ONLY					
Circ/Reg	Peds 1A	Circ/Reg	Peds 1A	Circ/Reg	Peds 1A	Circ/Reg	Peds 1A	Circ/Reg	All 1A	Circ/Reg	All 1A				
Nation	Peds 1A, 0-11y	Nation	Peds 1A, 0-11y	Circ/Reg	Adult 1A	Circ/Reg	Peds 1B	Circ/Reg	Peds 1B	Circ/Reg	Peds 1B				
Circ/Reg	Adult 1A	Circ/Reg	Adult 1A	Circ/Reg	Peds 1B	Nation	Peds 1A	Circ/Reg	MELD/PELD 32 *	Circ/Reg	MELD/PELD 32 *				
Circ/Reg	Peds 1B	Circ/Reg	Peds 1B	Circ/Reg	Any PELD	Circ/Reg	Peds 1B	DSA	MELD/PELD 15	Nation	Peds 1A				
Circ/Reg	Any PELD	Nation	Peds 1A, 12-17y	Circ/Reg	MELD 15, 12-17y	Circ/Reg	Adult 1A	Circ/Reg	MELD/PELD 15	Nation	Peds 1B				
Circ/Reg	MELD 15, 12-17y	Nation	Peds 1B	Circ/Reg	MELD 15, 18y	Circ/Reg	Any PELD	Nation	All 1A	Nation	Adult 1A				
Circ/Reg	MELD 15, 18y	Nation	Adult 1A	Circ/Reg	MELD<15, 12-17y	Circ/Reg	MELD 15, 12-17y	Nation	Peds 1B	DSA	PELD 15				
Circ/Reg	MELD<15, 12-17y	Circ/Reg	Any PELD	Circ/Reg	MELD<15, 18 y	Nation	Any PELD	Nation	MELD/PELD 15	DSA	MELD 15				
Circ/Reg	MELD<15, 18y	Circ/Reg	MELD 15, 12-17y	Nation	Peds 1A	Circ/Reg	MELD<15, 12-17y	DSA	MELD/PELD<15	Circ/Reg	PELD 15				
Nation	Peds 1A, 12-17y	Nation	Any PELD	Nation	Adult 1A	Nation	Any MELD, 12-17y	Circ/Reg	MELD/PELD<15	Circ/Reg	MELD 15				
Nation	Adult 1A	Circ/Reg	MELD<15, 12-17y	Nation	Peds 1B	Circ/Reg	MELD 15, 18y	Nation	MELD/PELD<15	Nation	PELD 15				
Nation	Peds 1B	Nation	Any MELD, 12-17y	Nation	Any PELD	Circ/Reg	MELD<15, 18 y					Nation	MELD 15		
Nation	Any PELD	Circ/Reg	MELD 15, 18y	Nation	Any MELD, 12-17y	Nation	Adult 1A					DSA	PELD<15		
Nation	Any MELD, 12-17y	Circ/Reg	MELD<15, 18 y	Nation	Any MELD, 18y	Nation	Any MELD, 18y	DSA	MELD<15	DSA	MELD<15				
Nation	Any MELD, 18y	Nation	Any MELD, 18y					Circ/Reg	PELD<15	Circ/Reg	PELD<15				
								Circ/Reg	MELD<15	Nation	PELD<15				
								Nation	PELD<15	Nation	PELD<15				
												Nation	MELD<15		

Circ = Proximity circle; Reg = OPTN/UNOS Region; DSA = Donor Service Area.

1A = Status 1A, granted to pediatric or adult candidates with acute liver failure and encephalopathy, decompensated Wilson’s disease with, primary non-function of a transplanted liver, hepatic artery thrombosis within 1 week (adults) or 2 weeks (children) after liver transplant.

1B = Status 1B, granted to pediatric candidates (0–17 years) with chronic liver disease, calculated PELD 25 and severe bleeding or dependence on a ventilator or dialysis, **Bold** indicates increased priority for national sharing.

* 3 points added for recipient within proximity circle to donor

TABLE 2:

Number of waitlist deaths, transplants, and deaths after transplant projected by SharePeds, overall and by listing status *

	Waitlist deaths						Transplants						Deaths after transplant					
	OPTN 2017			SharePeds			OPTN 2017			SharePeds			OPTN 2017			SharePeds		
				1		2				1		2				1		2
				n	p	n				n	p	n				n	p	n
All	3,770			3,774	0.42	3,766	0.44	18,536		18,541	0.66	18,501	0.51	13.0		12.9	0.70	13.0
Status 1A	26			25	0.26	18	0.0001	897		930	0.001	994	<0.0001	33		32	0.07	28
Status 1B	23.0			16	0.0002	12	<0.0001	274		282	0.08	283	0.01	7.6		7.0	0.41	6.9
MELD/PELD	2,070			2,080	0.02	2,086	0.03	17,358		17,334	0.24	17,208	0.0005	12.0		12.0	0.89	12.2

* p<0.001 considered statistically significant, given the multiple comparisons performed in this analysis.