Final Report

OPTN Liver & Intestinal Transplantation Committee | Descriptive Data Request

One-Year Monitoring Report of Liver and Intestine Acuity Circle Allocation
Removal of DSA and Region as Units of Allocation

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Contents

Purpose

The purpose of this report is to provide look at high-level metrics revealing the performance of the system and any potential consequences that may require changes to policy, programming, or clinical practice. This report, performed on behalf of the Organ Procurement and Transplantation Network (OPTN) Liver and Intestinal Transplantation Committee, will be followed by further reports post-implementation. The OPTN will respond to further requests by the Committee as well as relay appropriate requests to the Scientific Registry of Transplant Recipients (SRTR) related to these changes.

Monitoring Plan

Monitoring of the effect of policy changes implemented on February 04, 2020 will focus on changes in the match process, waiting list population, liver transplant recipient population, and deceased donor utilization. Specifically analysis will provide comparisons pre- and post-policy implementation and include:

- Changes in the number of livers and intestines recovered and transplanted
- Impact on the national liver discard and utilization rates
- Changes in the median allocation Model for End-Stage Liver Disease (MELD) or Pediatric End-Stage Liver Disease (PELD) score at transplant
- Changes in the distance (in nautical miles, NM) from the donor hospital to the transplant center for deceased donor liver and intestine transplants
- Impact on the number of liver and intestine candidates removed from the waiting list by reported removal reason
- Changes in the sequence number of liver transplant recipient
- Changes in the time from an Organ Procurement Organization's (OPO) first electronic notification of an offer to cross clamp for deceased donor livers
- Waiting list drop out rates by exception status
- Changes in deceased donor liver transplant recipients by exception status, and associated allocation scores

Data and Methods

Data Sources:

These analyses use data from the OPTN waiting list, Potential Transplant Recipient (PTR) data, as well as the Transplant Candidate Registration (TCR), Transplant Recipient Registration (TRR), Transplant Recipient Followup (TRF), and Deceased Donor Registration (DDR) forms. Analyses are based on OPTN data as of March 19, 2021 and is subject to change based on any future data submission or correction.

Cohorts:

The cohorts examined contain periods of 365 days, or one year of data before and after the liver policy change, for most metrics, excluding transplant recipients and post-transplant survival.

In the *Liver Waiting List* section, new registrations added to the liver waiting list are used. The pre- and post-policy eras are defined as 02/03/2019 - 02/03/2020 and 02/04/2020 - 02/03/2021, respectively. For waiting list dropout and transplant rates in this section, cohorts are defined as liver-alone registrations ever waiting during the pre- and post-policy periods. Multi-organ listings are excluded from rates. Adult (age 18 or older at listing) and pediatric (age $<$ 18 at listing) sections are included.

The *Deceased Donor Liver Transplants* section includes cohorts of deceased donor, liver-alone transplant recipients as well as deceased donor, liver multi-organ transplant recipients, labeled accordingly. Deceased donor liver-alone transplants are further broken into adult (age 18 or older at transplant) and pediatric (age $<$ 18 at transplant) sections, to elicit differences in patterns for these two groups. Cohorts of transplants are defined during 02/03/2019

- 12/31/2019 and 02/04/2020 - 12/31/2020 pre- and post-policy to account for the two month data reporting lag. Additional information on all deceased donor liver transplant recipients (liver-alone + liver multi-organ) is included in the *Appendix*. Post-transplant patient survival is also included in this section, and contains cohorts of all-age deceased donor liver-alone transplant recipients from 02/03/2019 - 05/31/2019 and 02/04/2020 - 05/31/2020, pre- and post-policy, respectively, to account for the two-month data lag of reporting on transplant recipients in addition to the 30 days for reporting patient deaths and graft failure events currently in place with the amnesty policy.

Data in the *Offer Rates* section includes offers for liver-alone registrations ever waiting during 02/03/2019 - 02/03/2020 (pre) and 02/04/2020 - 02/03/2021, stratified by a number of candidate characteristics. Multi-organ listings are excluded from these rates.

A number of data sets are used to provide the metrics in the *Liver Utilization* section. Data on all deceased organ donors from which at least one organ was recovered for the purpose of transplantation was used for liver utilization rates, while the subset of these donors that had a liver recovered were used for liver discard rates as well as volume of deceased liver donors procured. The pre- and post-policy eras were defined as 02/03/2019 - 02/03/2020 and 02/04/2020 - 02/03/2021, respectively. Deceased donor liver match runs with a final acceptance during these pre- and post-policy eras are also used. Deceased donor, liver-alone transplants were used to evaluate donor-to-recipient age comparisons, defined by the periods also used in the *Deceased Donor Liver Transplants* section.

The *Intestine* section reviews new registrations added to the intestine waiting list, registrations removed from the intestine waiting list due to reasons of death or too sick to transplant, deceased intestine donors recovered, and deceased donor intestine transplants. The time periods defined for each data set are the same as for the above-described liver sections. This section includes both intestine-alone and intestine multi-organ transplants.

Additional information is provided in the *Appendix*, including data on liver-alone registrations ever waiting and liver-alone registrations removed from the waiting list due to death or too sick to transplant during the pre- and post-policy periods.

A Note About COVID-19

For all figures and tables, we note that the World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020 and a national state of emergency was declared in the U.S. on March 13, 2020. Based on the WHO's declaration of the pandemic and the national state of emergency, the post-implementation monitoring for this report contains roughly 11 months of COVID-19 Era data (03/11/2020 - 02/03/2021). Given the impact that has been seen on the U.S. transplant and donation community (unos.org/covid) the true impact of this policy change is very challenging to determine.

Metrics presented in figures and tables are presented by overall pre- and post-policy era as well as **multiple COVID-19 eras**, where appropriate. The multiple COVID eras represent the time prior to COVID-19 emergency declaration until March 12, 2020 (**Pre-COVID Era**), the heaviest-impacted period of time from March 13, 2020 to May 09, 2020 (**COVID Onset Era**) and the additional period of time with continual, albeit less-dramatic, impact from May 10, 2020 to the end of the post-policy cohort (**COVID Stabilization Era**) are labeled.

The COVID-19 crisis has created challenges to conducting routine outpatient activities, including clinical testing, which are needed to obtain information required for transplant candidates, recipients, and living donors. Current OPTN policy requires that transplant programs submit numerous data for transplant recipients and living donors. The emergency policy from the OPTN Executive Committee relaxed requirements for follow-up form submission. The intent of the policy is to prevent unnecessary exposure risk to transplant recipients and living donors and to alleviate data burden for centers in the midst of COVID-19 crisis.

The TRF and LDF Data Submission During COVID-19 Amnesty Period emergency policy temporarily suspended the requirements for data collection and submission for the living donor follow-up (LDF), organ specific transplant recipient follow-up (TRF), and recipient malignancy (PTM) forms. The suspension of these requirements is backdated to forms expected between March 13, 2020 and March 31, 2021. It did not suspend the requirement

to report recipient death or graft failure, but extended the time frame for reporting that information for transplant recipients from 14 days to 30 days of knowledge of the event.

Methods

Counts and percentages are used to summarize categorical variables or characteristics, while density curves and distribution summaries (minimum, maximum, mean, median, percentiles) are provided for continuous characteristics. If statistical tests of comparison were performed, Chi-Square tests were used for categorical comparisons pre- vs. post-policy. Non-parametric Kruskal-Wallis and Mann-Whitney rank sum tests were used for comparisons in mean and median values pre- vs. post-policy, respectively, when the assumption of normality of the distribution may not hold. The Kolmogorov-Smirnov test was used to compare full distributions of continuous variables pre- vs. post-policy. The Fligner-Killeen test compared the variance in median MELD at transplant (MMaT) pre- vs. post-policy, as it is a robust non-parametric test against departures from normality.

For waiting list dropout, (for reasons of death or too sick to transplant) rates, all liver-alone registrations ever on the waiting list were included, even if listed for less than one day or never active. For transplant rate and offer rate analysis, only liver-alone registrations on the waiting list for at least one day were included. These rate analyses are registration-based, not candidate-based. That is, a single candidate may have had a liver registration at multiple transplant centers. Each such registration was counted separately in the analysis and contributed to the appropriate eras and characteristic group. However, if a candidate had multiple registrations that, on the same day, were in the same characteristic group, this active person-day was only counted once in the transplant and offer rate denominator. While waiting time for each registration is contributed for each candidate, only one event per candidate is recorded. This is taken as the first occurrence.

Dropout rates as expressed by removals per 100 patient-years were calculated by dividing the number of removals for death or too sick to transplant by the number of years patients spent waiting (expressed per 100). Dividing by the number of person-years serves to normalize the rates to account for often drastic differences in the number of candidates and durations of time waited (within each era) by different patient characteristics. For each time interval, all waiting time (active and inactive) within the interval was used to calculate patient-years. Since some candidates may spend several months or years on the waiting list, a candidate may contribute waiting time to both eras, but a removal is attributed only to the era and characteristic group in which it occurred. Some candidates may also be multi-listed at a number of transplant programs and thus have multiple registrations. Waiting time for each registration is contributed for each candidate, but only one removal per candidate is included in the calculation.

Transplant rates as expressed by transplants per 100 active patient-years were calculated by dividing the number of deceased donor liver-alone transplants by the number of active years patients spent waiting (expressed per 100). For each time interval, only active waiting time within the interval analyzed was used for the patient-years calculation since candidates may only receive offers and thus transplants when in an active status. Since some candidates may spend several months or years on the waiting list, a candidate may contribute waiting time to both eras, but a transplant is attributed only to the era and characteristic group in which it occurred.

Offer rates as expressed by offers per active patient-year were calculated by dividing the number of offers received by the number of active years patients spent waiting.

For dropout and transplant rates by exception status group and era, the associated waiting time from a candidate registration was attributed to the patient-years under "HCC exception" if there was ever an approved liver MELD or PELD exception request for HCC diagnosis (within that era). This does not include HCC diagnoses submitted under "Other specify". Similarly, associated waiting time for a candidate registration was attributed to the patient-years under "Non-HCC exception" if an approved liver MELD or PELD exception request for a diagnosis other than HCC occurred within that era. If a registration had multiple forms submitted within an era for both HCC and non-HCC exception types, the first of these that was submitted was used. All other candidates' patient-years waiting was attributed to the non-exception status group. This exception status definition differs from that used when counting waiting list removals or transplants, where such group membership is defined as the exception status at the time of event rather than ever during the policy period; thus, counts may not align with events from rates based on these definitions.

Post-transplant patient survival was calculated for the subset of deceased donor, liver-alone transplant recipients with at least six months of follow-up. Higher rates of patient status censoring were expected as a result of the amnesty policy. To account for this increase, survival analyses were run assuming recipients were alive unless their death was reported to the OPTN or identified in all (verified and unverified) external sources. Survival curves and point estimates were constructed using unadjusted Kaplan-Meier methodology and compared using the log-rank test.

Executive Summary

This report provides a review at one year under acuity circle (AC) allocation changes to evaluate any early indications that the policy may be trending towards achieving intended goals, as well as to evaluate potential intended and unintended consequences of the liver and intestine policy changes. Metrics are constrained to data points that are reliably available while allowing for the data submission lags allowed in OPTN policy in this report.

Even with roughly 11 of the 12 months of the post-policy period during the COVID-19 pandemic, many of the results in this report continue to align with the intended outcomes of the policy change that were supported by the SRTR modeling predictions prior to the implementation of this proposal. Some of the main findings from this report include:

- Coinciding with the COVID-19 global pandemic, nationally, there were:
  - **314** less adult (age 18+ at listing) and **61** less pediatric (age $<$ 18 at listing) registrations added to the liver waiting list post-policy
  - **20** less adult (age 18+ at transplant) and **16** less pediatric (age $<$ 18 at transplant) deceased donor, liver-alone transplant recipients post-policy
  - **37** more simultaneous liver-kidney transplant recipients post-policy
  - **6** more adult (age 18+ at donation) and **73** less pediatric (age $<$ 18 at donation) deceased liver donors recovered post-policy
- Transplant rates significantly increased for liver-alone candidates with MELD or PELD scores 29 and higher, or Status 1A/1B
- The national median transplant score (MTS) for adults remained unchanged, and decreased from 35 to 32 for pediatric transplant recipients
  - There was a decreasing trend in the variance in MTS for adults by State, DSA, and OPTN Region
- Distances between donor hospital and transplant program increased for deceased donor, liver-alone recipients
  - Increased distances occurred most often for adult recipients with MELD scores 29 and higher or Status 1A
  - The proportion of national shares increased from 20% to 60% for pediatric recipients
  - Median cold ischemia time increased by 12 minutes for adult and 38 minutes for pediatric recipients
- Liver-lung multi-organ transplants doubled from **10** to **21** post-policy
- There was no statistically significant change in unadjusted 6-month post-transplant patient survival
- Offer rates have increased for all MELD or PELD score or status groups post-policy
  - The most substantial increases occurred for candidates with MELD or PELD scores 29 - 32, overall as well as across age and race/ethnicity groups
- The liver discard rate decreased, and the liver utilization rate increased nationally
- Nationally, there were:
  - **31** more intestine registrations added to the intestine waiting list post-policy
  - **7** more deceased donor intestine transplants post-policy
  - **2** less deceased intestine donors recovered post-policy

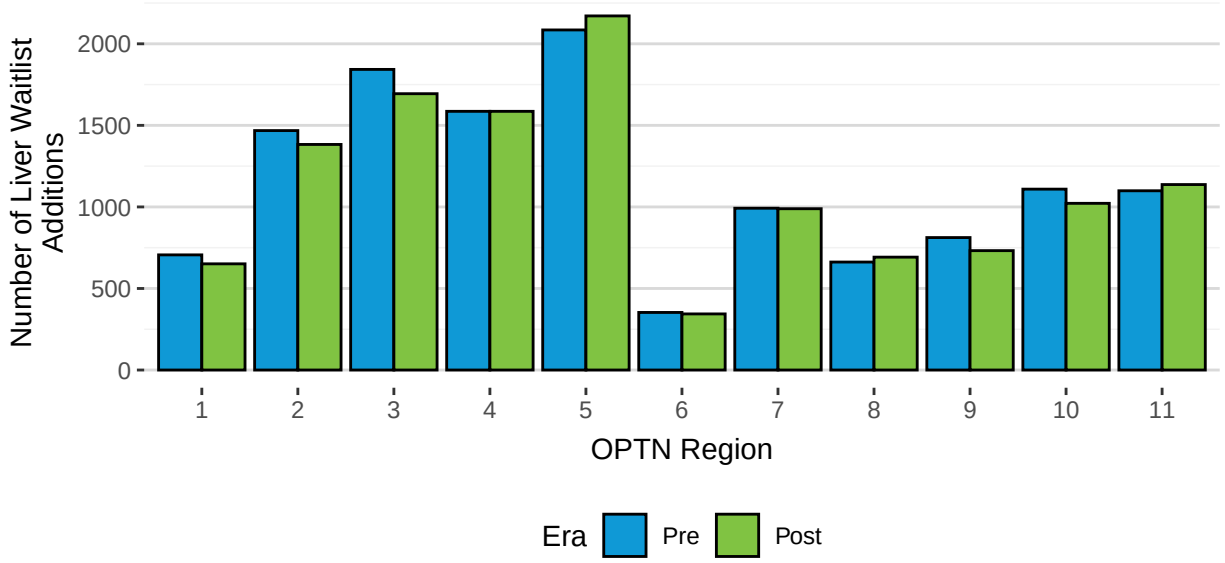
Results

Section I. Liver Waiting List

Adult Registration Additions

There were fewer new liver waitlist registrations overall post-policy (percent change -2.8%. This was true for most OPTN regions; however, the proportions of waiting list additions among regions were fairly consistent. The changes in listing volumes post-policy were impacted by the COVID-19 emergency declaration, and this decline was seen for most organs, particularly kidney waiting list additions (OPTN COVID-19 dashboard).

Figure 1. Adult Registrations Added to Liver Waiting List by OPTN Region of Listing Center and Era

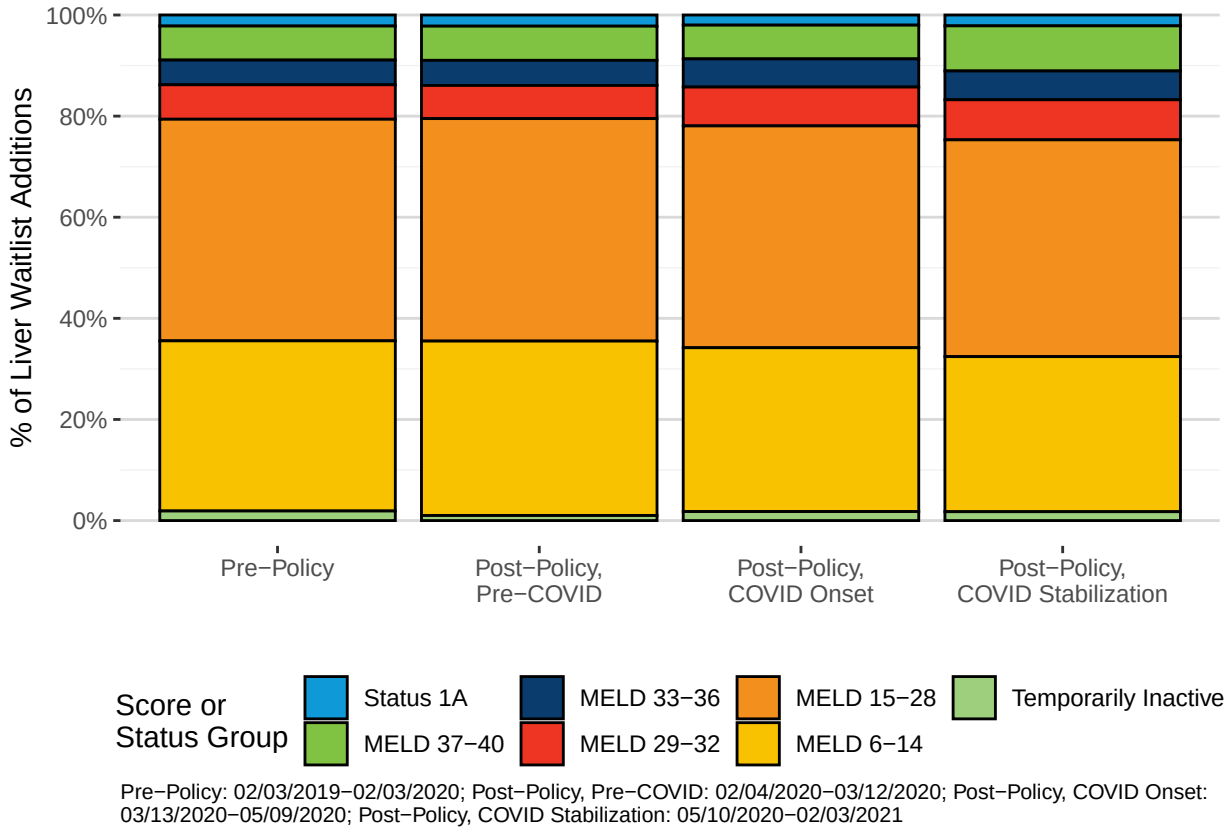


National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 1. Number and Percent of Adult Registrations Added to Liver Waiting List by OPTN Region of Listing Center and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
OPTN Region	N	%	N	%	N	%	N	%	N	%
1	706	5.6%	73	4.9%	69	3.8%	509	5.6%	651	5.2%
2	1468	11.5%	176	11.8%	201	11.2%	1006	11.0%	1383	11.2%
3	1843	14.5%	184	12.3%	245	13.6%	1265	13.9%	1694	13.7%
4	1586	12.5%	185	12.4%	231	12.9%	1170	12.8%	1586	12.8%
5	2085	16.4%	258	17.3%	333	18.5%	1580	17.3%	2171	17.5%
6	353	2.8%	41	2.7%	42	2.3%	261	2.9%	344	2.8%
7	992	7.8%	148	9.9%	142	7.9%	699	7.7%	989	8.0%
8	662	5.2%	81	5.4%	117	6.5%	494	5.4%	692	5.6%
9	812	6.4%	87	5.8%	79	4.4%	566	6.2%	732	5.9%
10	1109	8.7%	131	8.8%	143	8.0%	748	8.2%	1022	8.2%
11	1099	8.6%	129	8.6%	194	10.8%	814	8.9%	1137	9.2%
National	12715	100.0%	1493	100.0%	1796	100.0%	9112	100.0%	12401	100.0%

Figure 3. Adult Registrations Added to Liver Waiting List by MELD Score or Status at Listing and Era



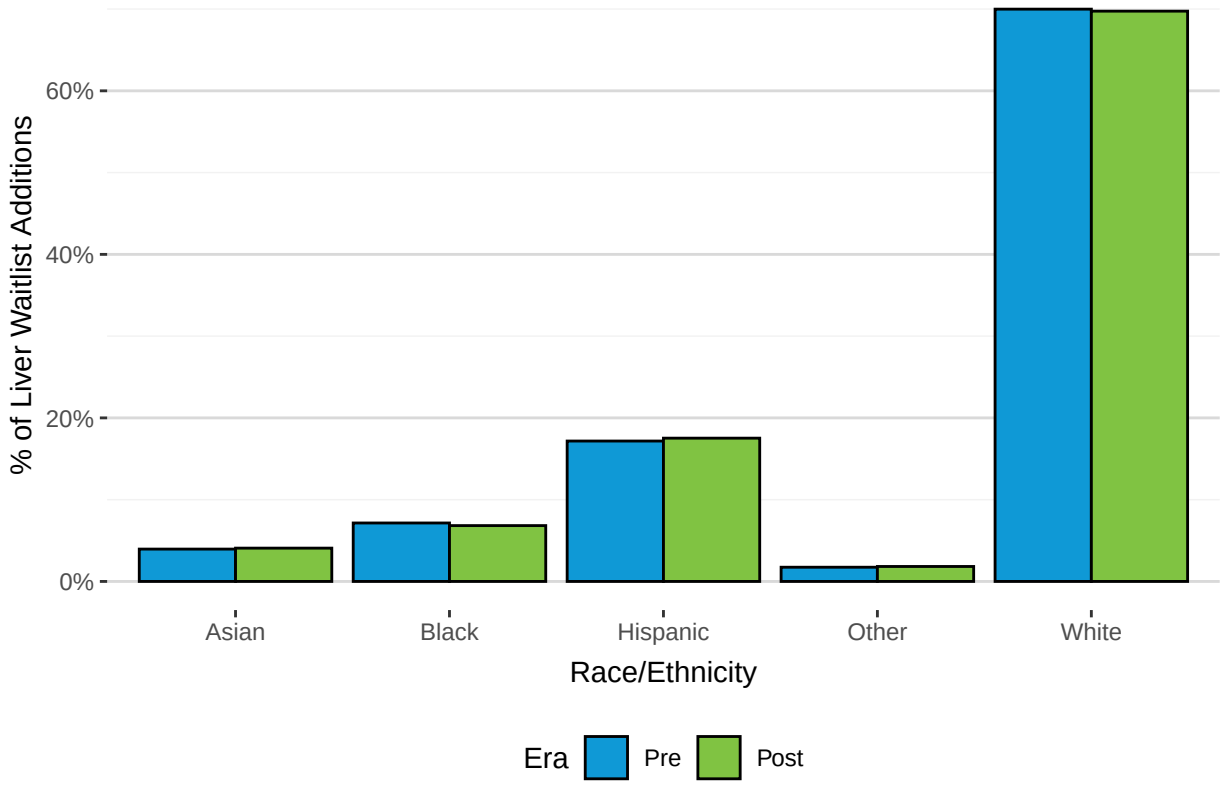
Pre−Policy: 02/03/2019−02/03/2020; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−02/03/2021

Table 3. Number and Percent of Adult Registrations Added to Liver Waiting List by MELD Score or Status at Listing and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Score or Status Group	N	%	N	%	N	%	N	%	N	%
Status 1A	278	2.2%	33	2.2%	36	2.0%	196	2.2%	265	2.1%
MELD 37-40	855	6.7%	101	6.8%	120	6.7%	813	8.9%	1034	8.3%
MELD 33-36	622	4.9%	74	5.0%	100	5.6%	519	5.7%	693	5.6%
MELD 29-32	867	6.8%	98	6.6%	138	7.7%	722	7.9%	958	7.7%
MELD 15-28	5573	43.8%	657	44.0%	788	43.9%	3907	42.9%	5352	43.2%
MELD 6-14	4279	33.7%	515	34.5%	582	32.4%	2795	30.7%	3892	31.4%
Temporarily Inactive	241	1.9%	15	1.0%	32	1.8%	160	1.8%	207	1.7%

There were increases in the volume and proportion of new registrations with higher MELD scores (MELD 29-40) post-policy. Overall, changes pre- to post-policy were statistically significant (χ^2_6=47.11, p<0.001). This was most notably the case for the post-policy COVID Stabilization period. This may reflect changes in practice due to COVID-19.

Figure 4. Adult Registrations Added to Liver Waiting List by Race/Ethnicity and Era



National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

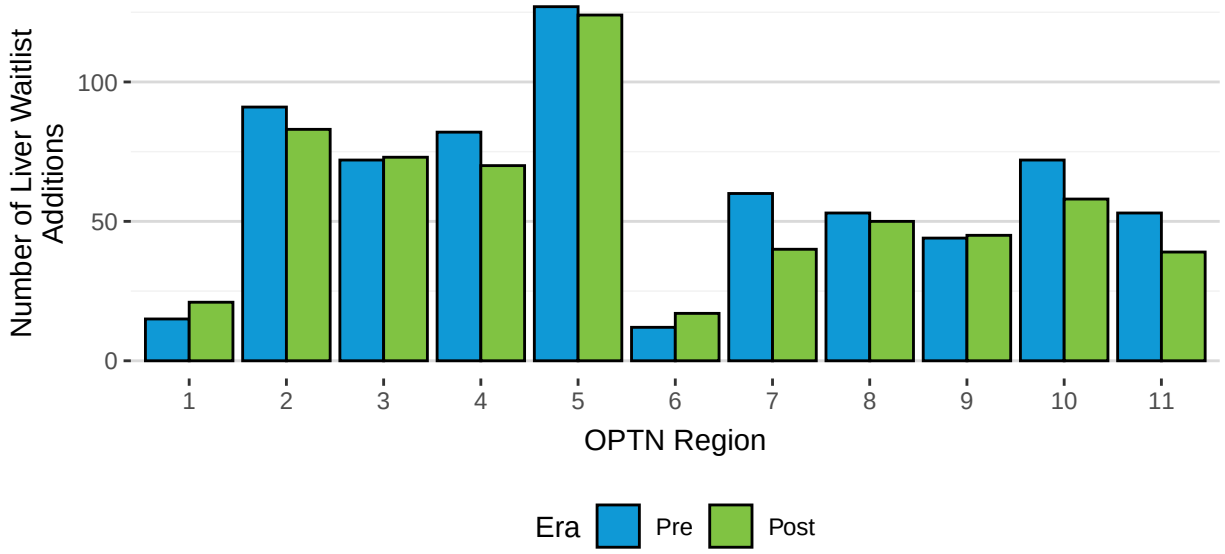
Table 4. Number and Percent of Adult Registrations Added to Liver Waiting List by Race/Ethnicity and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Race/Ethnicity	N	%	N	%	N	%	N	%	N	%
Asian	503	4.0%	48	3.2%	71	4.0%	386	4.2%	505	4.1%
Black	909	7.1%	97	6.5%	100	5.6%	650	7.1%	847	6.8%
Hispanic	2183	17.2%	250	16.7%	306	17.0%	1617	17.7%	2173	17.5%
Other	221	1.7%	27	1.8%	31	1.7%	169	1.9%	227	1.8%
White	8899	70.0%	1071	71.7%	1288	71.7%	6290	69.0%	8649	69.7%

The proportions of new registrations by race/ethnicity remained stable from the pre- to post-policy implementation eras.

Pediatric Registration Additions

Figure 6. Pediatric Registrations Added to Liver Waiting List by OPTN Region of Listing Center and Era



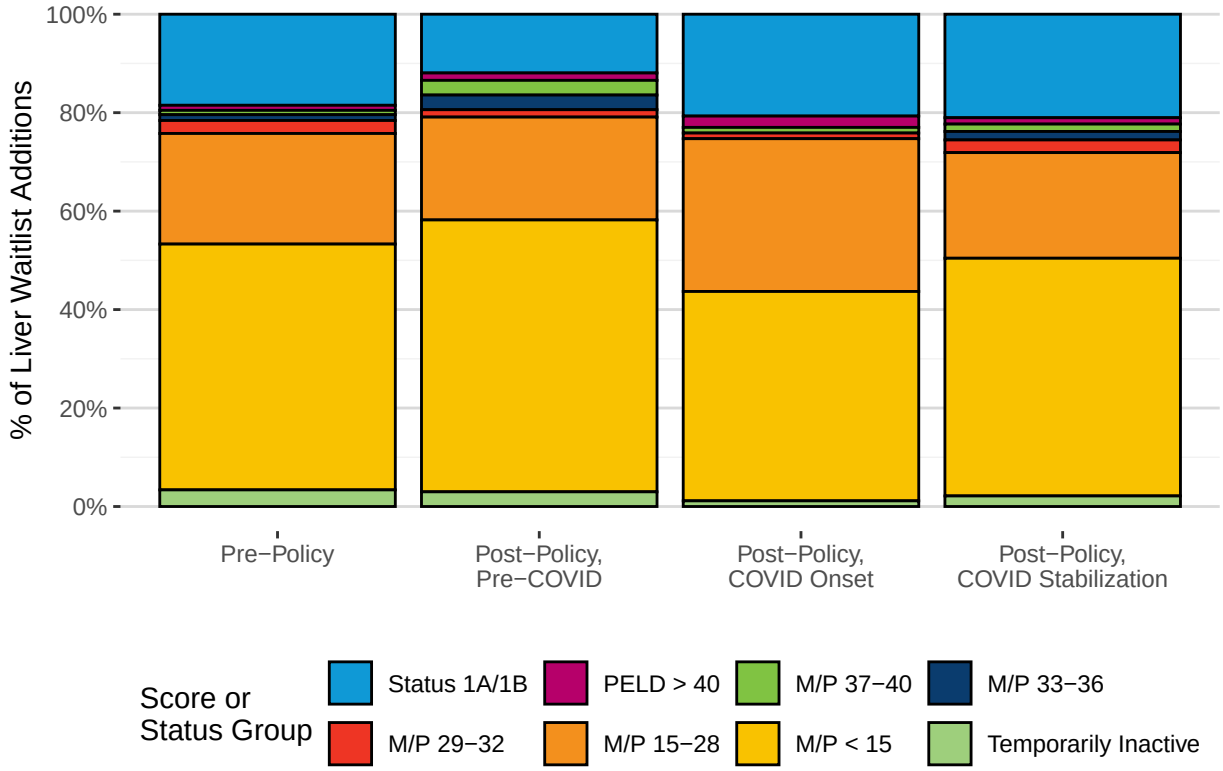
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 6. Number and Percent of Pediatric Registrations Added to Liver Waiting List by OPTN Region of Listing Center and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
OPTN Region	N	%	N	%	N	%	N	%	N	%
1	15	2.2%	5	7.5%	2	2.3%	14	3.0%	21	3.4%
2	91	13.4%	13	19.4%	9	10.3%	61	13.1%	83	13.4%
3	72	10.6%	7	10.4%	13	14.9%	53	11.4%	73	11.8%
4	82	12.0%	6	9.0%	3	3.4%	61	13.1%	70	11.3%
5	127	18.6%	13	19.4%	22	25.3%	89	19.1%	124	20.0%
6	12	1.8%	0	0.0%	0	0.0%	17	3.6%	17	2.7%
7	60	8.8%	6	9.0%	4	4.6%	30	6.4%	40	6.5%
8	53	7.8%	6	9.0%	5	5.7%	39	8.4%	50	8.1%
9	44	6.5%	5	7.5%	5	5.7%	35	7.5%	45	7.3%
10	72	10.6%	3	4.5%	16	18.4%	39	8.4%	58	9.4%
11	53	7.8%	3	4.5%	8	9.2%	28	6.0%	39	6.3%
National	681	100.0%	67	100.0%	87	100.0%	466	100.0%	620	100.0%

There were also fewer pediatric liver waitlist registrations added post-policy. This was true for most OPTN regions, though there is some variability in proportions by region pre- to post-policy due to the smaller numbers of pediatric candidates. Changes in listing volumes post-policy were impacted by the COVID-19 emergency declaration.

Figure 8. Pediatric Registrations Added to Liver Waiting List by MELD or PELD Score or Status at Listing and Era



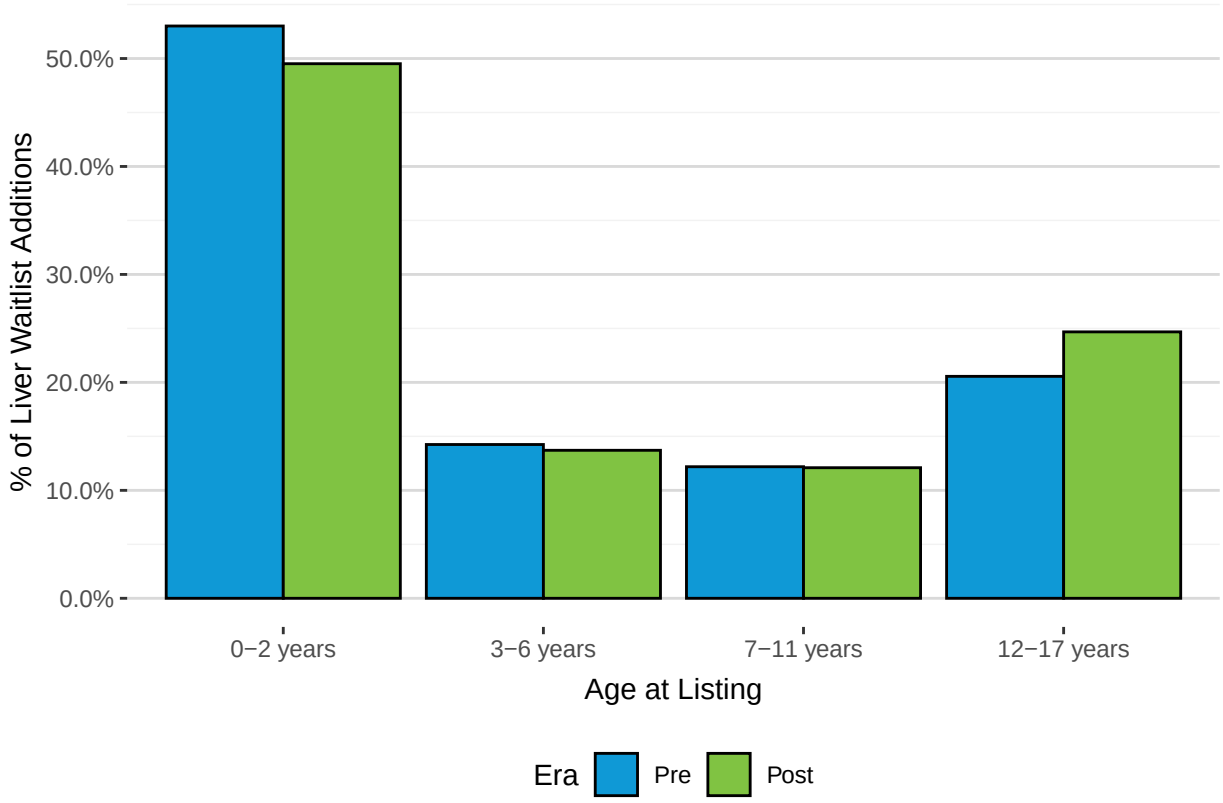
Pre−Policy: 02/03/2019−02/03/2020; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−02/03/2021

Table 8. Number and Percent of Pediatric Registrations Added to Liver Waiting List by MELD or PELD Score or Status at Listing and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Score or Status Group	N	%	N	%	N	%	N	%	N	%
Status 1A/1B	126	18.5%	8	11.9%	18	20.7%	98	21.0%	124	20.0%
PELD > 40	7	1.0%	1	1.5%	2	2.3%	6	1.3%	9	1.5%
M/P 37-40	6	0.9%	2	3.0%	1	1.1%	7	1.5%	10	1.6%
M/P 33-36	8	1.2%	2	3.0%	0	0.0%	8	1.7%	10	1.6%
M/P 29-32	18	2.6%	1	1.5%	1	1.1%	12	2.6%	14	2.3%
M/P 15-28	153	22.5%	14	20.9%	27	31.0%	100	21.5%	141	22.7%
M/P < 15	340	49.9%	37	55.2%	37	42.5%	225	48.3%	299	48.2%
Temporarily Inactive	23	3.4%	2	3.0%	1	1.1%	10	2.1%	13	2.1%

The distribution of MELD or PELD scores at listing remained stable pre- to post-policy overall, though there was variation across COVID-19 post-policy periods.

Figure 9. Pediatric Registrations Added to Liver Waiting List by Age at Listing and Era



National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 9. Number and Percent of Pediatric Registrations Added to Liver Waiting List by Age Group and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Age at Listing	N	%	N	%	N	%	N	%	N	%
0-2 years	361	53.0%	33	49.3%	46	52.9%	228	48.9%	307	49.5%
3-6 years	97	14.2%	10	14.9%	12	13.8%	63	13.5%	85	13.7%
7-11 years	83	12.2%	14	20.9%	10	11.5%	51	10.9%	75	12.1%
12-17 years	140	20.6%	10	14.9%	19	21.8%	124	26.6%	153	24.7%

There were decreases in new liver waiting list registrations for those under then age of 12, and an increase for ages 12-17. The most substantial decrease was in new registrations for 0-2 years old at time of listing. Changes pre- to overall post-policy were not statistically significant (χ^2_3=3.29, p=0.350). Any differences post-policy must be considered in light of the COVID-19 emergency declaration.

Figure 10. Pediatric Registrations Added to Liver Waiting List by Race/Ethnicity and Era

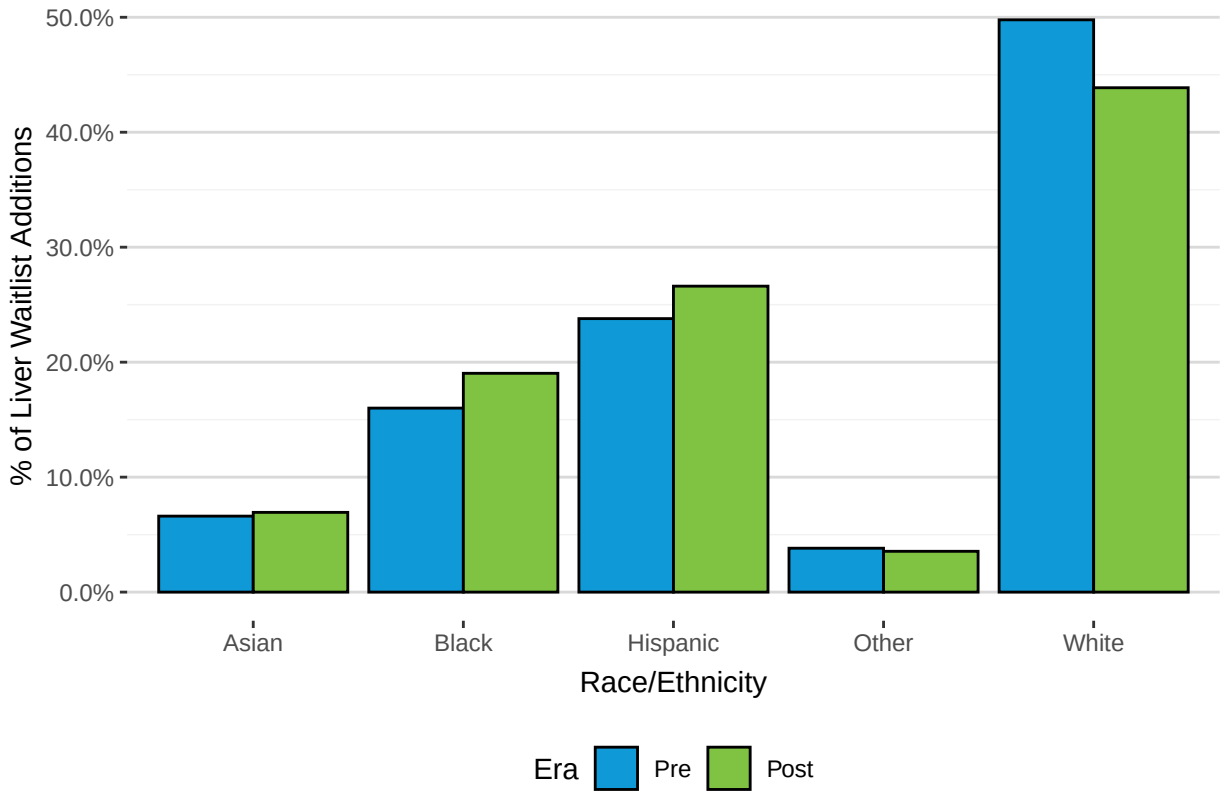


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Table 10. Number and Percent of Pediatric Registrations Added to Liver Waiting List by Race/Ethnicity and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Race/Ethnicity	N	%	N	%	N	%	N	%	N	%
Asian	45	6.6%	5	7.5%	5	5.7%	33	7.1%	43	6.9%
Black	109	16.0%	9	13.4%	12	13.8%	97	20.8%	118	19.0%
Hispanic	162	23.8%	20	29.9%	24	27.6%	121	26.0%	165	26.6%
Other	26	3.8%	2	3.0%	7	8.0%	13	2.8%	22	3.5%
White	339	49.8%	31	46.3%	39	44.8%	202	43.3%	272	43.9%

There were increases in the volumes and proportions of black and Hispanic new pediatric registrations post-policy and a subsequent decrease in the proportion of white registrations added to the liver waiting list.

Waiting List Rates

Changes in the amount of time patients ever waiting contributed and number of events, for each score group, determine the changes in rates. In the cases of significant findings, there were similar numbers of events pre- and post-policy but much fewer patient-years contributed to the groups post-policy, resulting in significantly different rates.

Additional follow-up time is needed for rates to stabilize and reflect policy change. Particularly for high MELD or PELD score candidates, due to smaller sample sizes, there is a lot of variability. Both waitlist removal and transplant rates post-policy must be considered in light of the COVID-19 emergency declaration.

Rates of removal for death/too sick to transplant significantly increased post-implementation for MELD/PELD 29-32 and MELD/PELD 33-36, as indicated by non-overlapping confidence intervals and risk ratio confidence intervals > 1, but did not significantly change for all other status groups.

Figure 12. Liver-Alone Waitlist Rates of Removal Due to Death or Too Sick to Transplant Per 100 Person-Years Waiting by MELD or PELD Score or Status and Era

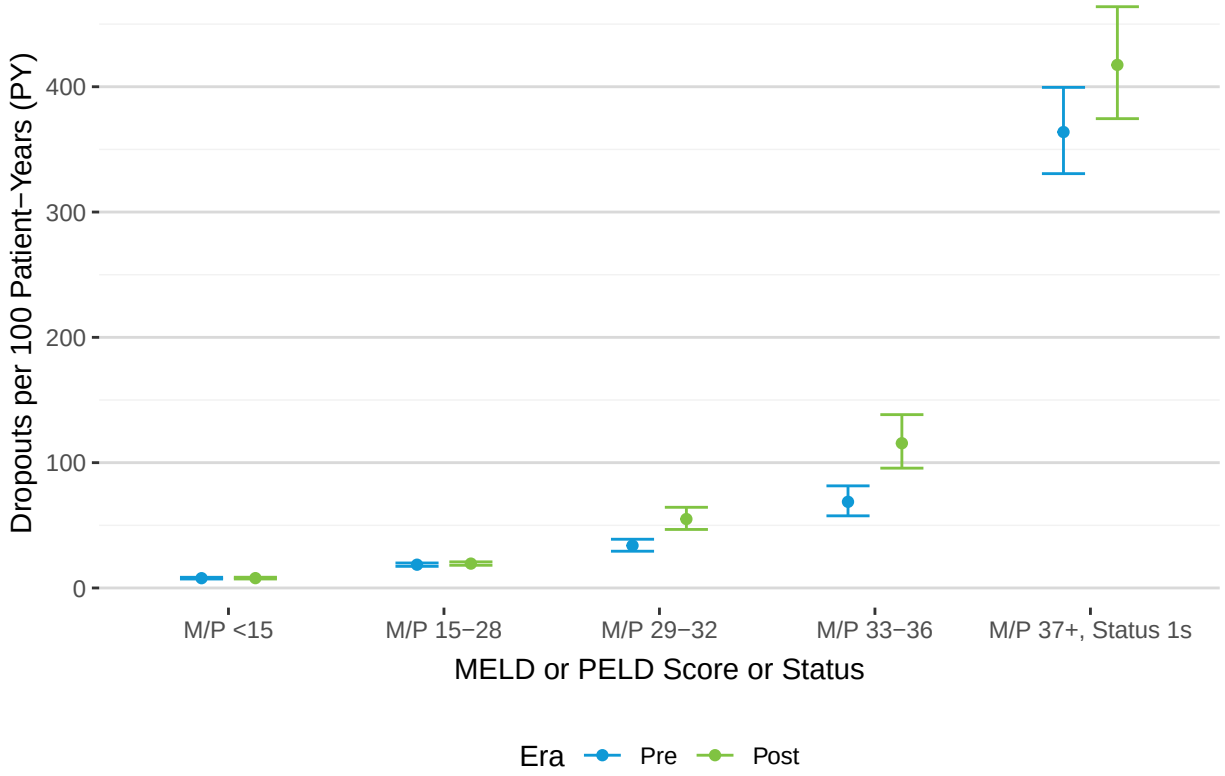
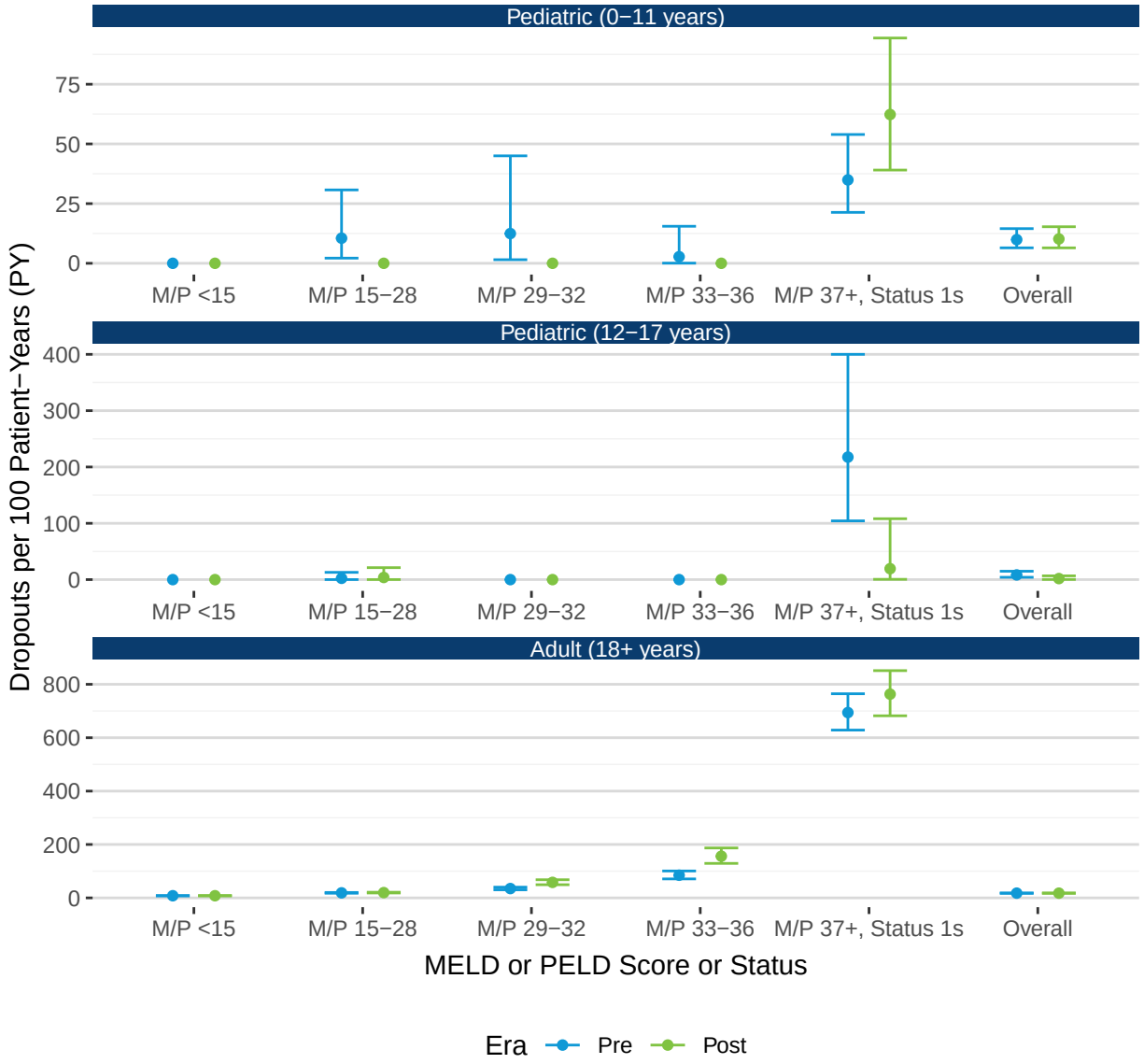


Table 12. Liver-Alone Waitlist Rates of Removal Due to Death or Too Sick to Transplant Per 100 Person-Years Waiting by MELD or PELD Score or Status and Era

		Ever Waiting	Death/Too Sick Events	Patient-Years	Dropouts per 100 PY		Risk Ratio (vs. Pre-Policy)	
Score or Status Group	Era	N	N	PY	Estimate	95% CI	Estimate	95% CI
M/P <15	Pre	14512	522	6684.5	7.81	7.15, 8.51	Ref.	Ref.
	Post	13570	503	6404.5	7.85	7.18, 8.57	1.01	0.89, 1.14
M/P 15-28	Pre	12799	742	3995.7	18.57	17.26, 19.96	Ref.	Ref.
	Post	12267	797	4097.4	19.45	18.12, 20.85	1.05	0.95, 1.16
M/P 29-32	Pre	4019	200	590.8	33.85	29.32, 38.89	Ref.	Ref.
	Post	2947	155	281.8	55.00	46.69, 64.38	1.62	1.32, 2.00
M/P 33-36	Pre	2052	133	193.4	68.76	57.57, 81.49	Ref.	Ref.
	Post	1672	118	102.2	115.52	95.62, 138.34	1.68	1.31, 2.15
M/P 37+, Status 1s	Pre	2371	440	120.9	363.86	330.65, 399.50	Ref.	Ref.
	Post	2147	345	82.7	417.41	374.52, 463.87	1.15	1.00, 1.32

Figure 13. Liver-Alone Waitlist Rates of Removal Due to Death or Too Sick to Transplant Per 100 Person-Years Waiting by MELD or PELD Score or Status, Age at Listing, and Era



National state of emergency declared in US due to COVID–19 pandemic on March 13, 2020.

For pediatric (0-11 years) liver candidates, there were few events that occurred at most score or status groups, leading to waiting list dropout rates of 0 or rates with substantially large variability in both the pre- and post-policy eras. Most pediatric candidate removals occurred with MELD or PELD scores 37 or higher, or in Status 1A or 1B. Overall there has not been a statistically significant change in waiting list dropout rates pre- versus post-policy for pediatric (0-11 years) candidates, though the sample size is still small at this time.

The instances of dropout events are even fewer for pediatric (12-17 years) liver candidates in either policy era. Overall there were two events post-policy, compared to 11 events pre-policy, and a similar number of patient-years waiting; however, due to small sample sizes, the confidence intervals overlap indicating no significant change at this time.

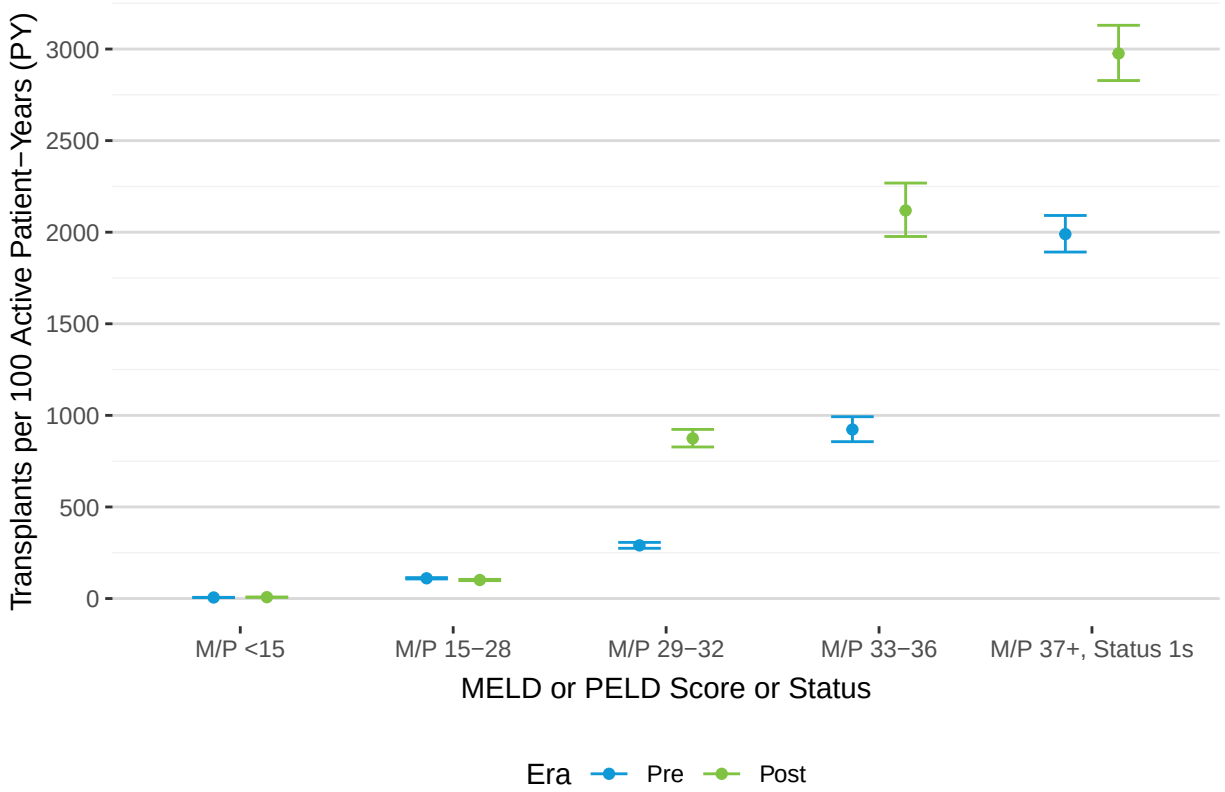
Adult (18+ years) liver candidates with MELD/PELD scores 29-36 still exhibit higher waiting list dropout rates post-policy (no overlapping confidence intervals) compared to pre-policy. Overall waiting list dropout rates for adults have not significantly changed.

Table 13. Liver-Alone Waitlist Rates of Removal Due to Death or Too Sick to Transplant Per 100 Person-Years Waiting by MELD or PELD Score or Status, Age at Listing, and Era

			Ever Waiting	Death/Too Sick Events	Patient-Years	Dropouts per 100 PY	
Age at Listing	Score or Status Group	Era	N	N	PY	Estimate	95% CI
Pediatric (0-11 years)	M/P <15	Pre	372	0	119.6	0.00	-, -
		Post	320	0	117.5	0.00	-, -
	M/P 15-28	Pre	209	3	28.5	10.52	2.17, 30.74
		Post	181	0	32.6	0.00	-, -
	M/P 29-32	Pre	126	2	16.1	12.46	1.51, 45.01
		Post	87	0	10.7	0.00	-, -
	M/P 33-36	Pre	224	1	35.9	2.78	0.07, 15.51
		Post	174	0	25.7	0.00	-, -
	M/P 37+, Status 1s	Pre	365	20	57.3	34.93	21.34, 53.94
		Post	243	22	35.3	62.32	39.05, 94.35
	Overall	Pre	738	26	262.3	9.91	6.47, 14.52
		Post	632	23	225.4	10.20	6.47, 15.31
Pediatric (12-17 years)	M/P <15	Pre	131	0	66.7	0.00	-, -
		Post	131	0	62.7	0.00	-, -
	M/P 15-28	Pre	119	1	43.2	2.32	0.06, 12.90
		Post	100	1	26.2	3.81	0.10, 21.24
	M/P 29-32	Pre	47	0	7.2	0.00	-, -
		Post	32	0	4.3	0.00	-, -
	M/P 33-36	Pre	23	0	2.1	0.00	-, -
		Post	13	0	0.8	0.00	-, -
	M/P 37+, Status 1s	Pre	46	10	4.6	217.52	104.31, 400.03
		Post	54	1	5.2	19.40	0.49, 108.12
	Overall	Pre	241	11	132.2	8.32	4.15, 14.89
		Post	260	2	108.0	1.85	0.22, 6.69
Adult (18+ years)	M/P <15	Pre	14011	522	6498.2	8.03	7.36, 8.75
		Post	13120	503	6224.2	8.08	7.39, 8.82
	M/P 15-28	Pre	12472	738	3924.4	18.81	17.47, 20.21
		Post	11988	796	4039.0	19.71	18.36, 21.13
	M/P 29-32	Pre	3846	198	567.5	34.89	30.20, 40.10
		Post	2828	155	266.8	58.10	49.32, 68.00
	M/P 33-36	Pre	1805	132	155.4	84.97	71.09, 100.76
		Post	1485	118	75.6	156.10	129.20, 186.93
	M/P 37+, Status 1s	Pre	1960	410	59.1	694.11	628.54, 764.66
		Post	1850	322	42.2	763.13	682.05, 851.21
	Overall	Pre	22204	2012	11328.9	17.76	16.99, 18.55
		Post	21458	1909	10776.7	17.71	16.93, 18.53

Rates of transplant significantly increased post-implementation for MELD/PELD 29-32, MELD/PELD 33-36, and MELD/PELD 37+/Status 1s, as indicated by non-overlapping confidence intervals and risk ratio confidence intervals > 1, but did not significantly change for lower MELD/PELD score groups.

Figure 15. Liver-Alone Transplant Rates Per 100 Active Person-Years Waiting by MELD or PELD Score or Status and Era

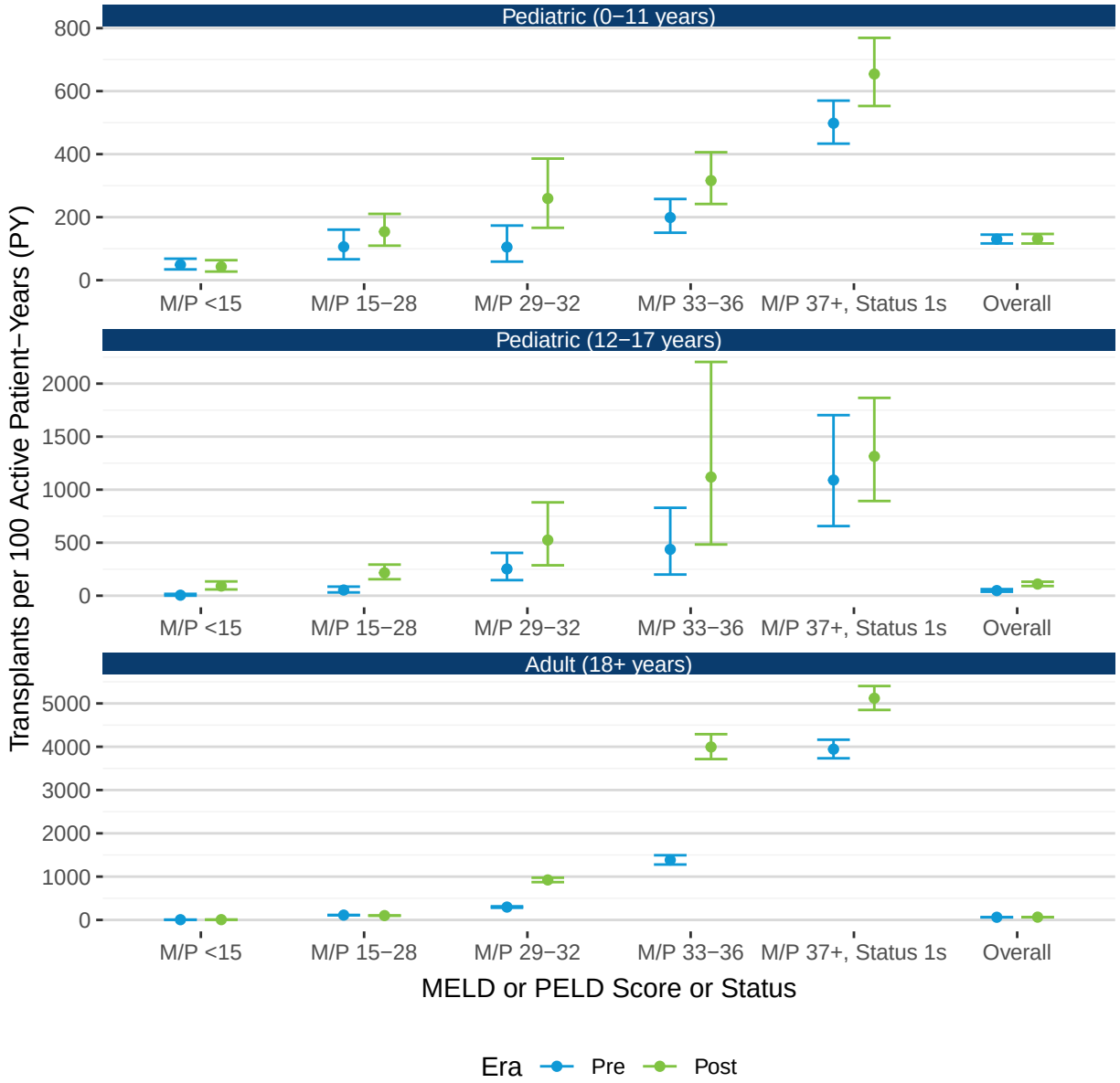


National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 15. Liver-Alone Transplant Rates Per 100 Active Person-Years Waiting by MELD or PELD Score or Status and Era

		Ever Waiting	Transplant Events	Active Patient-Years	Transplants per 100 Active PY		Risk Ratio (vs. Pre-Policy)	
Score or Status Group	Era	N	N	PY	Estimate	95% CI	Estimate	95% CI
M/P <15	Pre	13323	310	5397.5	5.74	5.12, 6.42	Ref.	Ref.
	Post	12391	373	5051.9	7.38	6.65, 8.17	1.29	1.11, 1.49
M/P 15-28	Pre	12178	3569	3230.8	110.47	106.87, 114.15	Ref.	Ref.
	Post	11670	3318	3279.6	101.17	97.76, 104.67	0.92	0.87, 0.96
M/P 29-32	Pre	3906	1262	435.1	290.08	274.29, 306.54	Ref.	Ref.
	Post	2784	1295	148.1	874.38	827.40, 923.34	3.01	2.79, 3.26
M/P 33-36	Pre	1923	719	77.9	922.67	856.45, 992.65	Ref.	Ref.
	Post	1583	825	38.9	2118.66	1976.54, 2268.30	2.30	2.08, 2.54
M/P 37+, Status 1s	Pre	2323	1544	77.6	1989.62	1891.60, 2091.40	Ref.	Ref.
	Post	2099	1517	51.0	2975.95	2828.06, 3129.56	1.50	1.39, 1.61

Figure 16. Liver-Alone Transplant Rates Per 100 Active Person-Years Waiting by MELD or PELD Score or Status, Age at Listing, and Era



National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Increased waiting list transplant rates for pediatric (0-11 years) liver candidates occurred for MELD/PELD scores 29-32, 33-36, and 37+/Status1s post-policy, though these changes were not significant.

Pediatric (12-17 years) liver candidates also experienced a significant increase, for MELD/PELD scores $<$ 15, 15-28 and overall post-policy compared to pre-policy.

Lastly, MELD/PELD 29 and higher adult (18+ years) liver candidates increased transplant rates pre- to post-policy, as evidenced by non-overlapping confidence intervals per score or status group. Overall, while the transplant rate was slightly higher post-policy, this was not a significant change.

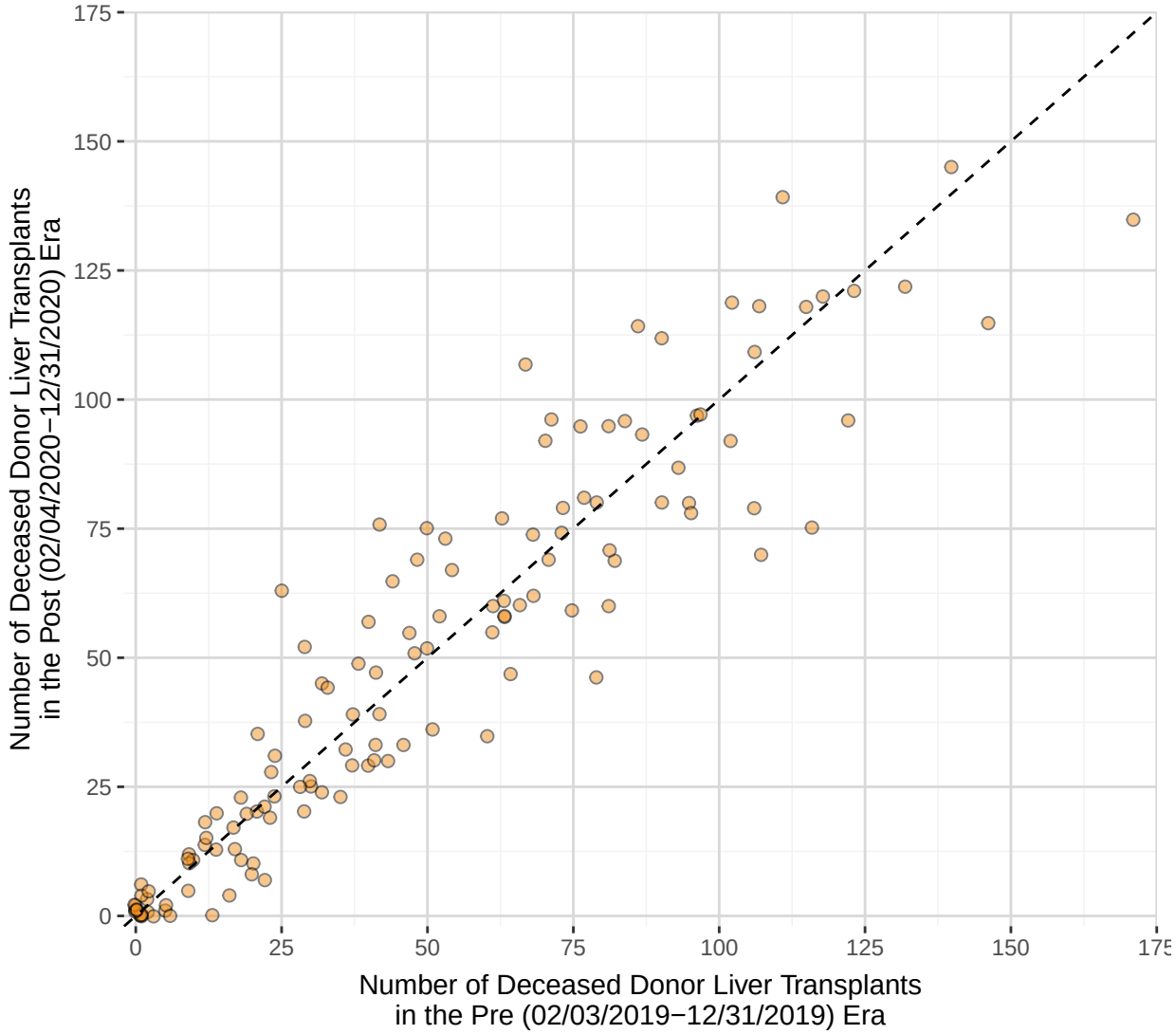
Table 16. Liver-Alone Transplant Rates Per 100 Active Person-Years Waiting by MELD or PELD Score or Status, Age at Listing, and Era

			Ever Waiting	Transplant Events	Active Patient-Years	Transplants per 100 Active PY	
Age at Listing	Score or Status Group	Era	N	N	PY	Estimate	95% CI
Pediatric (0-11 years)	M/P <15	Pre	324	35	71.5	48.98	34.12, 68.12
		Post	279	24	56.3	42.59	27.29, 63.38
	M/P 15-28	Pre	201	22	20.8	105.87	66.35, 160.28
		Post	175	39	25.3	153.88	109.42, 210.35
	M/P 29-32	Pre	125	15	14.3	105.09	58.82, 173.32
		Post	85	24	9.3	259.33	166.15, 385.86
	M/P 33-36	Pre	219	57	28.7	198.84	150.60, 257.62
		Post	170	61	19.3	316.08	241.78, 406.02
	M/P 37+, Status 1s	Pre	357	212	42.6	498.10	433.30, 569.86
		Post	231	147	22.5	654.33	552.83, 769.07
	Overall	Pre	738	341	262.3	129.99	116.56, 144.55
		Post	632	295	225.4	130.88	116.37, 146.70
Pediatric (12-17 years)	M/P <15	Pre	109	2	41.9	4.77	0.58, 17.24
		Post	105	25	27.4	91.22	59.03, 134.66
	M/P 15-28	Pre	110	17	31.9	53.31	31.05, 85.35
		Post	93	41	19.0	216.26	155.19, 293.38
	M/P 29-32	Pre	47	17	6.7	252.13	146.88, 403.69
		Post	30	14	2.7	524.64	286.83, 880.26
	M/P 33-36	Pre	22	9	2.1	436.84	199.75, 829.25
		Post	13	8	0.7	1118.77	483.01, 2204.43
	M/P 37+, Status 1s	Pre	42	19	1.7	1090.41	656.50, 1702.81
		Post	52	31	2.4	1314.17	892.91, 1865.36
	Overall	Pre	241	64	132.2	48.42	37.29, 61.83
		Post	260	119	108.0	110.17	91.27, 131.83
Adult (18+ years)	M/P <15	Pre	12892	273	5284.1	5.17	4.57, 5.82
		Post	12007	323	4968.2	6.50	5.81, 7.25
	M/P 15-28	Pre	11867	3530	3178.3	111.07	107.43, 114.79
		Post	11404	3239	3235.4	100.11	96.69, 103.62
	M/P 29-32	Pre	3734	1230	414.0	297.07	280.70, 314.15
		Post	2669	1257	136.2	923.04	872.71, 975.51
	M/P 33-36	Pre	1682	653	47.2	1383.47	1279.38, 1493.78
		Post	1400	756	18.9	3994.50	3714.80, 4289.68
	M/P 37+, Status 1s	Pre	1924	1313	33.3	3943.11	3732.68, 4162.30
		Post	1816	1339	26.2	5120.32	4849.71, 5402.11
	Overall	Pre	22204	6999	11328.9	61.78	60.34, 63.24
		Post	21458	6914	10776.7	64.16	62.65, 65.69

Section II. Deceased Donor Liver Transplants

Adult (Age 18 or Older at Transplant) Liver-Alone Transplants

Figure 18. Scatter Plot of Transplant Center Adult Deceased Donor Liver-Alone Transplant Volume

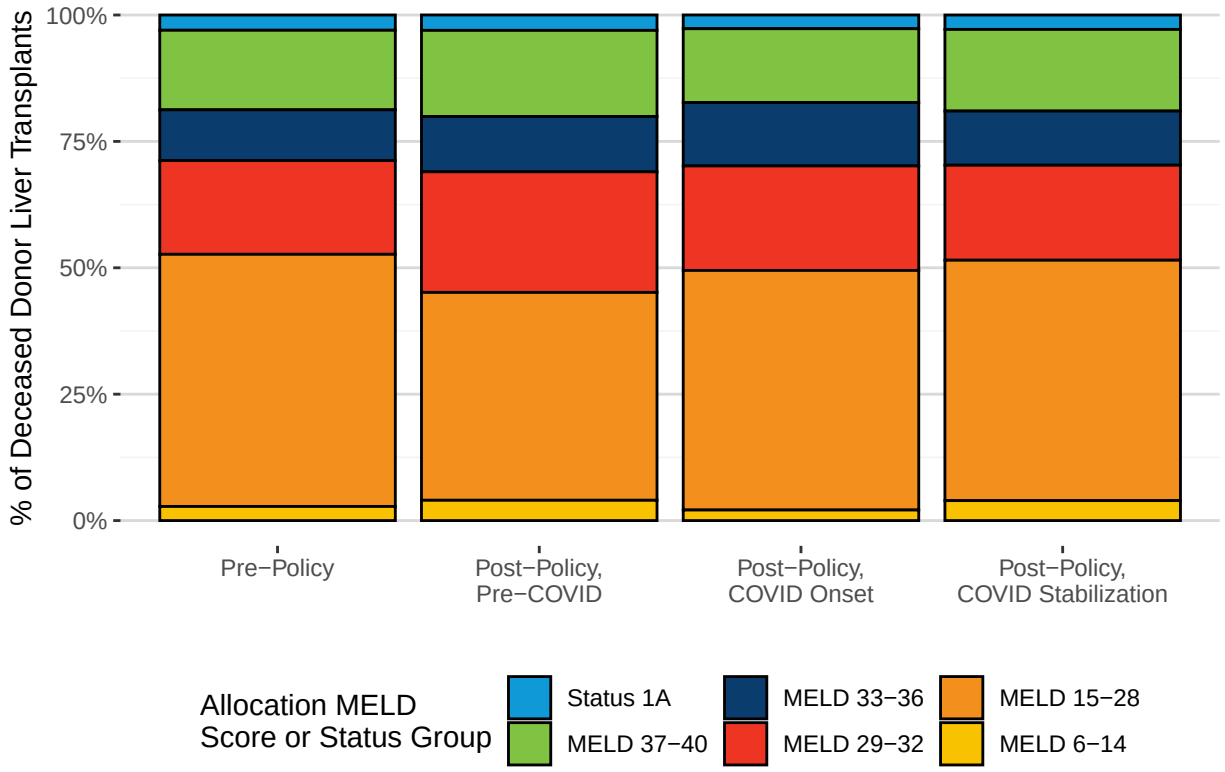


* There was 1 program that is not included due to new activation after the pre era.
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Any points along the diagonal dashed line indicate no changes in the absolute number of deceased donor liver transplants by program, pre- to post-policy. Points that fall above the diagonal represent programs that performed more deceased donor liver transplants post-policy compared to pre-policy. Points that fall below the diagonal represent programs that performed fewer deceased donor liver transplants post-policy compared to pre-policy.

The majority of programs performed similar number of deceased donor liver transplants Pre (02/03/2019-12/31/2019) and Post (02/04/2020-12/31/2020) policy, overall. A Spearman's rank correlation of ρ= 0.95 indicates a strong positive, monotonic relationship between these two measures. The Kruskal-Wallis test indicated that there was not a statistically significant change pre- to post-policy in the number of deceased donor, liver-alone transplants performed per transplant program (χ^2_1=0.0033, p=0.954).

Figure 19. Adult Deceased Donor Liver-Alone Transplants by Allocation MELD Score or Status and Era



Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

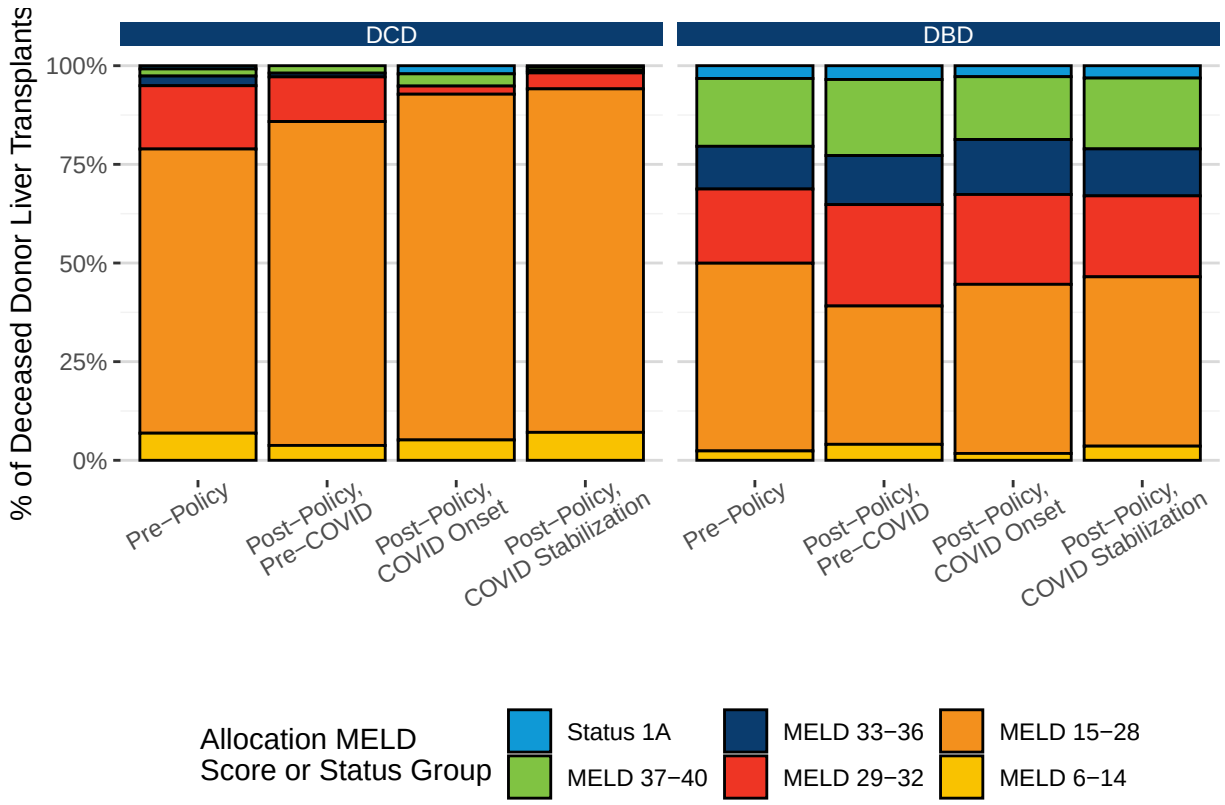
Table 18. Number and Percent of Adult Deceased Donor Liver-Alone Transplants by Allocation MELD Score or Status and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Score or Status Group	N	%	N	%	N	%	N	%	N	%
Status 1A	196	3.0%	25	3.0%	26	2.7%	134	2.8%	185	2.9%
MELD 37-40	1024	15.7%	140	17.0%	140	14.6%	760	16.2%	1040	16.0%
MELD 33-36	653	10.0%	90	10.9%	120	12.5%	504	10.7%	714	11.0%
MELD 29-32	1206	18.5%	196	23.8%	198	20.7%	884	18.8%	1278	19.7%
MELD 15-28	3244	49.9%	338	41.1%	454	47.4%	2237	47.5%	3029	46.7%
MELD 6-14	182	2.8%	33	4.0%	20	2.1%	186	4.0%	239	3.7%

Similar percentages of transplants occurred within each score group pre- and post-policy eras, with a slight decrease in the proportion of transplant recipients with MELD scores 15-28 post-policy. Changes pre- to overall post-policy were statistically significant (χ^2_5=20.31, p=0.001). The national median allocation MELD score at transplant was 28 pre-policy and 28 overall post-policy.

Changes in recipient score at transplant were variable across the country. This is illustrated by OPTN Region in the **Appendix**; however, these changes may be even more variable when considered at smaller units such as DSAs, states, or transplant programs due to smaller sample sizes and the differential impact of COVID-19 across the country. Any changes in allocation score distributions should be interpreted with caution in light of the COVID-19 emergency declaration.

Figure 20. Adult Deceased Donor Liver-Alone Transplants by Allocation MELD Score or Status, Donor Type, and Era



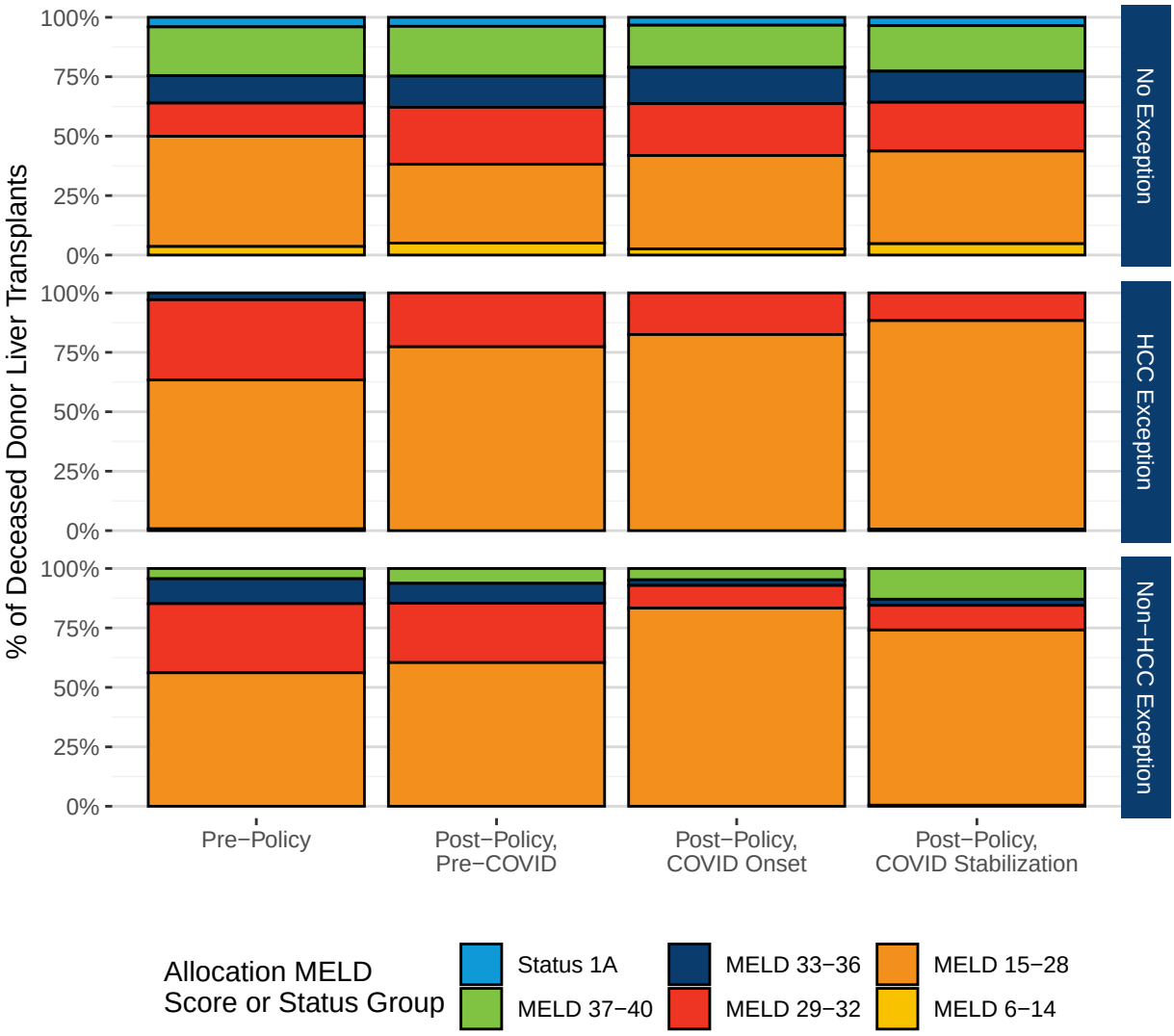
Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

Table 19. Number and Percent of Adult Deceased Donor Liver-Alone Transplants by Allocation MELD Score or Status, Donor Type, and Era

		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Donor Type	Score or Status Group	N	%	N	%	N	%	N	%	N	%
DCD	Status 1A	5	0.8%	0	0.0%	2	2.1%	2	0.4%	4	0.6%
	MELD 37-40	11	1.8%	2	1.9%	3	3.1%	4	0.8%	9	1.3%
	MELD 33-36	15	2.5%	1	0.9%	0	0.0%	3	0.6%	4	0.6%
	MELD 29-32	98	16.0%	12	11.3%	2	2.1%	20	4.0%	34	4.9%
	MELD 15-28	440	72.0%	87	82.1%	85	87.6%	430	87.0%	602	86.4%
	MELD 6-14	42	6.9%	4	3.8%	5	5.2%	35	7.1%	44	6.3%
DBD	Status 1A	191	3.2%	25	3.5%	24	2.8%	132	3.1%	181	3.1%
	MELD 37-40	1013	17.2%	138	19.3%	137	15.9%	756	18.0%	1031	17.8%
	MELD 33-36	638	10.8%	89	12.4%	120	13.9%	501	11.9%	710	12.3%
	MELD 29-32	1108	18.8%	184	25.7%	196	22.8%	864	20.5%	1244	21.5%
	MELD 15-28	2804	47.6%	251	35.1%	369	42.9%	1807	42.9%	2427	41.9%
	MELD 6-14	140	2.4%	29	4.1%	15	1.7%	151	3.6%	195	3.4%

Differences pre- to post-policy in the proportion of score groups was most notable for DCD donors, even across COVID-19 post-policy periods. There has been an increasing proportion of MELD 15-28 recipients of DCD donors post-policy. For DBD donors, there has been a slight increase in the volume and proportion of transplant recipients with MELD scores 29-40 and 6-14 post-policy. Due to the COVID-19 emergency declaration, this finding should be interpreted with caution.

Figure 21. Adult Deceased Donor Liver-Alone Transplants by Allocation MELD Score or Status, Exception Status and Era



Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

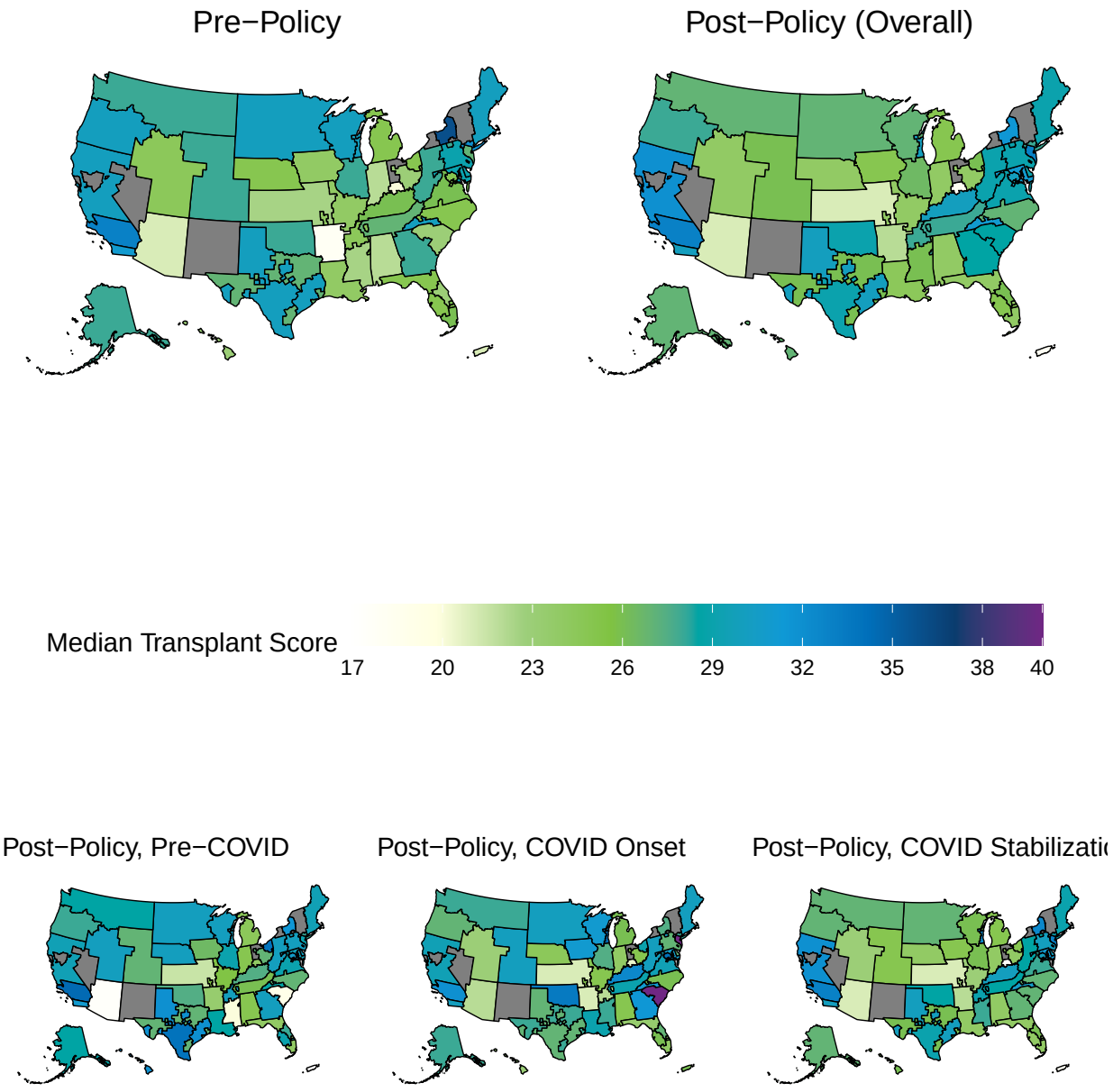
Table 20. Number and Percent of Adult Deceased Donor Liver-Alone Transplants by Allocation MELD Score at Transplant, Exception Status and Era

		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Exception Status	Score or Status Group	N	%	N	%	N	%	N	%	N	%
No Exception	Status 1A	196	4.0%	25	3.8%	26	3.3%	134	3.5%	185	3.5%
	MELD 37-40	998	20.5%	137	20.9%	138	17.7%	730	19.2%	1005	19.2%
	MELD 33-36	560	11.5%	86	13.1%	119	15.3%	498	13.1%	703	13.4%
	MELD 29-32	680	14.0%	157	24.0%	170	21.8%	783	20.5%	1110	21.2%
	MELD 15-28	2255	46.4%	217	33.1%	306	39.3%	1486	39.0%	2009	38.3%
	MELD 6-14	174	3.6%	33	5.0%	20	2.6%	181	4.7%	234	4.5%
HCC Exception	MELD 33-36	30	2.9%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	MELD 29-32	351	33.8%	27	22.7%	24	17.5%	77	11.6%	128	14.0%
	MELD 15-28	651	62.6%	92	77.3%	113	82.5%	580	87.7%	785	85.6%
	MELD 6-14	8	0.8%	0	0.0%	0	0.0%	4	0.6%	4	0.4%
Non-HCC Exception	MELD 37-40	26	4.3%	3	6.2%	2	4.8%	30	12.9%	35	10.9%
	MELD 33-36	63	10.5%	4	8.3%	1	2.4%	6	2.6%	11	3.4%
	MELD 29-32	175	29.1%	12	25.0%	4	9.5%	24	10.3%	40	12.4%
	MELD 15-28	338	56.1%	29	60.4%	35	83.3%	171	73.7%	235	73.0%
	MELD 6-14	0	0.0%	0	0.0%	0	0.0%	1	0.4%	1	0.3%

The distributions of allocation MELD scores or status at transplant by exception status for adult recipients show changes in distributions, particularly for HCC and non-HCC exception recipients. The large majority of both HCC and non-HCC exception transplant recipients have scores 15-28 post-policy. There has been an increase in non-HCC exception recipients with high MELD scores 37-40, and fewer with scores 29-36. Non-exception transplant recipients were fairly similar pre- versus post-policy.

The range of median transplant scores (MTS) by DSA was 18 to 36 in the pre-policy era. Between the 3 post-policy eras, the range of MTS by DSA differed. It is important to keep in mind that all post-policy periods are relatively short compared to the full pre-implementation period. However, the overall post-policy era does illustrate an attenuation of MTS from the extremes. The national MTS was 28 pre- and 28 post-policy.

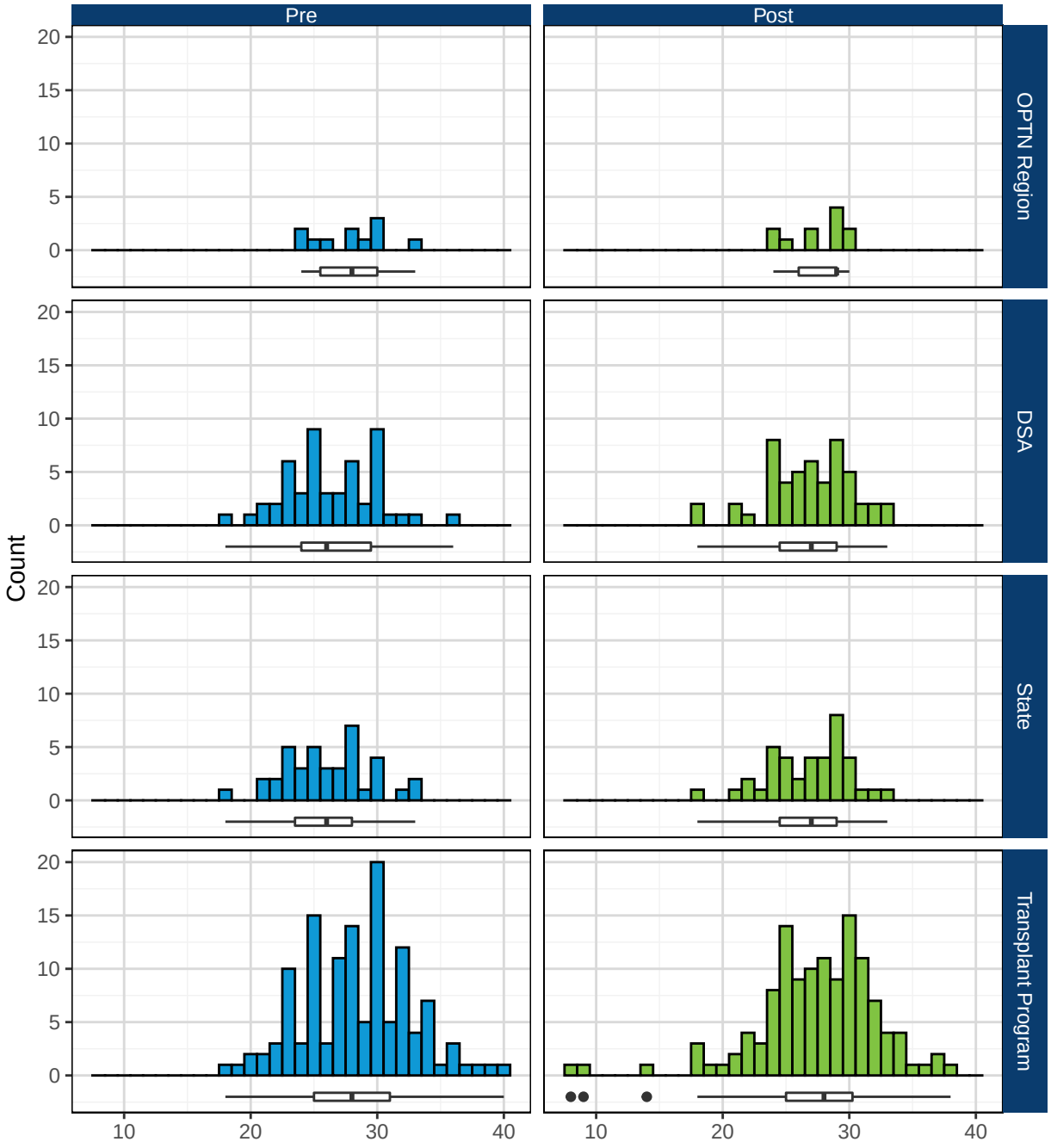
Figure 23. Median Adult Deceased Donor Liver-Alone Recipient Allocation MELD Score at Transplant by DSA of Transplant Center and Era



Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

The following figure illustrates how the variance in MTS, or the spread around the average MTS across geographic units, has decreased pre- to post-policy. There are different shapes to the distributions of MTS pre- to post-policy by geographic unit. In particular, MTS values by DSA, state, and transplant center are clustered around the interquartile ranges (25th and 75th percentiles). The MTS values by DSA and transplant center indicate fewer 'extreme' high values, while there are more 'extreme' low values by transplant center.

Figure 24. Distribution of Median Adult Deceased Donor Liver-Alone Recipient Allocation MELD Score at Transplant by Geographic Units and Era



National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.
Pre−Policy: 02/03/2019 − 12/31/2019; Post−Policy: 02/04/2020 − 12/31/2020.

Table 22. Distribution of Median Adult Deceased Donor Liver-Alone Recipient Allocation MELD Score at Transplant by Geographic Units and Era

Unit of Median Transplant Score	Policy Era	N	Median Transplant Score (MTS)					
			Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
OPTN Region	Pre-Policy	11	24.0	25.50	28.00	27.9	30.0	33.0
	Post-Policy, Pre-COVID	11	25.0	27.50	29.00	28.5	29.8	31.0
	Post-Policy, COVID Onset	11	24.0	26.50	28.00	27.8	29.5	30.0
	Post-Policy, COVID Stabilization	11	24.0	26.00	28.00	27.5	29.5	30.0
	Post Policy (overall)	11	24.0	26.00	29.00	27.5	29.0	30.0
DSA	Pre-Policy	51	18.0	24.00	26.00	26.4	29.5	36.0
	Post-Policy, Pre-COVID	51	17.0	25.75	28.50	27.6	30.0	34.5
	Post-Policy, COVID Onset	51	20.5	25.00	28.00	28.0	30.0	40.0
	Post-Policy, COVID Stabilization	51	17.5	24.00	27.00	26.7	29.0	33.0
	Post Policy (overall)	51	18.0	24.25	27.00	26.8	29.0	33.0
State	Pre-Policy	39	18.0	23.50	26.00	26.1	28.0	33.0
	Post-Policy, Pre-COVID	38	17.0	25.00	28.00	26.9	30.0	33.0
	Post-Policy, COVID Onset	38	21.0	25.00	28.00	28.1	30.4	40.0
	Post-Policy, COVID Stabilization	39	18.0	24.00	27.00	26.5	29.0	33.0
	Post Policy (overall)	39	18.0	24.25	27.00	26.8	29.0	33.0
Transplant Program	Pre-Policy	126	18.0	25.00	28.00	28.4	31.0	40.0
	Post-Policy, Pre-COVID	109	11.5	26.00	29.00	28.2	31.0	40.0
	Post-Policy, COVID Onset	106	18.0	26.00	29.00	28.8	31.0	40.0
	Post-Policy, COVID Stabilization	122	8.0	25.00	27.25	27.4	30.0	39.0
	Post Policy (overall)	124	8.0	25.00	28.00	27.4	30.1	38.0

It was also crucial to quantify the variation in median allocation MELD at transplant between different units. As expected, the changes in variance and standard deviation pre- versus post-policy were smaller as the unit of geography also got smaller.

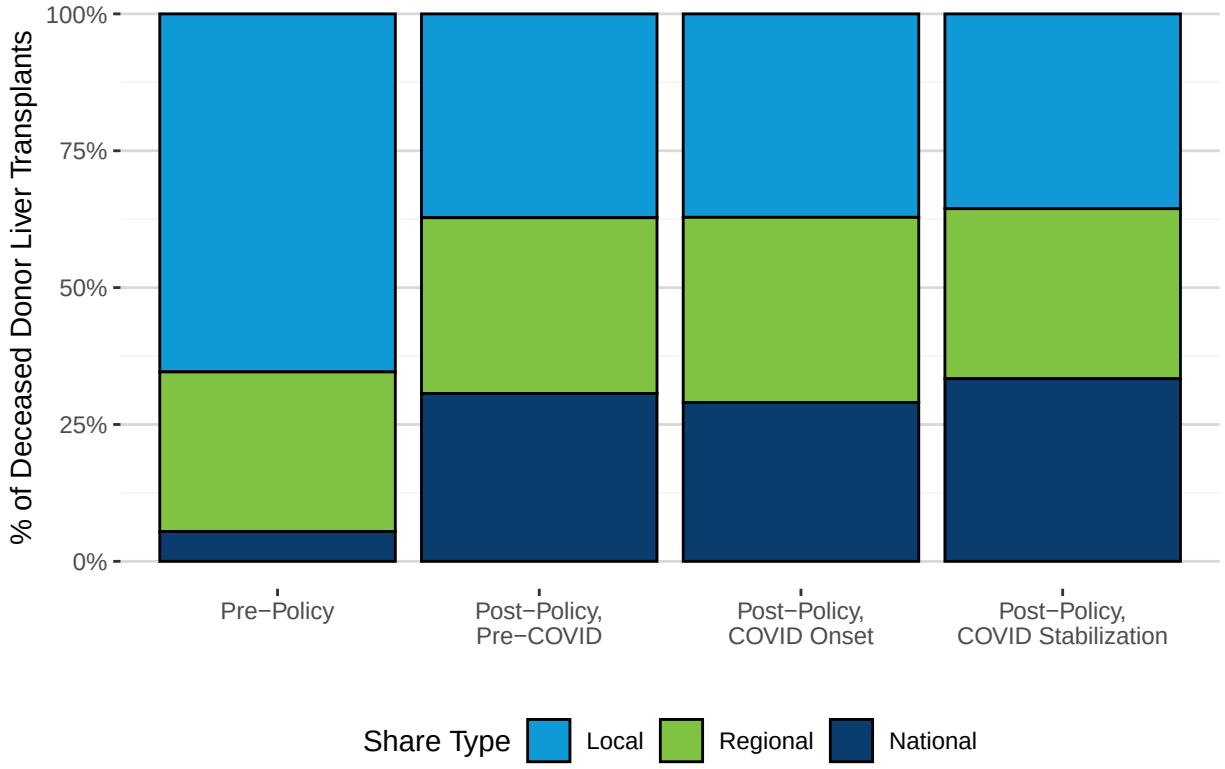
Table 23. Variance and Standard Deviation of Median Adult Deceased Donor Liver-Alone Recipient Allocation MELD Score at Transplant By Era

Unit of Median Transplant Score	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	Variance	(SD)	Variance	(SD)	Variance	(SD)	Variance	(SD)	Variance	(SD)
OPTN Region	8.29	2.88	4.42	2.10	4.36	2.09	5.47	2.34	5.27	2.30
DSA	13.17	3.63	14.97	3.87	17.90	4.23	12.77	3.57	11.59	3.40
State	11.85	3.44	16.06	4.01	19.09	4.37	10.56	3.25	10.31	3.21
Transplant Center	18.43	4.29	26.38	5.14	21.77	4.67	24.06	4.91	23.16	4.81

While patterns of decreasing variation of median allocation score at transplant are beginning to emerge, these changes should be interpreted with caution in light of the COVID-19 emergency declaration. Particularly in these smaller post-policy implementation time periods and as the sample size per geographic unit gets smaller. Overall pre- versus post-policy comparisons show that there were no statistically significant differences in variance at this time (OPTN Region χ^2_1=0.24, p=0.622, DSA χ^2_1=0.76, p=0.383, state χ^2_1=0.25, p=0.620, transplant program χ^2_1=0.03, p=0.861).

While just under two-thirds of liver transplants were local (transplant center within same DSA as donor hospital) in the pre-policy era, this dropped to approximately one-third during the post-policy eras. This change in distribution of share type was statistically significant (χ^2_2=1806.32, p<0.001) pre- versus overall post-policy. There are fairly equal percentages of liver transplants in the local, regional, and national share types across the post-policy eras.

Figure 25. Adult Deceased Donor Liver-Alone Transplants by Donor Share Type and Era



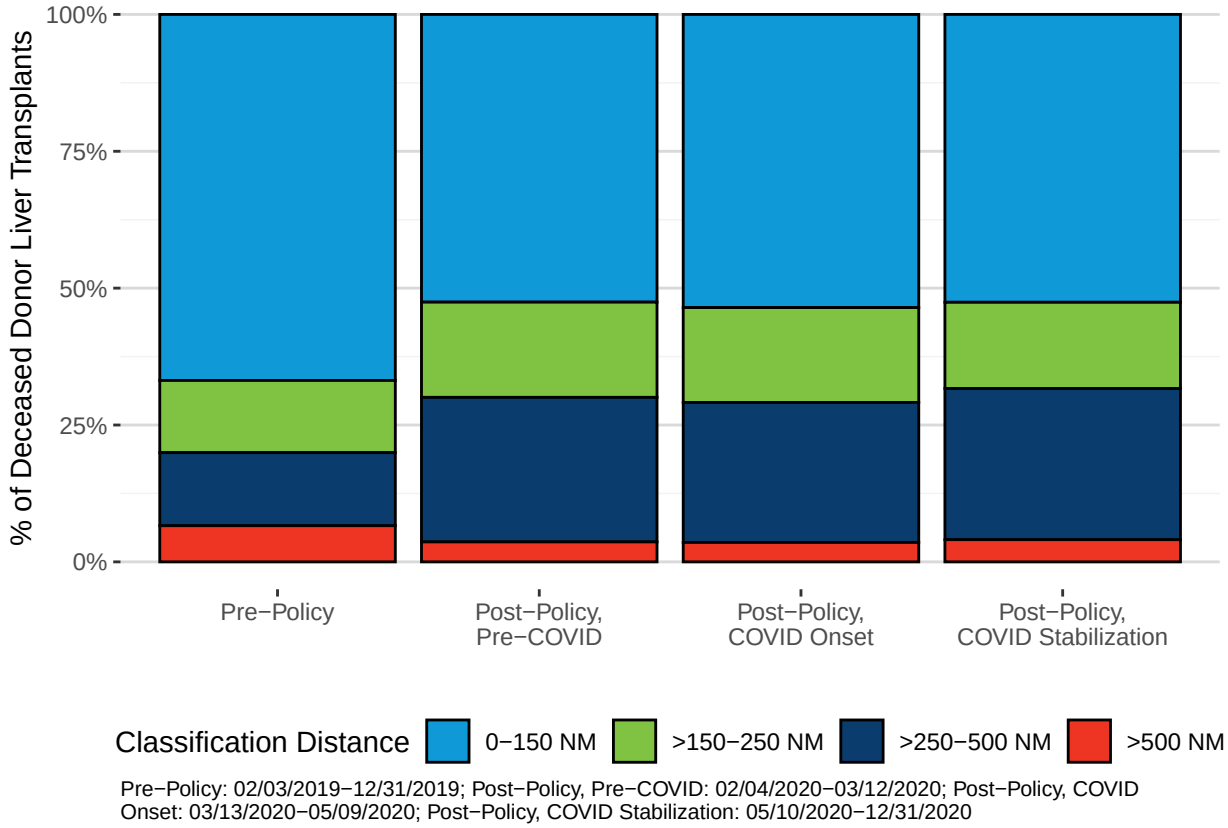
Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

Table 24. Number and Percent of Adult Deceased Donor Liver-Alone Transplants by Donor Share Type and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Share Type	N	%	N	%	N	%	N	%	N	%
Local	4254	65.4%	306	37.2%	356	37.2%	1674	35.6%	2336	36.0%
Regional	1897	29.2%	264	32.1%	324	33.8%	1461	31.1%	2049	31.6%
National	354	5.4%	252	30.7%	278	29.0%	1570	33.4%	2100	32.4%

Since the policy removed DSA and OPTN region as units of allocation and now uses circles around the donor hospital of the potential liver donor, the distance that deceased donor livers travel has been of interest. Based on information that is reported to the OPTN, this is defined as the straight-line nautical mile (NM) distance between donor hospital and transplant center. Unlike statute (regular) miles, NM do take into account some curvature of the earth. There was a decrease in liver transplants occurring within 150 NM of the donor hospital. There has been a subsequent increase in the liver transplants occurring over 150 NM but within 500 NM of the donor hospital, corresponding to the >150-250 NM and >250-500 NM classifications. This change in distribution of was statistically significant (χ^2_3=478.67, p<0.001) pre- versus overall post-policy.

Figure 26. Adult Deceased Donor Liver-Alone Transplants by Classification Distance and Era



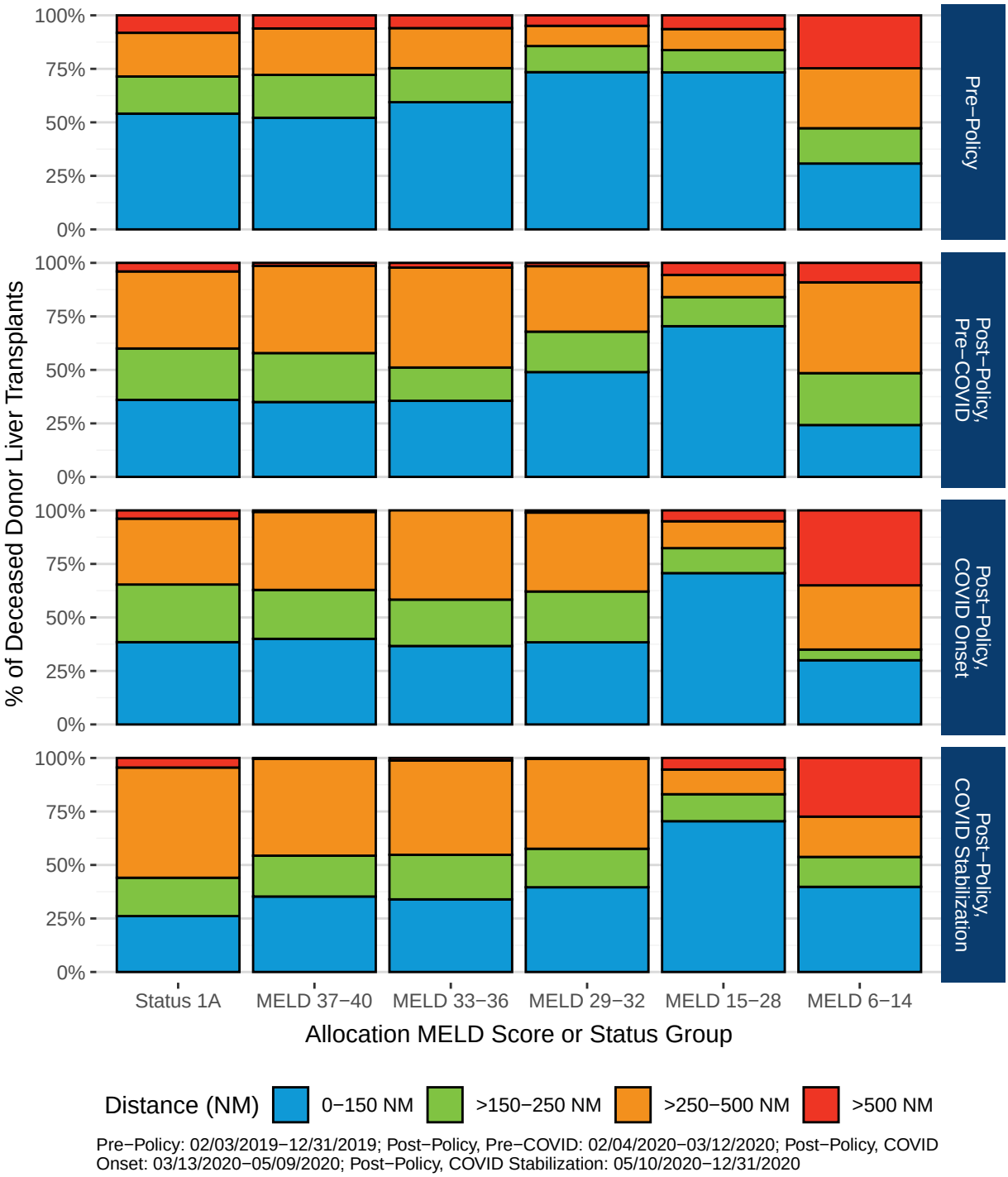
Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

Table 25. Number and Percent of Adult Deceased Donor Liver-Alone Transplants by Classification Distance and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Classification Distance	N	%	N	%	N	%	N	%	N	%
0-150 NM	4349	66.9%	432	52.6%	513	53.5%	2474	52.6%	3419	52.7%
>150-250 NM	858	13.2%	143	17.4%	166	17.3%	741	15.7%	1050	16.2%
>250-500 NM	868	13.3%	217	26.4%	245	25.6%	1299	27.6%	1761	27.2%
>500 NM	430	6.6%	30	3.6%	34	3.5%	191	4.1%	255	3.9%

There has been a substantial change in the distribution of distance between donor hospital and transplant program in all post-policy periods by score group. Notably in the post-policy eras, the higher allocation score groups have larger proportions of livers coming from further away, while the distribution of distance for recipients with MELD scores of 15-28 and $<$ 15 remained similar to pre-policy distributions. Some variability in distance by COVID-19 eras occurred for Status 1A and MELD 6-14 transplant recipients.

Figure 27. Adult Deceased Donor Liver-Alone Transplants by Allocation MELD Score or Status, Classification Distance, and Era



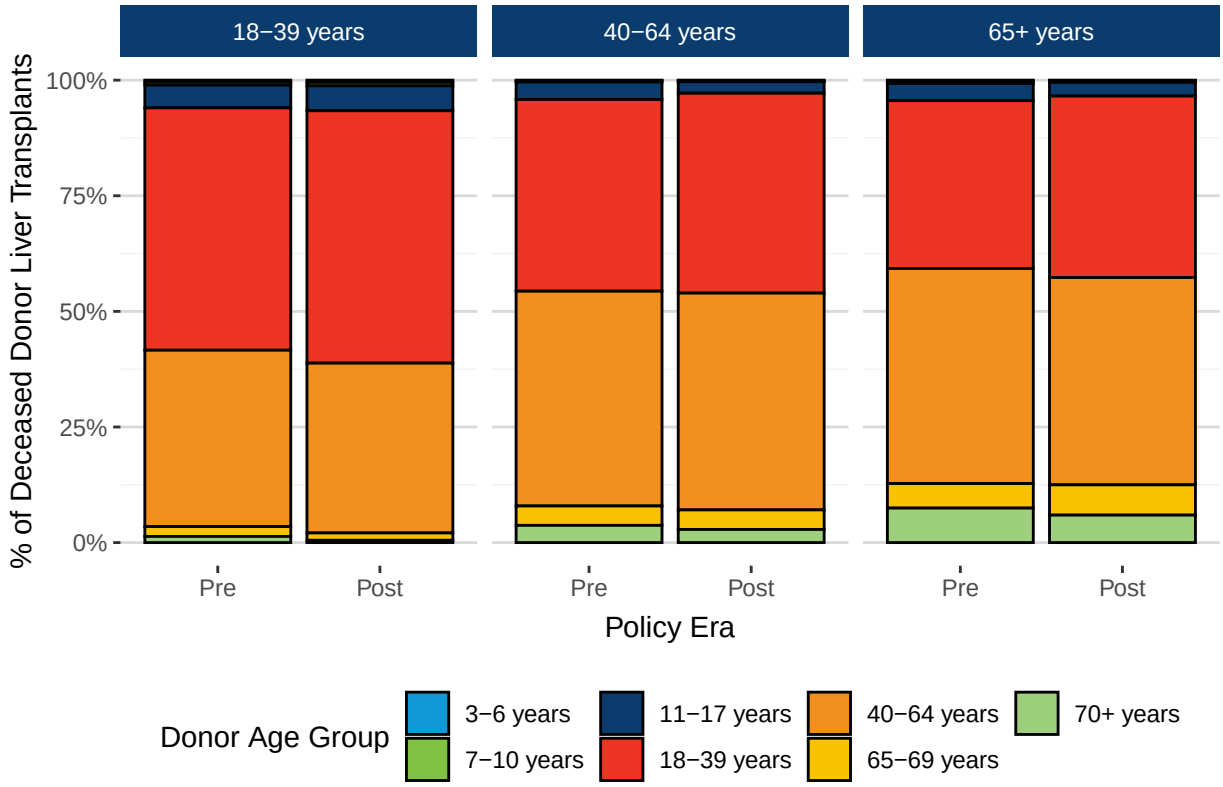
Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

Table 26. Number and Percent of Adult Deceased Donor Liver-Alone Transplants by Allocation MELD Score or Status, Classification Distance, and Era

		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Classification Distance	Score or Status Group	N	%	N	%	N	%	N	%	N	%
0-150 NM	Status 1A	106	2.4%	9	2.1%	10	1.9%	35	1.4%	54	1.6%
	MELD 37-40	534	12.3%	49	11.3%	56	10.9%	268	10.8%	373	10.9%
	MELD 33-36	388	8.9%	32	7.4%	44	8.6%	171	6.9%	247	7.2%
	MELD 29-32	886	20.4%	96	22.2%	76	14.8%	350	14.1%	522	15.3%
	MELD 15-28	2379	54.7%	238	55.1%	321	62.6%	1576	63.7%	2135	62.4%
	MELD 6-14	56	1.3%	8	1.9%	6	1.2%	74	3.0%	88	2.6%
>150-250 NM	Status 1A	34	4.0%	6	4.2%	7	4.2%	24	3.2%	37	3.5%
	MELD 37-40	205	23.9%	32	22.4%	32	19.3%	145	19.6%	209	19.9%
	MELD 33-36	104	12.1%	14	9.8%	26	15.7%	105	14.2%	145	13.8%
	MELD 29-32	147	17.1%	37	25.9%	47	28.3%	159	21.5%	243	23.1%
	MELD 15-28	338	39.4%	46	32.2%	53	31.9%	282	38.1%	381	36.3%
	MELD 6-14	30	3.5%	8	5.6%	1	0.6%	26	3.5%	35	3.3%
>250-500 NM	Status 1A	40	4.6%	9	4.1%	8	3.3%	69	5.3%	86	4.9%
	MELD 37-40	222	25.6%	57	26.3%	51	20.8%	344	26.5%	452	25.7%
	MELD 33-36	122	14.1%	42	19.4%	50	20.4%	222	17.1%	314	17.8%
	MELD 29-32	114	13.1%	60	27.6%	73	29.8%	371	28.6%	504	28.6%
	MELD 15-28	319	36.8%	35	16.1%	57	23.3%	258	19.9%	350	19.9%
	MELD 6-14	51	5.9%	14	6.5%	6	2.4%	35	2.7%	55	3.1%
>500 NM	Status 1A	16	3.7%	1	3.3%	1	2.9%	6	3.1%	8	3.1%
	MELD 37-40	63	14.7%	2	6.7%	1	2.9%	3	1.6%	6	2.4%
	MELD 33-36	39	9.1%	2	6.7%	0	0.0%	6	3.1%	8	3.1%
	MELD 29-32	59	13.7%	3	10.0%	2	5.9%	4	2.1%	9	3.5%
	MELD 15-28	208	48.4%	19	63.3%	23	67.6%	121	63.4%	163	63.9%
	MELD 6-14	45	10.5%	3	10.0%	7	20.6%	51	26.7%	61	23.9%

The distributions of donor age of adult deceased donor liver-alone transplants remained fairly similar pre- to post-policy. There was a decrease in the number of adult 40-64 year old recipients of 7-17 year old donors post-policy, as well as a drop in the number of 65+ year old donors receiving livers from donors younger than 18.

Figure 28. Adult Deceased Donor Liver-Alone Transplants by Recipient Age, Donor Age, and Era

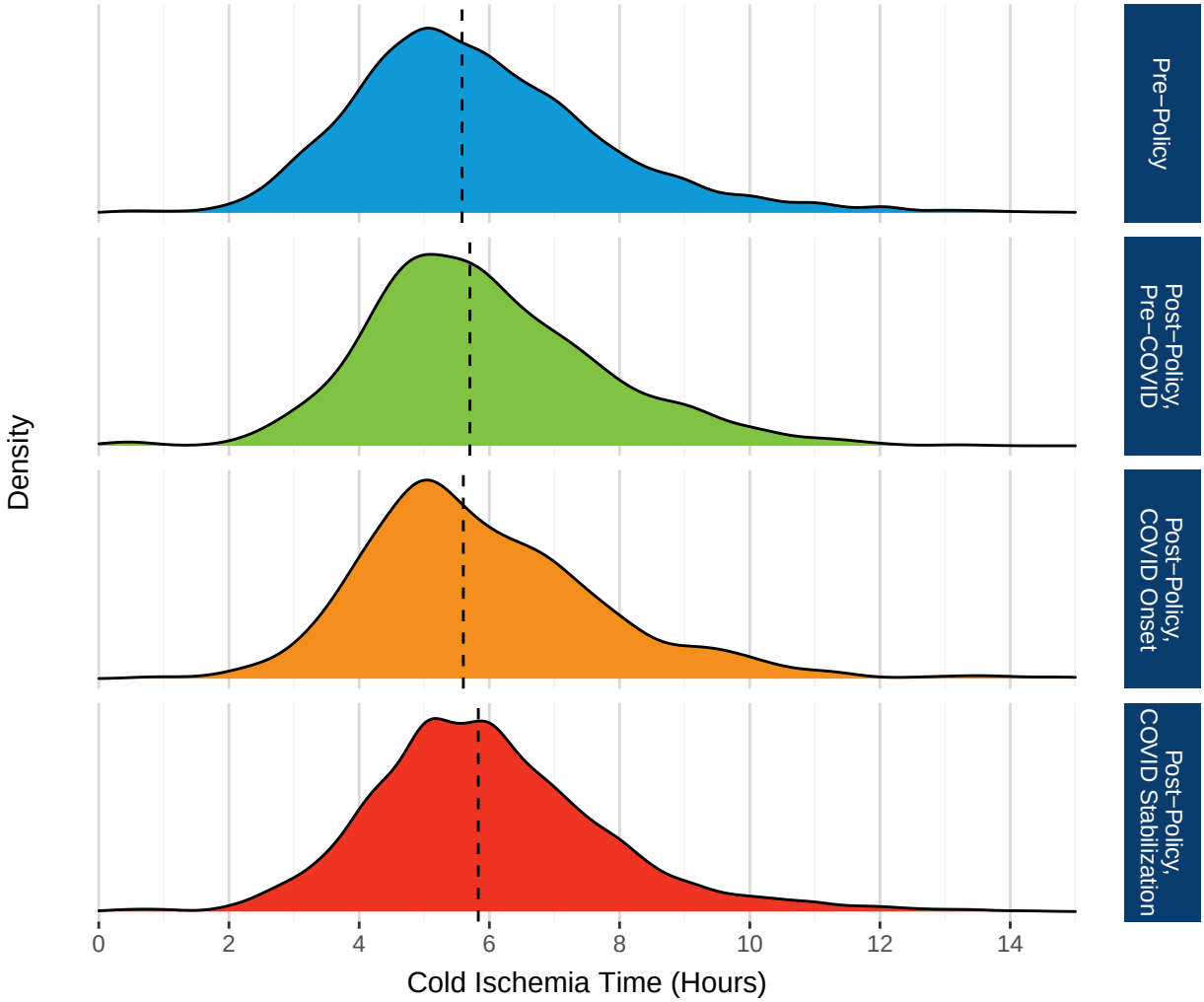


National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.
Pre−Policy: 02/03/2019 − 12/31/2019; Post−Policy: 02/04/2020 − 12/31/2020.

Table 27. Number and Percent of Adult Deceased Donor Liver-Alone Transplants by Recipient Age, Donor Age, and Era

		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Recipient Age	Donor Age	N	%	N	%	N	%	N	%	N	%
18-39 years	3-6 years	3	0.4%	0	0.0%	0	0.0%	4	0.7%	4	0.5%
	7-10 years	5	0.7%	0	0.0%	0	0.0%	6	1.0%	6	0.7%
	11-17 years	37	4.9%	10	9.3%	5	4.5%	29	4.9%	44	5.4%
	18-39 years	393	52.4%	55	50.9%	65	58.0%	326	54.6%	446	54.6%
	40-64 years	286	38.1%	40	37.0%	40	35.7%	220	36.9%	300	36.7%
	65-69 years	16	2.1%	2	1.9%	2	1.8%	9	1.5%	13	1.6%
	70+ years	10	1.3%	1	0.9%	0	0.0%	3	0.5%	4	0.5%
40-64 years	3-6 years	5	0.1%	0	0.0%	3	0.5%	3	0.1%	6	0.1%
	7-10 years	12	0.3%	1	0.2%	2	0.3%	5	0.2%	8	0.2%
	11-17 years	161	3.8%	9	1.7%	15	2.4%	80	2.6%	104	2.5%
	18-39 years	1769	41.5%	208	39.4%	299	47.4%	1303	43.0%	1810	43.2%
	40-64 years	1982	46.4%	268	50.8%	273	43.3%	1422	47.0%	1963	46.9%
	65-69 years	179	4.2%	17	3.2%	24	3.8%	136	4.5%	177	4.2%
	70+ years	159	3.7%	25	4.7%	15	2.4%	79	2.6%	119	2.8%
65+ years	3-6 years	3	0.2%	0	0.0%	0	0.0%	1	0.1%	1	0.1%
	7-10 years	8	0.5%	1	0.5%	2	0.9%	3	0.3%	6	0.4%
	11-17 years	55	3.7%	3	1.6%	4	1.9%	37	3.4%	44	3.0%
	18-39 years	540	36.3%	65	34.9%	96	44.7%	420	38.9%	581	39.2%
	40-64 years	692	46.5%	92	49.5%	92	42.8%	480	44.4%	664	44.8%
	65-69 years	79	5.3%	13	7.0%	9	4.2%	75	6.9%	97	6.5%
	70+ years	111	7.5%	12	6.5%	12	5.6%	64	5.9%	88	5.9%

Figure 29. Distribution of Cold Ischemia Time for Adult Deceased Donor Liver-Alone Transplants by Era



Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020
** Dotted lines indicate median cold ischemia time within each era.
*** There were 42 pre−policy and 135 post−policy transplant recipients with missing cold ischemia time that are not included.
^ There were 17 pre−policy and 15 post−policy transplant recipients with cold ischemia time > 15 hours not included.

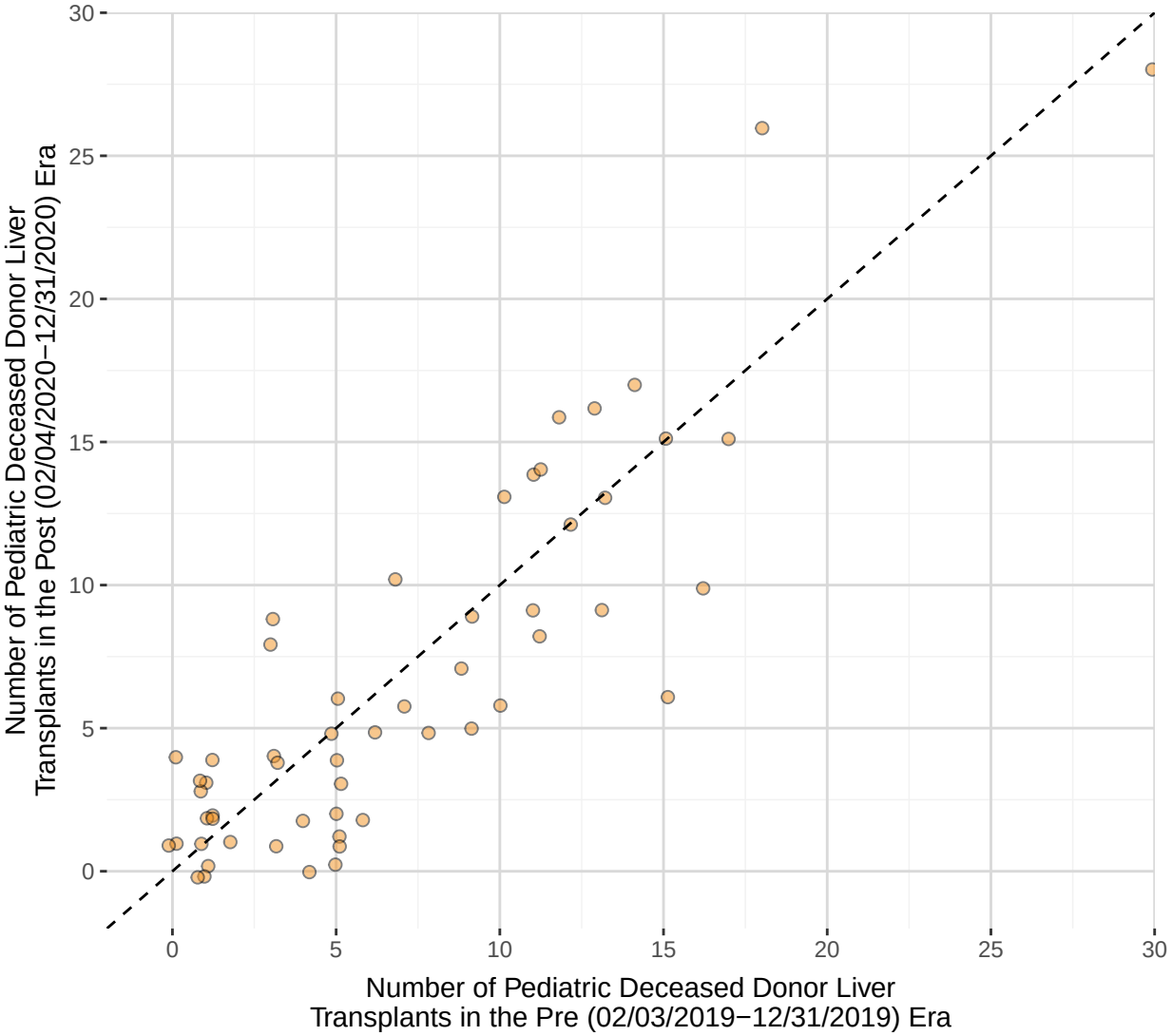
Table 28. Distribution of Cold Ischemia Time for Adult Deceased Donor Liver-Alone Transplants by Era

			Time (hours)					
Policy Era	N	N Missing	Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
Pre-Policy	6463	42	0.20	4.50	5.58	5.87	6.93	34.67
Post-Policy, Pre-COVID	810	12	0.42	4.73	5.70	5.97	7.00	43.00
Post-Policy, COVID Onset	942	16	0.83	4.68	5.60	5.95	6.98	17.63
Post-Policy, COVID Stabilization	4598	107	0.07	4.83	5.83	6.03	7.00	29.55
Post-Policy (overall)	6350	135	0.07	4.80	5.78	6.01	7.00	43.00

The median cold ischemia time increased by roughly 12 minutes post-policy compared to pre-policy; however, the change in average cold ichemia time was statistically significant pre- versus post-policy overall (t=-3.93, p<0.001). Changes in cold ischemia time post-policy should take into consideration the missingness of this measurement for approximately 2.1% of transplants post-policy (versus 0.6% pre-policy) as well as the COVID-19 emergency declaration.

Pediatric (Age < 18 at Transplant) Liver-Alone Transplants

Figure 30. Scatter Plot of Transplant Center Pediatric Deceased Donor Liver-Alone Transplant Volume

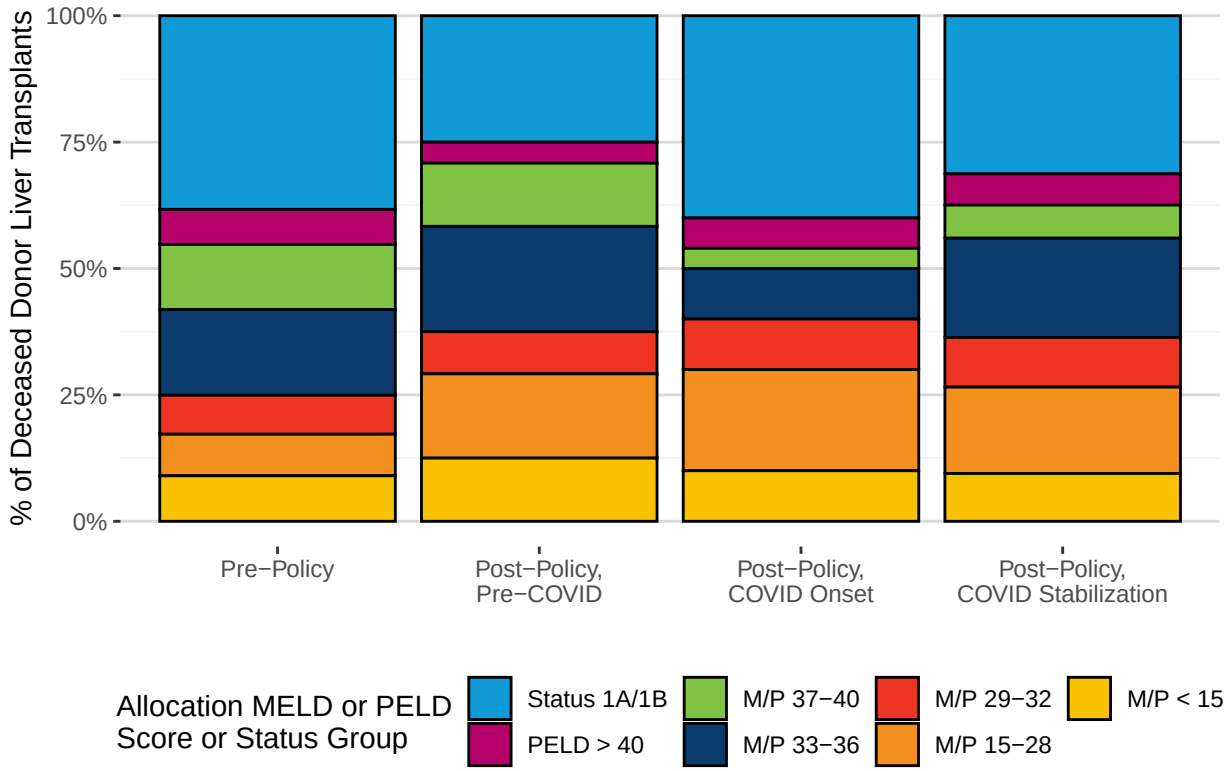


* There was 1 program that is not included due to new activation after the pre era.
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Any points along the diagonal dashed line indicate no changes in the absolute number of deceased donor liver transplants by program, pre- to post-policy. Points that fall above the diagonal represent programs that performed more deceased donor liver transplants post-policy compared to pre-policy. Points that fall below the diagonal represent programs that performed fewer deceased donor liver transplants post-policy compared to pre-policy.

The majority of programs performed similar number of deceased donor liver transplants Pre (02/03/2019-12/31/2019) and Post (02/04/2020-12/31/2020) policy, overall. A Spearman's rank correlation of ρ= 0.807 indicates a strong positive, monotonic relationship between these two measures. The Kruskal-Wallis test indicated that there was not a statistically significant change pre- to post-policy in the number of deceased donor, liver-alone transplants performed per transplant program (χ^2_1=0.0162, p=0.899).

Figure 31. Pediatric Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status and Era



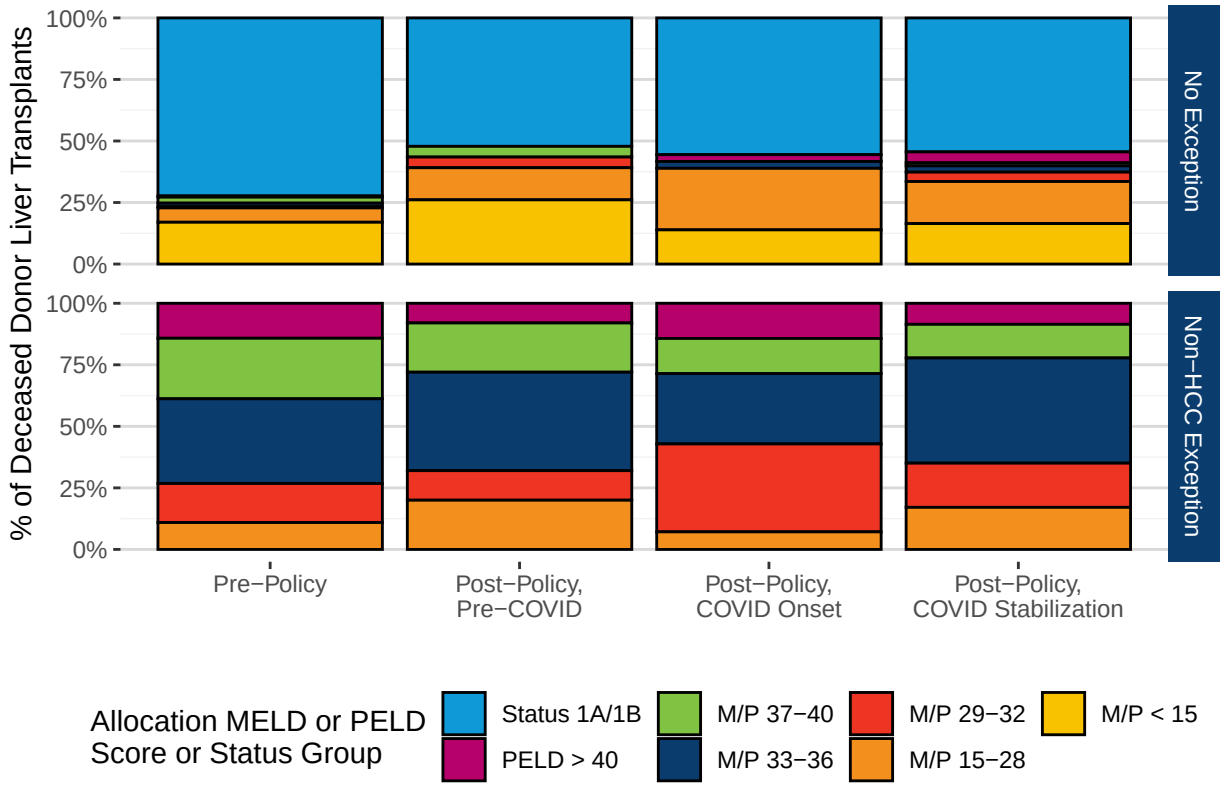
Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

Table 29. Number and Percent of Pediatric Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status Group and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Score or Status Group	N	%	N	%	N	%	N	%	N	%
Status 1A/1B	149	38.3%	12	25.0%	20	40.0%	86	31.3%	118	31.6%
PELD > 40	27	6.9%	2	4.2%	3	6.0%	17	6.2%	22	5.9%
M/P 37-40	50	12.9%	6	12.5%	2	4.0%	18	6.5%	26	7.0%
M/P 33-36	66	17.0%	10	20.8%	5	10.0%	54	19.6%	69	18.5%
M/P 29-32	30	7.7%	4	8.3%	5	10.0%	27	9.8%	36	9.7%
M/P 15-28	32	8.2%	8	16.7%	10	20.0%	47	17.1%	65	17.4%
M/P < 15	35	9.0%	6	12.5%	5	10.0%	26	9.5%	37	9.9%

Proportions of pediatric deceased donor, liver-alone transplants vary by allocation score or status due to smaller volumes. Decreases in status 1A/1B and higher MELD/PELD score transplants occurred post-policy, though there is substantial variation across COVID-19 eras. There were increased volumes of transplants with MELD or PELD scores 36 and lower post-policy as well. The national median allocation MELD/PELD score at transplant was 35 pre-policy and 32 overall post-policy. Any changes in allocation score distributions should be interpreted with caution in light of the COVID-19 emergency declaration.

Figure 32. Pediatric Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status, Exception Status and Era



Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

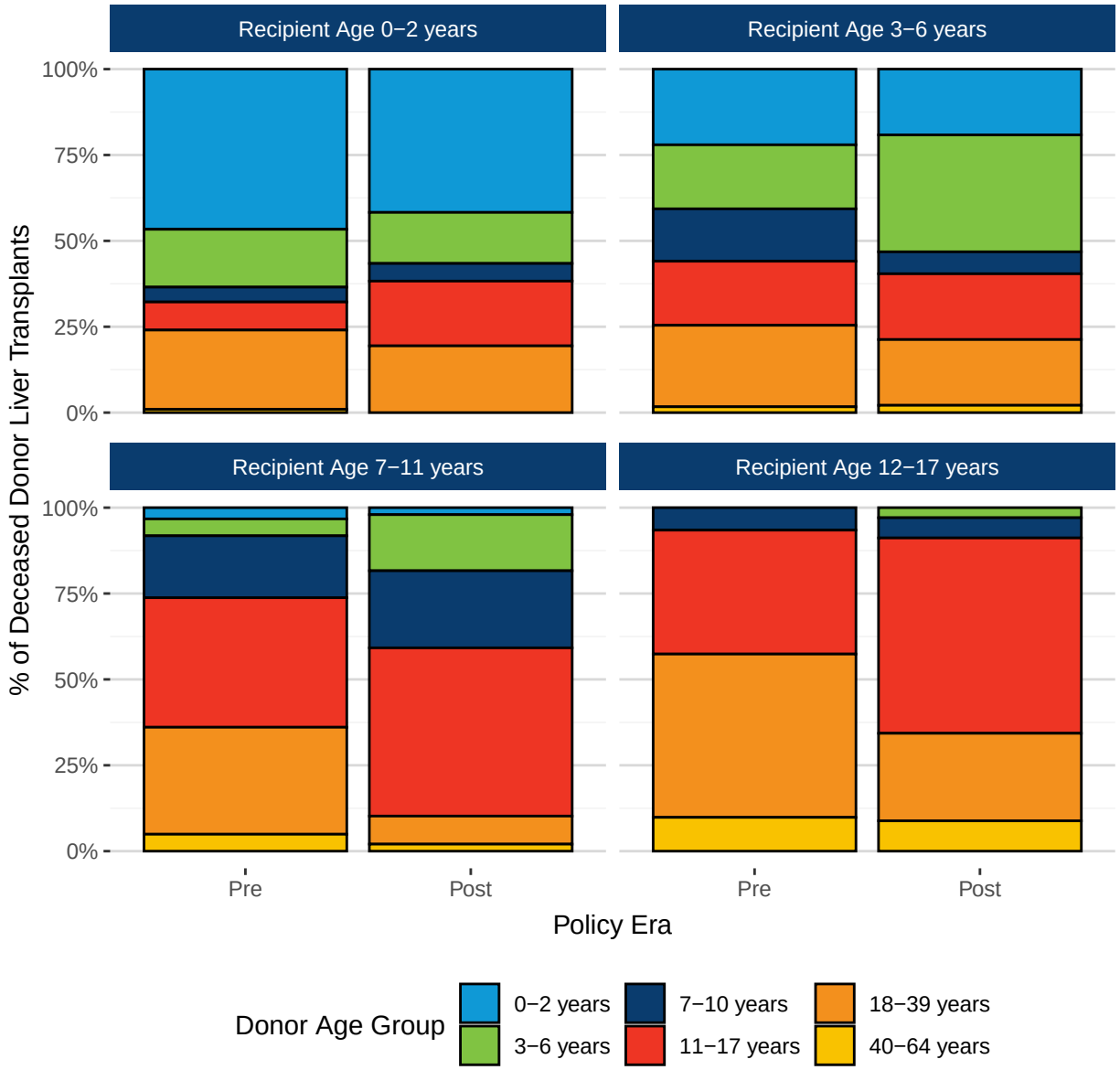
Table 30. Number and Percent of Pediatric Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status, Exception Status, and Era

		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Exception Status	Score or Status Group	N	%	N	%	N	%	N	%	N	%
No Exception	Status 1A/1B	149	72.3%	12	52.2%	20	55.6%	86	54.4%	118	54.4%
	PELD > 40	1	0.5%	0	0.0%	1	2.8%	7	4.4%	8	3.7%
	M/P 37-40	5	2.4%	1	4.3%	0	0.0%	2	1.3%	3	1.4%
	M/P 33-36	3	1.5%	0	0.0%	1	2.8%	4	2.5%	5	2.3%
	M/P 29-32	1	0.5%	1	4.3%	0	0.0%	6	3.8%	7	3.2%
	M/P 15-28	12	5.8%	3	13.0%	9	25.0%	27	17.1%	39	18.0%
	M/P < 15	35	17.0%	6	26.1%	5	13.9%	26	16.5%	37	17.1%
Non-HCC Exception	PELD > 40	26	14.2%	2	8.0%	2	14.3%	10	8.5%	14	9.0%
	M/P 37-40	45	24.6%	5	20.0%	2	14.3%	16	13.7%	23	14.7%
	M/P 33-36	63	34.4%	10	40.0%	4	28.6%	50	42.7%	64	41.0%
	M/P 29-32	29	15.8%	3	12.0%	5	35.7%	21	17.9%	29	18.6%
	M/P 15-28	20	10.9%	5	20.0%	1	7.1%	20	17.1%	26	16.7%

There have been changes in the distribution of scores for pediatric recipients by exception status. There was a shift in many of the high scores for exceptions over 35 towards the median PELD at transplant (exception scoring MPaT = 35 as of the time of this report) post-policy. There was also a decrease in Status 1A/1B transplants, though this still makes up the majority of non-exception transplants post-policy.

Additional priority for pediatric candidates for pediatric (age < 18) donors was another feature of the allocation changes that was of interest. While keeping in mind that the volumes of young pediatric (age 0-10) and older pediatric (age 11-17) liver donors are smaller, there has been an increase in all pediatric transplant recipients receiving a pediatric deceased donor liver. In particular, recipients ages 7-11 years and 12-17 years received increased proportions of livers from deceased liver donors aged 11-17 years.

Figure 33. Pediatric Deceased Donor Liver-Alone Transplants by Recipient Age, Donor Age, and Era



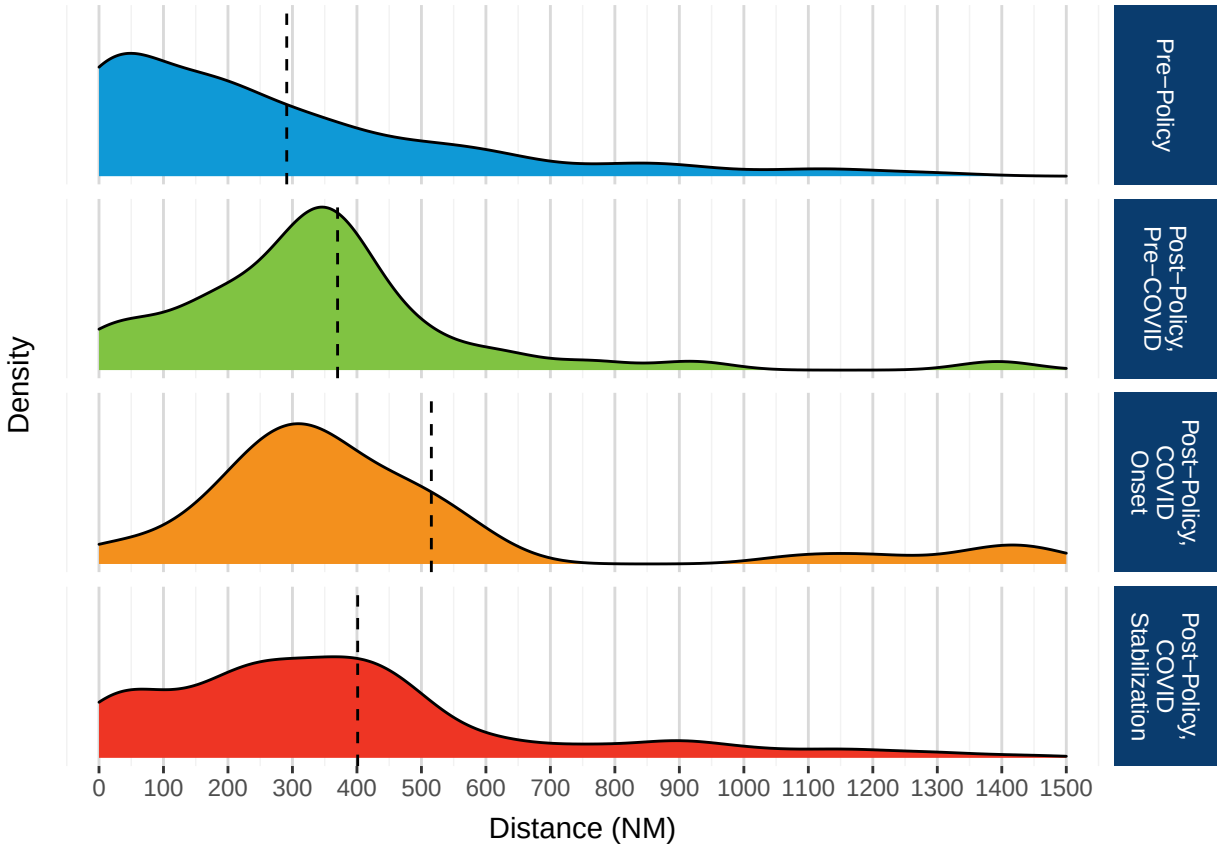
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.
Pre−Policy: 02/03/2019 − 12/31/2019; Post−Policy: 02/04/2020 − 12/31/2020.

Table 31. Number and Percent of Pediatric Deceased Donor Liver-Alone Transplants by Recipient Age, Donor Age, and Era

		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Recipient Age	Donor Age	N	%	N	%	N	%	N	%	N	%
0-2 years	0-2 years	97	46.6%	5	33.3%	13	41.9%	55	42.6%	73	41.7%
	3-6 years	35	16.8%	3	20.0%	6	19.4%	17	13.2%	26	14.9%
	7-10 years	9	4.3%	0	0.0%	3	9.7%	6	4.7%	9	5.1%
	11-17 years	17	8.2%	4	26.7%	5	16.1%	24	18.6%	33	18.9%
	18-39 years	48	23.1%	3	20.0%	4	12.9%	27	20.9%	34	19.4%
	40-64 years	2	1.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
3-6 years	0-2 years	13	22.0%	2	33.3%	1	16.7%	6	17.1%	9	19.1%
	3-6 years	11	18.6%	2	33.3%	3	50.0%	11	31.4%	16	34.0%
	7-10 years	9	15.3%	1	16.7%	0	0.0%	2	5.7%	3	6.4%
	11-17 years	11	18.6%	0	0.0%	1	16.7%	8	22.9%	9	19.1%
	18-39 years	14	23.7%	1	16.7%	1	16.7%	7	20.0%	9	19.1%
	40-64 years	1	1.7%	0	0.0%	0	0.0%	1	2.9%	1	2.1%
7-11 years	0-2 years	2	3.3%	0	0.0%	0	0.0%	1	3.1%	1	2.0%
	3-6 years	3	4.9%	2	18.2%	0	0.0%	6	18.8%	8	16.3%
	7-10 years	11	18.0%	0	0.0%	1	16.7%	10	31.2%	11	22.4%
	11-17 years	23	37.7%	9	81.8%	5	83.3%	10	31.2%	24	49.0%
	18-39 years	19	31.1%	0	0.0%	0	0.0%	4	12.5%	4	8.2%
	40-64 years	3	4.9%	0	0.0%	0	0.0%	1	3.1%	1	2.0%
12-17 years	3-6 years	0	0.0%	2	12.5%	1	14.3%	0	0.0%	3	2.9%
	7-10 years	4	6.6%	0	0.0%	0	0.0%	6	7.6%	6	5.9%
	11-17 years	22	36.1%	9	56.2%	6	85.7%	43	54.4%	58	56.9%
	18-39 years	29	47.5%	4	25.0%	0	0.0%	22	27.8%	26	25.5%
	40-64 years	6	9.8%	1	6.2%	0	0.0%	8	10.1%	9	8.8%

The distribution of distance from donor hospital to transplant center appears much differently for pediatric transplant recipients than for adult transplant recipients post-policy. Particularly in the post-policy COVID stabilization period, there is a much more uniform distribution of distances for transplants between 200 - 500 nautical miles. More variability across COVID-19 eras is expected given the smaller volumes of pediatric transplants.

Figure 34. Distribution of Distance from Donor Hospital to Transplant Center for Pediatric Deceased Donor Liver-Alone Transplants by Era



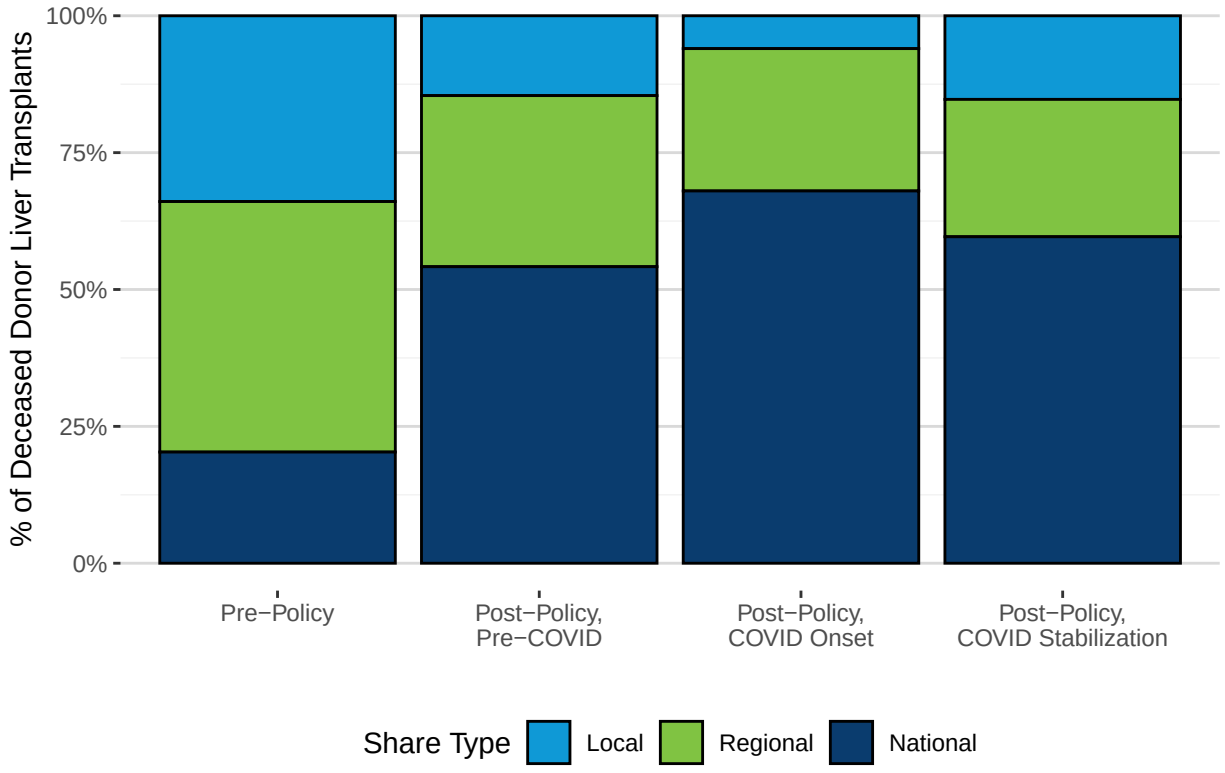
Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020
** Dotted lines indicate average distance within each era.
*** There were 5 pre−policy and 9 post−policy transplants > 1500 NM that were excluded.

Table 32. Summary of Distance from Donor Hospital to Transplant Center for Pediatric Deceased Donor Liver-Alone Transplants by Era

	Distance (NM)					
Policy Era	Minimum	25th Percentile	Mean	Median	75th Percentile	Maximum
Pre-Policy	0	41.0	291.1	197	405.0	2218
Post-Policy, Pre-COVID	0	220.5	370.0	339	409.5	1592
Post-Policy, COVID Onset	0	263.8	515.4	349	507.5	2108
Post-Policy, COVID Stabilization	0	184.0	401.1	334	478.5	2205
Post-Policy (overall)	0	207.0	412.5	339	477.0	2205

The majority of transplants occurred at the regional level (transplant center within same OPTN region as donor hospital, not within the same DSA) pre-policy, and only about 20% were national share types. This has shifted post-policy, with about 60% of pediatric deceased donor, liver-alone transplants being national shares, and just under 15% of these transplants occurring locally. This change in distribution of share type was statistically significant (χ^2_2=127.75, p<0.001) pre- versus post-policy.

Figure 35. Pediatric Deceased Donor Liver-Alone Transplants by Donor Share Type and Era



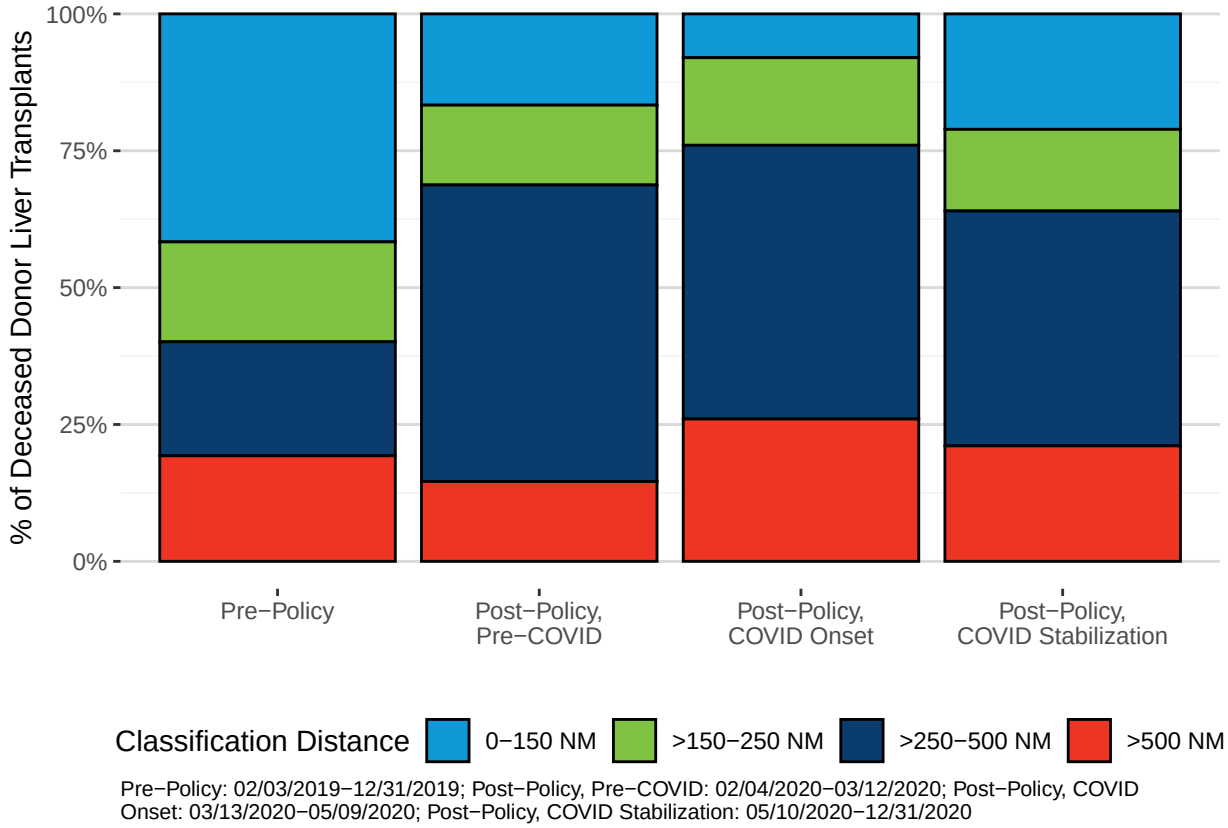
Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

Table 33. Number and Percent of Pediatric Deceased Donor Liver-Alone Transplants by Donor Share Type and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Share Type	N	%	N	%	N	%	N	%	N	%
Local	132	33.9%	7	14.6%	3	6.0%	42	15.3%	52	13.9%
Regional	178	45.8%	15	31.2%	13	26.0%	69	25.1%	97	26.0%
National	79	20.3%	26	54.2%	34	68.0%	164	59.6%	224	60.1%

As in previous figures and tables, there was a decrease in liver transplants occurring within 150 NM of the donor hospital. There has been a subsequent increase in the liver transplants occurring over 250 NM but within 500 NM of the donor hospital. This change in distribution was statistically significant (χ^2_3=68.98, p<0.001) pre- versus post-policy.

Figure 36. Pediatric Deceased Donor Liver-Alone Transplants by Classification Distance and Era

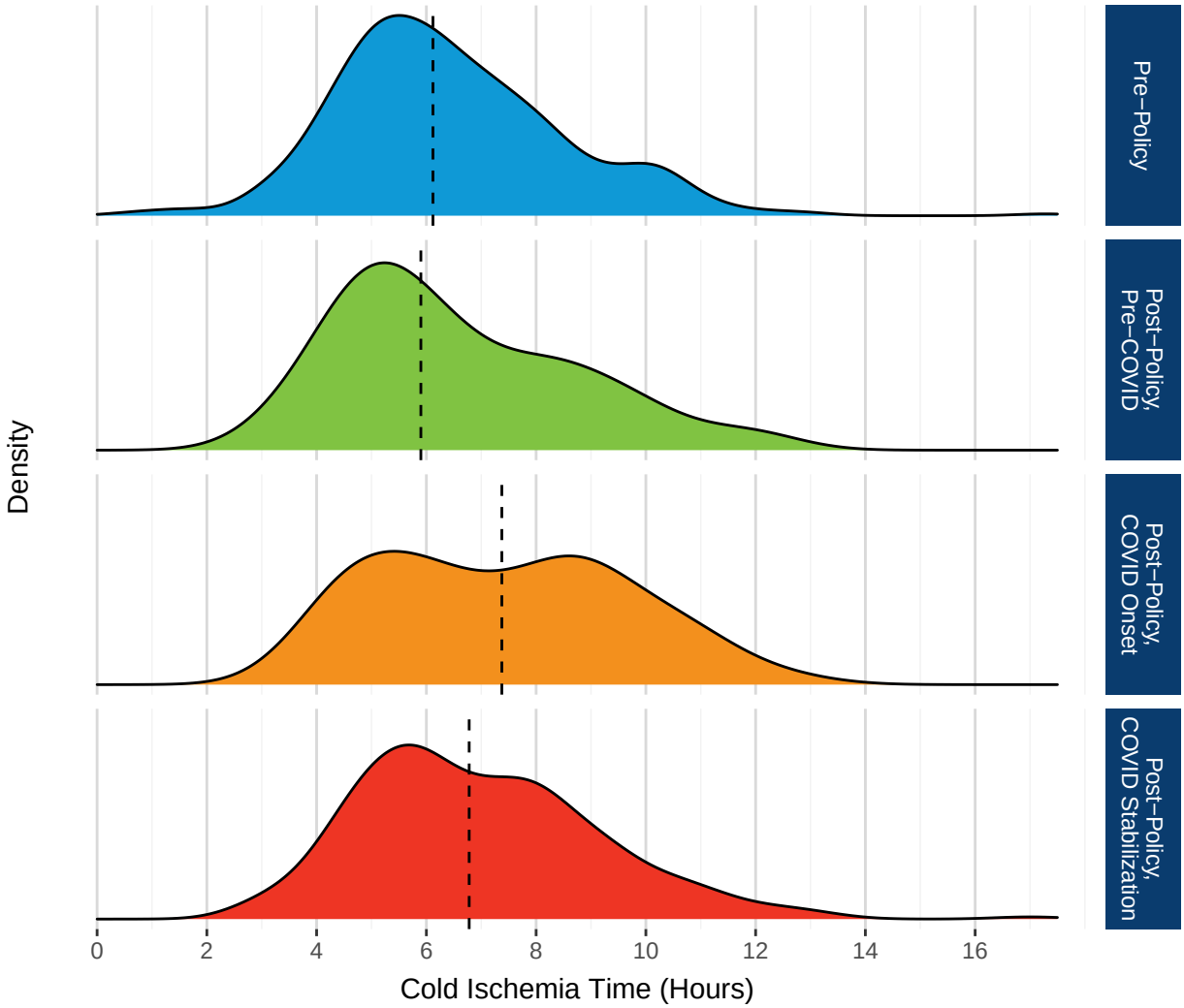


Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

Table 34. Number and Percent of Pediatric Deceased Donor Liver-Alone Transplants by Classification Distance and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Classification Distance	N	%	N	%	N	%	N	%	N	%
0-150 NM	162	41.6%	8	16.7%	4	8.0%	58	21.1%	70	18.8%
>150-250 NM	71	18.3%	7	14.6%	8	16.0%	41	14.9%	56	15.0%
>250-500 NM	81	20.8%	26	54.2%	25	50.0%	118	42.9%	169	45.3%
>500 NM	75	19.3%	7	14.6%	13	26.0%	58	21.1%	78	20.9%

Figure 38. Distribution of Cold Ischemia Time for Pediatric Deceased Donor Liver-Alone Transplants by Era



Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020
** Dotted lines indicate median cold ischemia time within each era.
*** There were 2 pre−policy and 5 post−policy transplant recipients with missing cold ischemia time that are not included.

Table 36. Distribution of Cold Ischemia Time for Pediatric Deceased Donor Liver-Alone Transplants by Era

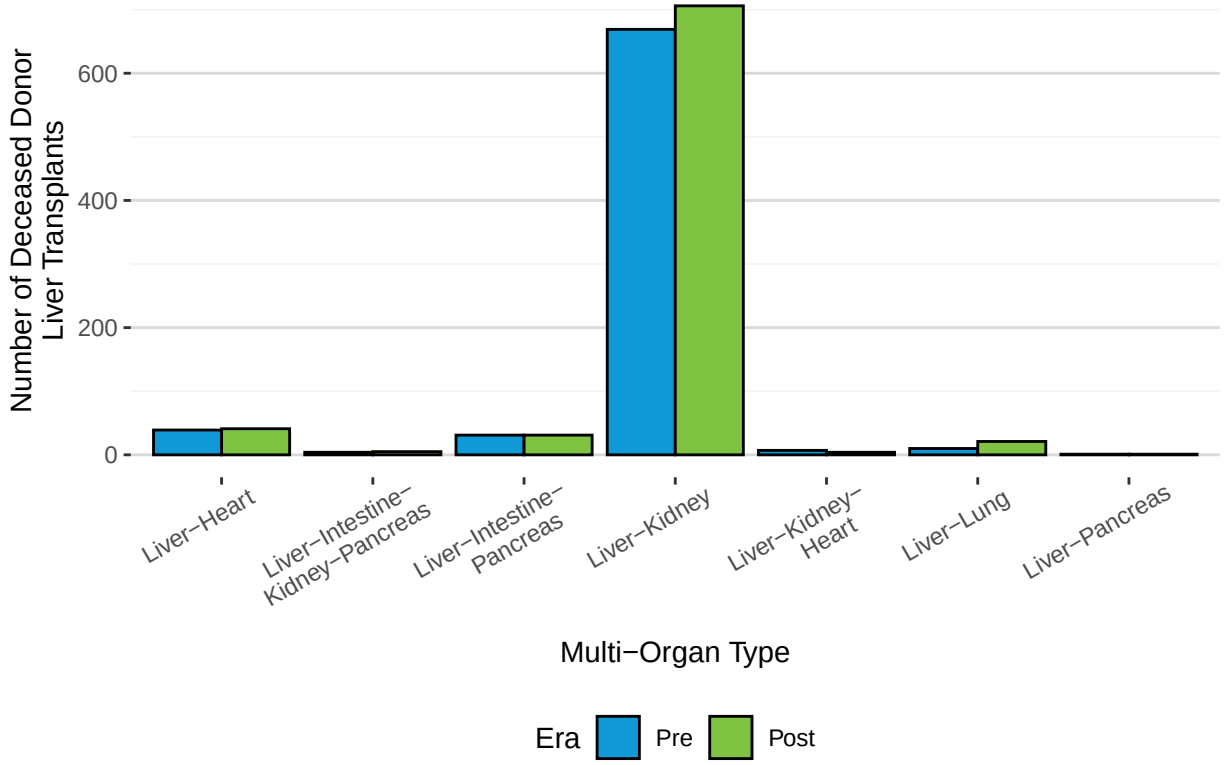
			Time (hours)					
Policy Era	N	N Missing	Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
Pre-Policy	387	2	0.57	5.03	6.12	6.44	7.63	17.28
Post-Policy, Pre-COVID	48	0	3.35	4.97	5.90	6.56	8.23	11.90
Post-Policy, COVID Onset	50	0	3.95	5.64	7.38	7.39	9.00	12.50
Post-Policy, COVID Stabilization	270	5	2.92	5.30	6.78	6.99	8.29	17.00
Post-Policy (overall)	368	5	2.92	5.26	6.75	6.99	8.38	17.00

The median cold ischemia time increased by 38 minutes pre- to post-policy. This change varied by COVID-19 eras post-policy; however, the change in average cold ichemia time was statistically significant pre- versus post-policy overall (t=-3.48, p<0.001). Changes in cold ischemia time within post-policy COVID-19 eras should take into consideration smaller sample sizes as well as the COVID-19 emergency declaration.

Liver Multi-Organ Transplants

While liver-alone transplants make up the vast majority of deceased liver donor recipients, about 10% are recipients of liver multi-organ transplants. The largest liver multi-organ category is liver-kidney (SLK) transplants, which saw an increase in volume and percentage of liver transplants post-policy implementation. Any other combinations accounted for less than 1% of liver transplants, respectively, during all policy eras.

Figure 39. Deceased Donor Liver Transplants by Multi-Organ Type and Era

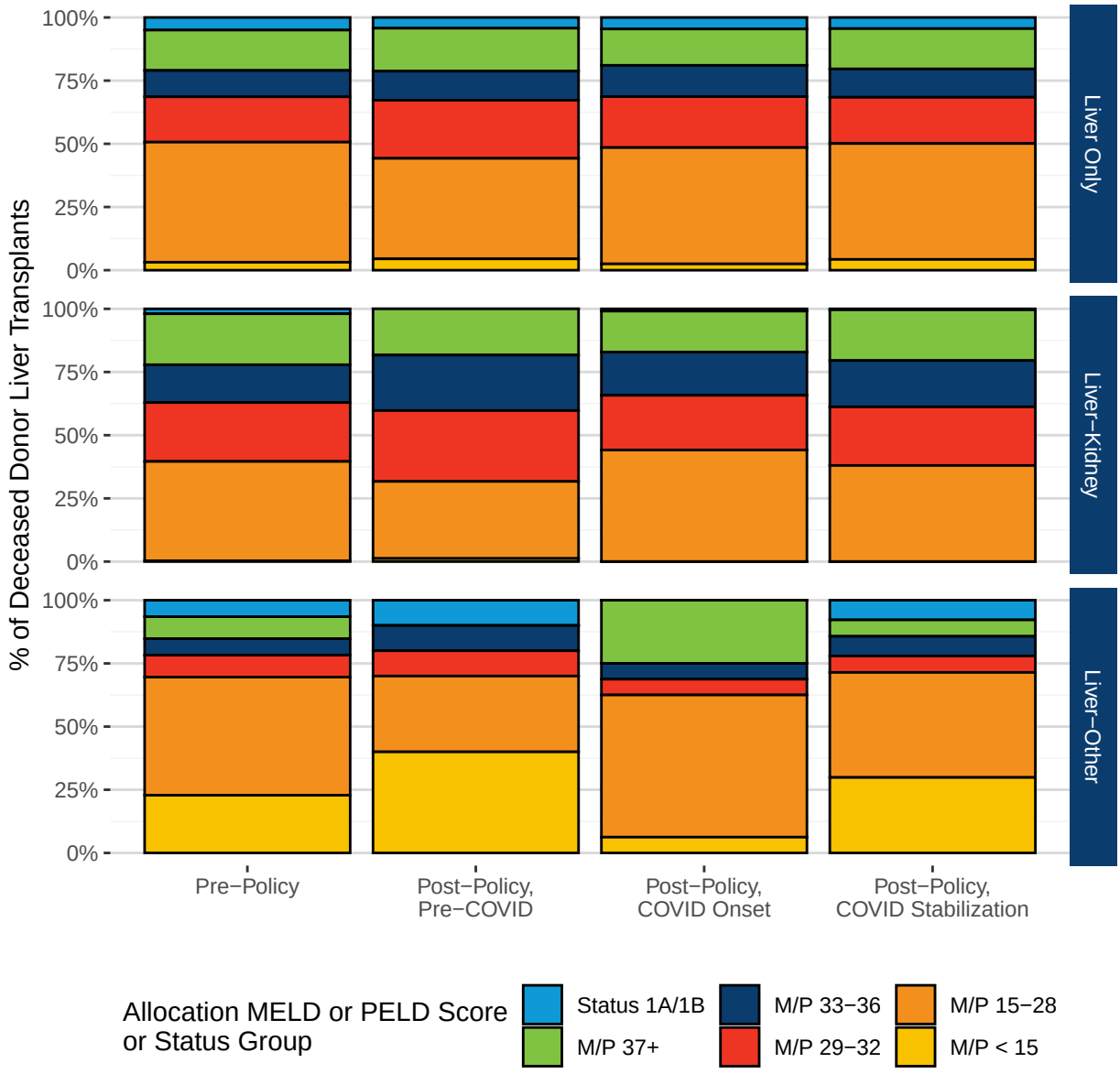


National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.
Pre−Policy: 02/03/2019 − 12/31/2019; Post−Policy: 02/04/2020 − 12/31/2020.

Table 37. Number and Percent of Deceased Donor Liver Transplants by Multi-Organ Type and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Multi-Organ Type	N	%	N	%	N	%	N	%	N	%
Liver Only	6894	90.1%	870	90.4%	1008	88.8%	4980	89.4%	6858	89.4%
Liver-Heart	39	0.5%	6	0.6%	7	0.6%	28	0.5%	41	0.5%
Liver-Intestine-Kidney-Pancreas	4	0.1%	1	0.1%	0	0.0%	4	0.1%	5	0.1%
Liver-Intestine-Pancreas	31	0.4%	0	0.0%	7	0.6%	24	0.4%	31	0.4%
Liver-Kidney	669	8.7%	82	8.5%	111	9.8%	513	9.2%	706	9.2%
Liver-Kidney-Heart	7	0.1%	0	0.0%	0	0.0%	4	0.1%	4	0.1%
Liver-Lung	10	0.1%	3	0.3%	2	0.2%	16	0.3%	21	0.3%
Liver-Pancreas	1	0.0%	0	0.0%	0	0.0%	1	0.0%	1	0.0%

Figure 40. Deceased Donor Liver Transplants by Multi-Organ Type, Allocation MELD or PELD Score or Status, and Era



Pre–Policy: 02/03/2019–12/31/2019; Post–Policy, Pre–COVID: 02/04/2020–03/12/2020; Post–Policy, COVID Onset: 03/13/2020–05/09/2020; Post–Policy, COVID Stabilization: 05/10/2020–12/31/2020

Similar volumes by allocation MELD or PELD score or status occurred pre- to post-policy eras for all multi-organ types. Differences in distribution of scores at transplant are observable for liver-other multi-organ transplant recipients across eras, and remain similar for SLK transplant recipients. Changes in allocation score distributions should be interpreted with caution in light of the COVID-19 emergency declaration.

Table 38. Number and Percent of Deceased Donor Liver Transplants by Multi-Organ Type, Allocation MELD or PELD Score or Status, and Era

		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Multi-Organ Type	Score or Status Group	N	%	N	%	N	%	N	%	N	%
Liver Only	Status 1A/1B	345	5.0%	37	4.3%	46	4.6%	220	4.4%	303	4.4%
	M/P 37+	1101	16.0%	148	17.0%	145	14.4%	795	16.0%	1088	15.9%
	M/P 33-36	719	10.4%	100	11.5%	125	12.4%	558	11.2%	783	11.4%
	M/P 29-32	1236	17.9%	200	23.0%	203	20.1%	911	18.3%	1314	19.2%
	M/P 15-28	3276	47.5%	346	39.8%	464	46.0%	2284	45.9%	3094	45.1%
	M/P < 15	217	3.1%	39	4.5%	25	2.5%	212	4.3%	276	4.0%
Liver-Kidney	Status 1A/1B	13	1.9%	0	0.0%	1	0.9%	2	0.4%	3	0.4%
	M/P 37+	135	20.2%	15	18.3%	18	16.2%	103	20.1%	136	19.3%
	M/P 33-36	100	14.9%	18	22.0%	19	17.1%	94	18.3%	131	18.6%
	M/P 29-32	156	23.3%	23	28.0%	24	21.6%	119	23.2%	166	23.5%
	M/P 15-28	263	39.3%	25	30.5%	49	44.1%	195	38.0%	269	38.1%
	M/P < 15	2	0.3%	1	1.2%	0	0.0%	0	0.0%	1	0.1%
Liver-Other	Status 1A/1B	6	6.5%	1	10.0%	0	0.0%	6	7.8%	7	6.8%
	M/P 37+	8	8.7%	0	0.0%	4	25.0%	5	6.5%	9	8.7%
	M/P 33-36	6	6.5%	1	10.0%	1	6.2%	6	7.8%	8	7.8%
	M/P 29-32	8	8.7%	1	10.0%	1	6.2%	5	6.5%	7	6.8%
	M/P 15-28	43	46.7%	3	30.0%	9	56.2%	32	41.6%	44	42.7%
	M/P < 15	21	22.8%	4	40.0%	1	6.2%	23	29.9%	28	27.2%

With the implementation of the acuity circles allocation policy, changes were also made to the sharing requirements for SLK. If an OPO is offering a kidney and liver from the same deceased donor, then before allocating the kidney to kidney alone candidates, the OPO must offer the kidney with the liver to candidates who meet SLK eligibility criteria and are:

1. Within 150 NM of the donor hospital and have a MELD or PELD $\geq$ 15,
2. Within 250 NM of the donor hospital and have a MELD or PELD $\geq$ 29, or
3. Within 250 NM of the donor hospital and status 1A or 1B.

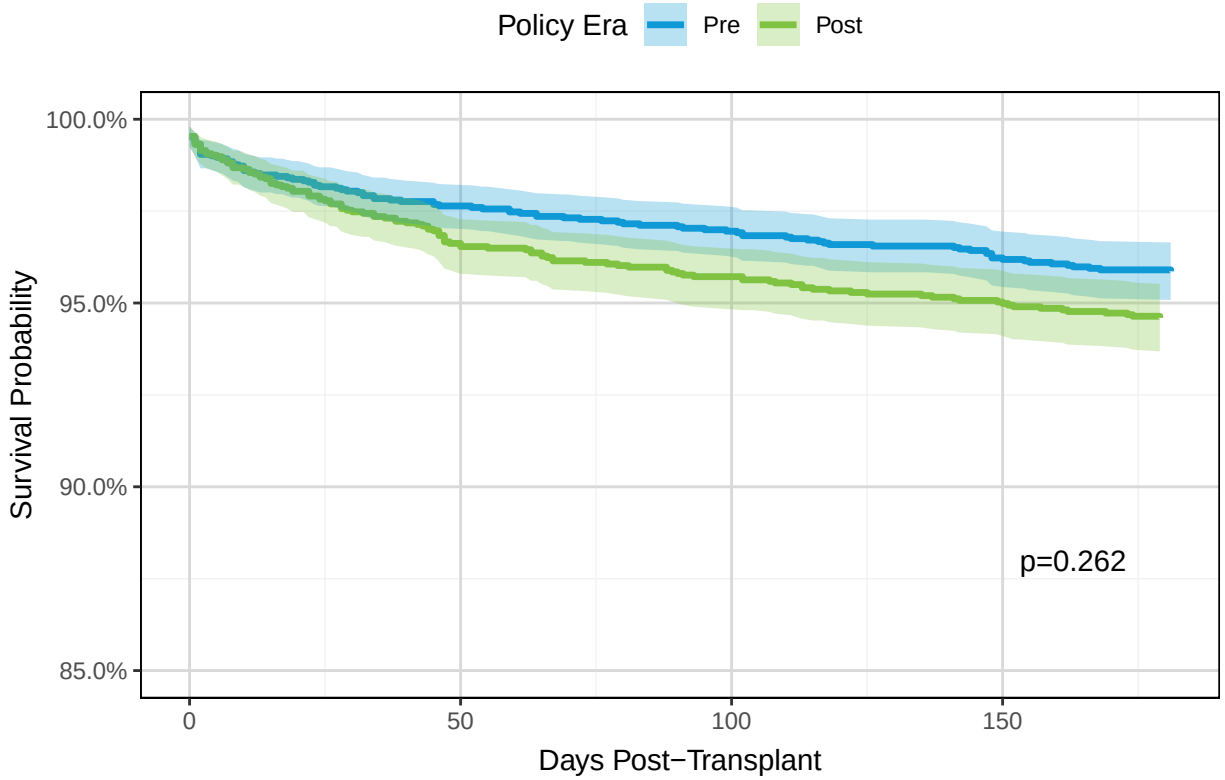
Changes in distribution of distance from donor hospital to transplant program were similar for SLK transplant recipients to those for liver-alone transplant recipients. The distribution of distance was relatively stable for other liver multi-organ transplant recipients, though this may be more variable over time due to the small sample size. Changes in distributions should be interpreted with caution in light of the COVID-19 emergency declaration.

Table 39. Number and Percent of Deceased Donor Liver Transplants by Multi-Organ Type, Classification Distance, and Era

		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Multi-Organ Type	Classification Distance	N	%	N	%	N	%	N	%	N	%
Liver Only	0-150 NM	4511	65.4%	440	50.6%	517	51.3%	2532	50.8%	3489	50.9%
	>150-250 NM	929	13.5%	150	17.2%	174	17.3%	782	15.7%	1106	16.1%
	>250-500 NM	949	13.8%	243	27.9%	270	26.8%	1417	28.5%	1930	28.1%
	>500 NM	505	7.3%	37	4.3%	47	4.7%	249	5.0%	333	4.9%
Liver-Kidney	0-150 NM	449	67.1%	45	54.9%	64	57.7%	275	53.6%	384	54.4%
	>150-250 NM	87	13.0%	12	14.6%	19	17.1%	91	17.7%	122	17.3%
	>250-500 NM	102	15.2%	22	26.8%	27	24.3%	134	26.1%	183	25.9%
	>500 NM	31	4.6%	3	3.7%	1	0.9%	13	2.5%	17	2.4%
Liver-Other	0-150 NM	39	42.4%	6	60.0%	7	43.8%	35	45.5%	48	46.6%
	>150-250 NM	13	14.1%	0	0.0%	4	25.0%	14	18.2%	18	17.5%
	>250-500 NM	20	21.7%	3	30.0%	1	6.2%	17	22.1%	21	20.4%
	>500 NM	20	21.7%	1	10.0%	4	25.0%	11	14.3%	16	15.5%

Liver-Alone Post-Transplant Outcomes

Figure 41. Six-Month Post-Transplant Assumed-Alive Patient Survival Curves for Deceased Donor Liver-Alone Recipients by Era



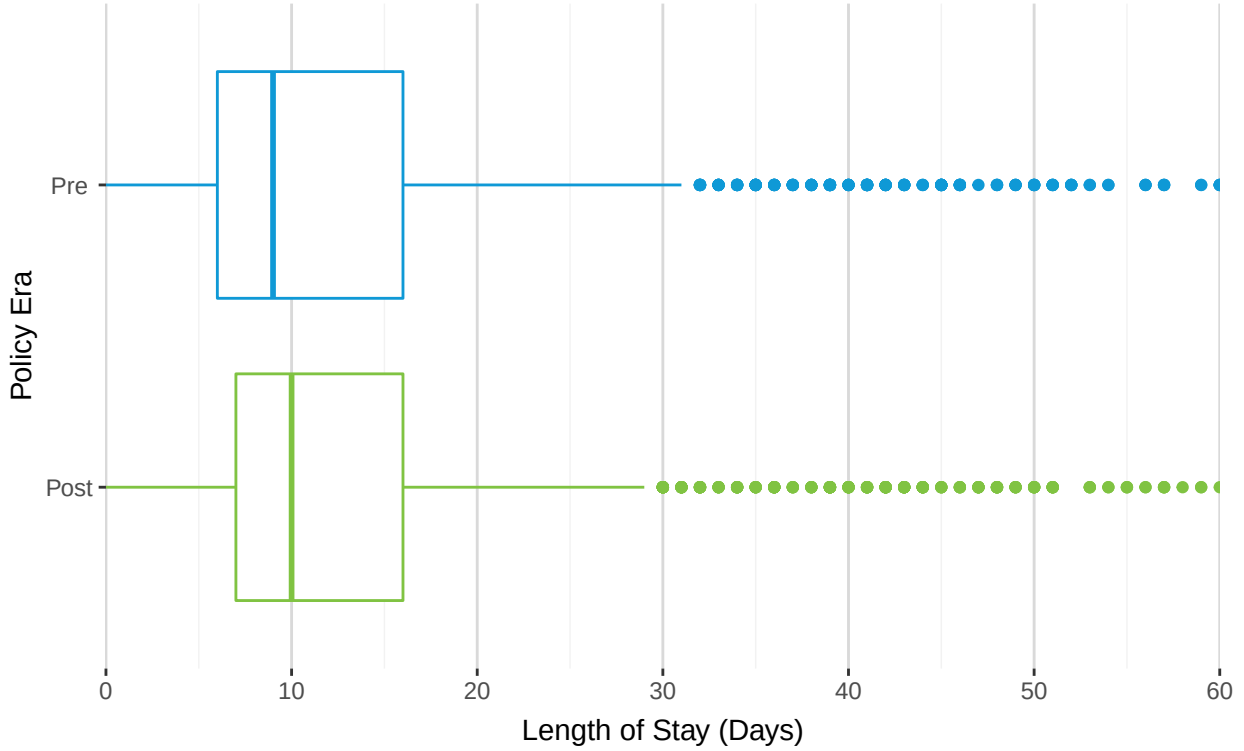
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.
Pre−Policy: 02/03/2019 − 05/31/2019; Post−Policy: 02/04/2020 − 05/31/2020.

Table 41. Six-Month Post-Transplant Assumed-Alive Patient Survival Estimates for Deceased Donor Liver-Alone Recipients by Era

		Survival Probability	
Policy Era	N At Risk	Estimate	95% CI
Pre	2370	95.9%	(95.1%, 96.6%)
Post	2194	94.6%	(93.7%, 95.5%)

Six-month patient survival for deceased donor, liver alone liver recipients showed no statistically significant difference between pre- and post-policy eras (p=0.262). The probability of survival at six-months post-transplant was 95.9% and 94.6%, pre- and post-policy, respectively.

Figure 42. Distribution of Length of Post-Transplant Stay for Deceased Donor Liver-Alone Recipients by Era



National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.
Pre−Policy: 02/03/2019 − 05/31/2019; Post−Policy: 02/04/2020 − 05/31/2020
** There were 30 pre−policy and 38 post−policy transplant recipients with missing length of stay that are not included.
*** There were 69 pre−policy and 63 post−policy transplant recipients with length of stay > 60 days not included.

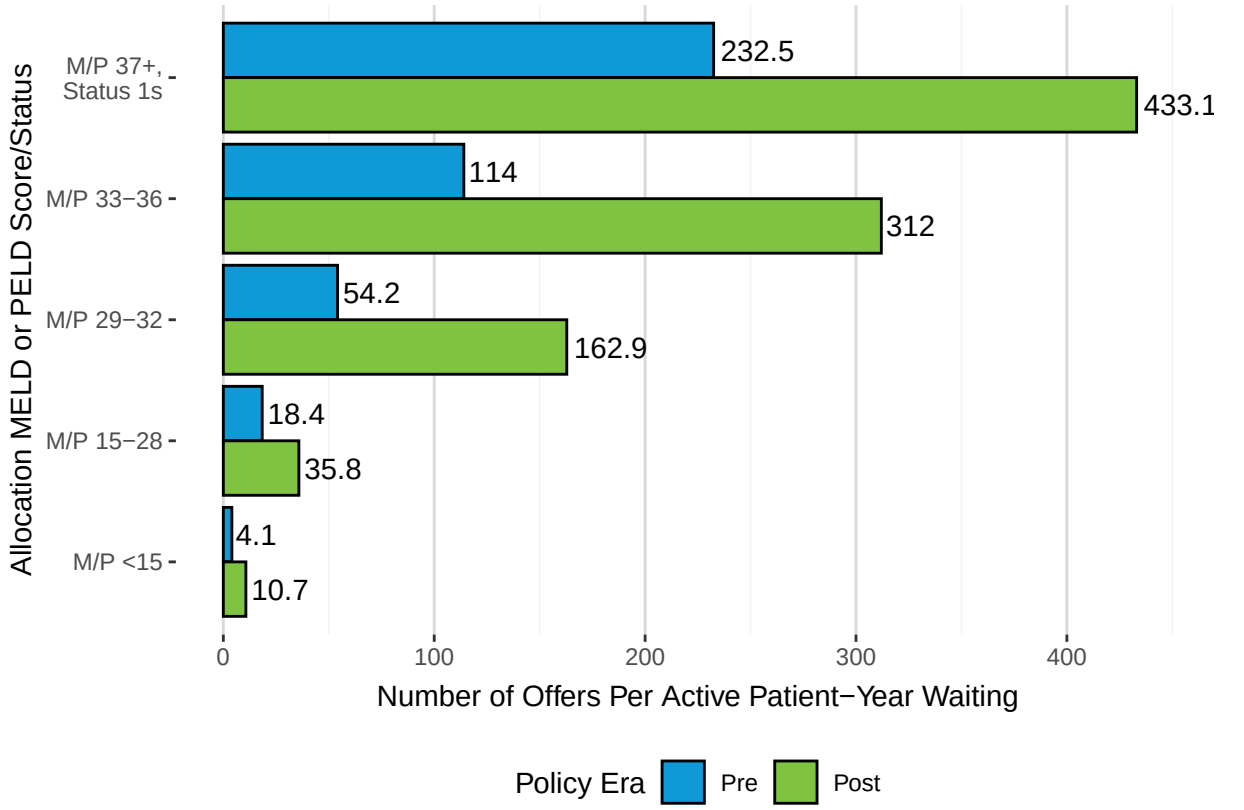
Table 42. Distribution of Length of Post-Transplant Stay for Deceased Donor Liver-Alone Recipients by Era

			Length of Stay (days)					
Policy Era	N	N Missing	Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
Pre	2482	30	0	7	9	15.8	16	546
Post	2315	38	0	7	10	15.4	17	235

The distribution of post-transplant length of stay remained similar. Due to the COVID-19 emergency declaration, this finding should be interpreted with caution.

Section III. Offer Rates

Figure 43. Number of Offers Per Patient-Year Waiting by Allocation MELD or PELD Score or Status and Era



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Patient years take into account both the number of people at a given score/status as well at the amount of time each person spends at the given score/status. For example, if candidate Z spent 9 months at a MELD of 25 and 3 months at a MELD of 31, they would contribute 0.75 person-years to the MELD/PELD 15-28 group, and 0.25 person-years to the MELD/PELD 29-32 group. Summing this for all candidates on the waiting list contributing time during the era makes up the denominator of the offers per active patient-year waiting metric. Active patient-years are used since candidates are not able to receive offers when inactive.

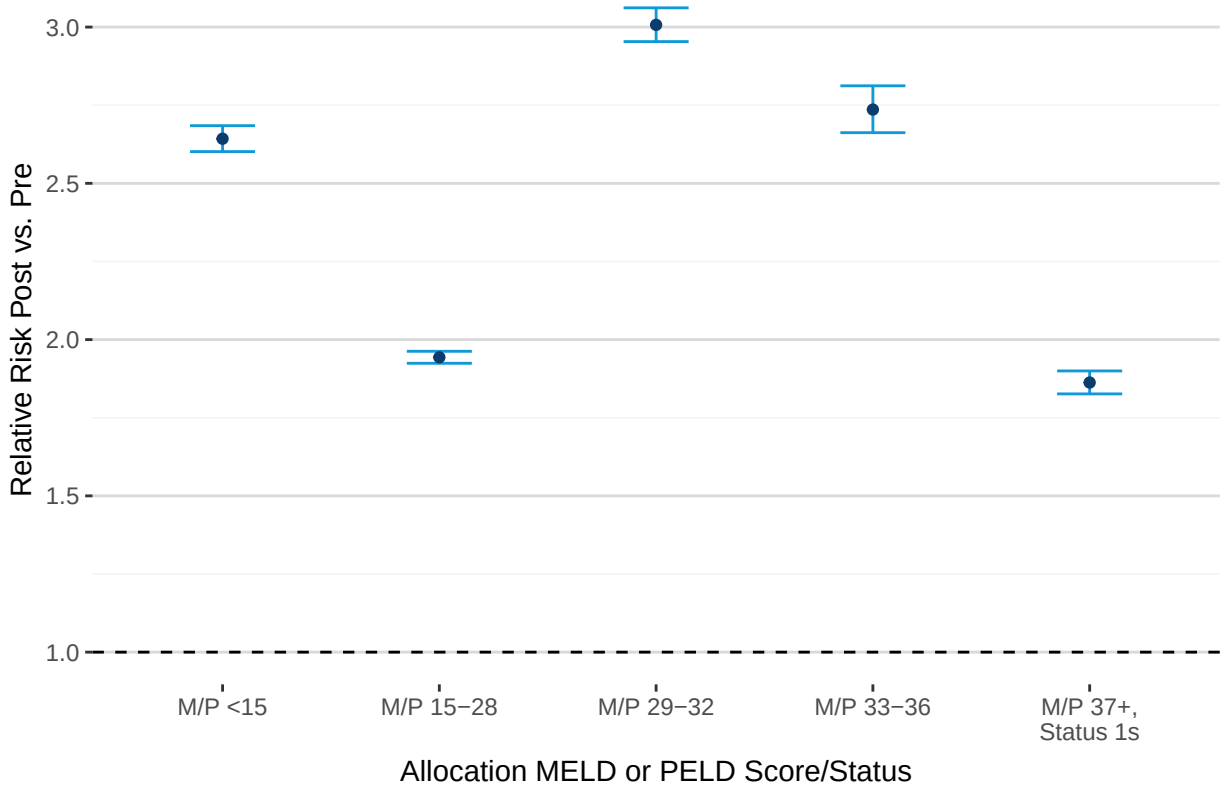
The numerator sums the number of offers received by candidates within the particular score/status. So, if the same candidate Z received one offer at their MELD 25, and 7 offers at MELD 31, these would be added to the numerator for the respective score groups.

Table 43. Number of Offers Per Patient-Year Waiting by Allocation MELD or PELD Score or Status and Era

		Ever Waiting	Offers	Active Person-Years	Offers per Active PY		Risk Ratio (vs. Pre-Policy)	
Score Group	Policy Era	N	N	PY	Estimate	95% CI	Estimate	95% CI
M/P <15	Pre	13326	21872	5400.10	4.05	(4.00, 4.10)	Ref.	Ref.
	Post	12394	54082	5052.70	10.70	(10.61, 10.79)	2.64	(2.60, 2.68)
M/P 15-28	Pre	12177	59549	3230.23	18.43	(18.29, 18.58)	Ref.	Ref.
	Post	11670	117469	3278.98	35.82	(35.62, 36.03)	1.94	(1.92, 1.96)
M/P 29-32	Pre	3906	23557	434.95	54.16	(53.47, 54.86)	Ref.	Ref.
	Post	2785	24115	148.07	162.86	(160.81, 164.93)	3.01	(2.95, 3.06)
M/P 33-36	Pre	1923	8858	77.67	114.04	(111.68, 116.44)	Ref.	Ref.
	Post	1583	12114	38.82	312.02	(306.49, 317.62)	2.74	(2.66, 2.81)
M/P 37+, Status 1s	Pre	2322	17963	77.26	232.51	(229.12, 235.93)	Ref.	Ref.
M/P 37+,	Post	2099	21974	50.74	433.07	(427.37, 438.84)	1.86	(1.83, 1.90)

For all allocation MELD/PELD scores/statuses, there was an increase in the rate of offers per active patient-year waiting in the post-policy era. This was equivalent to a 1.86-fold increase from pre- to post-policy for MELD/PELD 37+ and Status 1s, on the low end and a 3.01-fold increase for MELD/PELD 29-32 on the high end.

Figure 44. Relative Risk Comparing Post- to Pre-Policy Offers Per Patient-Year Waiting by Allocation MELD or PELD Score or Status



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For all allocation MELD/PELD scores/statuses for both adult (18+ years) and pediatric (< 18 years) candidates, there was an increase in the rate of offers per active patient-year waiting in the post-policy era. These increases were more pronounced for pediatric candidates. The most marked increase was for pediatric candidates with MELD/PELD scores 29-32, with an 5.17-fold increase in the risk of offers per patient-year waiting pre- to post-policy. The 47% in the risk of offers per patient-year waiting pre- to post-policy for adult candidates with MELD/PELD 37+ or Status 1s could be due to these candidates already receiving a high priority and thus larger quantity of offers under the prior allocation policy.

Figure 45. Relative Risk Comparing Post- to Pre-Policy Offers Per Patient-Year Waiting by Allocation MELD or PELD Score or Status and Age at Listing

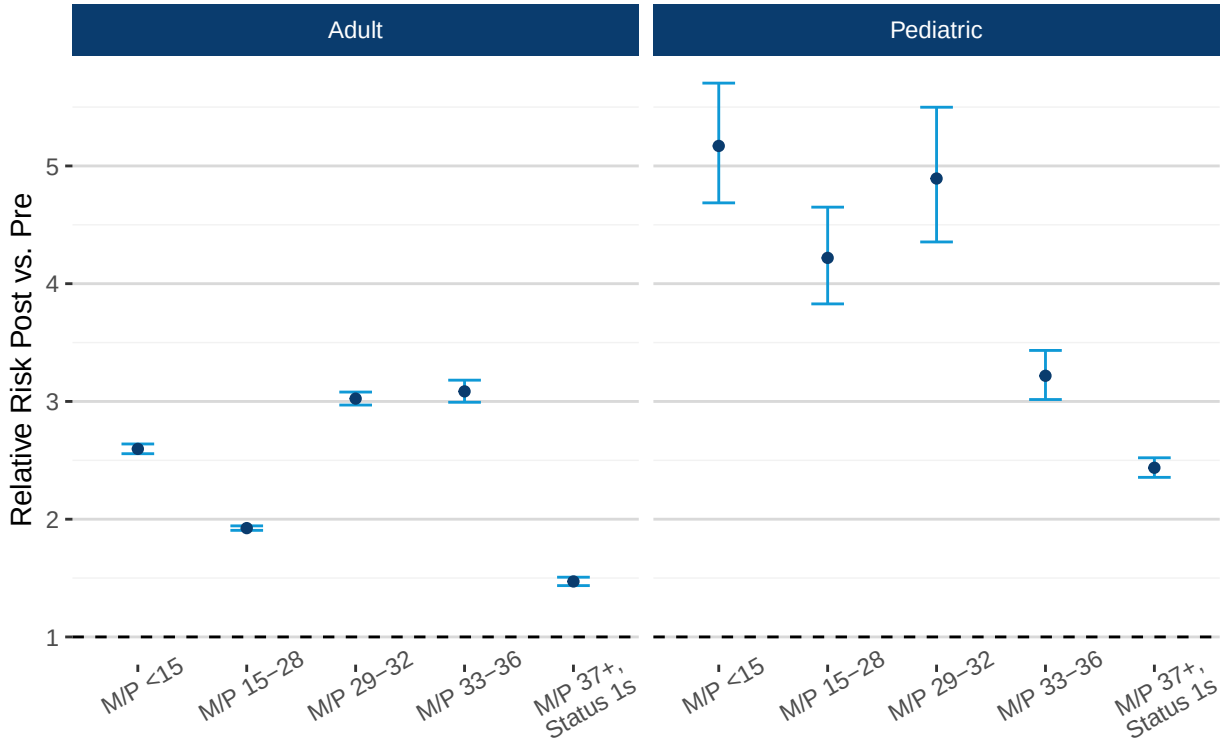

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Table 44. Number of Offers Per Patient-Year Waiting by Allocation MELD or PELD Score or Status, Age at Listing, and Era

			Ever Waiting	Offers	Active Person-Years	Offers per Active PY		Risk Ratio (vs. Pre-Policy)	
Age at Listing	Score Group	Policy Era	N	N	PY	Estimate	95% CI	Estimate	95% CI
Pediatric	M/P <15	Pre	433	503	113.38	4.44	(4.06, 4.84)	Ref.	Ref.
		Post	384	1921	83.75	22.94	(21.92, 23.99)	5.17	(4.69, 5.7)
	M/P 15-28	Pre	311	521	52.67	9.89	(9.06, 10.78)	Ref.	Ref.
		Post	268	1849	44.30	41.73	(39.85, 43.68)	4.22	(3.83, 4.6)
	M/P 29-32	Pre	172	384	21.02	18.27	(16.49, 20.19)	Ref.	Ref.
		Post	115	1066	11.92	89.40	(84.12, 94.94)	4.89	(4.35, 5.5)
	M/P 33-36	Pre	241	1353	30.73	44.03	(41.72, 46.44)	Ref.	Ref.
		Post	183	2836	20.01	141.70	(136.54, 147.02)	3.22	(3.02, 3.4)
	M/P 37+, Status 1s	Pre	399	5715	44.30	129.00	(125.68, 132.39)	Ref.	Ref.
		Post	283	7804	24.82	314.36	(307.43, 321.42)	2.44	(2.36, 2.5)
Adult	M/P <15	Pre	12895	21369	5286.72	4.04	(3.99, 4.10)	Ref.	Ref.
		Post	12010	52161	4968.95	10.50	(10.41, 10.59)	2.60	(2.56, 2.6)
	M/P 15-28	Pre	11866	59028	3177.76	18.58	(18.43, 18.73)	Ref.	Ref.
		Post	11404	115620	3234.84	35.74	(35.54, 35.95)	1.92	(1.91, 1.9)
	M/P 29-32	Pre	3734	23173	413.93	55.98	(55.26, 56.71)	Ref.	Ref.
		Post	2670	23049	136.15	169.30	(167.12, 171.50)	3.02	(2.97, 3.1)
	M/P 33-36	Pre	1682	7505	46.95	159.86	(156.26, 163.52)	Ref.	Ref.
		Post	1400	9278	18.81	493.22	(483.24, 503.36)	3.09	(2.99, 3.2)
	M/P 37+, Status 1s	Pre	1923	12248	32.96	371.65	(365.09, 378.29)	Ref.	Ref.
		Post	1816	14170	25.92	546.79	(537.82, 555.86)	1.47	(1.44, 1.5)

Across allocation score groups, all race/ethnicity groups experienced increases in offers per patient-year waiting pre- to post-policy era. However, this increase was lowest for Hispanic and Other race/ethnicity groups, at various MELD or PELD score or status groups.

Figure 47. Relative Risk Post- Versus Pre-Policy of Offers Per Patient-Year Waiting by Allocation MELD or PELD Score or Status and Race/Ethnicity

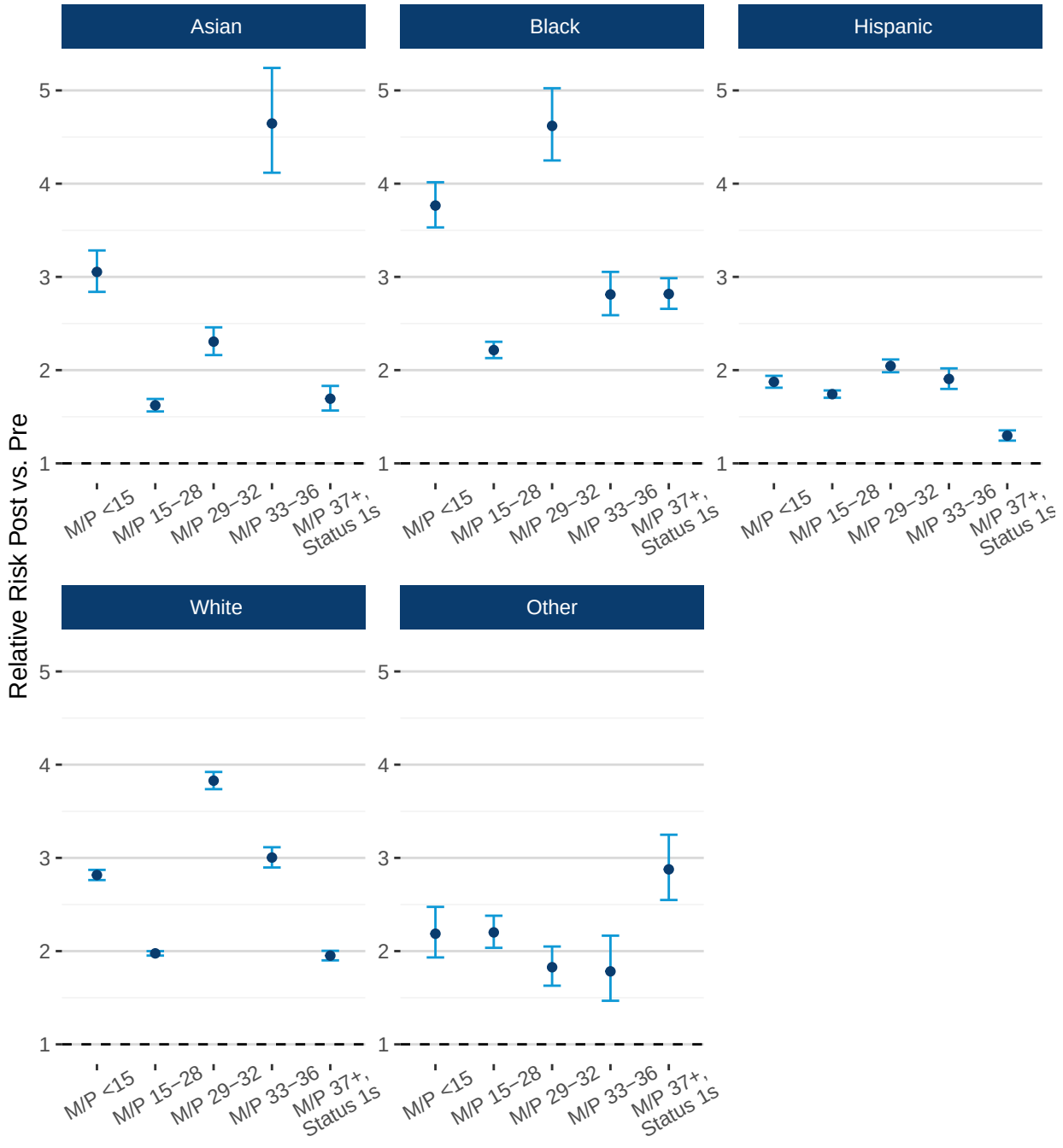

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Table 45. Number of Offers Per Patient-Year Waiting by Allocation MELD or PELD Score or Status, Race/Ethnicity, and Era

			Ever Waiting	Offers	Active Person-Years	Offers per Active PY		Risk Ratio (vs. Pre-Policy)	
Race/Ethnicity	Score Group	Policy Era	N	N	PY	Estimate	95% CI	Estimate	95% CI
Asian	M/P <15	Pre	642	1013	276.62	3.66	(3.44, 3.89)	Ref.	Ref.
		Post	583	2563	229.21	11.18	(10.75, 11.62)	3.05	(2.84, 3.3)
	M/P 15-28	Pre	414	3239	96.33	33.62	(32.48, 34.80)	Ref.	Ref.
		Post	440	7523	137.91	54.55	(53.32, 55.80)	1.62	(1.56, 1.7)
	M/P 29-32	Pre	245	2331	50.08	46.55	(44.68, 48.47)	Ref.	Ref.
		Post	143	1532	14.28	107.31	(102.00, 112.82)	2.31	(2.16, 2.5)
	M/P 33-36	Pre	94	395	5.29	74.62	(67.45, 82.36)	Ref.	Ref.
		Post	76	794	2.29	346.66	(322.97, 371.64)	4.65	(4.12, 5.2)
	M/P 37+, Status 1s	Pre	122	1308	5.07	257.79	(244.00, 272.14)	Ref.	Ref.
		Post	124	1226	2.81	436.58	(412.48, 461.71)	1.69	(1.57, 1.8)
Black	M/P <15	Pre	885	1202	358.99	3.35	(3.16, 3.54)	Ref.	Ref.
		Post	796	4096	324.90	12.61	(12.22, 13.00)	3.77	(3.53, 4.0)
	M/P 15-28	Pre	756	3493	191.64	18.23	(17.63, 18.84)	Ref.	Ref.
		Post	733	8386	207.73	40.37	(39.51, 41.24)	2.21	(2.13, 2.3)
	M/P 29-32	Pre	264	1020	27.52	37.06	(34.82, 39.41)	Ref.	Ref.
		Post	165	1183	6.91	171.21	(161.59, 181.25)	4.62	(4.25, 5.0)
	M/P 33-36	Pre	150	829	7.37	112.49	(104.96, 120.41)	Ref.	Ref.
		Post	143	1772	5.60	316.27	(301.72, 331.35)	2.81	(2.59, 3.1)
	M/P 37+, Status 1s	Pre	238	1786	8.71	205.13	(195.72, 214.86)	Ref.	Ref.
		Post	241	3068	5.31	577.82	(557.56, 598.64)	2.82	(2.66, 3.0)
Hispanic	M/P <15	Pre	2447	5210	942.31	5.53	(5.38, 5.68)	Ref.	Ref.
		Post	2347	9223	890.13	10.36	(10.15, 10.58)	1.87	(1.81, 1.9)
	M/P 15-28	Pre	2146	11709	583.99	20.05	(19.69, 20.42)	Ref.	Ref.
		Post	2073	21146	605.36	34.93	(34.46, 35.41)	1.74	(1.70, 1.8)
	M/P 29-32	Pre	868	6739	108.34	62.20	(60.73, 63.71)	Ref.	Ref.
		Post	652	7008	55.11	127.17	(124.21, 130.18)	2.04	(1.98, 2.1)
	M/P 33-36	Pre	423	2407	19.90	120.95	(116.16, 125.88)	Ref.	Ref.
		Post	337	2194	9.52	230.45	(220.91, 240.30)	1.91	(1.80, 2.0)
	M/P 37+, Status 1s	Pre	510	4308	16.65	258.75	(251.08, 266.59)	Ref.	Ref.
		Post	420	4324	12.88	335.73	(325.80, 345.89)	1.30	(1.24, 1.4)
White	M/P <15	Pre	9149	14083	3748.21	3.76	(3.70, 3.82)	Ref.	Ref.
		Post	8464	37393	3534.03	10.58	(10.47, 10.69)	2.82	(2.76, 2.9)
	M/P 15-28	Pre	8647	40194	2296.51	17.50	(17.33, 17.67)	Ref.	Ref.
		Post	8216	78398	2267.27	34.58	(34.34, 34.82)	1.98	(1.95, 2.0)
	M/P 29-32	Pre	2441	12651	237.86	53.19	(52.26, 54.12)	Ref.	Ref.
		Post	1772	13938	68.45	203.62	(200.25, 207.03)	3.83	(3.74, 3.9)
	M/P 33-36	Pre	1208	4988	42.68	116.86	(113.64, 120.15)	Ref.	Ref.
		Post	987	7178	20.45	351.01	(342.94, 359.23)	3.00	(2.90, 3.1)
	M/P 37+, Status 1s	Pre	1401	10225	44.88	227.85	(223.45, 232.31)	Ref.	Ref.
		Post	1261	12190	27.42	444.62	(436.77, 452.59)	1.95	(1.90, 2.0)
Other	M/P <15	Pre	209	364	74.60	4.88	(4.39, 5.41)	Ref.	Ref.
		Post	214	807	75.64	10.67	(9.94, 11.43)	2.19	(1.93, 2.5)
	M/P 15-28	Pre	223	914	63.77	14.33	(13.42, 15.29)	Ref.	Ref.
		Post	218	2016	63.91	31.54	(30.18, 32.95)	2.20	(2.04, 2.4)
	M/P 29-32	Pre	91	816	11.31	72.15	(67.28, 77.28)	Ref.	Ref.
		Post	58	454	3.44	131.83	(119.98, 144.53)	1.83	(1.63, 2.0)
	M/P 33-36	Pre	48	239	2.43	98.46	(86.37, 111.77)	Ref.	Ref.
		Post	42	176	1.00	175.52	(150.55, 203.45)	1.78	(1.47, 2.2)
	M/P 37+, Status 1s	Pre	54	336	1.95	172.01	(154.10, 191.42)	Ref.	Ref.
		Post	55	1166	2.36	494.87	(466.87, 524.11)	2.88	(2.55, 3.2)

Section IV. Liver Utilization

Overall, there were fewer deceased liver donors recovered in the nation post-policy (percent change -0.7%). However, volumes were variable across the country. Below illustrates this by OPTN region. The **Appendix** highlights these trends by OPO as well. Changes in deceased liver donors recovered post-policy must be considered in light of the COVID-19 emergency declaration and the differential impact across the country.

Figure 48. Deceased Liver Donors Recovered by OPTN Region and Era

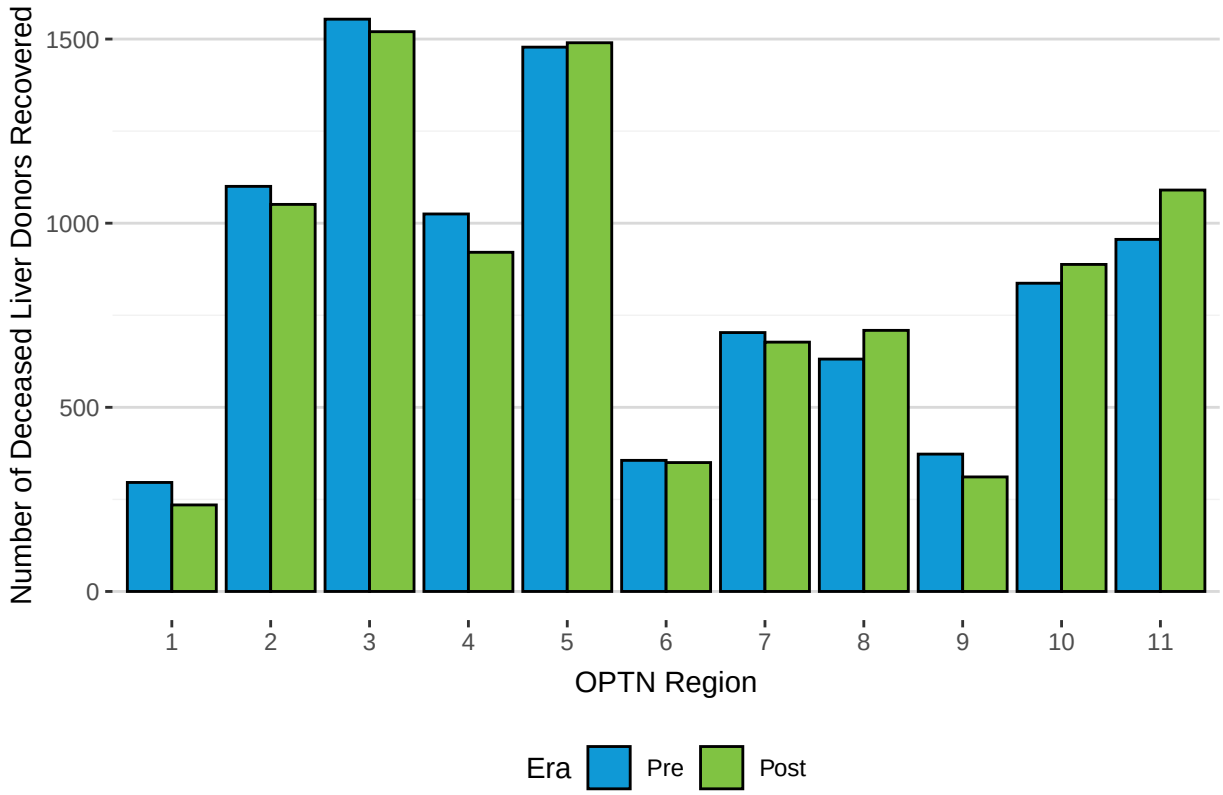

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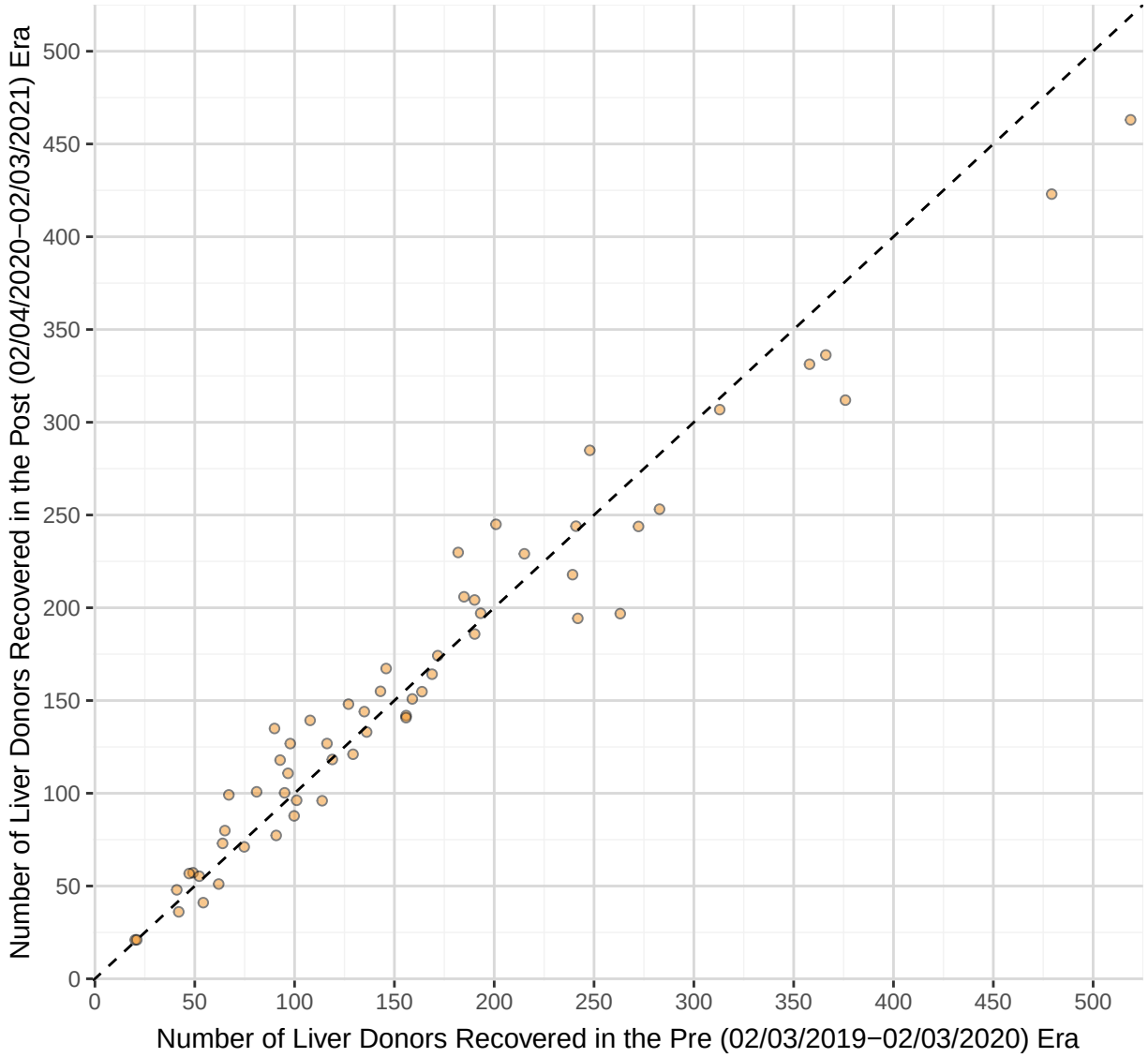
Table 46. Number of Deceased Liver Donors Recovered by OPTN Region and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
OPTN Region	N	%	N	%	N	%	N	%	N	%
1	296	3.2%	33	3.1%	39	3.2%	163	2.3%	235	2.5%
2	1100	11.8%	127	11.9%	154	12.6%	770	11.1%	1051	11.4%
3	1554	16.7%	146	13.6%	193	15.7%	1181	17.0%	1520	16.4%
4	1025	11.0%	117	10.9%	139	11.3%	665	9.6%	921	10.0%
5	1478	15.9%	184	17.2%	215	17.5%	1091	15.7%	1490	16.1%
6	356	3.8%	43	4.0%	38	3.1%	269	3.9%	350	3.8%
7	703	7.6%	93	8.7%	79	6.4%	505	7.3%	677	7.3%
8	631	6.8%	87	8.1%	75	6.1%	547	7.9%	709	7.7%
9	373	4.0%	30	2.8%	30	2.4%	251	3.6%	311	3.4%
10	837	9.0%	102	9.5%	111	9.0%	675	9.7%	888	9.6%
11	956	10.3%	109	10.2%	154	12.6%	827	11.9%	1090	11.8%
National	9309	100.0%	1071	100.0%	1227	100.0%	6944	100.0%	9242	100.0%

Figure 49. Scatter Plot of OPO Volume by Era

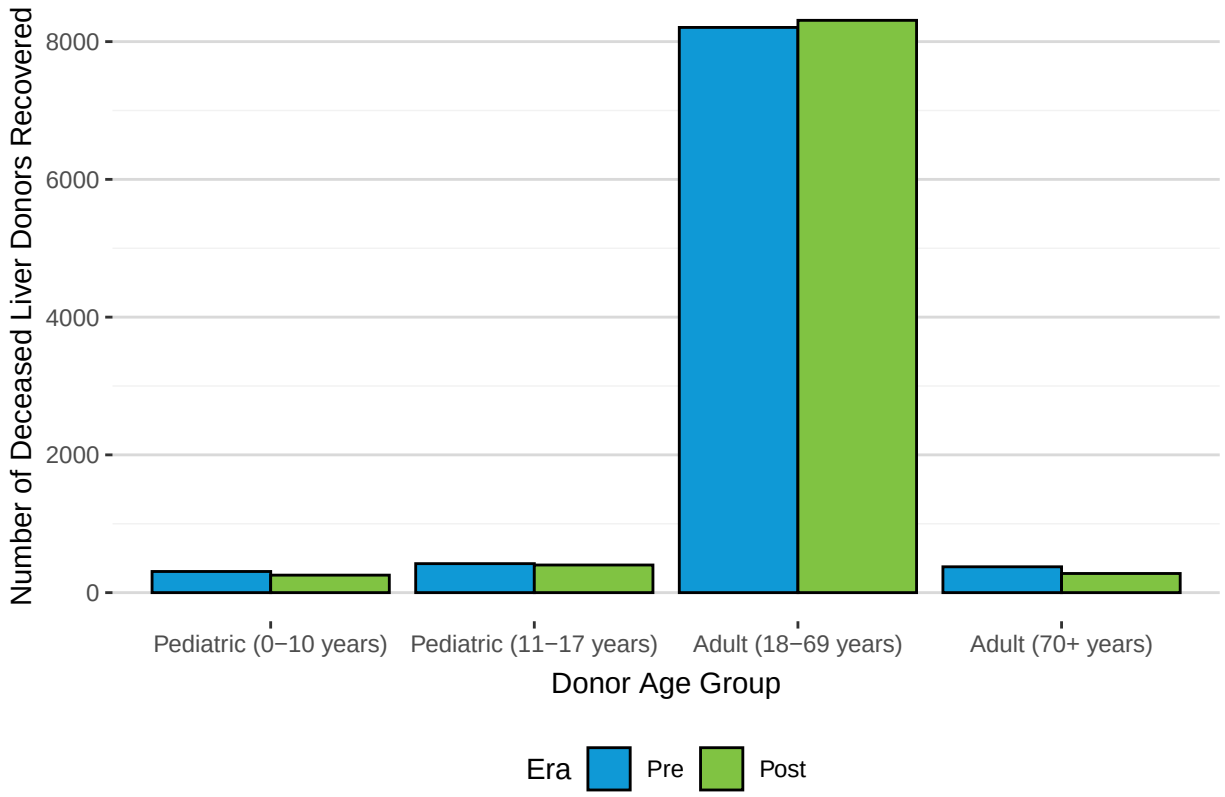


* Note that the Post (02/04/2020−02/03/2021) Era contains months during the COVID−19 pandemic.

Any points along the diagonal dashed line indicate no changes in the absolute number of deceased liver donors recovered by an OPO, pre- to post-policy. Points that fall above the diagonal represent OPOs that recovered more deceased liver donors post-policy compared to pre-policy. Points that fall below the diagonal represent OPOs that recovered fewer liver donors post-policy compared to pre-policy.

The vast majority of OPOs recovered similar number of livers Pre (02/03/2019-02/03/2020) and Post (02/04/2020-02/03/2021) policy, overall. A Spearman's rank correlation ρ=0.97 indicates a strong positive, monotonic relationship between these two measures. The Kruskal-Wallis test indicated that there was not a statistically significant change pre- to post-policy in the number of deceased liver donors recovered per OPO (χ^2_1=0.0717, p=0.789).

Figure 50. Deceased Liver Donors Recovered by Donor Age and Era



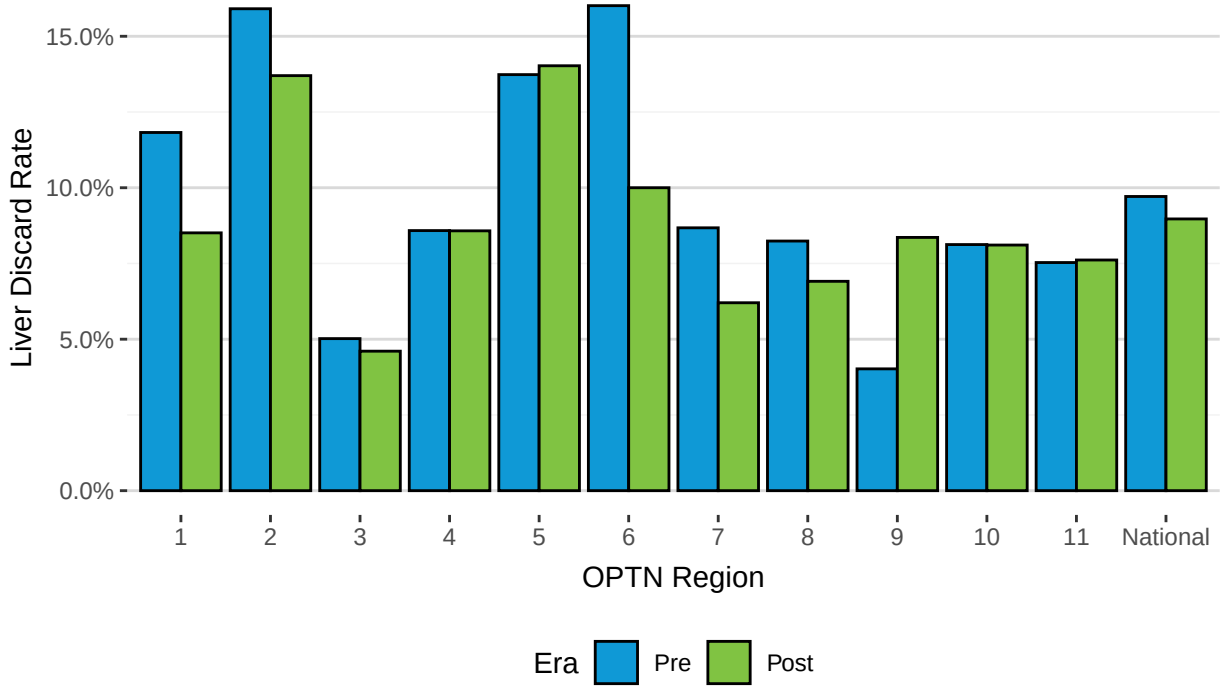
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 46. Number of Deceased Liver Donors Recovered by Donor Age and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Donor Age Group	N	%	N	%	N	%	N	%	N	%
Pediatric (0-10 years)	307	3.3%	22	2.1%	39	3.2%	193	2.8%	254	2.7%
Pediatric (11-17 years)	421	4.5%	56	5.2%	53	4.3%	292	4.2%	401	4.3%
Adult (18-69 years)	8206	88.2%	945	88.2%	1103	89.9%	6261	90.2%	8309	89.9%
Adult (70+ years)	375	4.0%	48	4.5%	32	2.6%	198	2.9%	278	3.0%

The decrease in deceased liver donors recovered occurred across in all donor age groups except adults (18-69 years) post-policy. The proportion of deceased liver donors recovered in the pediatric (0-10 years) and adult (70+ years) age groups varied the most across COVID-19 eras post-policy.

Figure 51. Liver Discard Rate by OPTN Region and Era



National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 46. Liver Discard Rate by OPTN Region and Era

	Pre-Policy			Post-Policy, Pre-COVID			Post-Policy, COVID Shutdown			Post-Policy, COVID Stabilization			Post-Policy (overall)		
OPTN Region	Recovered	Discarded	%	Recovered	Discarded	%	Recovered	Discarded	%	Recovered	Discarded	%	Recovered	Discarded	%
1	296	35	11.82	33	4	12.12	39	4	10.26	163	12	7.36	235	20	8.51
2	1100	175	15.91	127	16	12.60	154	22	14.29	770	106	13.77	1051	144	13.70
3	1554	78	5.02	146	8	5.48	193	7	3.63	1181	55	4.66	1520	70	4.61
4	1025	88	8.59	117	7	5.98	139	7	5.04	665	65	9.77	921	79	8.58
5	1478	203	13.73	184	27	14.67	215	25	11.63	1091	157	14.39	1490	209	14.03
6	356	57	16.01	43	6	13.95	38	4	10.53	269	25	9.29	350	35	10.00
7	703	61	8.68	93	7	7.53	79	5	6.33	505	30	5.94	677	42	6.20
8	631	52	8.24	87	11	12.64	75	1	1.33	547	37	6.76	709	49	6.91
9	373	15	4.02	30	3	10.00	30	3	10.00	251	20	7.97	311	26	8.36
10	837	68	8.12	102	14	13.73	111	7	6.31	675	51	7.56	888	72	8.11
11	956	72	7.53	109	7	6.42	154	11	7.14	827	65	7.86	1090	83	7.61
National	9309	904	9.71	1071	110	10.27	1227	96	7.82	6944	623	8.97	9242	829	8.97

Discard rate is defined as the number of livers not transplanted over the number of deceased liver donors recovered, multiplied by 100 to get a percentage. Nationally the liver discard rate has fluctuated over the COVID-19 eras post-policy; however, this is lower overall post-policy compared to pre-policy. This change showed some marginal effect, though it was not statistically significant (χ^2_1=2.92, p=0.087). Changes in discard rates by OPTN region differ. These changes must be considered in light of the COVID-19 emergency declaration.

Figure 52. Liver Discard Rate by Donor Age and Era

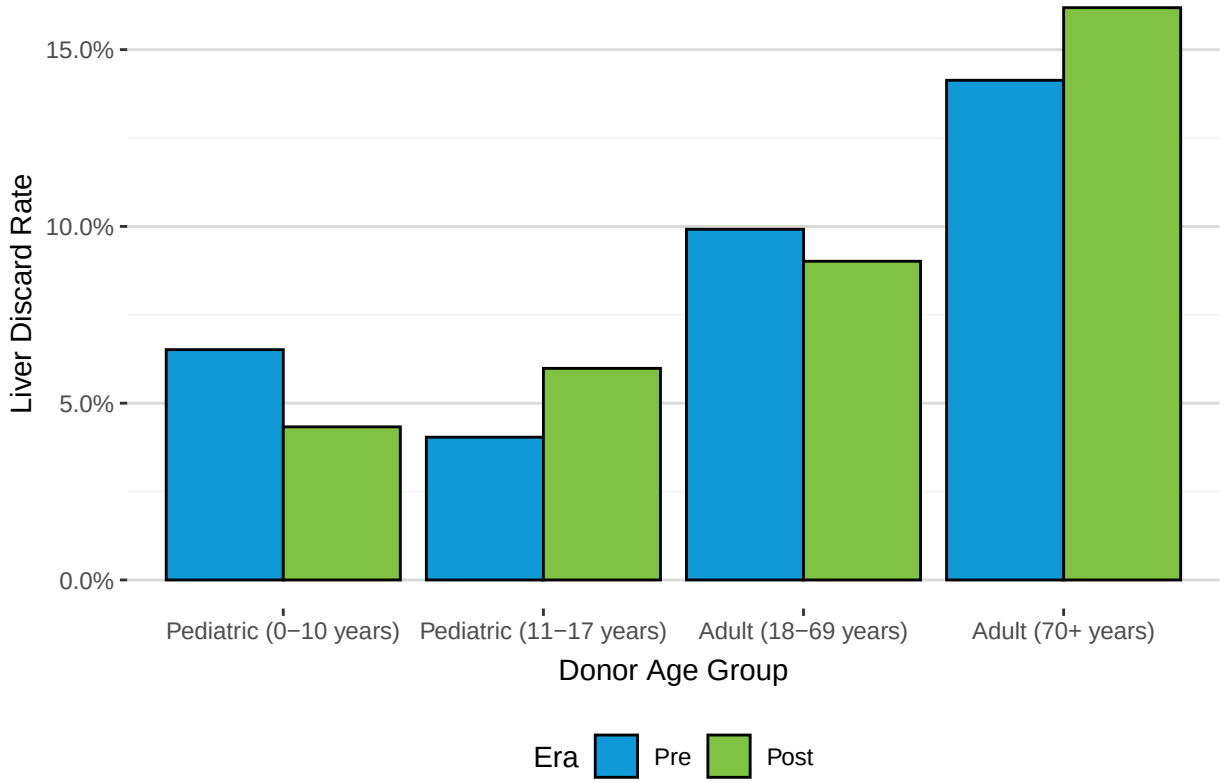


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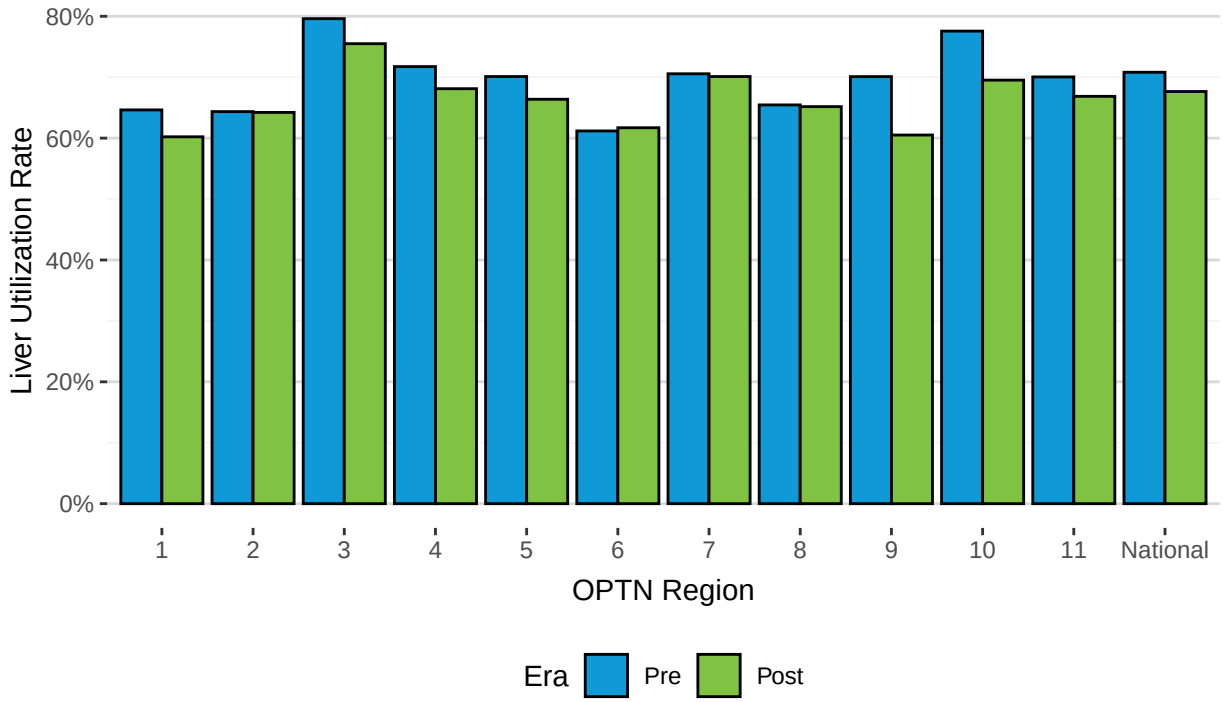
Table 47. Liver Discard Rate by Donor Age and Era

Donor Age Group	Pre-Policy %	Post-Policy, Pre-COVID %	Post-Policy, COVID Shutdown %	Post-Policy, COVID Stabilization %	Post-Policy (overall) %
Pediatric (0-10 years)	6.51	4.55	2.56	4.66	4.33
Pediatric (11-17 years)	4.04	5.36	9.43	5.48	5.99
Adult (18-69 years)	9.92	10.05	7.71	9.09	9.01
Adult (70+ years)	14.13	22.92	15.63	14.65	16.19

The proportion of deceased donor livers recovered and not used for transplant has also varied by donor age group across COVID-19 post-policy eras. Overall, there has been a decrease in the discard rate of pediatric (0-10 years) and adult (18-69 years) deceased donor livers, and an increase for pediatric (11-17 years) and adult (70+ years) donors post-policy. Any changes should be interpreted with caution in light of the COVID-19 emergency declaration.

Figure 53. Liver Utilization Rate by OPTN Region and Era



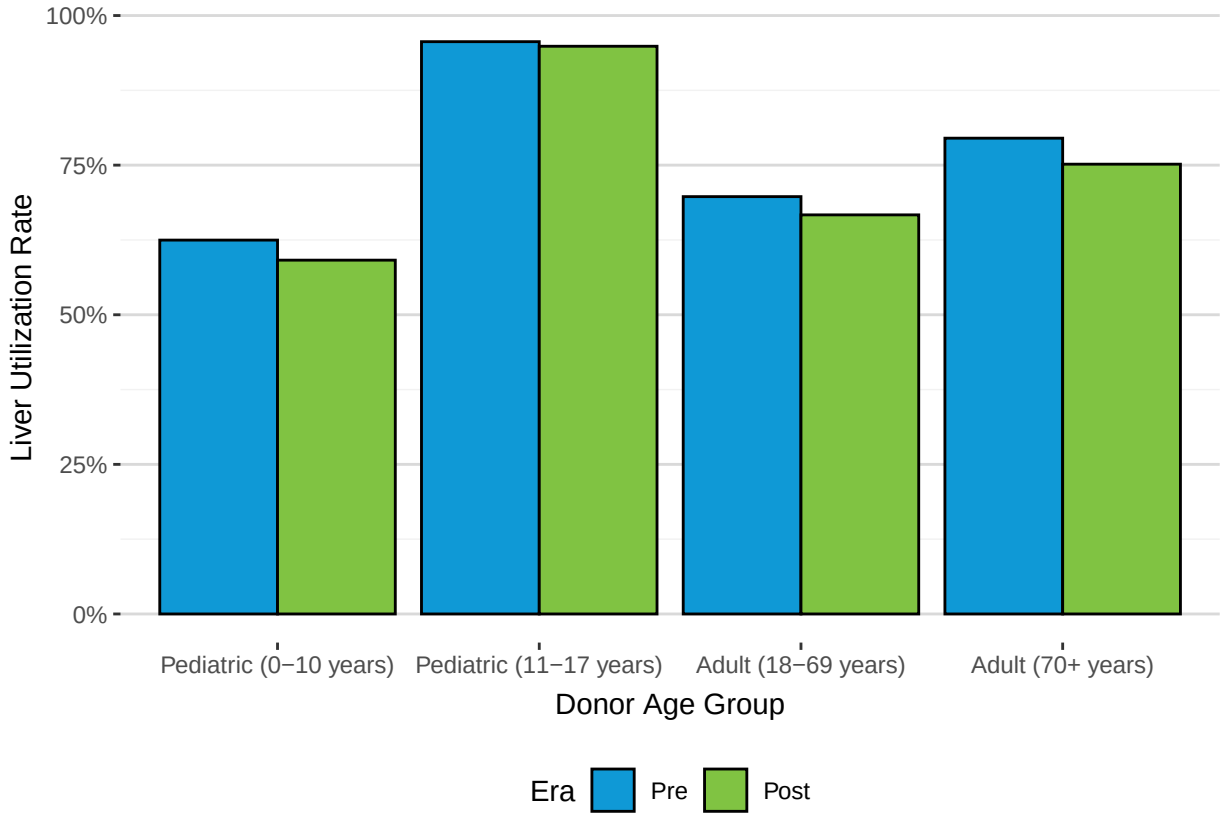
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 48. Liver Utilization Rate by OPTN Region and Era

	Pre-Policy	Post-Policy, Pre-COVID	Post-Policy, COVID Shutdown	Post-Policy, COVID Stabilization	Post-Policy (overall)
OPTN Region	%	%	%	%	%
1	64.63	67.44	78.00	55.84	60.22
2	64.35	68.94	69.79	62.52	64.22
3	79.61	68.32	80.17	75.74	75.50
4	71.74	76.39	75.00	65.51	68.11
5	70.11	64.63	67.36	66.48	66.38
6	61.18	66.07	53.97	62.31	61.70
7	70.56	68.80	72.55	69.99	70.11
8	65.45	65.55	67.89	64.74	65.17
9	70.10	50.00	57.45	62.43	60.51
10	77.56	73.77	72.73	68.47	69.52
11	70.05	64.63	74.50	65.88	66.86
National	70.81	67.62	71.60	67.00	67.65

Liver utilization rate is defined as the number of livers transplanted over the total number of organ donors recovered, multiplied by 100 to get a percentage. Nationally, the liver utilization rate decreased post-policy; this was similar for most OPTN regions as well. This change was statistically significant (χ^2_1=28.88, p<0.001). Changes in deceased liver donor utilization rate must be considered in light of the COVID-19 emergency declaration.

Figure 54. Liver Utilization Rate by Donor Age and Era



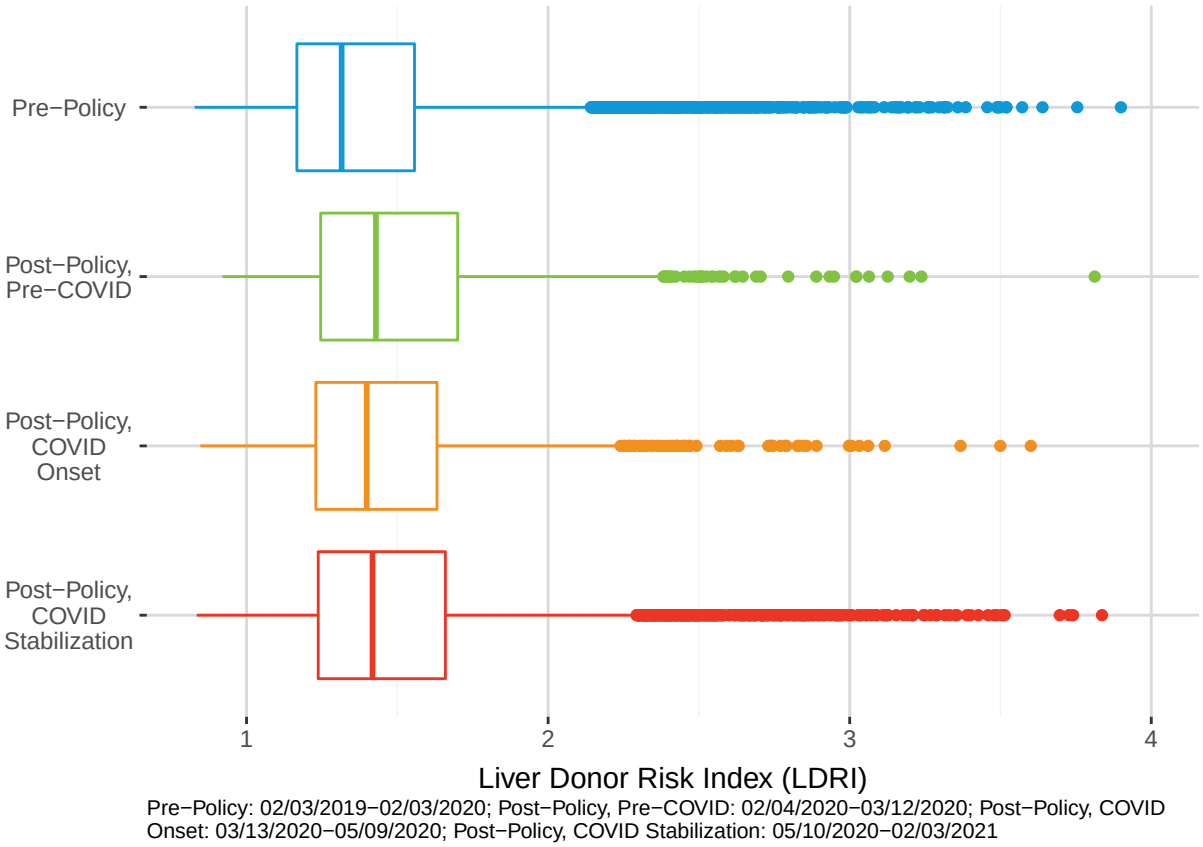
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 49. Liver Utilization Rate by Donor Age and Era

Donor Age Group	Pre-Policy %	Post-Policy, Pre-COVID %	Post-Policy, COVID Shutdown %	Post-Policy, COVID Stabilization %	Post-Policy (overall) %
Pediatric (0-10 years)	62.47	53.85	71.70	57.68	59.12
Pediatric (11-17 years)	95.63	87.30	86.67	97.85	94.87
Adult (18-69 years)	69.74	66.87	70.84	65.97	66.69
Adult (70+ years)	79.51	72.55	77.14	75.45	75.16

The trends in variable utilization rate across COVID-19 post-policy eras was also seen by donor age group, as was the decrease pre- to post-policy overall. These should be interpreted with caution in light of the COVID-19 emergency declaration.

Figure 55. Distribution of Liver Donor Risk Index by Era



Pre−Policy: 02/03/2019−02/03/2020; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−02/03/2021

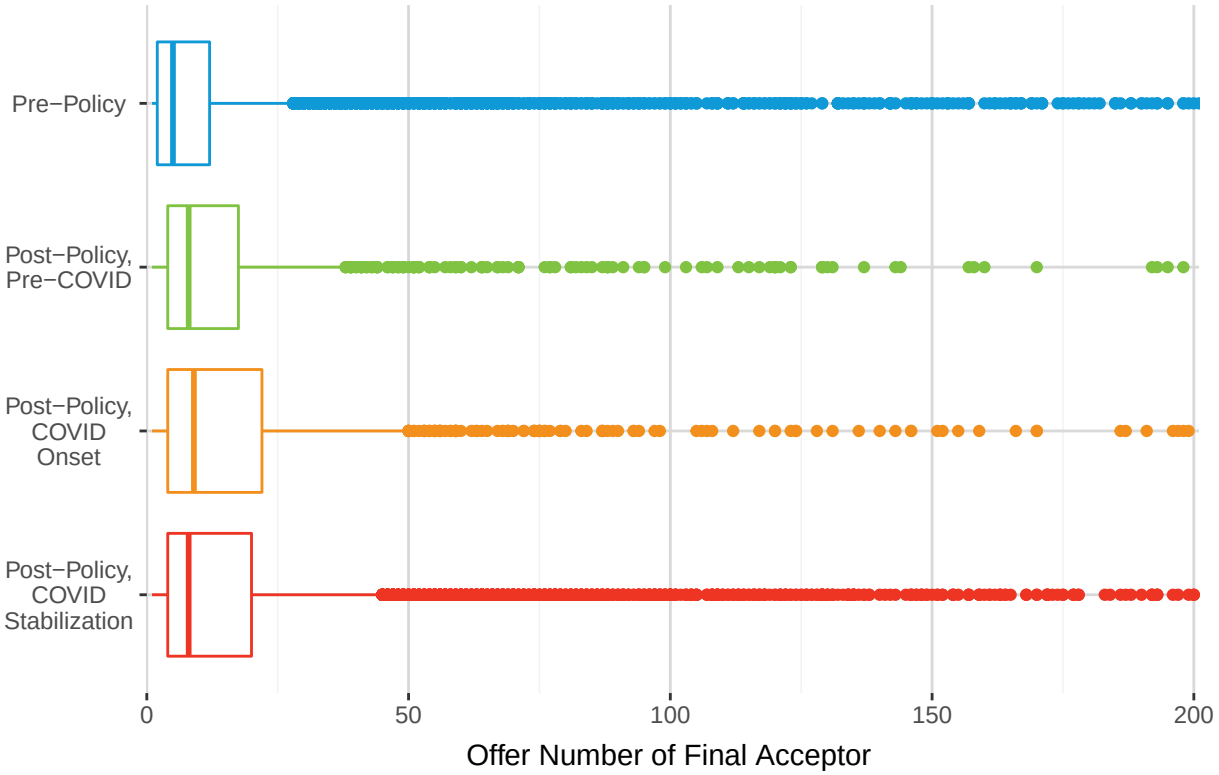
Table 50. Distribution of Liver Donor Risk Index by Era

	LDRI					
Era	Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
Pre-Policy	0.83	1.17	1.32	1.43	1.56	5.18
Post-Policy, Pre-COVID	0.92	1.25	1.43	1.52	1.70	3.81
Post-Policy, COVID Onset	0.85	1.23	1.40	1.49	1.63	4.33
Post-Policy, COVID Stabilization	0.84	1.24	1.42	1.50	1.66	4.18
Post-Policy (overall)	0.84	1.24	1.42	1.50	1.66	4.33

The distribution of the liver donor risk index (LDRI) for liver donors recovered has slightly shifted pre- to post-policy. The overall range in LDRI has decreased, indicated by slightly higher minimum and lower maximum values post-policy; however, the interquartile range has shifted towards larger values post-policy compared to pre-policy. Overall there have not been large changes in the quality of deceased liver donors.

The distribution of the sequence number of the final acceptor on liver match runs is shown below. "Final acceptor" is used, as it is possible for two liver segments to be placed on the same match run; in these cases, the last of these is used if both segments are placed. Accepting candidate sequence number increased pre- to post-policy, as indicated by shifts in the first quartile, median, and 3rd quartile of the boxplots in the post-policy eras. Changes in final acceptor sequence number must be considered in light of the COVID-19 emergency declaration.

Figure 56. Distribution of Sequence Number of Final Acceptor on Liver Match Run by Era

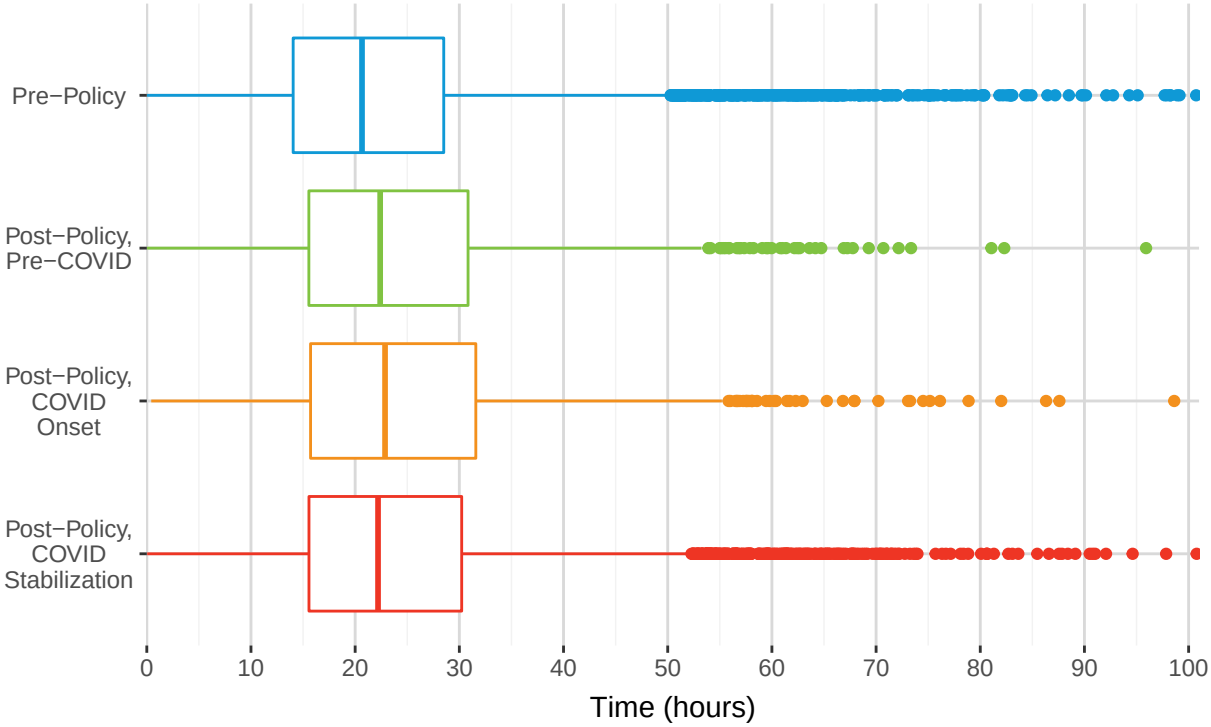


Pre−Policy: 02/03/2019−02/03/2020; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−02/03/2021
** There were 475 final acceptances pre−policy and 386 post−policy with an offer number > 200.

Table 51. Distribution of Sequence Number of Final Acceptor on Liver Match Run by Era

		Final Acceptor Sequence Number						
Era	N Matches	Min	25th Percentile	Median	Mean	75th Percentile	90th Percentile	Max
Pre-Policy	8496	1	2	5	77	14	50	9353
Post-Policy, Pre-COVID	989	1	4	9	96	22	84	7517
Post-Policy, COVID Onset	1138	1	4	10	85	25	68	7128
Post-Policy, COVID Stabilization	6386	1	4	9	104	24	84	7555
Post-Policy (overall)	8513	1	4	9	100	24	81	7555

Figure 57. Distribution of Time from First Electronic Offer to Cross Clamp for Deceased Liver Donors by Era



Pre−Policy: 02/03/2019−02/03/2020; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−02/03/2021
* There were 0 matches pre−policy and 2 post−policy with a time > 100 hours that are not included.
** There were 2 matches pre−policy and 2 post−policy with the first electronic offer prior to cross−clamp that are not included.

Table 52. Distribution of Time from First Electronic Offer to Cross Clamp for Deceased Liver Donors by Era

		Time (Hours)					
Era	N Matches	Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
Pre-Policy	10969	0.02	14.06	20.67	22.71	28.53	353.92
Post-Policy, Pre-COVID	1298	0.01	15.56	22.42	24.25	30.85	105.80
Post-Policy, COVID Onset	1483	0.43	15.72	22.87	24.87	31.58	98.62
Post-Policy, COVID Stabilization	8660	0.03	15.57	22.20	23.95	30.23	117.74
Post-Policy (overall)	11441	0.01	15.57	22.32	24.10	30.49	117.74

Average time from first electronic offer being sent to actual cross clamp time increased by roughly 1.4 hours pre- to post-policy. However, this was variable among post-policy eras and changes should be considered in light of the COVID-19 emergency declaration.

Section V. Intestine

There were 112 intestine candidates added to the waiting list pre-policy and 143 post-policy. Few intestine registrations were removed in the pre-policy era (5) or post-policy era (1) due to death or too sick to transplant.

A total of 91 deceased intestine donors were recovered pre-policy and 89 were recovered post-policy. More deceased donor intestine transplants occurred post-policy (75 pre- and 82 post-policy). Note that this includes all deceased donor intestine recipients - intestine alone as well as intestine multi-organ. The following table illustrates the distribution of intestine-alone versus intestine multi-organ transplants in each policy era.

Table 53. Number of Deceased Donor Intestine Transplants by Multi-Organ Type and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Multi-Organ Type	N	%	N	%	N	%	N	%	N	%
Intestine Only	32	42.7%	4	50.0%	2	22.2%	31	47.7%	37	45.1%
Intestine-Kidney	3	4.0%	0	0.0%	0	0.0%	2	3.1%	2	2.4%
Intestine-Kidney-Pancreas	0	0.0%	0	0.0%	0	0.0%	1	1.5%	1	1.2%
Intestine-Liver-Kidney	4	5.3%	1	12.5%	0	0.0%	4	6.2%	5	6.1%
Intestine-Liver-Pancreas	31	41.3%	0	0.0%	7	77.8%	24	36.9%	31	37.8%
Intestine-Pancreas	5	6.7%	3	37.5%	0	0.0%	3	4.6%	6	7.3%

The distribution of intestine transplants by classification distance groups were similar between the policy eras.

Table 54. Number of Deceased Donor Intestine Transplants by Classification Distance and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Classification Distance	N	%	N	%	N	%	N	%	N	%
0-150 NM	15	20.0%	2	25.0%	1	11.1%	15	23.1%	18	22.0%
>150-250 NM	7	9.3%	0	0.0%	2	22.2%	5	7.7%	7	8.5%
>250-500 NM	15	20.0%	2	25.0%	1	11.1%	20	30.8%	23	28.0%
>500 NM	38	50.7%	4	50.0%	5	55.6%	25	38.5%	34	41.5%

Conclusion

This report provides a review of the first year under acuity circle allocation changes. A national state of emergency was declared due to COVID-19 on March 13, 2020, making the true impact of this policy change challenging to determine. While changes pre- to post-policy must be considered in light of this national emergency, many of the results thus far are supported by the predictions of the SRTR modeling prior to implementation of the acuity circle allocation policy. Takeaways at a national-level of these policy changes are as follows.

Generally the waiting list has remained consistent with regards to characteristics of new additions pre- to post-policy. As was the case with all organ waiting lists, the effects of COVID-19 were seen in the volumes of new waiting list additions (OPTN COVID-19 dashboard).

There has been an increase in the volume and proportion of adult (age 18 years or older) deceased donor transplants with DCD donors post-policy, though this trend has been seen for most organs in addition to liver prior to this policy change. The majority of DCD livers are used for adult transplant recipients with MELD or PELD scores 15-28. The increase in non-exception transplants has also facilitated an increase in the transplant of patients with MELD scores 29 and higher; thus, many lower MELD score transplants are occurring with DCD donors or for recipients with an exception score. The median MELD at transplant (MMaT) for adult liver-alone deceased donor transplant recipients has shifted post-policy by various geographic areas, and there have been decreases in the variance of MMaT by OPTN Region, DSA, and state, though these were not statistically significant. The increased distances from donor hospital to transplant program that were immediate with this policy change have been consistent, with broader sharing across DSA and OPTN regional boundaries. Interestingly, this has increased the proportion of transplants within 150 - 500 nautical miles, and decreased transplants further than 500 nautical miles for adults, compared to pre-policy. However, cold ischemia time only increased slightly (median increased by 12 minutes for adult recipients) despite the increase in distance and time from first electronic offer to cross-clamp.

For pediatric (age $<$ 18 years) liver alone deceased donor transplant, there was also an increase in non-exception recipients post-policy; however, there was a substantial decrease in the proportion and volume of Status 1A and 1B transplants, which are considered non-exception, during this time. There has been a 67% increase in the volume of adolescent (age 12-17 years) transplants post-policy. The changes with this policy to increase priority of pediatric candidates for pediatric donors, have led to an increase in pediatric donors going to pediatric recipients of all ages. Increased distances from donor hospital to transplant program also occurred for pediatric transplants, resulting in 60% of transplants being from national (outside of OPTN Region) shares.

Additionally, there was an increase in simultaneous liver-kidney multi-organ transplants post-policy by 5.5% and a 110% increase in number of liver-lung multi-organ transplants post-policy. Six-month post-transplant patient survival for all liver-alone deceased donor recipients was unchanged pre- to post-policy. While offer rates increased across all MELD or PELD score/status groups, age groups, and race/ethnicity groups, this was by varying degrees. There was variation in the changes in discard and utilization rates within OPTN Regions, though both decreased nationally. While there were fewer deceased donors with a liver recovered (decreased utilization rate), more often those that did have a liver recovered resulted in transplant (decreased discard rate). Donor quality, as measured by the liver donor risk index (LDRI), trended towards slightly higher values post-policy, and was higher for non-HCC exception transplant recipients. However, changes in donor quality were variable across OPTN Regions.

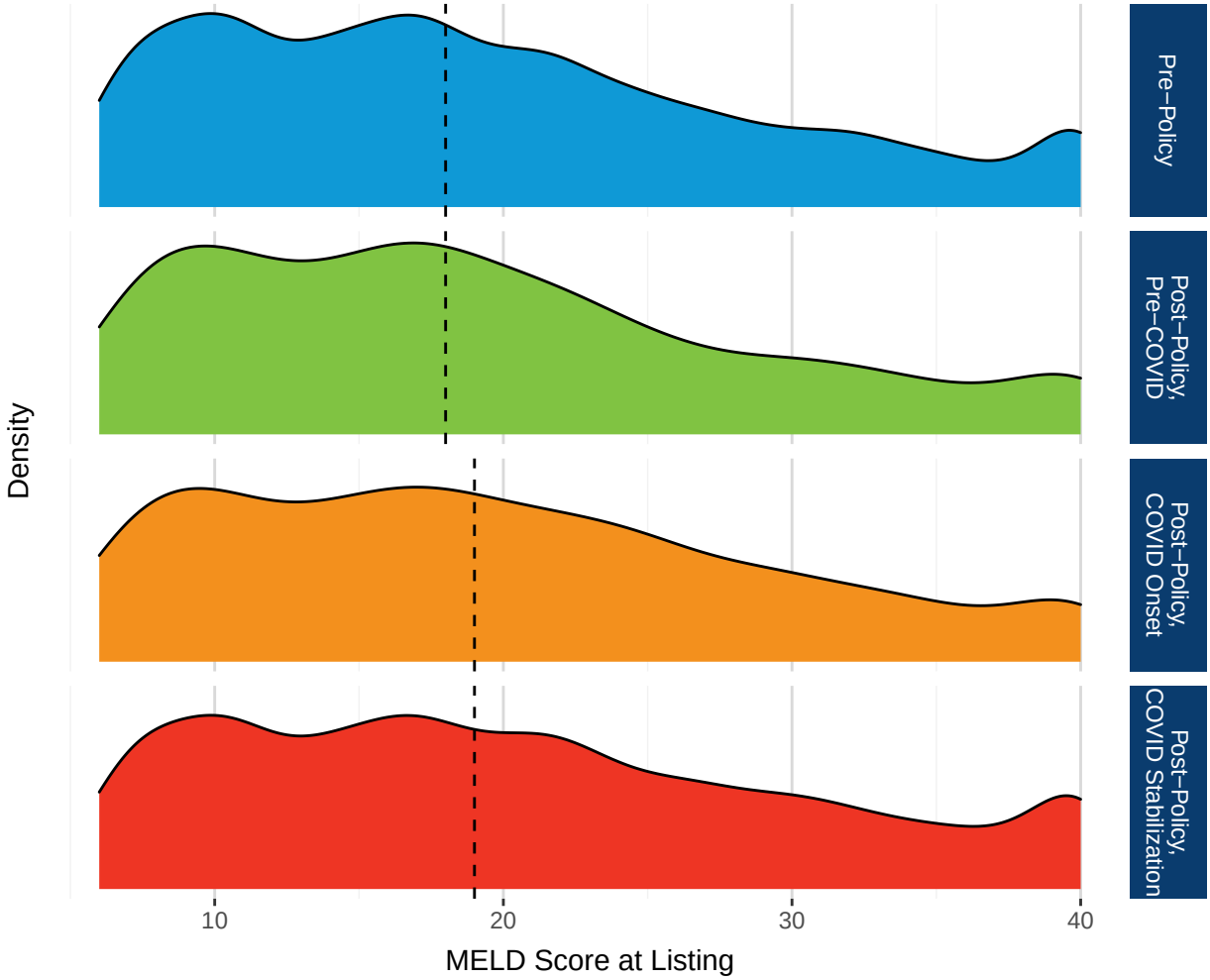
The COVID-19 crisis has created challenges in many sectors, but particularly the medical field. Specific to transplantation, changes in potential patient evaluation, organ procurement, and transplant recipient selection process, as well as acceptance behaviors and routine outpatient activities, including clinical testing, have interrupted the ability to fully realize and understand any policy changes during the COVID-19 onset period.

The confounding effects of COVID-19 cannot be parsed out from potential policy effects, and continued data accumulation and monitoring of the system will be needed to determine when the effects of this crisis may no longer be an influential factor.

Appendix

Additional Waiting List Registration Additions Information

Figure 58. Distribution of MELD Score at Listing for Adult Registrations Added to Liver Waiting List by Era



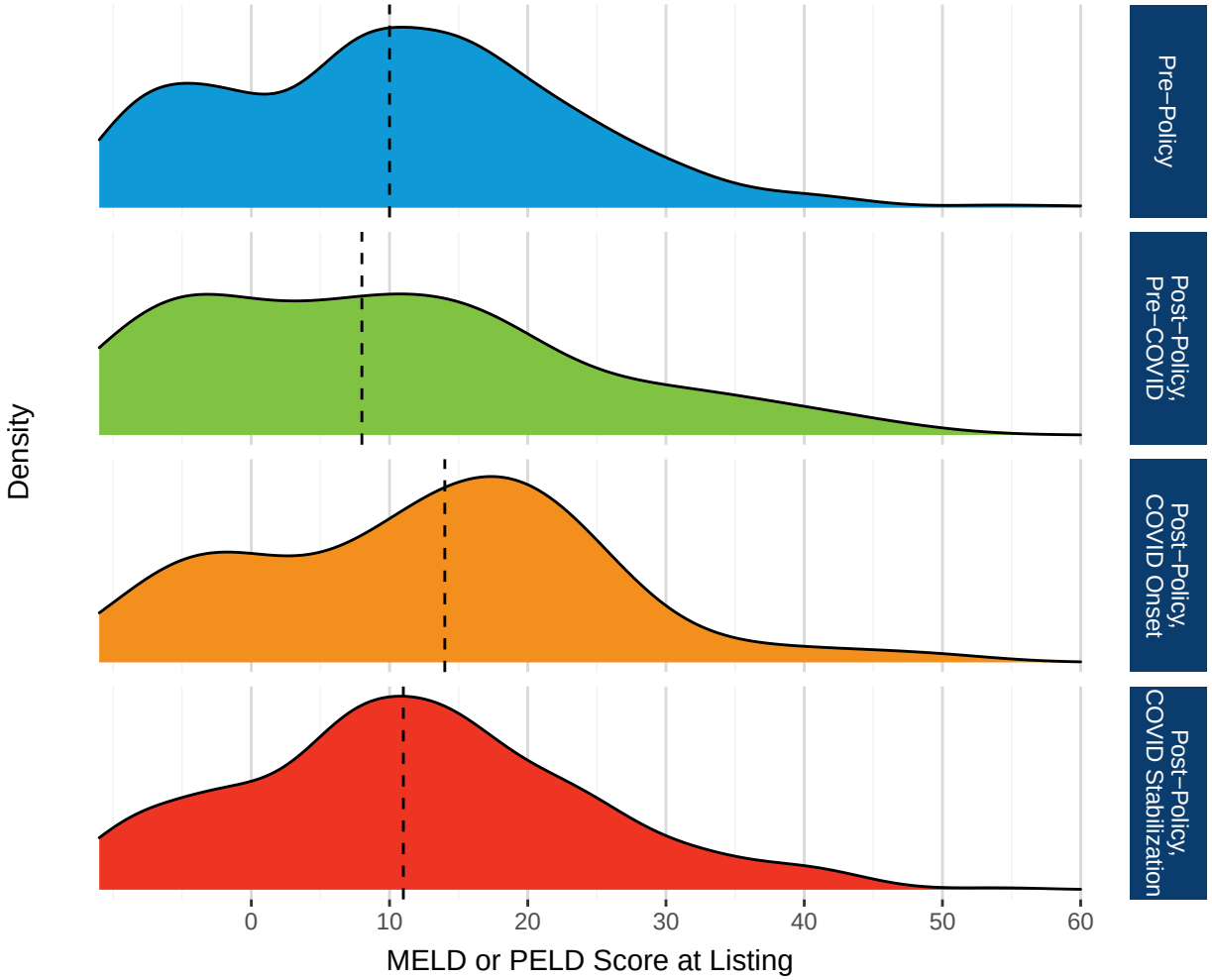
Pre−Policy: 02/03/2019−02/03/2020; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−02/03/2021

Table 55. Distribution of MELD Score at Listing for Adult Registrations Added to Liver Waiting List by Era

	MELD or PELD Score at Listing					
Policy Era	Minimum	25th Percentile	Mean	Median	75th Percentile	Maximum
Pre-Policy	6	12	19.6	18	26	40
Post-Policy, Pre-COVID	6	11	19.3	18	25	40
Post-Policy, COVID Onset	6	12	19.9	19	26	40
Post-Policy, COVID Stabilization	6	12	20.6	19	28	40
Post-Policy (overall)	6	12	20.4	19	27	40

The shift towards higher MELD scores at listing in the post-policy era, based on slightly higher median and 75th percentiles, can be noted above.

Figure 59. Distribution of MELD or PELD Score at Listing for Pediatric Registrations Added to Liver Waiting List by Era



Pre−Policy: 02/03/2019−02/03/2020; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−02/03/2021

Table 56. Distribution of MELD or PELD Score at Listing for Pediatric Registrations Added to Liver Waiting List by Era

	MELD or PELD Score at Listing					
Policy Era	Minimum	25th Percentile	Mean	Median	75th Percentile	Maximum
Pre-Policy	-11	0	10.2	10	18.0	60
Post-Policy, Pre-COVID	-10	-3	9.2	8	17.0	45
Post-Policy, COVID Onset	-10	1	12.5	14	20.3	49
Post-Policy, COVID Stabilization	-11	3	11.7	11	20.0	54
Post-Policy (overall)	-11	2	11.5	11	20.0	54

The shift towards higher MELD and PELD scores at listing in the post-policy era, based on slightly higher median and 75th percentiles, can be noted above.

Table 63. Number of Liver-Alone Waiting List Registrations Ever Waiting by State and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
State	N	%	N	%	N	%	N	%	N	%
AL	292	1.2%	127	1.0%	137	1.0%	207	1.0%	234	1.0%
AR	102	0.4%	48	0.4%	53	0.4%	72	0.4%	84	0.4%
AZ	571	2.4%	214	1.7%	215	1.6%	433	2.1%	530	2.3%
CA	3631	15.0%	2250	17.4%	2291	17.4%	3126	15.5%	3529	15.2%
CO	532	2.2%	227	1.8%	221	1.7%	331	1.6%	386	1.7%
CT	241	1.0%	161	1.2%	168	1.3%	234	1.2%	254	1.1%
DC	374	1.5%	218	1.7%	231	1.8%	332	1.6%	363	1.6%
DE	11	0.0%	6	0.0%	3	0.0%	8	0.0%	12	0.1%
FL	1205	5.0%	506	3.9%	542	4.1%	1033	5.1%	1203	5.2%
GA	678	2.8%	350	2.7%	373	2.8%	565	2.8%	639	2.8%
HI	45	0.2%	24	0.2%	26	0.2%	42	0.2%	46	0.2%
IA	68	0.3%	26	0.2%	34	0.3%	65	0.3%	73	0.3%
IL	689	2.8%	327	2.5%	330	2.5%	525	2.6%	637	2.7%
IN	251	1.0%	96	0.7%	104	0.8%	191	0.9%	220	0.9%
KS	187	0.8%	101	0.8%	105	0.8%	156	0.8%	173	0.7%
KY	243	1.0%	144	1.1%	153	1.2%	223	1.1%	261	1.1%
LA	424	1.8%	171	1.3%	176	1.3%	292	1.4%	350	1.5%
MA	1324	5.5%	905	7.0%	886	6.7%	1246	6.2%	1367	5.9%
MD	1036	4.3%	733	5.7%	747	5.7%	928	4.6%	1020	4.4%
MI	623	2.6%	304	2.4%	294	2.2%	435	2.2%	498	2.1%
MN	520	2.1%	231	1.8%	224	1.7%	370	1.8%	441	1.9%
MO	342	1.4%	123	1.0%	132	1.0%	284	1.4%	330	1.4%
MS	72	0.3%	25	0.2%	25	0.2%	60	0.3%	71	0.3%
NC	458	1.9%	190	1.5%	198	1.5%	334	1.7%	399	1.7%
NE	219	0.9%	118	0.9%	133	1.0%	177	0.9%	216	0.9%
NJ	254	1.0%	161	1.2%	164	1.2%	249	1.2%	269	1.2%
NY	1803	7.4%	1116	8.6%	1088	8.2%	1514	7.5%	1740	7.5%
OH	1126	4.7%	619	4.8%	620	4.7%	936	4.6%	1116	4.8%
OK	196	0.8%	105	0.8%	110	0.8%	182	0.9%	203	0.9%
OR	256	1.1%	123	1.0%	119	0.9%	194	1.0%	229	1.0%
PA	1455	6.0%	665	5.1%	677	5.1%	1086	5.4%	1301	5.6%
PR	70	0.3%	18	0.1%	18	0.1%	55	0.3%	59	0.3%
SC	138	0.6%	55	0.4%	66	0.5%	129	0.6%	144	0.6%
SD	58	0.2%	35	0.3%	38	0.3%	54	0.3%	55	0.2%
TN	523	2.2%	245	1.9%	276	2.1%	463	2.3%	542	2.3%
TX	2602	10.8%	1344	10.4%	1372	10.4%	2214	11.0%	2563	11.1%
UT	273	1.1%	162	1.3%	169	1.3%	288	1.4%	323	1.4%
VA	402	1.7%	163	1.3%	177	1.3%	329	1.6%	403	1.7%
WA	379	1.6%	192	1.5%	198	1.5%	331	1.6%	366	1.6%
WI	529	2.2%	294	2.3%	297	2.3%	452	2.2%	535	2.3%

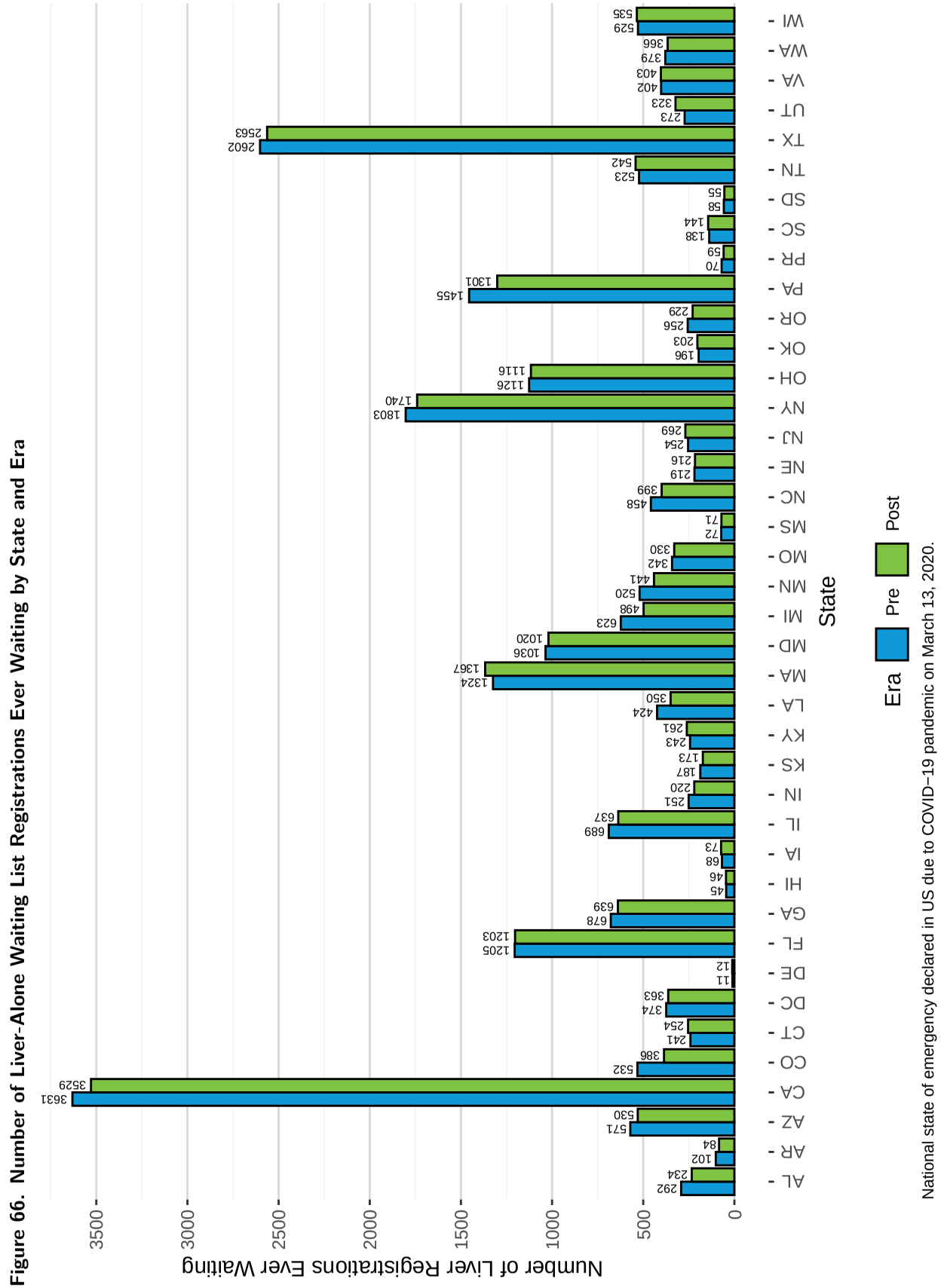


Figure 66. Number of Liver-Alone Waiting List Registrations Ever Waiting by State and Era

Additional Waiting List Removals Information

Table 63. Number of Liver-Alone Waiting List Registrations Removed for Death or Too Sick to Transplant by State and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
State	N	%	N	%	N	%	N	%	N	%
AL	32	1.5%	0	0.0%	3	1.0%	19	1.3%	22	1.1%
AR	12	0.6%	1	0.4%	3	1.0%	5	0.3%	9	0.4%
AZ	24	1.1%	5	2.2%	5	1.7%	20	1.3%	30	1.5%
CA	329	15.5%	37	16.2%	52	17.4%	224	15.1%	313	15.5%
CO	66	3.1%	8	3.5%	3	1.0%	22	1.5%	33	1.6%
CT	21	1.0%	1	0.4%	4	1.3%	19	1.3%	24	1.2%
DC	32	1.5%	1	0.4%	3	1.0%	22	1.5%	26	1.3%
FL	72	3.4%	6	2.6%	9	3.0%	49	3.3%	64	3.2%
GA	53	2.5%	11	4.8%	8	2.7%	46	3.1%	65	3.2%
HI	4	0.2%	0	0.0%	0	0.0%	6	0.4%	6	0.3%
IA	12	0.6%	1	0.4%	1	0.3%	2	0.1%	4	0.2%
IL	57	2.7%	6	2.6%	11	3.7%	31	2.1%	48	2.4%
IN	23	1.1%	1	0.4%	1	0.3%	19	1.3%	21	1.0%
KS	14	0.7%	1	0.4%	3	1.0%	14	0.9%	18	0.9%
KY	28	1.3%	4	1.7%	5	1.7%	21	1.4%	30	1.5%
LA	22	1.0%	2	0.9%	3	1.0%	16	1.1%	21	1.0%
MA	133	6.3%	13	5.7%	11	3.7%	103	6.9%	127	6.3%
MD	95	4.5%	7	3.1%	20	6.7%	66	4.4%	93	4.6%
MI	54	2.6%	6	2.6%	6	2.0%	15	1.0%	27	1.3%
MN	54	2.6%	4	1.7%	5	1.7%	24	1.6%	33	1.6%
MO	24	1.1%	1	0.4%	1	0.3%	22	1.5%	24	1.2%
MS	4	0.2%	1	0.4%	1	0.3%	5	0.3%	7	0.3%
NC	41	1.9%	5	2.2%	1	0.3%	25	1.7%	31	1.5%
NE	25	1.2%	0	0.0%	5	1.7%	6	0.4%	11	0.5%
NJ	25	1.2%	4	1.7%	2	0.7%	27	1.8%	33	1.6%
NY	165	7.8%	23	10.0%	41	13.8%	95	6.4%	159	7.9%
OH	79	3.7%	13	5.7%	13	4.4%	59	4.0%	85	4.2%
OK	20	0.9%	0	0.0%	2	0.7%	6	0.4%	8	0.4%
OR	26	1.2%	4	1.7%	3	1.0%	18	1.2%	25	1.2%
PA	127	6.0%	11	4.8%	13	4.4%	108	7.3%	132	6.6%
PR	8	0.4%	0	0.0%	0	0.0%	7	0.5%	7	0.3%
SC	11	0.5%	2	0.9%	1	0.3%	10	0.7%	13	0.6%
SD	9	0.4%	0	0.0%	1	0.3%	4	0.3%	5	0.2%
TN	43	2.0%	3	1.3%	4	1.3%	30	2.0%	37	1.8%
TX	259	12.2%	35	15.3%	34	11.4%	218	14.7%	287	14.2%
UT	11	0.5%	0	0.0%	0	0.0%	16	1.1%	16	0.8%
VA	28	1.3%	4	1.7%	8	2.7%	23	1.5%	35	1.7%
WA	19	0.9%	0	0.0%	3	1.0%	22	1.5%	25	1.2%
WI	56	2.6%	8	3.5%	9	3.0%	44	3.0%	61	3.0%

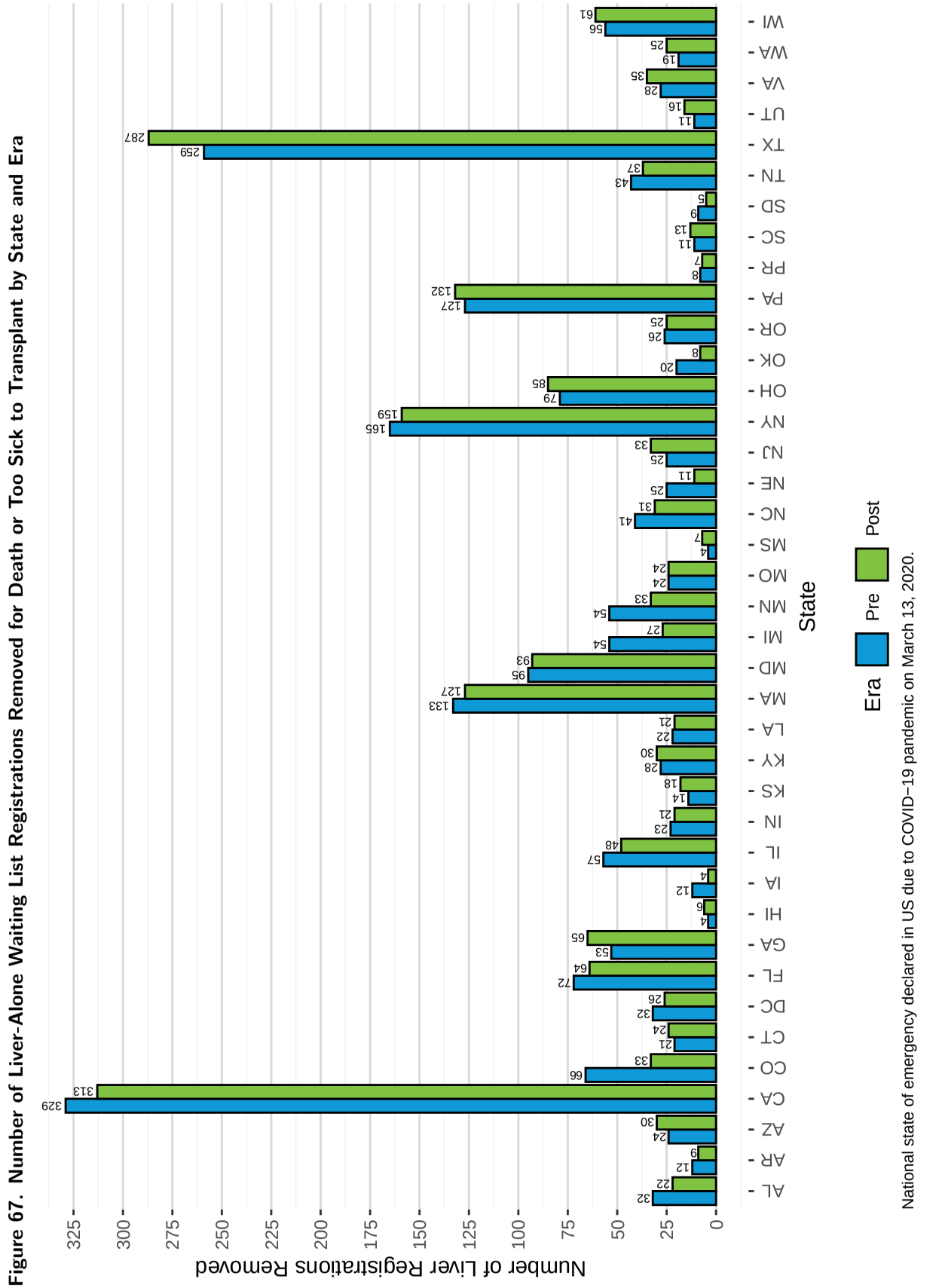


Figure 67. Number of Liver-Alone Waiting List Registrations Removed for Death or Too Sick to Transplant by State and Era

Additional Deceased Donor Liver Transplant Information

Table 63. Number of Deceased Donor Liver-Alone Transplants by State and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
State	N	%	N	%	N	%	N	%	N	%
AL	111	1.6%	10	1.1%	11	1.1%	61	1.2%	82	1.2%
AR	37	0.5%	4	0.5%	4	0.4%	21	0.4%	29	0.4%
AZ	281	4.1%	33	3.8%	36	3.6%	176	3.5%	245	3.6%
CA	743	10.8%	104	12.0%	131	13.0%	552	11.1%	787	11.5%
CO	107	1.6%	17	2.0%	9	0.9%	74	1.5%	100	1.5%
CT	40	0.6%	4	0.5%	6	0.6%	35	0.7%	45	0.7%
DC	86	1.2%	6	0.7%	14	1.4%	72	1.4%	92	1.3%
DE	3	0.0%	1	0.1%	0	0.0%	3	0.1%	4	0.1%
FL	534	7.7%	45	5.2%	73	7.2%	387	7.8%	505	7.4%
GA	234	3.4%	20	2.3%	32	3.2%	159	3.2%	211	3.1%
HI	12	0.2%	2	0.2%	1	0.1%	12	0.2%	15	0.2%
IA	30	0.4%	3	0.3%	2	0.2%	20	0.4%	25	0.4%
IL	249	3.6%	40	4.6%	42	4.2%	210	4.2%	292	4.3%
IN	133	1.9%	15	1.7%	10	1.0%	80	1.6%	105	1.5%
KS	60	0.9%	4	0.5%	5	0.5%	26	0.5%	35	0.5%
KY	50	0.7%	6	0.7%	12	1.2%	39	0.8%	57	0.8%
LA	202	2.9%	23	2.6%	21	2.1%	119	2.4%	163	2.4%
MA	217	3.1%	48	5.5%	30	3.0%	150	3.0%	228	3.3%
MD	150	2.2%	14	1.6%	22	2.2%	125	2.5%	161	2.3%
MI	181	2.6%	27	3.1%	6	0.6%	113	2.3%	146	2.1%
MN	143	2.1%	23	2.6%	26	2.6%	120	2.4%	169	2.5%
MO	165	2.4%	15	1.7%	21	2.1%	122	2.4%	158	2.3%
MS	40	0.6%	5	0.6%	4	0.4%	20	0.4%	29	0.4%
NC	202	2.9%	25	2.9%	25	2.5%	123	2.5%	173	2.5%
NE	78	1.1%	12	1.4%	20	2.0%	65	1.3%	97	1.4%
NJ	51	0.7%	7	0.8%	3	0.3%	31	0.6%	41	0.6%
NY	348	5.0%	49	5.6%	55	5.5%	355	7.1%	459	6.7%
OH	353	5.1%	42	4.8%	78	7.7%	277	5.6%	397	5.8%
OK	51	0.7%	8	0.9%	8	0.8%	61	1.2%	77	1.1%
OR	66	1.0%	13	1.5%	9	0.9%	49	1.0%	71	1.0%
PA	447	6.5%	48	5.5%	65	6.4%	280	5.6%	393	5.7%
PR	35	0.5%	3	0.3%	1	0.1%	23	0.5%	27	0.4%
SC	71	1.0%	2	0.2%	7	0.7%	44	0.9%	53	0.8%
SD	9	0.1%	0	0.0%	0	0.0%	11	0.2%	11	0.2%
TN	209	3.0%	26	3.0%	35	3.5%	155	3.1%	216	3.1%
TX	680	9.9%	91	10.5%	106	10.5%	436	8.8%	633	9.2%
UT	78	1.1%	17	2.0%	13	1.3%	72	1.4%	102	1.5%
VA	151	2.2%	17	2.0%	32	3.2%	109	2.2%	158	2.3%
WA	131	1.9%	10	1.1%	16	1.6%	88	1.8%	114	1.7%
WI	126	1.8%	31	3.6%	17	1.7%	105	2.1%	153	2.2%

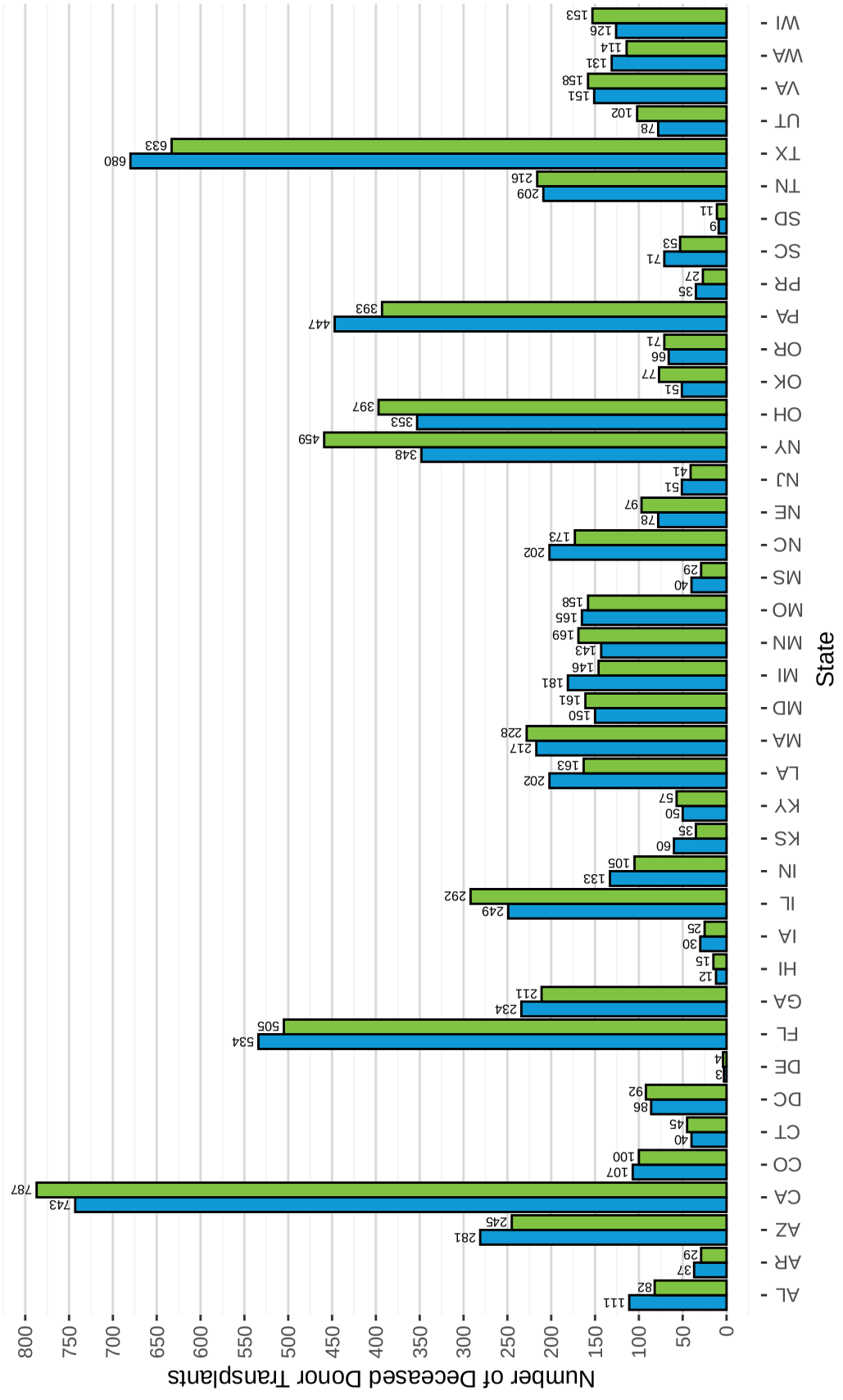


Figure 68. Number of Deceased Donor Liver-Alone Transplants by State and Era

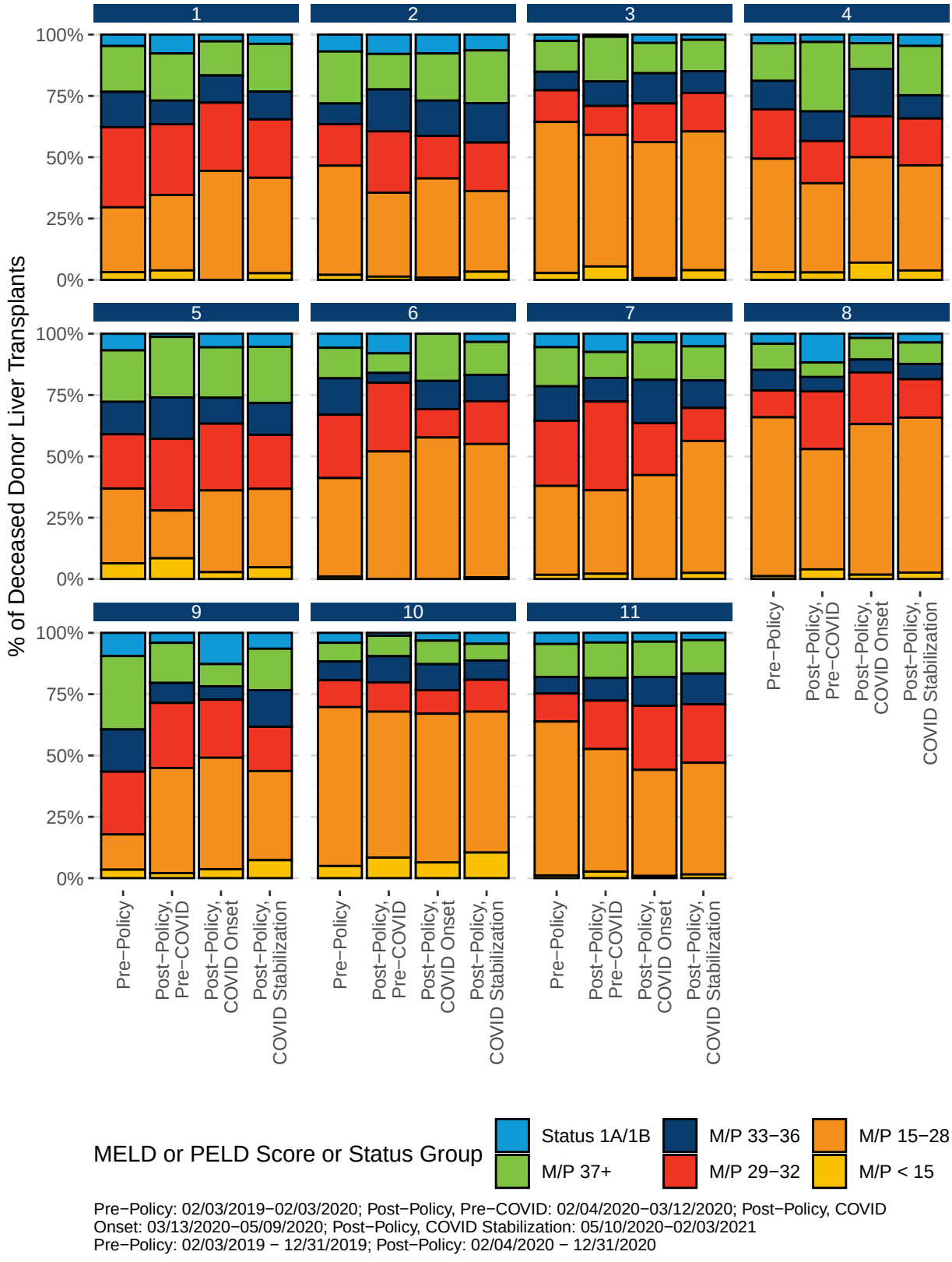
Table 63. Number of Deceased Donor Liver-Alone Transplants by Transplant Program DSA and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
DSA	N	%	N	%	N	%	N	%	N	%
ALOB	111	1.6%	10	1.1%	11	1.1%	61	1.2%	82	1.2%
AROR	37	0.5%	4	0.5%	4	0.4%	21	0.4%	29	0.4%
AZOB	281	4.1%	33	3.8%	36	3.6%	176	3.5%	245	3.6%
CADN	256	3.7%	37	4.3%	47	4.7%	184	3.7%	268	3.9%
CAOP	413	6.0%	56	6.4%	56	5.6%	301	6.0%	413	6.0%
CASD	74	1.1%	11	1.3%	28	2.8%	67	1.3%	106	1.5%
CORS	107	1.6%	17	2.0%	9	0.9%	74	1.5%	100	1.5%
DCTC	86	1.2%	6	0.7%	14	1.4%	72	1.4%	92	1.3%
FLFH	54	0.8%	4	0.5%	7	0.7%	33	0.7%	44	0.6%
FLMP	168	2.4%	16	1.8%	20	2.0%	115	2.3%	151	2.2%
FLUF	171	2.5%	10	1.1%	25	2.5%	143	2.9%	178	2.6%
FLWC	141	2.0%	15	1.7%	21	2.1%	96	1.9%	132	1.9%
GALL	234	3.4%	20	2.3%	32	3.2%	159	3.2%	211	3.1%
HIOP	12	0.2%	2	0.2%	1	0.1%	12	0.2%	15	0.2%
IAOP	30	0.4%	3	0.3%	2	0.2%	20	0.4%	25	0.4%
ILIP	249	3.6%	40	4.6%	42	4.2%	210	4.2%	292	4.3%
INOP	133	1.9%	15	1.7%	10	1.0%	80	1.6%	105	1.5%
KYDA	50	0.7%	6	0.7%	12	1.2%	39	0.8%	57	0.8%
LAOP	202	2.9%	23	2.6%	21	2.1%	119	2.4%	163	2.4%
MAOB	257	3.7%	52	6.0%	36	3.6%	185	3.7%	273	4.0%
MDPC	150	2.2%	14	1.6%	22	2.2%	125	2.5%	161	2.3%
MIOP	181	2.6%	27	3.1%	6	0.6%	113	2.3%	146	2.1%
MNOP	152	2.2%	23	2.6%	26	2.6%	131	2.6%	180	2.6%
MOMA	141	2.0%	12	1.4%	21	2.1%	105	2.1%	138	2.0%
MSOP	40	0.6%	5	0.6%	4	0.4%	20	0.4%	29	0.4%
MWOB	84	1.2%	7	0.8%	5	0.5%	43	0.9%	55	0.8%
NCCM	70	1.0%	10	1.1%	8	0.8%	45	0.9%	63	0.9%
NCNC	132	1.9%	15	1.7%	17	1.7%	78	1.6%	110	1.6%
NEOR	78	1.1%	12	1.4%	20	2.0%	65	1.3%	97	1.4%
NJTO	51	0.7%	7	0.8%	3	0.3%	31	0.6%	41	0.6%
NYFL	42	0.6%	8	0.9%	14	1.4%	54	1.1%	76	1.1%
NYRT	306	4.4%	41	4.7%	41	4.1%	301	6.0%	383	5.6%
OHLB	112	1.6%	9	1.0%	26	2.6%	95	1.9%	130	1.9%
OHLP	115	1.7%	15	1.7%	24	2.4%	80	1.6%	119	1.7%
OHOV	126	1.8%	18	2.1%	28	2.8%	102	2.0%	148	2.2%
OKOP	51	0.7%	8	0.9%	8	0.8%	61	1.2%	77	1.1%
ORUO	66	1.0%	13	1.5%	9	0.9%	49	1.0%	71	1.0%
PADV	313	4.5%	29	3.3%	36	3.6%	209	4.2%	274	4.0%
PATF	137	2.0%	20	2.3%	29	2.9%	74	1.5%	123	1.8%
PRLL	35	0.5%	3	0.3%	1	0.1%	23	0.5%	27	0.4%
SCOP	71	1.0%	2	0.2%	7	0.7%	44	0.9%	53	0.8%
TNDS	119	1.7%	13	1.5%	16	1.6%	89	1.8%	118	1.7%
TNMS	90	1.3%	13	1.5%	19	1.9%	66	1.3%	98	1.4%
TXGC	290	4.2%	47	5.4%	45	4.5%	213	4.3%	305	4.4%

(continued)

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
DSA	N	%	N	%	N	%	N	%	N	%
TXSA	114	1.7%	15	1.7%	26	2.6%	76	1.5%	117	1.7%
TXSB	276	4.0%	29	3.3%	35	3.5%	147	3.0%	211	3.1%
UTOP	78	1.1%	17	2.0%	13	1.3%	72	1.4%	102	1.5%
VATB	151	2.2%	17	2.0%	32	3.2%	109	2.2%	158	2.3%
WALC	131	1.9%	10	1.1%	16	1.6%	88	1.8%	114	1.7%
WIDN	49	0.7%	15	1.7%	4	0.4%	37	0.7%	56	0.8%
WIUW	77	1.1%	16	1.8%	13	1.3%	68	1.4%	97	1.4%

Figure 69. Deceased Donor Liver-Alone Transplants by MELD or PELD Score or Status, OPTN Region of Transplant Center, and Era



Pre−Policy: 02/03/2019−02/03/2020; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−02/03/2021
Pre−Policy: 02/03/2019 − 12/31/2019; Post−Policy: 02/04/2020 − 12/31/2020

Table 64. Number of Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status, OPTN Region of Transplant Center, and Era

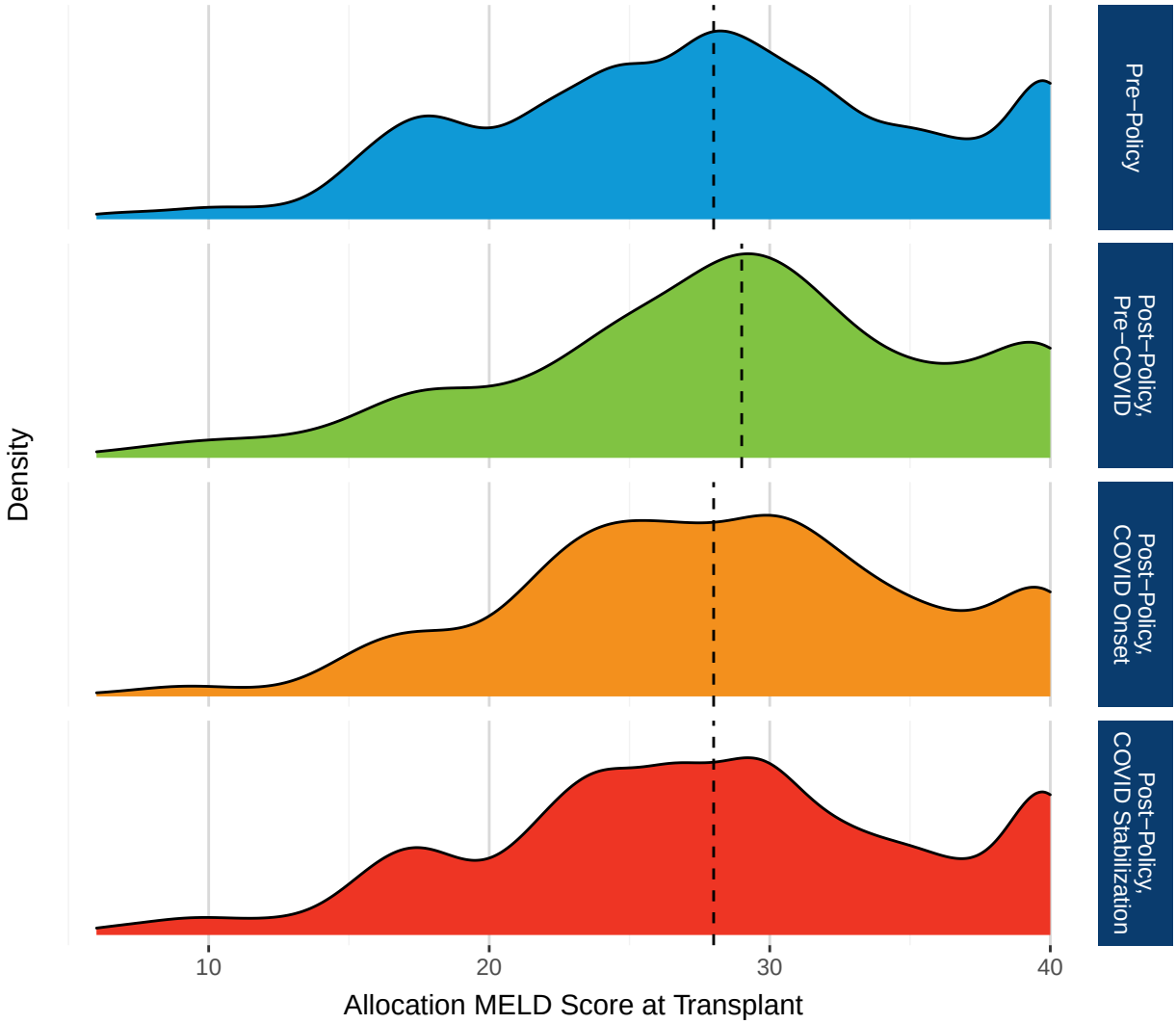
		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
OPTN Region	Score or Status Group	N	%	N	%	N	%	N	%	N	%
1	Status 1A/1B	12	4.7%	4	7.7%	1	2.8%	7	3.8%	12	4.4%
	M/P 37+	48	18.7%	10	19.2%	5	13.9%	36	19.5%	51	18.7%
	M/P 33-36	37	14.4%	5	9.6%	4	11.1%	21	11.4%	30	11.0%
	M/P 29-32	84	32.7%	15	28.8%	10	27.8%	44	23.8%	69	25.3%
	M/P 15-28	68	26.5%	16	30.8%	16	44.4%	72	38.9%	104	38.1%
	M/P < 15	8	3.1%	2	3.8%	0	0.0%	5	2.7%	7	2.6%
2	Status 1A/1B	51	6.9%	6	7.9%	8	7.7%	33	6.5%	47	6.8%
	M/P 37+	156	21.2%	11	14.5%	20	19.2%	110	21.5%	141	20.4%
	M/P 33-36	62	8.4%	13	17.1%	15	14.4%	82	16.0%	110	15.9%
	M/P 29-32	125	17.0%	19	25.0%	18	17.3%	101	19.8%	138	20.0%
	M/P 15-28	328	44.5%	26	34.2%	42	40.4%	168	32.9%	236	34.2%
	M/P < 15	15	2.0%	1	1.3%	1	1.0%	17	3.3%	19	2.7%
3	Status 1A/1B	31	2.6%	1	0.9%	5	3.4%	17	2.2%	23	2.2%
	M/P 37+	150	12.6%	20	18.2%	18	12.3%	101	12.8%	139	13.3%
	M/P 33-36	90	7.5%	11	10.0%	18	12.3%	70	8.9%	99	9.5%
	M/P 29-32	154	12.9%	13	11.8%	23	15.8%	124	15.7%	160	15.3%
	M/P 15-28	735	61.6%	59	53.6%	81	55.5%	447	56.6%	587	56.1%
	M/P < 15	33	2.8%	6	5.5%	1	0.7%	31	3.9%	38	3.6%
4	Status 1A/1B	26	3.6%	3	3.0%	4	3.5%	23	4.6%	30	4.2%
	M/P 37+	112	15.3%	28	28.3%	12	10.5%	100	20.1%	140	19.7%
	M/P 33-36	85	11.6%	12	12.1%	22	19.3%	47	9.5%	81	11.4%
	M/P 29-32	147	20.1%	17	17.2%	19	16.7%	95	19.1%	131	18.5%
	M/P 15-28	338	46.2%	36	36.4%	49	43.0%	213	42.9%	298	42.0%
	M/P < 15	23	3.1%	3	3.0%	8	7.0%	19	3.8%	30	4.2%
5	Status 1A/1B	75	6.8%	2	1.3%	10	5.6%	43	5.4%	55	4.9%
	M/P 37+	231	21.0%	38	24.7%	37	20.6%	183	22.9%	258	22.8%
	M/P 33-36	146	13.2%	26	16.9%	19	10.6%	104	13.0%	149	13.1%
	M/P 29-32	244	22.1%	45	29.2%	49	27.2%	176	22.0%	270	23.8%
	M/P 15-28	336	30.5%	30	19.5%	60	33.3%	256	32.0%	346	30.5%
	M/P < 15	70	6.4%	13	8.4%	5	2.8%	38	4.8%	56	4.9%
6	Status 1A/1B	12	5.7%	2	8.0%	0	0.0%	5	3.4%	7	3.5%
	M/P 37+	26	12.4%	2	8.0%	5	19.2%	20	13.4%	27	13.5%
	M/P 33-36	31	14.8%	1	4.0%	3	11.5%	16	10.7%	20	10.0%
	M/P 29-32	54	25.8%	7	28.0%	3	11.5%	26	17.4%	36	18.0%
	M/P 15-28	84	40.2%	13	52.0%	15	57.7%	81	54.4%	109	54.5%
	M/P < 15	2	1.0%	0	0.0%	0	0.0%	1	0.7%	1	0.5%
7	Status 1A/1B	29	5.5%	7	7.4%	3	3.5%	23	5.2%	33	5.3%
	M/P 37+	84	15.9%	10	10.6%	13	15.3%	62	13.9%	85	13.6%
	M/P 33-36	74	14.0%	9	9.6%	15	17.6%	50	11.2%	74	11.8%
	M/P 29-32	140	26.6%	34	36.2%	18	21.2%	60	13.5%	112	17.9%
	M/P 15-28	191	36.2%	32	34.0%	36	42.4%	240	53.8%	308	49.3%
	M/P < 15	9	1.7%	2	2.1%	0	0.0%	11	2.5%	13	2.1%
8	Status 1A/1B	18	4.1%	6	11.8%	1	1.8%	11	3.6%	18	4.3%
	M/P 37+	47	10.7%	3	5.9%	5	8.8%	27	8.8%	35	8.4%
	M/P 33-36	37	8.4%	3	5.9%	3	5.3%	19	6.2%	25	6.0%
	M/P 29-32	48	10.9%	12	23.5%	12	21.1%	48	15.6%	72	17.3%
	M/P 15-28	285	64.8%	25	49.0%	35	61.4%	194	63.2%	254	61.2%
	M/P < 15	5	1.1%	2	3.9%	1	1.8%	8	2.6%	11	2.7%
9	Status 1A/1B	33	9.5%	2	4.1%	7	12.7%	23	6.5%	32	7.0%
	M/P 37+	104	29.9%	8	16.3%	5	9.1%	60	16.9%	73	15.9%
	M/P 33-36	60	17.2%	4	8.2%	3	5.5%	53	14.9%	60	13.1%
	M/P 29-32	89	25.6%	13	26.5%	13	23.6%	64	18.0%	90	19.6%
	M/P 15-28	50	14.4%	21	42.9%	25	45.5%	129	36.3%	175	38.1%
	M/P < 15	12	3.4%	1	2.0%	2	3.6%	26	7.3%	29	6.3%

(continued)

OPTN Region	Score or Status Group	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
10	Status 1A/1B	27	4.0%	1	1.2%	3	3.2%	21	4.5%	25	3.9%
	M/P 37+	51	7.6%	7	8.3%	9	9.6%	32	6.8%	48	7.4%
	M/P 33-36	51	7.6%	9	10.7%	10	10.6%	37	7.9%	56	8.6%
	M/P 29-32	73	10.9%	10	11.9%	9	9.6%	61	13.0%	80	12.3%
	M/P 15-28	432	64.8%	50	59.5%	57	60.6%	270	57.4%	377	58.2%
	M/P < 15	33	4.9%	7	8.3%	6	6.4%	49	10.4%	62	9.6%
11	Status 1A/1B	31	4.5%	3	3.9%	4	3.6%	14	3.0%	21	3.2%
	M/P 37+	92	13.5%	11	14.5%	16	14.4%	64	13.6%	91	13.9%
	M/P 33-36	46	6.7%	7	9.2%	13	11.7%	59	12.6%	79	12.0%
	M/P 29-32	78	11.4%	15	19.7%	29	26.1%	112	23.8%	156	23.7%
	M/P 15-28	429	62.8%	38	50.0%	48	43.2%	214	45.5%	300	45.7%
	M/P < 15	7	1.0%	2	2.6%	1	0.9%	7	1.5%	10	1.5%

It was hypothesized that there would be an increase in the median transplant score immediately following the policy change, implying an influx of high MELD candidate transplants. The figure below shows the distribution of allocation scores at transplant for adult recipients. This excludes Status 1A deceased donor liver transplants.

Figure 70. Distribution of Adult Deceased Donor Liver-Alone Recipient Allocation MELD Score at Transplant by Era



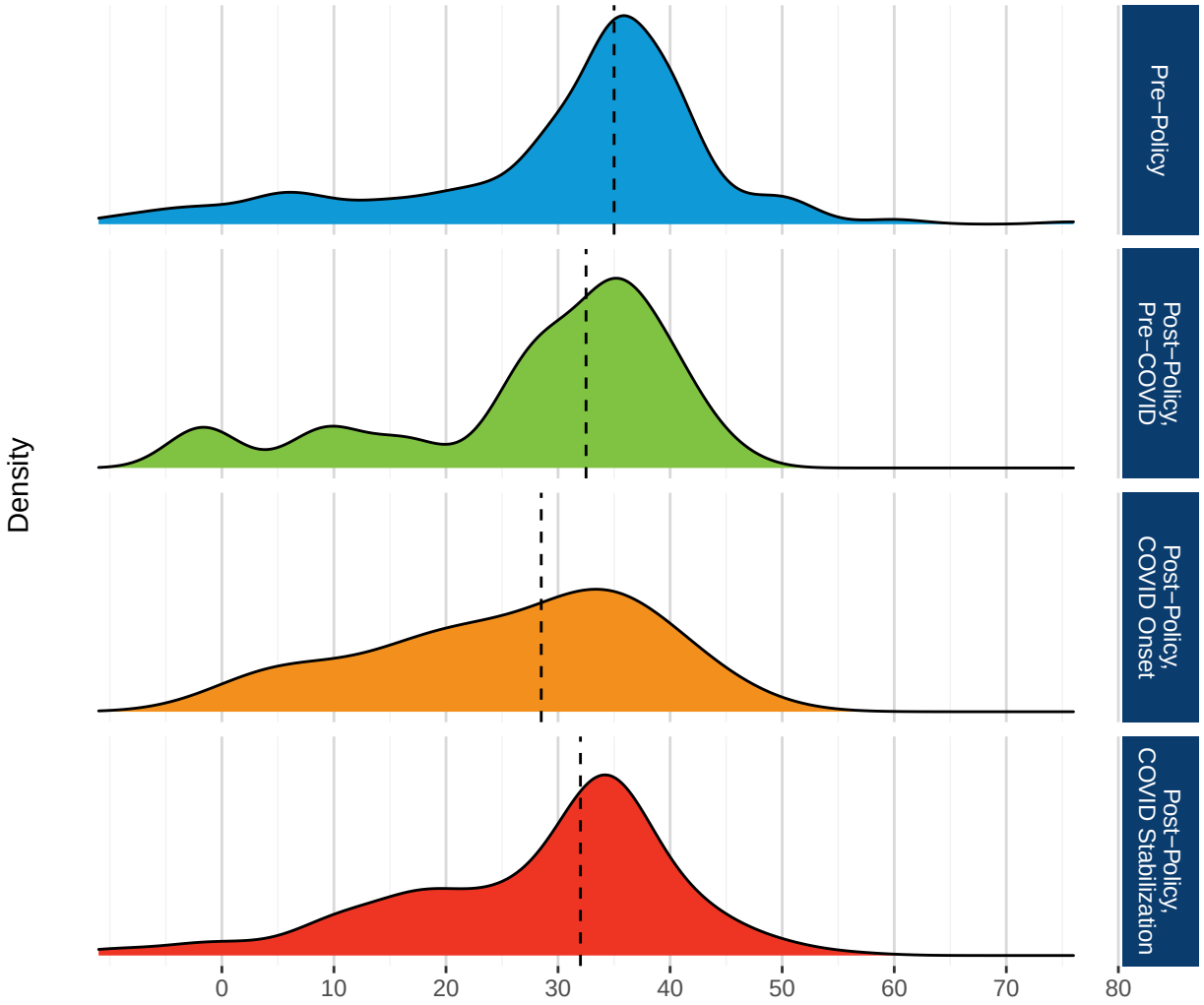
Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020
** Dotted lines indicate median score within each era.

Table 65. Distribution of Adult Deceased Donor Liver-Alone Recipient Allocation MELD Score at Transplant by Era

		Allocation MELD or PELD at Transplant					
Policy Era	N	Minimum	25th Percentile	Mean	Median	75th Percentile	Maximum
Pre-Policy	6309	6	22	28	28	33	40
Post-Policy, Pre-COVID	797	6	24	29	29	34	40
Post-Policy, COVID Onset	932	6	24	28	28	33	40
Post-Policy, COVID Stabilization	4571	6	23	28	28	33	40
Post-Policy (overall)	6300	6	23	28	28	33	40

There has been more fluctuation in pediatric allocation scores at transplant across the COVID-19 post-policy eras. This figure excludes any Status 1A or Status 1B deceased donor liver transplants.

Figure 71. Distribution of Pediatric Deceased Donor Liver-Alone Recipient Allocation MELD or PELD Score at Transplant by Era



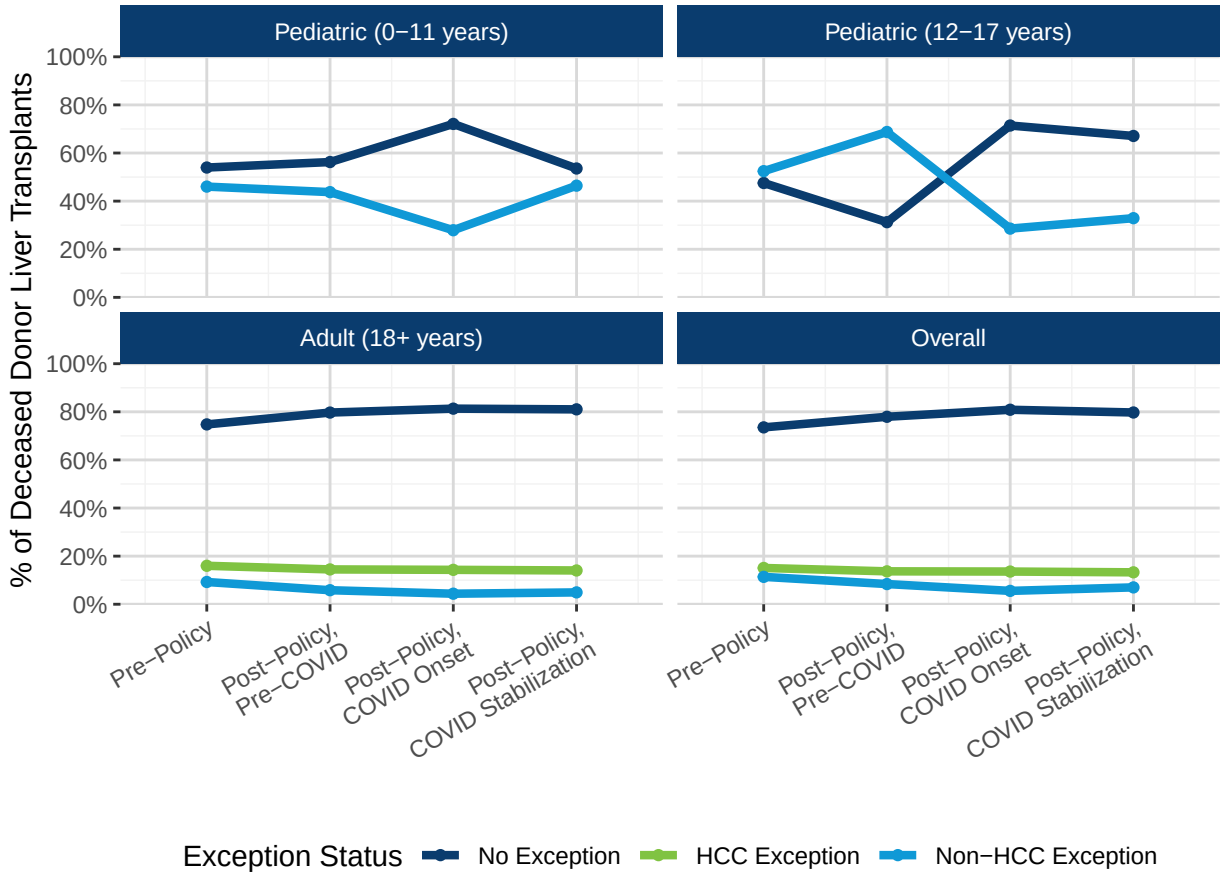
Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020
** Dotted lines indicate median score within each era.

Table 66. Distribution of Pediatric Deceased Donor Liver-Alone Recipient Allocation MELD or PELD Score at Transplant by Era

		Allocation MELD or PELD at Transplant					
Policy Era	N	Minimum	25th Percentile	Mean	Median	75th Percentile	Maximum
Pre-Policy	240	-10	28	31	35.0	40	76
Post-Policy, Pre-COVID	36	-2	26	28	32.5	35	45
Post-Policy, COVID Onset	30	3	18	26	28.5	35	45
Post-Policy, COVID Stabilization	189	-11	20	28	32.0	35	56
Post-Policy (overall)	255	-11	20	28	32.0	35	56

Across all age groups, the percent of deceased donor, liver-alone transplants for non-exception recipients increased pre- to post-policy, though the magnitude of this increase varied by age. As seen previously in the report, the overall volume of pediatric (0-11 years) recipients is lower and pediatric (12-17 years) recipients is higher in the post-policy era.

Figure 72. Percentage of Deceased Donor Liver-Alone Transplants by Exception Status, Age at Transplant, and Era

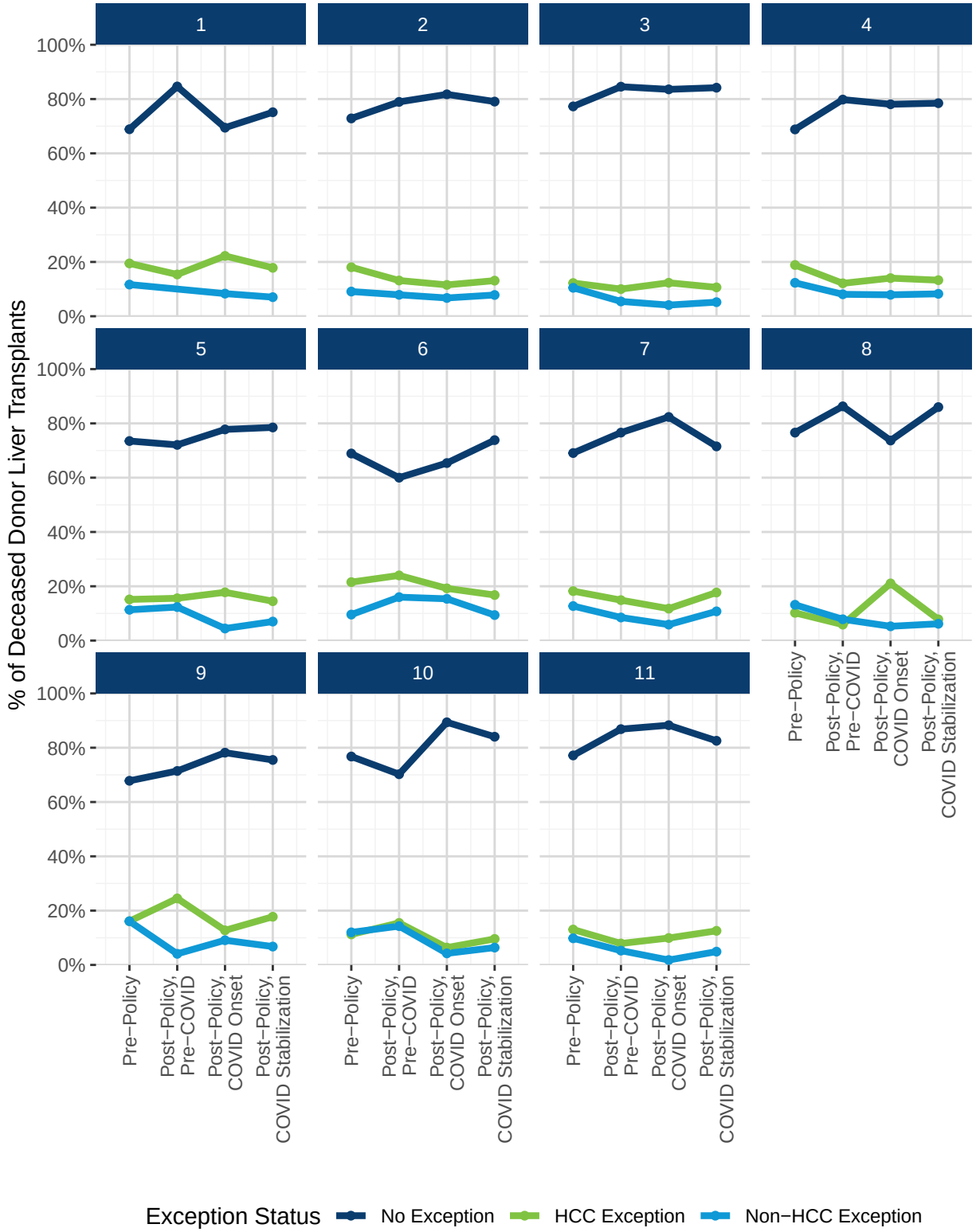


Pre–Policy: 02/03/2019–12/31/2019; Post–Policy, Pre–COVID: 02/04/2020–03/12/2020; Post–Policy, COVID Onset: 03/13/2020–05/09/2020; Post–Policy, COVID Stabilization: 05/10/2020–12/31/2020

Table 73. Number and Percent of Deceased Donor Liver-Alone Transplants by Exception Status, Age at Transplant, and Era

		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
Recipient Age	Exception Status	N	%	N	%	N	%	N	%	N	%
Pediatric (0-11 years)	No Exception	177	54.0%	18	56.2%	31	72.1%	105	53.6%	154	56.8%
	Non-HCC Exception	151	46.0%	14	43.8%	12	27.9%	91	46.4%	117	43.2%
Pediatric (12-17 years)	No Exception	29	47.5%	5	31.2%	5	71.4%	53	67.1%	63	61.8%
	Non-HCC Exception	32	52.5%	11	68.8%	2	28.6%	26	32.9%	39	38.2%
Adult (18+ years)	No Exception	4863	74.8%	655	79.7%	779	81.3%	3812	81.0%	5246	80.9%
	HCC Exception	1040	16.0%	119	14.5%	137	14.3%	661	14.0%	917	14.1%
	Non-HCC Exception	602	9.3%	48	5.8%	42	4.4%	232	4.9%	322	5.0%

Figure 73. Percentage of Deceased Donor Liver-Alone Transplants by Exception Status, OPTN Region and Era



Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020

Table 74. Number and Percent of Deceased Donor Liver-Alone Transplants by Exception Status, OPTN Region, and Era

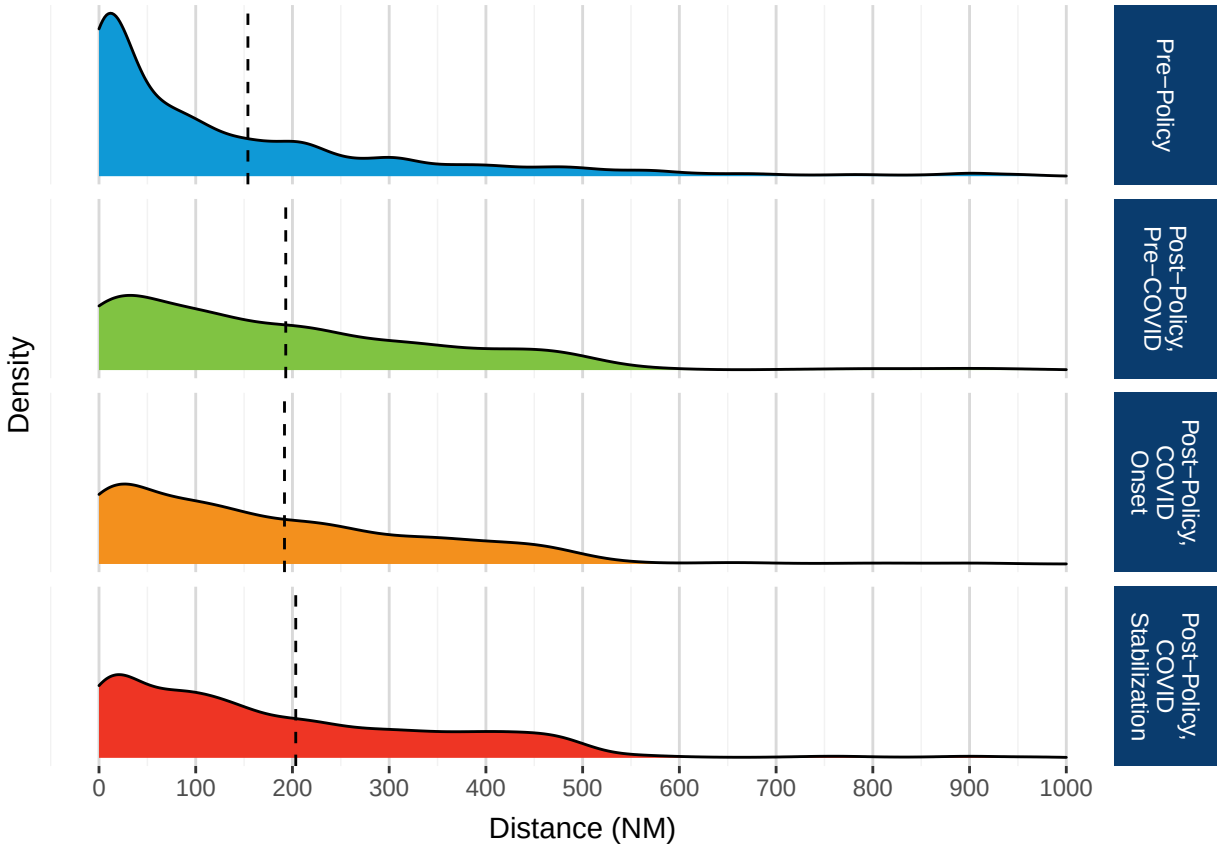
		Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
OPTN Region	Exception Status	N	%	N	%	N	%	N	%	N	%
1	No Exception	177	68.9%	44	84.6%	25	69.4%	139	75.1%	208	76.2%
	HCC Exception	50	19.5%	8	15.4%	8	22.2%	33	17.8%	49	17.9%
	Non-HCC Exception	30	11.7%	0	0.0%	3	8.3%	13	7.0%	16	5.9%
2	No Exception	537	72.9%	60	78.9%	85	81.7%	404	79.1%	549	79.5%
	HCC Exception	133	18.0%	10	13.2%	12	11.5%	67	13.1%	89	12.9%
	Non-HCC Exception	67	9.1%	6	7.9%	7	6.7%	40	7.8%	53	7.7%
3	No Exception	922	77.3%	93	84.5%	122	83.6%	665	84.2%	880	84.1%
	HCC Exception	146	12.2%	11	10.0%	18	12.3%	84	10.6%	113	10.8%
	Non-HCC Exception	125	10.5%	6	5.5%	6	4.1%	41	5.2%	53	5.1%
4	No Exception	503	68.8%	79	79.8%	89	78.1%	390	78.5%	558	78.6%
	HCC Exception	138	18.9%	12	12.1%	16	14.0%	66	13.3%	94	13.2%
	Non-HCC Exception	90	12.3%	8	8.1%	9	7.9%	41	8.2%	58	8.2%
5	No Exception	810	73.5%	111	72.1%	140	77.8%	628	78.5%	879	77.5%
	HCC Exception	167	15.2%	24	15.6%	32	17.8%	116	14.5%	172	15.2%
	Non-HCC Exception	125	11.3%	19	12.3%	8	4.4%	56	7.0%	83	7.3%
6	No Exception	144	68.9%	15	60.0%	17	65.4%	110	73.8%	142	71.0%
	HCC Exception	45	21.5%	6	24.0%	5	19.2%	25	16.8%	36	18.0%
	Non-HCC Exception	20	9.6%	4	16.0%	4	15.4%	14	9.4%	22	11.0%
7	No Exception	364	69.1%	72	76.6%	70	82.4%	319	71.5%	461	73.8%
	HCC Exception	96	18.2%	14	14.9%	10	11.8%	79	17.7%	103	16.5%
	Non-HCC Exception	67	12.7%	8	8.5%	5	5.9%	48	10.8%	61	9.8%
8	No Exception	337	76.6%	44	86.3%	42	73.7%	264	86.0%	350	84.3%
	HCC Exception	45	10.2%	3	5.9%	12	21.1%	24	7.8%	39	9.4%
	Non-HCC Exception	58	13.2%	4	7.8%	3	5.3%	19	6.2%	26	6.3%
9	No Exception	236	67.8%	35	71.4%	43	78.2%	268	75.5%	346	75.4%
	HCC Exception	56	16.1%	12	24.5%	7	12.7%	63	17.7%	82	17.9%
	Non-HCC Exception	56	16.1%	2	4.1%	5	9.1%	24	6.8%	31	6.8%
10	No Exception	512	76.8%	59	70.2%	84	89.4%	395	84.0%	538	83.0%
	HCC Exception	75	11.2%	13	15.5%	6	6.4%	45	9.6%	64	9.9%
	Non-HCC Exception	80	12.0%	12	14.3%	4	4.3%	30	6.4%	46	7.1%
11	No Exception	527	77.2%	66	86.8%	98	88.3%	388	82.6%	552	84.0%
	HCC Exception	89	13.0%	6	7.9%	11	9.9%	59	12.6%	76	11.6%
	Non-HCC Exception	67	9.8%	4	5.3%	2	1.8%	23	4.9%	29	4.4%

The changes in distribution of non-exception, HCC exception, and non-HCC exception transplant recipients differs by OPTN region, pre- to post-policy. The percentage of non-exception transplant recipients increased in all OPTN regions pre- to post-policy. The largest increase was in region 1, and the smallest increase was in region 5.

OPTN regions 5, 8, and 9 experienced increased percentages of HCC exception transplant recipients post-policy, while all other regions experienced decreases. region 4 experienced the largest decrease pre- to post-policy. In all OPTN Regions, the percentage of non-HCC exception transplant recipients fell from double to single digits pre- to post-policy.

Since the policy removed DSA and OPTN region as units of allocation and now uses circles around the donor hospital of the potential liver donor, the distance that deceased donor livers travel has been of interest. There has been a shift towards farther distances in the post-policy periods, and this is more evenly distributed across distances from about 150 to 500 NM indicated by the more gradual slopes of the densities.

Figure 74. Distribution of Distance from Donor Hospital to Transplant Center for Adult Deceased Donor Liver-Alone Transplants by Era



Pre−Policy: 02/03/2019−12/31/2019; Post−Policy, Pre−COVID: 02/04/2020−03/12/2020; Post−Policy, COVID Onset: 03/13/2020−05/09/2020; Post−Policy, COVID Stabilization: 05/10/2020−12/31/2020
** Dotted lines indicate average distance within each era.
*** There were 72 pre−policy and 83 post−policy transplants > 1000 NM that were excluded.

Table 69. Summary of Distance from Donor Hospital to Transplant Center for Adult Deceased Donor Liver-Alone Transplants by Era

	Distance (NM)					
Policy Era	Minimum	25th Percentile	Mean	Median	75th Percentile	Maximum
Pre-Policy	0	11	154.0	72.0	206.0	2327
Post-Policy, Pre-COVID	0	41	193.1	139.5	292.0	1461
Post-Policy, COVID Onset	0	39	191.8	138.0	277.8	1736
Post-Policy, COVID Stabilization	0	49	203.4	142.0	307.0	2336
Post-Policy (overall)	0	47	200.4	141.0	301.0	2336

Additional Utilization Information

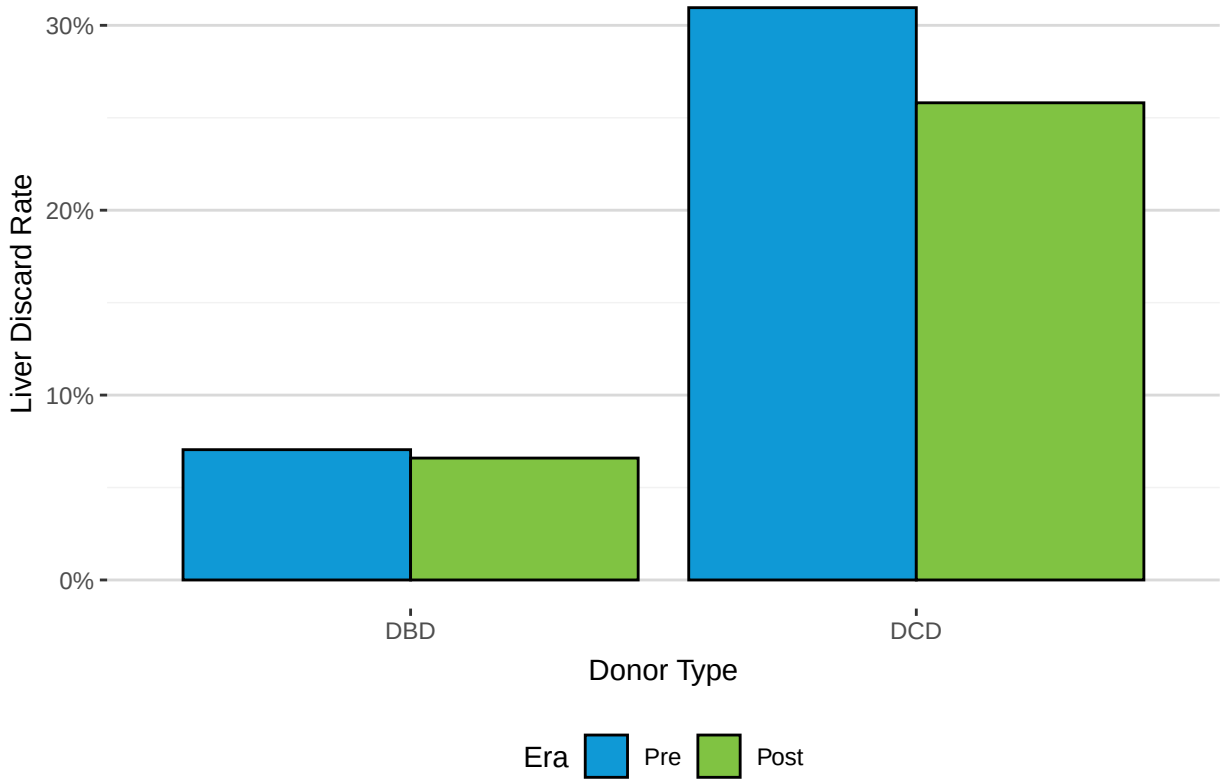
Table 70. Number of Deceased Liver Donors Recovered by OPO and Era

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
OPO Code	N	%	N	%	N	%	N	%	N	%
ALOB	169	1.8%	23	2.1%	22	1.8%	119	1.7%	164	1.8%
AROR	62	0.7%	5	0.5%	5	0.4%	41	0.6%	51	0.6%
AZOB	241	2.6%	34	3.2%	31	2.5%	179	2.6%	244	2.6%
CADN	313	3.4%	32	3.0%	54	4.4%	221	3.2%	307	3.3%
CAGS	67	0.7%	9	0.8%	8	0.7%	82	1.2%	99	1.1%
CAOP	479	5.1%	45	4.2%	69	5.6%	309	4.4%	423	4.6%
CASD	101	1.1%	12	1.1%	15	1.2%	69	1.0%	96	1.0%
CORS	127	1.4%	22	2.1%	13	1.1%	113	1.6%	148	1.6%
CTOP	54	0.6%	3	0.3%	7	0.6%	31	0.4%	41	0.4%
DCTC	114	1.2%	9	0.8%	10	0.8%	77	1.1%	96	1.0%
FLFH	159	1.7%	12	1.1%	13	1.1%	126	1.8%	151	1.6%
FLMP	136	1.5%	14	1.3%	24	2.0%	95	1.4%	133	1.4%
FLUF	172	1.8%	10	0.9%	23	1.9%	141	2.0%	174	1.9%
FLWC	215	2.3%	20	1.9%	29	2.4%	180	2.6%	229	2.5%
GALL	283	3.0%	20	1.9%	34	2.8%	199	2.9%	253	2.7%
HIOP	20	0.2%	2	0.2%	1	0.1%	18	0.3%	21	0.2%
IAOP	64	0.7%	5	0.5%	3	0.2%	65	0.9%	73	0.8%
ILIP	358	3.8%	37	3.5%	42	3.4%	252	3.6%	331	3.6%
INOP	185	2.0%	28	2.6%	19	1.5%	159	2.3%	206	2.2%
KYDA	90	1.0%	15	1.4%	18	1.5%	102	1.5%	135	1.5%
LAOP	193	2.1%	22	2.1%	28	2.3%	147	2.1%	197	2.1%
MAOB	242	2.6%	30	2.8%	32	2.6%	132	1.9%	194	2.1%
MDPC	129	1.4%	15	1.4%	28	2.3%	78	1.1%	121	1.3%
MIOP	272	2.9%	33	3.1%	29	2.4%	182	2.6%	244	2.6%
MNOP	156	1.7%	24	2.2%	11	0.9%	107	1.5%	142	1.5%
MOMA	190	2.0%	18	1.7%	15	1.2%	153	2.2%	186	2.0%
MSOP	65	0.7%	13	1.2%	7	0.6%	60	0.9%	80	0.9%
MWOB	201	2.2%	34	3.2%	31	2.5%	180	2.6%	245	2.7%
NCCM	95	1.0%	10	0.9%	17	1.4%	73	1.1%	100	1.1%
NCNC	190	2.0%	22	2.1%	37	3.0%	145	2.1%	204	2.2%
NEOR	49	0.5%	8	0.7%	13	1.1%	36	0.5%	57	0.6%
NJTO	156	1.7%	23	2.1%	19	1.5%	99	1.4%	141	1.5%
NMOP	41	0.4%	6	0.6%	5	0.4%	37	0.5%	48	0.5%
NVLV	143	1.5%	35	3.3%	19	1.5%	101	1.5%	155	1.7%
NYAP	47	0.5%	6	0.6%	4	0.3%	47	0.7%	57	0.6%
NYFL	42	0.5%	10	0.9%	5	0.4%	21	0.3%	36	0.4%
NYRT	263	2.8%	11	1.0%	19	1.5%	167	2.4%	197	2.1%
NYWN	21	0.2%	3	0.3%	2	0.2%	16	0.2%	21	0.2%
OHLB	116	1.2%	11	1.0%	13	1.1%	103	1.5%	127	1.4%
OHLC	81	0.9%	6	0.6%	24	2.0%	71	1.0%	101	1.1%
OHLP	108	1.2%	14	1.3%	23	1.9%	102	1.5%	139	1.5%
OHOV	75	0.8%	10	0.9%	3	0.2%	58	0.8%	71	0.8%

(continued)

	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
OPO Code	N	%	N	%	N	%	N	%	N	%
OKOP	119	1.3%	8	0.7%	14	1.1%	96	1.4%	118	1.3%
ORUO	97	1.0%	15	1.4%	10	0.8%	86	1.2%	111	1.2%
PADV	519	5.6%	54	5.0%	64	5.2%	345	5.0%	463	5.0%
PATF	182	2.0%	26	2.4%	33	2.7%	171	2.5%	230	2.5%
PRLL	100	1.1%	7	0.7%	8	0.7%	73	1.1%	88	1.0%
SCOP	135	1.5%	15	1.4%	21	1.7%	108	1.6%	144	1.6%
TNDS	248	2.7%	32	3.0%	27	2.2%	226	3.3%	285	3.1%
TNMS	52	0.6%	2	0.2%	10	0.8%	43	0.6%	55	0.6%
TXGC	366	3.9%	53	4.9%	50	4.1%	233	3.4%	336	3.6%
TXSA	164	1.8%	15	1.4%	21	1.7%	119	1.7%	155	1.7%
TXSB	376	4.0%	41	3.8%	54	4.4%	217	3.1%	312	3.4%
UTOP	93	1.0%	11	1.0%	14	1.1%	93	1.3%	118	1.3%
VATB	146	1.6%	13	1.2%	24	2.0%	130	1.9%	167	1.8%
WALC	239	2.6%	26	2.4%	27	2.2%	165	2.4%	218	2.4%
WIDN	91	1.0%	13	1.2%	12	1.0%	52	0.7%	77	0.8%
WIUW	98	1.1%	19	1.8%	14	1.1%	94	1.4%	127	1.4%

Figure 75. Liver Discard Rate by Donor Type and Era



National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

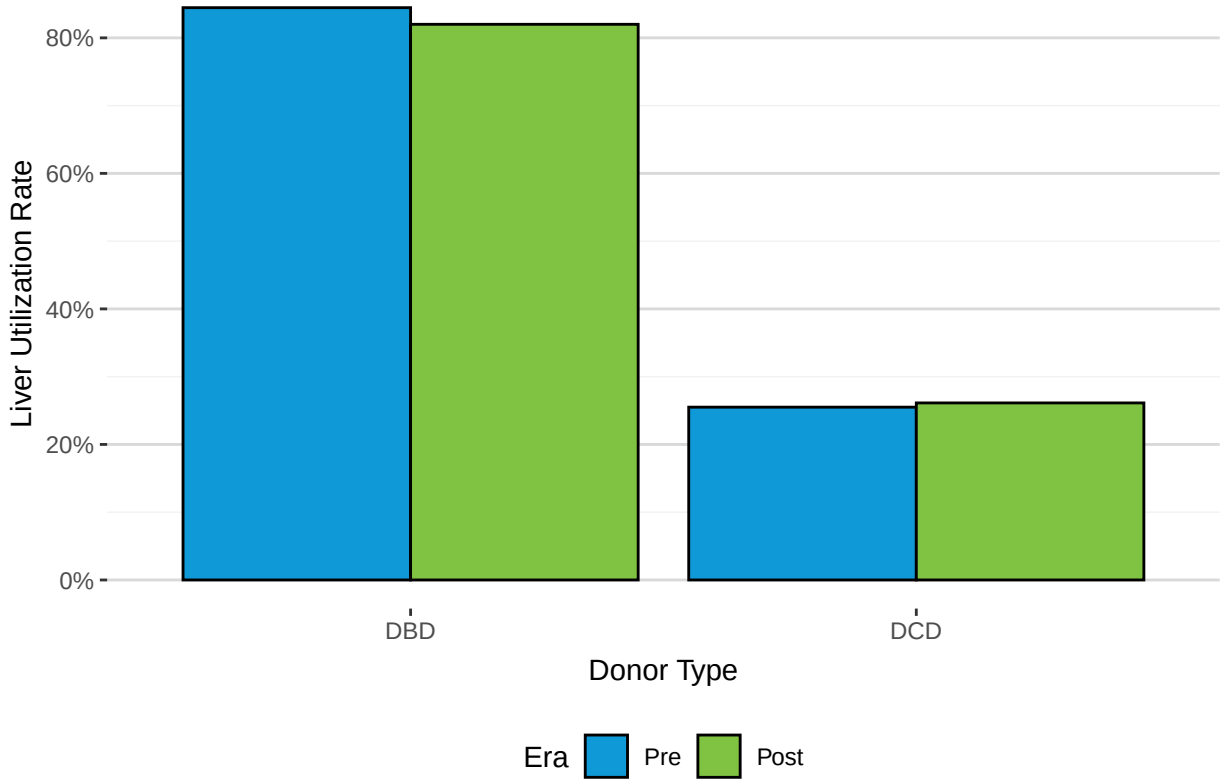
Table 70. Liver Discard Rate by Donor Type and Era

	Pre-Policy	Post-Policy, Pre-COVID	Post-Policy, COVID Shutdown	Post-Policy, COVID Stabilization	Post-Policy (overall)
Donor Type	%	%	%	%	%
DBD	7.05	6.83	6.75	6.53	6.59
DCD	30.95	29.45	16.79	26.50	25.81

The discard rate of DBD donors remained stable across policy eras. The discard rate of DCD donors decreased overall pre- to post-policy; however, this fluctuated greatly over the post-policy COVID-19 eras. A larger percentage of DCD liver donors recovered for purposes of transplant were ultimately transplanted.

These changes must be considered in light of the COVID-19 emergency declaration and subsequent changes in practice.

Figure 76. Liver Utilization Rate by Donor Type and Era



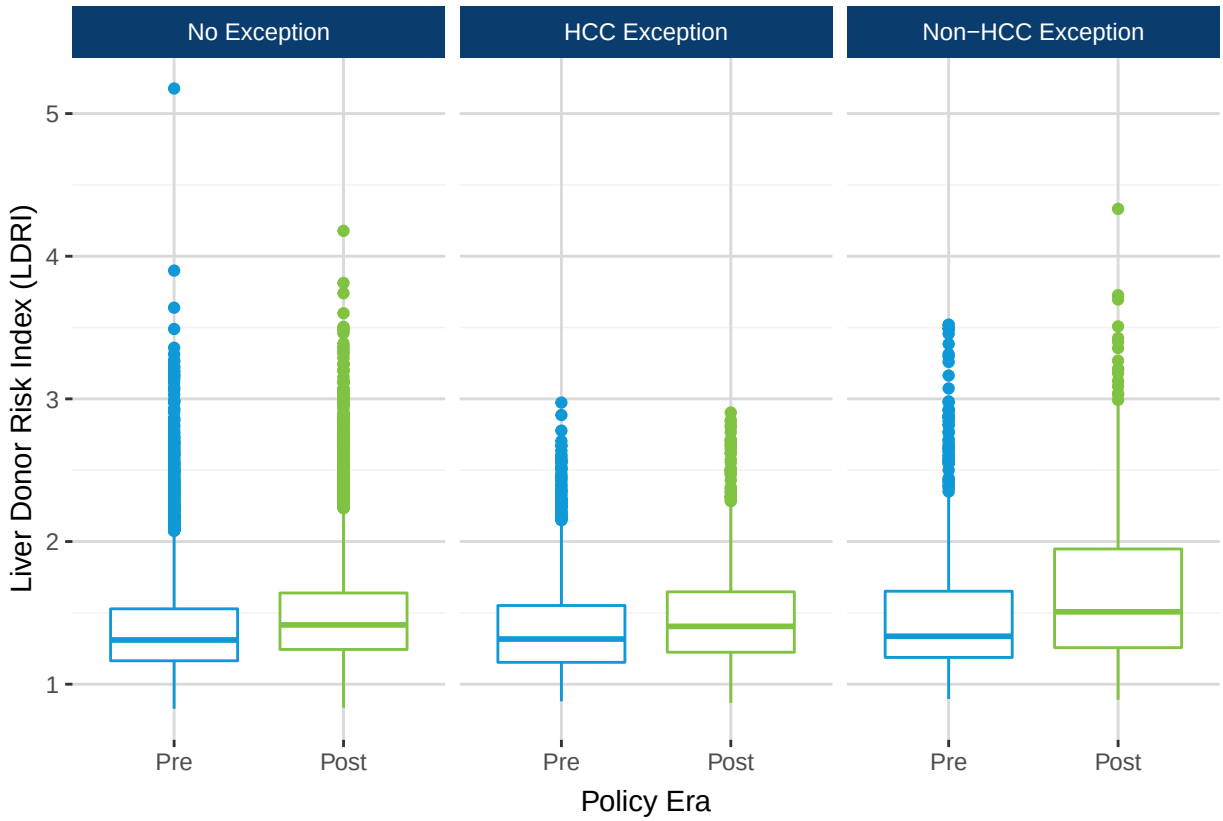
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 71. Liver Utilization Rate by Donor Type and Era

	Pre-Policy	Post-Policy, Pre-COVID	Post-Policy, COVID Shutdown	Post-Policy, COVID Stabilization	Post-Policy (overall)
Donor Type	%	%	%	%	%
DBD	84.45	81.45	82.84	81.93	82.00
DCD	25.50	29.87	31.23	24.84	26.12

Liver utilization rates fluctuated over these eras for both DBD and DCD donors. Overall liver utilization rates are higher for DBD donors than DCD donors, regardless of policy era. Changes must be considered in light of the COVID-19 emergency declaration and subsequent changes in practice.

Figure 77. Distribution of Liver Donor Risk Index by Recipient Exception Status and Era



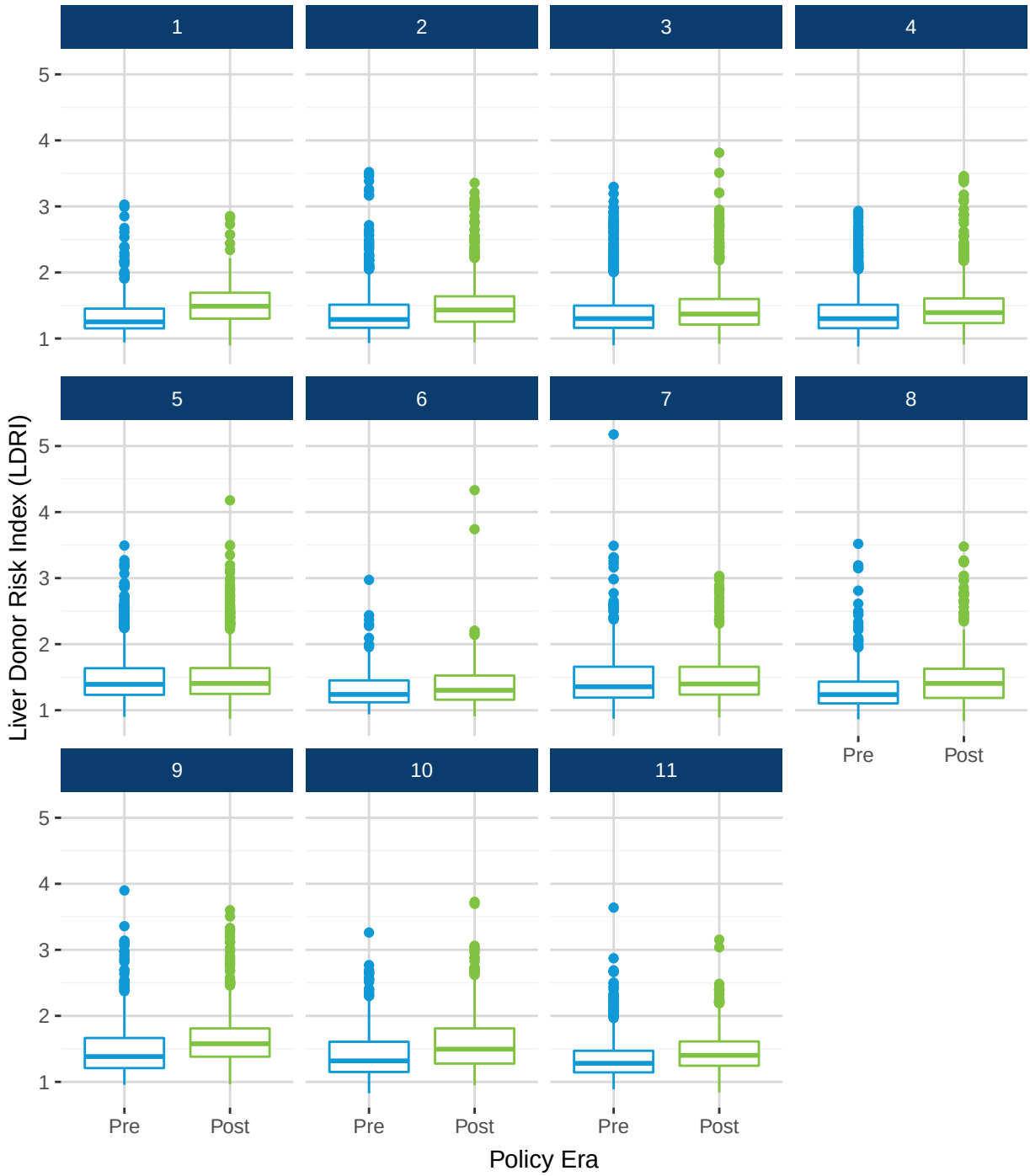
National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 72. Distribution of Liver Donor Risk Index by Recipient Exception Status and Era

		LDRI					
Exception Status	Era	Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
No Exception	Pre-Policy	0.83	1.16	1.31	1.41	1.53	5.18
	Post-Policy, Pre-COVID	0.92	1.24	1.41	1.49	1.65	3.81
	Post-Policy, COVID Stabilization	0.84	1.25	1.42	1.49	1.64	4.18
	Post-Policy, COVID Onset	0.92	1.24	1.41	1.49	1.64	3.60
	Post-Policy (overall)	0.84	1.24	1.42	1.49	1.64	4.18
HCC Exception	Pre-Policy	0.88	1.15	1.32	1.41	1.55	2.97
	Post-Policy, Pre-COVID	0.97	1.28	1.46	1.56	1.80	2.69
	Post-Policy, COVID Stabilization	0.87	1.22	1.41	1.48	1.64	2.90
	Post-Policy, COVID Onset	1.01	1.19	1.34	1.43	1.54	2.43
	Post-Policy (overall)	0.87	1.22	1.41	1.48	1.65	2.90
Non-HCC Exception	Pre-Policy	0.90	1.19	1.34	1.50	1.65	3.52
	Post-Policy, Pre-COVID	1.02	1.25	1.54	1.62	1.93	3.13
	Post-Policy, COVID Stabilization	0.89	1.26	1.49	1.68	1.97	3.73
	Post-Policy, COVID Onset	1.02	1.24	1.56	1.66	1.89	4.33
	Post-Policy (overall)	0.89	1.26	1.51	1.67	1.95	4.33

LDRI similarly increased pre- to post-policy across all exception statuses. Pre-policy, non-HCC exception transplant recipient deceased donor livers were of slightly less quality (higher LDRI); this was also the case post-policy compared to non-exception and HCC exception transplant recipient deceased donor livers.

Figure 78. Distribution of Liver Donor Risk Index by Recipient OPTN Region and Era



National state of emergency declared in US due to COVID−19 pandemic on March 13, 2020.

Table 73. Distribution of Liver Donor Risk Index by Recipient OPTN Region and Era

		LDRI					
OPTN Region	Era	Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
1	Pre-Policy	0.94	1.15	1.25	1.37	1.45	3.03
	Post-Policy, Pre-COVID	1.04	1.30	1.45	1.47	1.68	1.94
	Post-Policy, COVID Stabilization	0.89	1.31	1.51	1.53	1.70	2.85
	Post-Policy, COVID Onset	0.95	1.20	1.47	1.49	1.68	2.07
	Post-Policy (overall)	0.89	1.30	1.49	1.51	1.69	2.85
2	Pre-Policy	0.93	1.16	1.29	1.40	1.51	3.52
	Post-Policy, Pre-COVID	0.97	1.25	1.46	1.56	1.75	3.06
	Post-Policy, COVID Stabilization	0.96	1.27	1.43	1.50	1.63	3.36
	Post-Policy, COVID Onset	0.94	1.23	1.38	1.48	1.62	3.12
	Post-Policy (overall)	0.94	1.25	1.43	1.50	1.64	3.36
3	Pre-Policy	0.90	1.16	1.30	1.40	1.50	3.30
	Post-Policy, Pre-COVID	0.92	1.19	1.34	1.45	1.56	3.81
	Post-Policy, COVID Stabilization	0.92	1.23	1.39	1.49	1.62	3.51
	Post-Policy, COVID Onset	0.94	1.19	1.31	1.40	1.52	2.89
	Post-Policy (overall)	0.92	1.21	1.37	1.47	1.60	3.81
4	Pre-Policy	0.88	1.16	1.30	1.40	1.51	2.93
	Post-Policy, Pre-COVID	0.97	1.22	1.42	1.47	1.60	2.80
	Post-Policy, COVID Stabilization	0.91	1.23	1.39	1.48	1.60	3.46
	Post-Policy, COVID Onset	0.96	1.27	1.39	1.50	1.67	3.37
	Post-Policy (overall)	0.91	1.23	1.39	1.48	1.61	3.46
5	Pre-Policy	0.90	1.23	1.39	1.50	1.64	3.49
	Post-Policy, Pre-COVID	0.94	1.24	1.39	1.49	1.59	3.20
	Post-Policy, COVID Stabilization	0.87	1.25	1.41	1.52	1.67	4.18
	Post-Policy, COVID Onset	0.92	1.21	1.38	1.44	1.53	3.50
	Post-Policy (overall)	0.87	1.25	1.41	1.50	1.64	4.18
6	Pre-Policy	0.94	1.12	1.24	1.32	1.45	2.97
	Post-Policy, Pre-COVID	1.02	1.22	1.31	1.35	1.49	1.78
	Post-Policy, COVID Stabilization	0.91	1.15	1.31	1.38	1.52	3.74
	Post-Policy, COVID Onset	0.96	1.21	1.27	1.46	1.54	4.33
	Post-Policy (overall)	0.91	1.16	1.30	1.38	1.52	4.33
7	Pre-Policy	0.87	1.19	1.35	1.49	1.66	5.18
	Post-Policy, Pre-COVID	0.96	1.28	1.45	1.54	1.72	2.89
	Post-Policy, COVID Stabilization	0.89	1.20	1.38	1.46	1.63	3.03
	Post-Policy, COVID Onset	0.93	1.29	1.44	1.56	1.70	3.01
	Post-Policy (overall)	0.89	1.24	1.40	1.49	1.66	3.03
8	Pre-Policy	0.86	1.10	1.24	1.33	1.43	3.52
	Post-Policy, Pre-COVID	1.03	1.30	1.48	1.56	1.71	3.24
	Post-Policy, COVID Stabilization	0.84	1.17	1.39	1.47	1.62	3.48
	Post-Policy, COVID Onset	0.99	1.21	1.42	1.50	1.62	2.79
	Post-Policy (overall)	0.84	1.19	1.41	1.49	1.63	3.48
9	Pre-Policy	0.96	1.21	1.38	1.53	1.66	3.90
	Post-Policy, Pre-COVID	1.16	1.39	1.57	1.66	1.80	3.02
	Post-Policy, COVID Stabilization	0.96	1.38	1.58	1.67	1.81	3.50
	Post-Policy, COVID Onset	1.12	1.40	1.63	1.68	1.84	3.60
	Post-Policy (overall)	0.96	1.38	1.58	1.67	1.81	3.60
10	Pre-Policy	0.83	1.15	1.32	1.43	1.61	3.26
	Post-Policy, Pre-COVID	0.99	1.22	1.55	1.57	1.87	2.62
	Post-Policy, COVID Stabilization	0.99	1.28	1.49	1.58	1.80	3.73
	Post-Policy, COVID Onset	0.95	1.30	1.49	1.58	1.73	3.06
	Post-Policy (overall)	0.95	1.28	1.49	1.58	1.81	3.73
11	Pre-Policy	0.89	1.14	1.28	1.36	1.47	3.64
	Post-Policy, Pre-COVID	0.99	1.24	1.43	1.51	1.76	2.40
	Post-Policy, COVID Stabilization	0.84	1.25	1.40	1.45	1.60	3.15
	Post-Policy, COVID Onset	0.95	1.23	1.43	1.48	1.64	2.41
	Post-Policy (overall)	0.84	1.24	1.40	1.46	1.61	3.15