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Same Policy, Different Impact: Center-Level Effects of Share 35 Liver Allocation

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Abstract

Early studies of national data suggest that the Share 35 allocation policy increased liver transplants without compromising post-transplant outcomes. Changes in center-specific volumes and practice patterns in response to the national policy change are not well characterized. Understanding center-level responses to Share 35 is crucial for optimizing the policy and constructing effective future policy revisions. Data from the United Network for Organ Sharing were analyzed to compare center-level volumes of allocation-MELD 35 transplants pre- and post-policy implementation. There was significant center-level variation in the number and proportion of allocation-MELD 35 transplants performed from the pre- to post-Share 35 period; eight centers accounted for 33.7% of the total national increase in allocation-MELD 35 transplants performed in the 2.5-year post-Share 35 period, while 25 centers accounted for 65.0% of the national increase. This trend correlated with increased listing at these centers of patients with MELD 35 at the time of initial listing. These centers did not over-represent the total national volume of liver transplants. Comparison of post-Share 35 allocation-MELD to calculated time-of-transplant laboratory MELD showed that only 69.6% of patients transplanted with allocation-MELD 35 maintained a calculated laboratory MELD 35 at the time-of-transplant.

Conclusion—Share 35 increased transplantation of allocation-MELD 35 recipients on a national level, but the policy asymmetrically impacted practice patterns and volumes of a subset of centers. Longer-term data is necessary to assess outcomes at centers with markedly increased volumes of high-MELD transplants post-Share 35.

Keywords

Liver Transplantation; Allocation Policy; Regional Sharing

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Share 35, implemented on June 18, 2013, represented the most significant change to the allocation system for deceased donor livers in the United States since the adoption of Model for End Stage Liver Disease score (MELD) based allocation in 2002 (1,2). The Share 35 policy resulted from a desire to decrease waitlist mortality by improving access to deceased donor livers for the sickest patients (3–7). To achieve this goal, donor livers are offered to a merged list of regional candidates with MELD ≥ 35 before they are offered to other local and then regional candidates with MELD < 35 . Pre-implementation prediction models suggested that sharing at a MELD cutoff of 35 would result in a reduction in total waitlist mortality with minimal increases in travel distances and cold ischemic time, but the policy change and its subsequent impact remain controversial (8). In comparing the early national experience in the year before and the year after Share 35 implementation, Massie et al reported a decreased discard rate and decreased waitlist mortality with the new policy. These effects were seen in the absence of significant changes in the number of patients listed at MELD ≥ 35 , cold ischemic time, or early (5 month) post-transplant mortality (9). These early results suggest that Share 35 achieved its goals with minimal downside.

Share 35 is a national policy, but implementation occurs at a regional level. Consequently, effects may be different across regions and between individual transplant centers—Halazun et al recently identified regional variation in post-Share 35 outcomes (10). Center-level practices towards transplanting a MELD ≥ 35 patients depend on both center-level decisions and regional environment. Aggregated national data, therefore, may not capture the significance of local effects.

At present, the impacts of Share 35 on individual transplant centers are not well characterized. Several important questions remain. First, did the new policy yielded broad and homogenous effects, or did significant pockets of local center-level effects account for what was observed at the aggregated national level? Second, did policy change correlate with any identifiable center-level behavioral changes, such as alterations in transplant volume, recipient listing practices, or organ acceptance patterns? Third, what was the actual calculated laboratory MELD score at the time of transplant for the patients who were listed with an allocation-MELD ≥ 35 and potentially received regionally-shared donor livers?

Methods

Data source

We used a Standard Transplant Analysis and Research file from the United Network for Organ Sharing/Organ Procurement and Transplantation Network as the data source for the study. This file included data on all liver transplant recipients with encrypted codes for transplant center and donor service area. Match run data was not required to complete any of the analyses.

Study populations

Adult (age ≥ 18) patients who received a deceased donor liver transplant between December 18, 2010 and December 17, 2015 were included in the study. Patients allocated as Status 1 were included in analysis, except when otherwise stated. Recipients of simultaneous liver-

kidney transplants were also included, as it was anticipated that Share 35 would increase simultaneous liver-kidney transplant volume, but recipients of other multi-visceral transplants were excluded from analysis. The transplants included for analysis do not all specifically represent regionally shared organs.

Recipients were divided into four equivalent 15-month “eras” by date of transplantation: 1) December 18, 2010–March 17, 2012 (Era 1); 2) March 18, 2012–June 17, 2013 (Era 2); 3) June 18, 2013–September 17, 2014 (Era 3); September 18, 2014–December 17, 2015 (Era 4). For most analyses, recipients from era 1 and era 2 were combined to form the 2.5-year “pre-Share 35 period” and those from era 3 and era 4 the 2.5-year “post-Share 35 period.”

MELD scores

The allocation-MELD (aMELD) is the MELD score for each recipient that was used on the match run that yielded the transplanted organ. Because patients with aMELD ≥ 35 can carry that aMELD score for up to seven days, we defined the calculated time-of-transplant laboratory MELD (TOT lab MELD) as a recipient’s MELD calculated from labs provided in the Standard Transplant Analysis and Research file that were obtained before and closest to the actual time of that recipient’s transplant. The TOT lab MELD does not take into account any exception points. Listing-MELD ≥ 35 wait-listings describe new patients added to the wait list who had MELD ≥ 35 at the time of their initial listing.

Analytic Approaches

Center-level variation in transplant volume and listing practices—For 110 liver transplant centers, center-level volumes of aMELD ≥ 35 transplants were calculated for each of the four 15-month eras. Centers were then divided into two subgroups, the eight centers that demonstrated an increase of ≥ 40 aMELD ≥ 35 transplants from the pre- to post-Share 35 period and the twenty-five centers that demonstrated an increase of ≥ 20 aMELD ≥ 35 transplants. To assess for possible changes in listing practices, the number of new listing-MELD ≥ 35 wait-listings was also tabulated by center for the pre- and post-Share 35 periods.

Scatter plots were constructed and Pearson correlation coefficients calculated in order to test for center-level correlations between pre- to post-Share 35 changes in aMELD ≥ 35 transplant volume and new listing-MELD ≥ 35 wait-listings, changes in new listing-MELD ≥ 35 wait-listings and new listing-MELD <35 wait-listings, changes in aMELD ≥ 35 transplant volume and pre-Share 35 baseline center transplant volume, and changes in aMELD ≥ 35 transplant volume and aMELD <35 transplant volume.

Time-of-transplant laboratory MELD scores and pre-transplant patient locations—Given the ability for patients with aMELD ≥ 35 to hold their allocation MELDs for up to seven days and remain eligible for regionally shared donor organs regardless of potential improvements in clinical status, we characterized the TOT laboratory MELD scores for patients transplanted with aMELD ≥ 35 pre- and post-Share 35. Similarly, we characterized the pre-transplant location for patients transplanted with aMELD ≥ 35 pre- and post-Share 35. Status 1 patients were excluded from this analysis since they categorically precede typical listed patients in allocation, and the change in MELD score is not

meaningful in organ allocation to patients with fulminant hepatic failure or early hepatic artery thrombosis.

Transplant proportions (by MELD group)—MELD groups were created in order to investigate the change in relative transplant volumes by MELD group for patients transplanted with aMELD ≥ 35 pre- versus post-Share 35. MELD groups were defined as: 1) Status 1; 2) MELD <35 at allocation by exception; 3) MELD <35 at allocation by calculated MELD; 4) MELD ≥ 35 at allocation by exception; and 5) MELD ≥ 35 at allocation by calculated MELD.

There was concern that some patients may have a calculated MELD that was competitive with an exception MELD score, and that this would make categorization more challenging. When this was specifically assessed, only 14 of 526 (2.7%) aMELD ≥ 35 exception cases had a TOT lab MELD score within 5 points of their aMELD. Concern about confounding between groups seems unwarranted.

Statistical analysis—Statistical analyses were performed with STATA SE for MAC OS X version 14.0 (StataCorp LP, College Station, TX) using Pearson's Chi-Square test. Pearson correlation coefficients were used to measure linear dependence between various changes in transplant volumes and new wait-listings as detailed above.

Results

Region-level variation in transplant volume

The percentage of deceased-donor transplant recipients who had an aMELD ≥ 35 increased from 19.5% (n=1,358) and 18.7% (n=1,287) in era 1 and era 2, respectively, to 27.9% (n=2,019) and 26.8% (n=2,072) in era 3 and era 4, respectively (p < 0.001). There was an increase in number of aMELD ≥ 35 transplants performed in all eleven regions from pre- to post-Share 35, but there was also substantial region-to-region variation in the magnitude of these changes (Supplementary Figure 1). Because region 9 had regional sharing prior to Share 35 implementation, we did not expect to see a significant impact of the policy in this region but included it for completeness.

There was no evidence of a bolus effect in the post-Share 35 period; regional volumes of aMELD ≥ 35 transplants were comparable between era 3 and era 4 following Share 35 implementation (Supplementary Table 1). The percent of aMELD ≥ 35 transplants that were simultaneous liver-kidney transplants did not change appreciably from 13.8% and 15.2% in era 1 and era 2, respectively, to 14.1% and 15.3% in era 3 and era 4, respectively (p = 0.54).

Center-level variation in transplant volume and listing practices

The total number of aMELD ≥ 35 transplants increased by 1,446 from the 2.5-year pre-Share 35 to the 2.5-year post-Share 35 period. There was significant variation between individual centers in the absolute number and change in number of patients transplanted with aMELD ≥ 35 post-Share 35: 18 centers demonstrated a decrease in aMELD ≥ 35 transplants from the pre- to post-Share 35 period, 67 centers had an increase of 0–19

transplants, 17 centers had an increase of 20–39 transplants, and 8 centers had an increase of 40 transplants.

Many centers experienced minimal volume change; for 36 centers (32.7%) the change in number aMELD ≥ 35 transplants from pre- to post-Share 35 was between -5 and 5. A subset of centers, however, demonstrated large increases in aMELD ≥ 35 transplants from pre- to post-Share 35. The 25 centers (22.7% of all transplant centers) that demonstrated an increase of ≥ 20 aMELD ≥ 35 transplants from pre- to post-Share 35 accounted for nearly two-thirds (65.0%) of the national increase in aMELD ≥ 35 transplants, while the 8 centers (7.3% of all transplant centers) that demonstrated the largest increase (≥ 40) in aMELD ≥ 35 transplants from pre- to post-Share 35 accounted for over one-third (33.7%) of the total national increase (Figure 1). These increases were disproportionate to these centers' total transplant volume: the 25 centers performed 32.1% of all pre-Share 35 liver transplants, while the 8 centers performed 10.2%.

The increase in aMELD ≥ 35 transplants from pre- to post-Share 35 that was observed at each of the 8 centers exceed any era-to-era variation in volume seen at these centers (Figure 2). The 8 centers that had the largest increase in aMELD ≥ 35 transplants represented five regions, while the 25 centers that demonstrated an increase of ≥ 20 aMELD ≥ 35 transplants in the post-Share 35 period came from nine different regions. No more than 5 of the 25 centers came from any one region (Supplementary Figure 2).

The percentage of all new wait-listings who had a listing-MELD ≥ 35 at the time of initial listing increased from 6.7% (n=1,778) in the pre-Share 35 period to 7.9% (n=2,159) post-Share 35 ($p < 0.001$). The largest absolute and relative increase of new wait-listings with listing-MELD ≥ 35 were for patients with alcohol-induced liver disease, and of these 277 new wait-listings, 161 (58.1%) were for younger patients between the ages of 18–49.

The subset of centers that demonstrated large increases in aMELD ≥ 35 transplants from pre- to post-Share 35 often had a coincident increase in new listing-MELD ≥ 35 wait-listings (Figure 3). Center-level changes in aMELD ≥ 35 transplant volume from pre- to post-Share 35 did correlate with changes in new listing-MELD ≥ 35 wait-listings (Pearson correlation coefficient 0.76, $p < 0.001$; Figure 4A). Changes in new listing-MELD ≥ 35 wait-listings, however, did not correlate with changes in new listing-MELD < 35 wait-listings (Pearson correlation coefficient 0.08, $p = 0.40$; Figure 4B). Additionally, center-level changes in aMELD ≥ 35 transplant volume from pre- to post-Share 35 did not correlate with either pre-Share 35 baseline center transplant volume (Pearson correlation coefficient 0.31, $p = 0.001$; Figure 4C) or with center-level changes in aMELD < 35 transplant volume (Pearson correlation coefficient -0.003 , $p = 0.97$; Figure 4D).

Time-of-transplant laboratory MELD scores

Allocation-MELD ≥ 35 scores are valid for 7 days. While centers generally attempt to capture rising rather than falling MELD scores with recertification, TOT lab MELD can be increased or decreased relative to a patient's aMELD (Supplementary Figure 3). In seven of eleven regions, the percentage of transplant recipients who were allocated a liver with aMELD ≥ 35 and maintained a TOT lab MELD ≥ 35 decreased in the 2.5-year period after

the policy change (Figure 5). Nationally, out of all of the patients transplanted with aMELD ≥ 35 , the percentage of those who had a TOT lab MELD ≥ 35 decreased slightly from 71.2% pre-Share 35 to 69.6% post-Share 35 ($p = 0.15$).

In the post-Share 35 period, 2.6% (105/4,091) of patients transplanted with an aMELD ≥ 35 were hepatocellular carcinoma (HCC) exception cases, a statistically significant (but likely clinically insignificant) increase from pre-Share 35 (1.1% [30/2,645]; $p < 0.001$).

Pre-transplant patient locations

Nationally, there was a small increase in the percentage of aMELD ≥ 35 transplant recipients in the intensive care unit from pre- to post-Share 35 (38.8% to 43.5%), and this reflected a decrease in the percentage of aMELD ≥ 35 transplant recipients in the non-intensive care unit inpatient setting (47.5% to 42.1%). The percent of aMELD ≥ 35 transplant recipients who came from home for their transplant increased slightly from pre- to post-Share 35 (13.8% to 14.5%).

Transplant proportions (by MELD Group)

The percent of patients transplanted with MELD ≥ 35 at allocation by calculated MELD increased nationally from 17.9% in the pre-Share 35 period to 24.9% post-Share 35. There was also an increase in the percent of patients transplanted with MELD ≥ 35 at allocation by exception, from 1.2% pre- to 2.5% post-Share 35. While the percent of patients transplanted with MELD < 35 at allocation by exception remained relatively constant from pre- (34.9%) to post-Share 35 (35.6%), the percent of patients transplanted with MELD < 35 at allocation by calculated MELD decreased in all eleven regions and decreased nationally from 42.4% pre- to 33.8% post-Share 35 ($p < 0.001$; Supplementary Figure 4).

Changes in DRI

To evaluate whether the increase in aMELD ≥ 35 transplants performed in the post-Share period ≥ 35 was accompanied by decreases in donor organ quality for these recipients, centers were divided into four quartiles based on their absolute increase in aMELD ≥ 35 transplants performed from the pre- to post-Share 35 periods. For each quartile of centers, the median DRI was compared pre- versus post-Share 35. The median DRI for donor livers used for all transplant recipients and for donor livers used for only aMELD ≥ 35 recipients were nearly identical between quartiles and unchanged from pre- to post-Share 35 (Supplementary Table 2).

Etiology

The etiology of liver disease was tabulated, by recipient age, for all aMELD ≥ 35 recipients in the pre- and post-Share 35 periods (Table 1). There was a 9.2% increase from pre- to post-Share 35 in transplants for alcohol-induced liver disease in patients ages 18–39 and an 8.4% increase in patients ages 40–59. The next largest increase for any etiology or age group was a 3.2% increase in transplants for recipients age ≥ 60 with hepatitis C.

Discussion

Share 35 liver allocation policy aimed to increase access to donor livers for the sickest patients across the nation. National data suggests that the policy achieved this goal in aggregate (9), but analysis of 2.5-years of post policy implementation data reveals that a minority of centers were responsible for most of the increased volume of high-MELD transplants. Many centers saw minimal change in volume of aMELD 35 transplants after Share 35, while the increases in aMELD 35 transplants seen in the post-Share 35 period were fairly concentrated, with under one-quarter (25/110, 22.7%) of centers accounting for nearly two-thirds (65.0%) of the national increase in aMELD 35 transplants. A similar phenomenon of center-level concentration was reported with nationally-placed livers (11). Given the distribution of regions represented by these centers, the disparate local effects are not explained by regional differences in median aMELD.

The *increase* in aMELD 35 transplants was not solely attributable to centers that did the most high-MELD transplants, such as centers in region 5 where the median-MELD is near 35, or to centers with the largest overall volume, suggesting that the policy change led some centers to alter their practice patterns. Many of the centers that experienced a large increase in volume of aMELD 35 transplants following Share 35 implementation, specifically those outside of region 5, exhibited a concomitant increase in new wait-listings of patients with listing-MELD 35 at the time of initial listing. The largest absolute and relative increases in new listing-MELD 35 wait-listings and aMELD 35 transplants post-Share 35 were for younger patients with alcohol-induced liver disease (12). These increases coincided with a report by Mathurin et al on the success of liver transplantation in patients with acute alcoholic hepatitis (13).

Pre-implementation simulations used to assess the expected impact of policy change may fail to predict the changes in human behavior that accompany policy change—such as the surge in transplantation of patients with acute alcoholic hepatitis seen after Share 35 implementation. These data join a nascent body of literature highlighting the significant variation in transplant center practices and organ offer acceptances for the sickest patients and are consistent with prior reports of centers changing practice patterns in response to allocation changes (14, 15). In light of these shortcomings, Schnier et al have advocated for greater synergy between transplant surgeons and economists, who possess greater expertise in human behavior and decision making under risk and may be better equipped to counsel policy makers in making allocation policy changes (16).

In addition to alterations in listing practices, changes in competitive environment, center personnel, organ acceptance patterns, and regional access to higher performing organ procurement organizations may influence a center's increase in aMELD 35 transplant volume. We did not identify changes in the donor liver quality, or DRI, used for aMELD 35 transplants pre- compared to post-Share 35 (17), suggesting that the centers which demonstrated a large increase in volume of aMELD 35 transplants did not do so on the basis of changes in organ acceptance practices. A recent study by Washburn et al found that centers are actually less likely to accept organs for aMELD 35 patients after the policy change (18). Goldberg et al similarly reported a significant decline in liver acceptance offers

after implementation of Share 35 as well as varied and significant changes in organ offer acceptance rates at the center level pre- versus post-Share 35 (19). Together, these studies provide further clarification that alterations in organ acceptance practices did not drive center-level increases in aMELD ≥ 35 transplant volume.

Listed patients with HCC exception scores previously had more favorable access to transplantation compared to non-tumor patients (20), and Share 35 was expected to mitigate this difference. We report preservation of the transplant rates for the cohort of patients with MELD <35 at allocation by exception. Most of the increase in transplant rates for patients with calculated MELD ≥ 35 at allocation was balanced by a decrease in transplant rates for patients with non-exception score calculated MELD <35 at allocation, while the remaining increase can be attributed to the increased total number ($n=1,138$) of deceased donor liver transplants performed in the post-Share 35 period. This finding was true across all regions and suggests that regional sharing patterns typically involve regional utilization of a liver for a decompensated patient with aMELD ≥ 35 , rather than for a local decompensated patient with a calculated laboratory MELD <35 . It will be important to understand whether these regional allocations result in livers being distributed to patients with significant differences in MELD; a difference of a small number of MELD points may not have prognostic value in outcome (21, 22).

Over 30% of patients transplanted with aMELD ≥ 35 did not maintain a TOT lab MELD ≥ 35 , yet patients with aMELD ≥ 35 by HCC exception accounted for only 2.6% of the aMELD ≥ 35 transplants performed post-Share 35. It is therefore unlikely that the recently enacted HCC exception score cap of 34 will significantly affect the findings reported in this study (23). Given the proportion of patients who had a MELD score that improved in the time between listing labs and TOT labs, as well as the 14.5% of aMELD ≥ 35 recipients who came from home for their transplant, the ability to capture and hold an aMELD ≥ 35 for 7 days irrespective of changes in clinical status may need to be reconsidered in light of regional or proposed national sharing. More frequent updating of aMELD scores could lead to greater transparency with respect to true patient disease and risk of waitlist mortality and improve an allocation system that focuses on transplanting the sickest first. The importance of this is underscored by the finding by Chow et al that top local candidates who lose priority for a donor liver to a regional candidate with aMELD ≥ 35 have a 15% chance of dying on or being removed from the waitlist in the ensuing 12 months (21).

It is important to note the limitations of this study. There is variability in the quality of data associated with United Network for Organ Sharing registries that were previously characterized by Massie et al (24). We cannot be certain that the effects observed were caused by Share 35 policy implementation, or that linkages between listing and volume are truly causal. While we identified an increase in transplant rates of patients with an aMELD ≥ 35 who were hepatocellular carcinoma (HCC) exception cases post-Share 35, we did not evaluate if the profile of donor risk used in these recipients changed after policy implementation. Last, it is difficult to make durable conclusions from a study of only two and a half years of post-policy data. To fully judge the value of this policy, data on waitlist and post-transplant outcomes from a longer-term period than that what is currently available will need to be considered.

The report by Massie et al on the one-year patient outcomes after Share 35 policy implementation was promising (9), but other recent studies have illuminated caveats. Annamalai et al failed to identify significant change in waitlist mortality nationally (25). Halazun et al raised concern about the “one size fits all” nature of Share 35 given the regional variation that they observed in their analysis of post-Share 35 outcomes (10). Perhaps most important, long-term outcomes after Share 35 will not be available for several more years (26, 27).

In conclusion, Share 35 represents a first step towards increasing access to liver transplantation for the sickest patients. As data on the impact of Share 35 matures, the liver transplant community will benefit from ongoing analysis and optimization of sharing policies, especially those that balance the competing interests of preservation of outcomes and cost with maximizing organ utility, reducing waitlist mortality, and minimizing center and regional disparities in access (28, 22). Center-level effects are harder to study than national effects, but since patients are transplanted at centers, center-level effects are determinative of patients’ experiences with policy change. An understanding of the center-level changes that occur with policy implementation must be considered carefully at the time of policy debate and studied afterward to assure that such changes translate into desired outcomes (29).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Abbreviations

DRI	donor risk index
HCC	hepatocellular carcinoma
MELD	model for end-stage liver disease (score implied)
aMELD	allocation-MELD
TOT	time-of-transplant

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Figure 1. Histogram of absolute change in number of aMELD ≥35 transplants per center
The 8 centers that had the largest (> 40) increase in aMELD ≥35 transplants accounted for 33.7% of the total national increase in aMELD ≥35 volume. Twenty-five centers showed an increase of ≤ 20 aMELD ≥35 transplants in the post-Share 35 period and accounted for 65.0% of the entire national increase in aMELD ≥35 transplants.

Figure 2. Volume of aMELD ≥ 35 transplants, by 15-month era, for the 8 centers that demonstrated the largest (≥ 40) increase in aMELD ≥ 35 transplants in the post-Share 35 period The increase in aMELD ≥ 35 transplants from pre- to post-Share 35 that was observed at the 8 centers exceed any era-to-era variation in volume seen at these centers.

Figure 3. Heat map of center volumes and listing practices

The number of patients transplanted with aMELD ≥ 35 and the number of new listing-MELD ≥ 35 wait-listings by center, for all centers for which both transplant volume and listing data was available, in the pre- and post-Share 35 periods.

Figure 4. Correlations between changes in transplant volumes and wait-listings

A) Center-level changes in aMELD ≥ 35 transplant volume from pre- to post-Share 35 correlated with changes in new listing-MELD ≥ 35 wait-listings. **B)** Changes in new listing-MELD ≥ 35 wait-listings did not correlate with changes in new listing-MELD < 35 wait-listings. **C)** Changes in aMELD ≥ 35 transplant volume did not correlate with either pre-Share 35 baseline center transplant volume, or **D)** with changes in aMELD < 35 transplant volume.

Figure 5.

Regional trends in calculated time-of-transplant laboratory MELD for patients who were transplanted with aMELD ≥ 35 pre- and post-Share 35.

Table 1

The etiology of liver disease is presented for all aMELD 35 transplant recipients pre- and post-Share 35 by patient age **A**) 18–39, **B**) 40–59, and **C**) 60. Alcohol, alcohol-induced liver disease; HCV, hepatitis C; HBV, hepatitis B; NASH, non-alcoholic steatohepatitis; PSC, primary sclerosing cholangitis; Autoimmune, autoimmune hepatitis or cirrhosis; PBC, primary biliary cirrhosis.

A) Recipients age 18–39								
Etiology	Alcohol	HCV	HBV	NASH	PSC	Autoimmune	PBC	Other
Pre-Share 35	56 (20.8)	19 (7.1)	5 (1.9)	26 (9.7)	34 (12.6)	35 (13.0)	7 (2.6)	87 (32.3)
Post-Share 35	156 (30.0)	38 (7.3)	12 (2.3)	43 (8.3)	67 (12.9)	64 (12.3)	11 (2.1)	129 (24.8)
Total								269

B) Recipients age 40–59								
Etiology	Alcohol	HCV	HBV	NASH	PSC	Autoimmune	PBC	Other
Pre-Share 35	313 (19.6)	678 (42.5)	46 (2.9)	206 (12.9)	69 (4.3)	55 (3.4)	63 (3.9)	167 (10.5)
Post-Share 35	620 (28.0)	736 (33.2)	56 (2.5)	329 (14.8)	83 (3.7)	40 (3.0)	85 (3.8)	209 (9.4)
Total								1,597

C) Recipients age 60								
Etiology	Alcohol	HCV	HBV	NASH	PSC	Autoimmune	PBC	Other
Pre-Share 35	138 (17.7)	272 (34.9)	21 (2.7)	178 (22.9)	36 (4.6)	21 (2.7)	34 (4.4)	79 (10.1)
Post-Share 35	219 (16.2)	516 (38.1)	35 (2.6)	326 (24.1)	50 (3.7)	40 (3.0)	56 (4.1)	111 (8.2)
Total								779

Post-Share 35								1,353