

Out-of-the-Gate Monitoring of Liver and Intestine Acuity Circle Allocation, 9 Month Report Removal of DSA and Region as Units of Allocation

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Purpose

The purpose of this report is to provide an early 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. It contains information for responding to the media, general public, and transplant community in the nine-month period following implementation. 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
- Changes in volumes of exception request forms automatically approved and those reviewed manually
- Approval rates of exception request forms
- Waiting list drop out rates by exception status
- Changes in deceased donor liver transplant recipients by exception status, and associated allocation scores

Cohorts

The cohorts examined contain periods of 270 days, or approximately 9 months of data before after the liver policy change.

Figures and tables include multiple post-policy eras, representing the brief period of time prior to COVID-19 declared a national emergency in the US (Pre-COVID Era, 02/04/2020 - 03/12/2020), the heaviest-impacted period of time from 03/13/2020 to May 09, 2020 (COVID Shutdown Era) and the additional period of time with continual, albeit less-dramatic, impact from 05/10/2020 to the end of the post-policy cohort (COVID Stabilization Era).

In the *Liver Waiting List* section, new registrations added to the liver waiting list as well as registrations removed from the liver waiting list due to reasons of death or too sick to transplant are used. The pre- and post-policy eras are defined as 02/05/2019 - 11/02/2019 and 02/04/2020 - 10/31/2020, respectively. Multi-organ listings are excluded from removal counts. For waiting list removal and transplant rates in this section, cohorts are defined as liver-alone registrations ever waiting during the above time periods. Multi-organ listings are excluded from rates.

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. Cohorts of transplants are defined during 02/05/2019 - 09/02/2019 and 02/04/2020 - 08/31/2020 pre- and post-policy to account for data reporting lags.

In the *Liver Utilization* section, a number of data sets are used to provide these metrics. 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 02/05/2019 - 11/02/2019 and 02/04/2020 - 10/31/2020, 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.

This analysis is based on OPTN data as of December 25, 2020 and is subject to change based on any future data submission or correction.

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 8 months of COVID-19 Era data (03/11/2020 - 10/31/2020). 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 Shutdown 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.

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.

For waiting list removal (for reasons of death or too sick to transplant) rates, all liver-alone registrations who were ever on the waiting list were included, even if listed for less than one day or never active. For waiting list transplant rate and offer rate analysis, only liver alone registrations on the waiting list for at least one day were included.

Removal 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 analyzed was used for the patient-years

calculation. 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.

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 (removal for removal rates, transplant for transplant rates) per candidate is recorded. This is taken as the first occurrence.

For removal 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). 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 in the counts 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.

Executive Summary

This report provides a review of the first nine months 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.

The *TRF and LDF Data Submission During COVID-19 Amnesty Period* emergency policy suspends 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 March 13, 2020 and has now been extended by the Executive Committee to expire on December 31, 2020 if the Executive Committee or Board of Directors has not acted before that date. This only applies to forms with an expected date during this timeframe. It does not suspend the requirement to report recipient death or graft failure, but extends the time frame for reporting that information for transplant recipients from 14 days to 30 days of knowledge of the event.

Again, while changes pre- to post-policy must be considered in light of this national emergency, 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, also seen in the previous 6-month report, include:

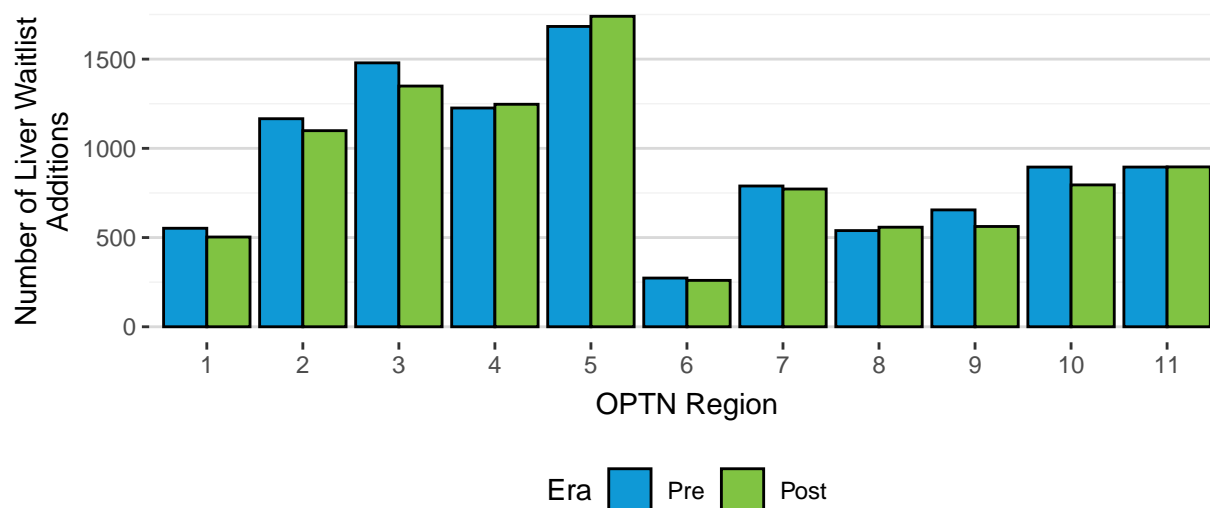
- Decreased variance in median allocation MELD or PELD score at transplant when examined by different geographies, including by state, donation service area (DSA) and OPTN region
- Increased percentage of non-exception transplant recipients, similar percentage of hepatocellular carcinoma (HCC) exception transplant recipients, and decreased percentage of non-HCC exception transplant recipients
- Increased distance (nautical miles) from donor hospital to transplant program of recipient
- Liver waiting list transplant rate increases for MELD or PELD scores 29 and higher, with no changes by candidate exception status
- Liver waiting list mortality rate increases for MELD or PELD scores 29 - 36 and decreases for non-exception transplant candidates
- Similar national liver discard and utilization rates

Results

Section I. Liver Waiting List

Waiting List Additions

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

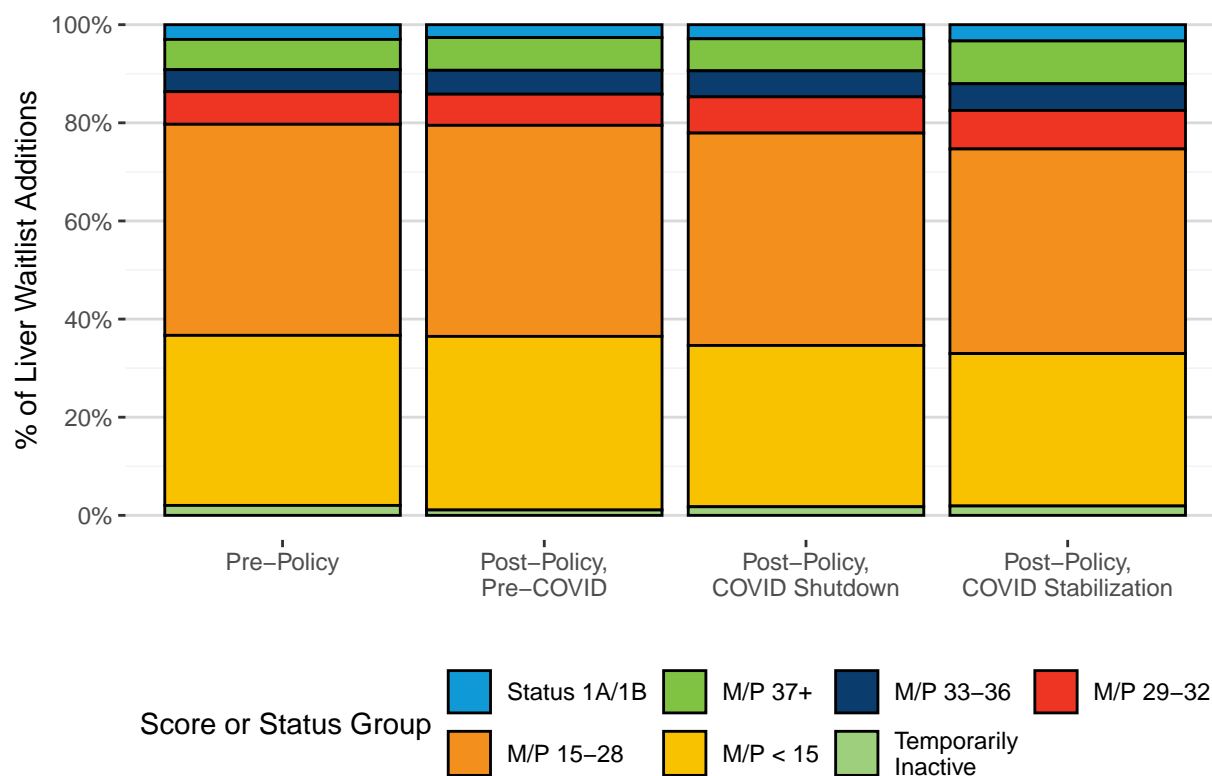


National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.

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

OPTN Region	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
1	552	5.4%	78	5.0%	71	3.8%	354	5.6%	503	5.1%
2	1166	11.5%	189	12.1%	210	11.2%	700	11.0%	1099	11.2%
3	1479	14.6%	191	12.2%	258	13.7%	900	14.2%	1349	13.8%
4	1226	12.1%	191	12.2%	234	12.4%	822	13.0%	1247	12.7%
5	1683	16.6%	271	17.4%	355	18.9%	1114	17.6%	1740	17.8%
6	273	2.7%	41	2.6%	42	2.2%	177	2.8%	260	2.7%
7	789	7.8%	154	9.9%	146	7.8%	472	7.4%	772	7.9%
8	539	5.3%	87	5.6%	122	6.5%	349	5.5%	558	5.7%
9	655	6.5%	92	5.9%	84	4.5%	386	6.1%	562	5.7%
10	895	8.8%	134	8.6%	159	8.4%	502	7.9%	795	8.1%
11	895	8.8%	132	8.5%	202	10.7%	562	8.9%	896	9.2%
National	10152	100.0%	1560	100.0%	1883	100.0%	6338	100.0%	9781	100.0%

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

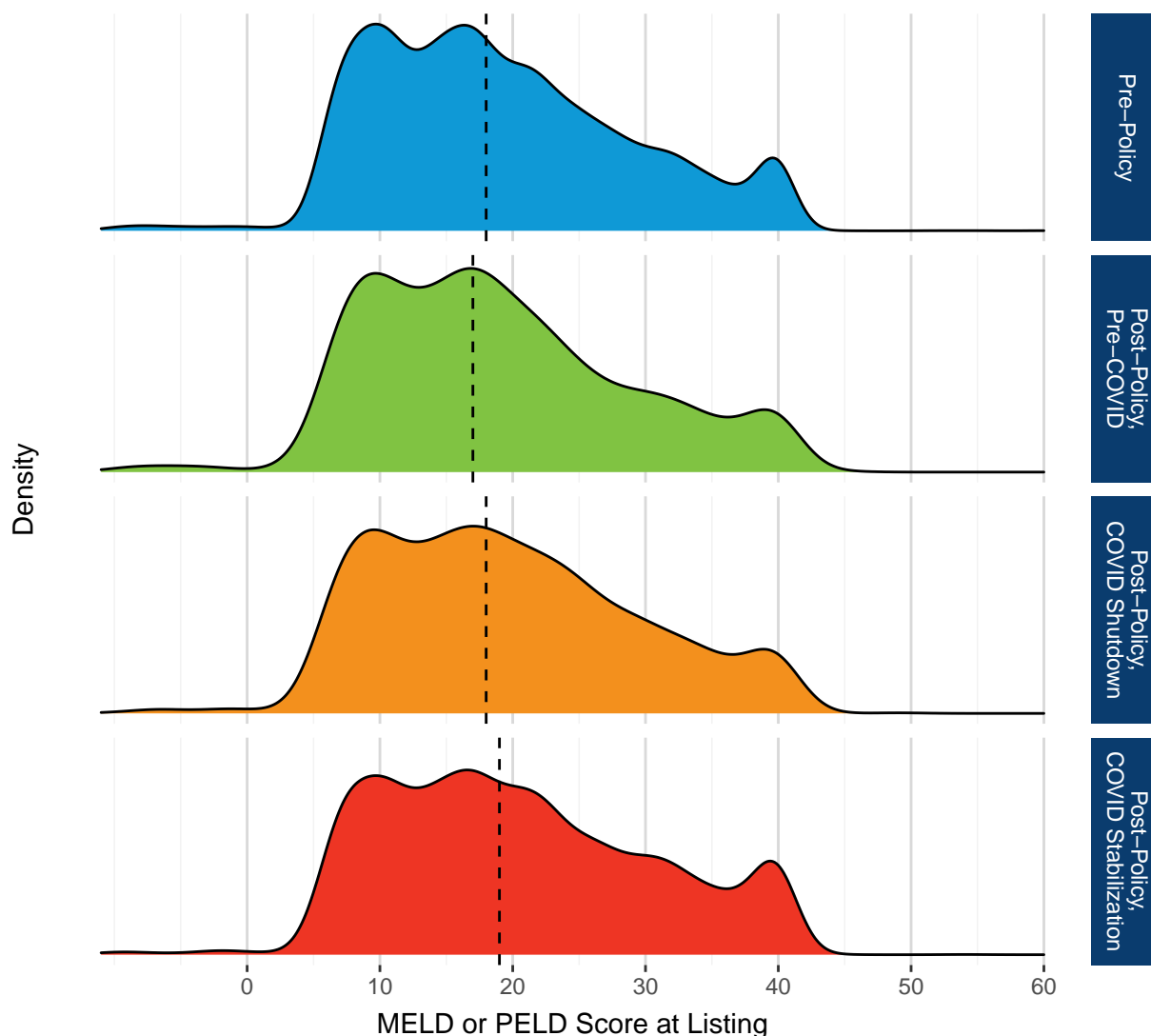
Figure 2. Registrations Added to Liver Waiting List by MELD or PELD Score or Status at Listing and Era

Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 2. Number and Percent of Registrations Added to Liver Waiting List by MELD or PELD Score or Status at Listing and Era

Score or Status Group	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Status 1A/1B	305	3.0%	41	2.6%	54	2.9%	210	3.3%	305	3.1%
M/P 37+	626	6.2%	104	6.7%	123	6.5%	553	8.7%	780	8.0%
M/P 33-36	455	4.5%	76	4.9%	100	5.3%	345	5.4%	521	5.3%
M/P 29-32	675	6.6%	99	6.3%	139	7.4%	498	7.9%	736	7.5%
M/P 15-28	4367	43.0%	671	43.0%	815	43.3%	2642	41.7%	4128	42.2%
M/P < 15	3518	34.7%	552	35.4%	619	32.9%	1969	31.1%	3140	32.1%
Temporarily Inactive	206	2.0%	17	1.1%	33	1.8%	121	1.9%	171	1.7%

The percentages of new registrations among different MELD or PELD score groups and statuses were consistent, with slight increases in the proportion of new additions with higher MELD and PELD scores post-policy. This may reflect changes in practice due to COVID-19.

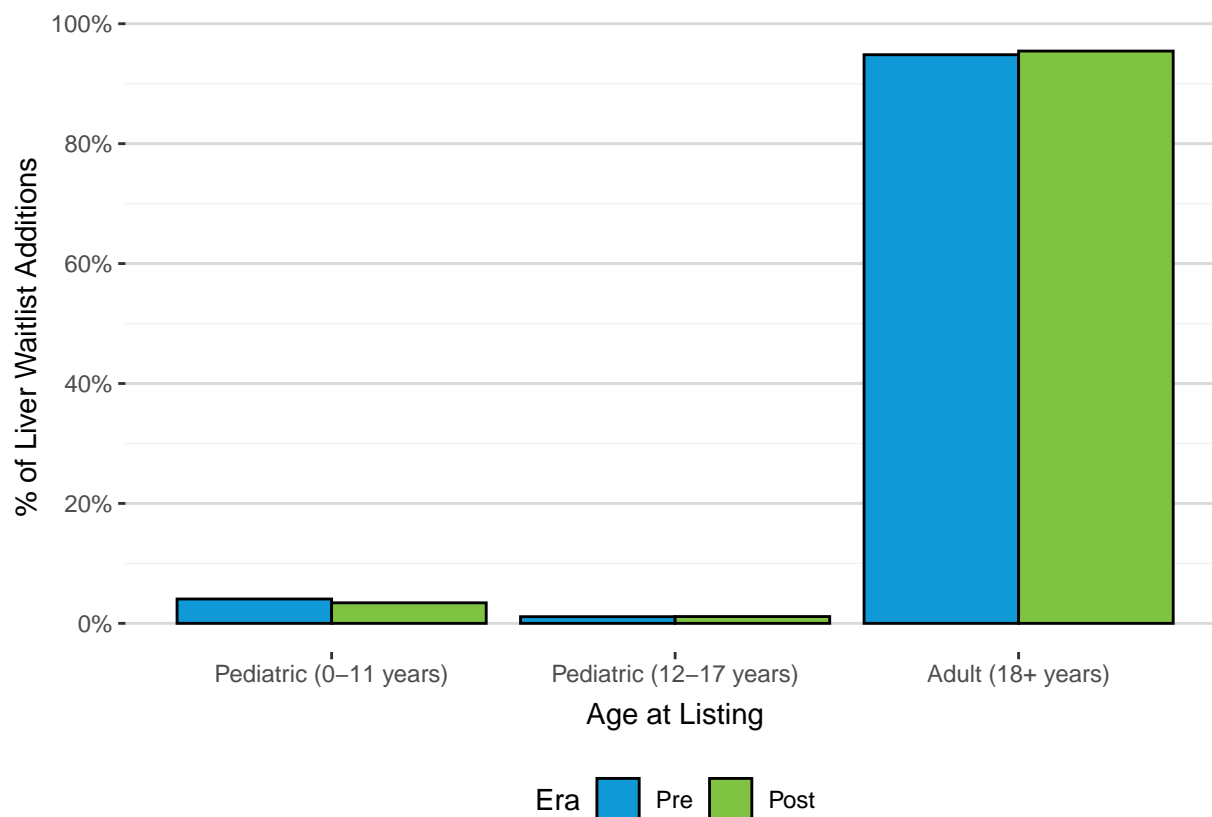
Figure 3. Distribution of MELD or PELD Score at Listing by Era, with Median Score

Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 3. Distribution Statistics for MELD/PELD Score at Listing by Era

Policy Era	N	Minimum	25th Percentile	Median	75th Percentile	Maximum
Pre-Policy	9641	-11	11	18	25	60
Post-Policy, Pre-COVID	1502	-10	11	17	25	45
Post-Policy, COVID Shutdown	1796	-10	12	18	26	49
Post-Policy, COVID Stabilization	6007	-11	12	19	28	54
Post Policy (overall)	9305	-11	12	19	27	54

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

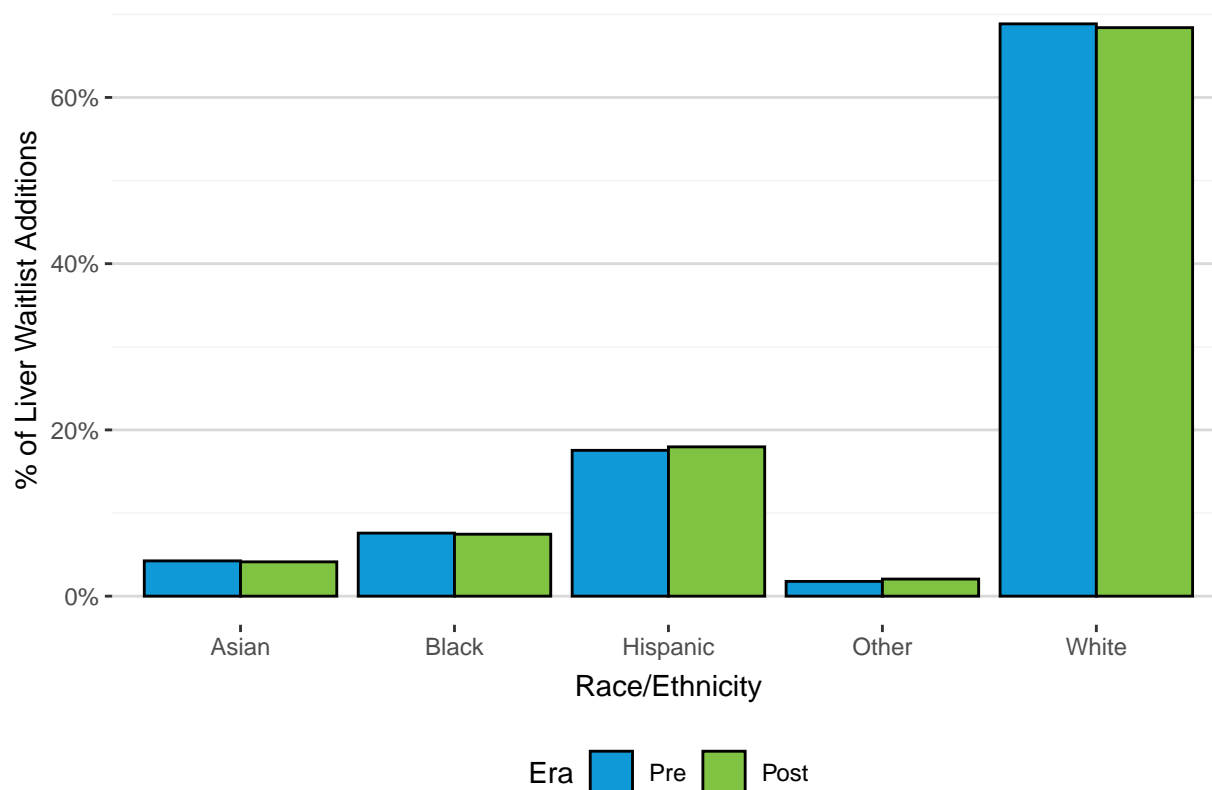
Figure 4. Registrations Added to Liver Waiting List by Age at Listing and Era

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

Table 4. Number and Percent of Registrations Added to Liver Waiting List by Age Group and Era

Age at Listing	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Pediatric (0-11 years)	412	4.1%	57	3.7%	68	3.6%	210	3.3%	335	3.4%
Pediatric (12-17 years)	113	1.1%	10	0.6%	19	1.0%	82	1.3%	111	1.1%
Adult (18+ years)	9627	94.8%	1493	95.7%	1796	95.4%	6046	95.4%	9335	95.4%

The percentage distribution by age group was consistent from pre- to post-implementation. Any differences post-policy must be considered in light of the COVID-19 emergency declaration.

Figure 5. 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.

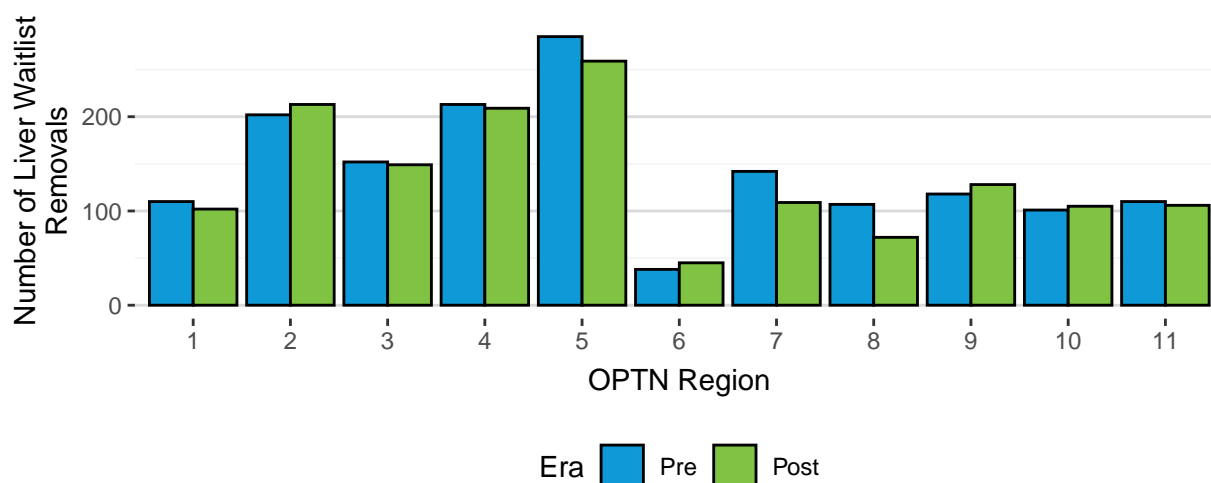
Table 5. Number and Percent of Registrations Added to Liver Waiting List by Race/Ethnicity and Era

Race/Ethnicity	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Asian	431	4.2%	53	3.4%	76	4.0%	275	4.3%	404	4.1%
Black	770	7.6%	106	6.8%	112	5.9%	511	8.1%	729	7.5%
Hispanic	1781	17.5%	270	17.3%	330	17.5%	1157	18.3%	1757	18.0%
Other	180	1.8%	29	1.9%	38	2.0%	134	2.1%	201	2.1%
White	6990	68.9%	1102	70.6%	1327	70.5%	4261	67.2%	6690	68.4%

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

Waiting List Removals

Figure 6. Liver-Alone Registrations* Removed Due to Death or Too Sick to Transplant by OPTN Region of Listing Center and Era



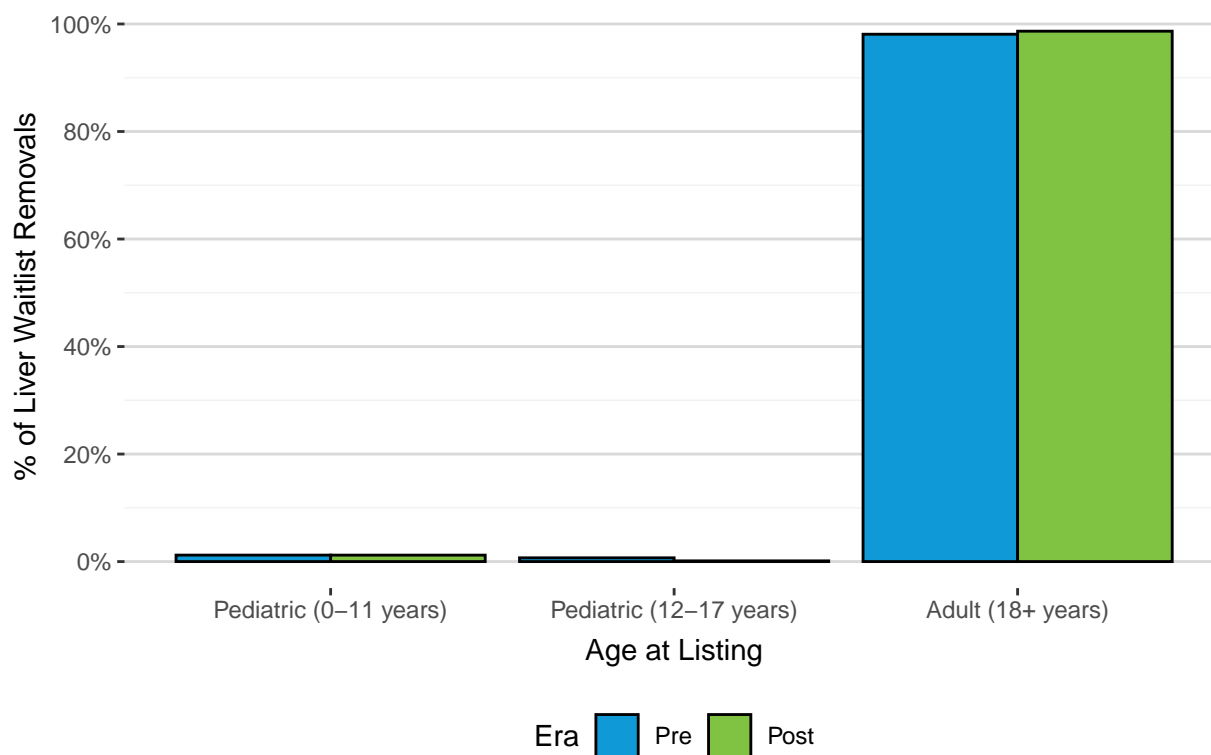
* Candidates may be listed at multiple transplant programs, contributing multiple registrations and thus represent multiple deaths in these counts.
National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.

Table 6. Number and Percent of Liver-Alone Registrations* Removed Due To Death or Too Sick to Transplant by OPTN Region and Era

OPTN Region	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
1	110	7.0%	14	6.1%	15	5.0%	73	7.5%	102	6.8%
2	202	12.8%	23	10.0%	38	12.8%	152	15.7%	213	14.2%
3	152	9.6%	21	9.2%	27	9.1%	101	10.4%	149	10.0%
4	213	13.5%	35	15.3%	36	12.1%	138	14.2%	209	14.0%
5	285	18.1%	42	18.3%	57	19.1%	160	16.5%	259	17.3%
6	38	2.4%	4	1.7%	6	2.0%	35	3.6%	45	3.0%
7	142	9.0%	18	7.9%	26	8.7%	65	6.7%	109	7.3%
8	107	6.8%	11	4.8%	13	4.4%	48	4.9%	72	4.8%
9	118	7.5%	23	10.0%	41	13.8%	64	6.6%	128	8.6%
10	101	6.4%	20	8.7%	20	6.7%	65	6.7%	105	7.0%
11	110	7.0%	18	7.9%	19	6.4%	69	7.1%	106	7.1%
National	1578	100.0%	229	100.0%	298	100.0%	970	100.0%	1497	100.0%

* Candidates may be listed at multiple transplant programs, contributing multiple registrations and thus represent multiple deaths in these counts.

The distribution of waiting list removals due to death or too sick to transplant by OPTN region remained similar across eras. Overall, there were fewer removals in the post-policy era. Changes in removal volumes post-policy may have been impacted by the COVID-19 emergency declaration.

Figure 7. Liver-Alone Registrations* Removed Due to Death or Too Sick to Transplant by Age at Listing and Era

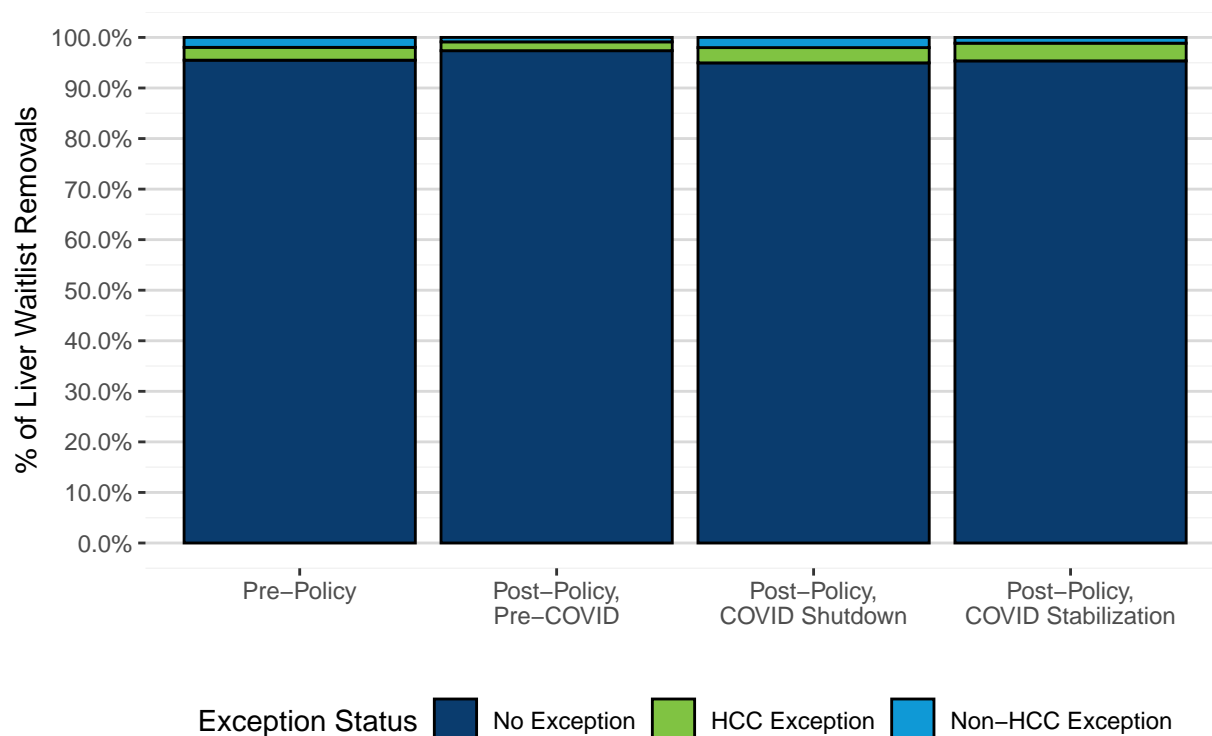
* Candidates may be listed at multiple transplant programs, contributing multiple registrations and thus represent multiple deaths in these counts.
National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.

Table 7. Number and Percent of Liver-Alone Registrations* Removed Due To Death or Too Sick to Transplant by Age at Listing and Era

Age at Listing	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Pediatric (0-11 years)	19	1.2%	2	0.9%	5	1.7%	11	1.1%	18	1.2%
Pediatric (12-17 years)	11	0.7%	1	0.4%	0	0.0%	1	0.1%	2	0.1%
Adult (18+ years)	1548	98.1%	226	98.7%	293	98.3%	958	98.8%	1477	98.7%

* Candidates may be listed at multiple transplant programs, contributing multiple registrations and thus represent multiple deaths in these counts.

Following policy implementation, the distribution of waitlist removals for death or too sick to transplant remained consistent across age categories.

Figure 8. Liver-Alone Registrations* Removed Due To Death or Too Sick to Transplant by Exception Status at Removal and Era

* Candidates may be listed at multiple transplant programs, contributing multiple registrations and thus represent multiple deaths in these counts.

Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 8. Number and Percent of Liver-Alone Registrations* Removed Due To Death or Too Sick to Transplant by Exception Status at Removal and Era

Exception Status	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
No Exception	1507	95.5%	223	97.4%	283	95.0%	925	95.4%	1431	95.6%
HCC Exception	40	2.5%	4	1.7%	9	3.0%	34	3.5%	47	3.1%
Non-HCC Exception	31	2.0%	2	0.9%	6	2.0%	11	1.1%	19	1.3%

* Candidates may be listed at multiple transplant programs, contributing multiple registrations and thus represent multiple deaths in these counts.

Following policy implementation, the proportion of waitlist removals for death or too sick to transplant remained similar for non-exceptions. There were slightly more HCC exceptions and slightly fewer other exceptions removed post-policy, compared to pre-policy.

It should also be noted that the pre-policy era encompasses time under both the RRB and NLRB systems. The first implementation of the NLRB policy was on May 14, 2019 (late pre-policy era) and additional changes to the structure of the NLRB occurred when the new allocation policy was implemented.

Waiting List Rates

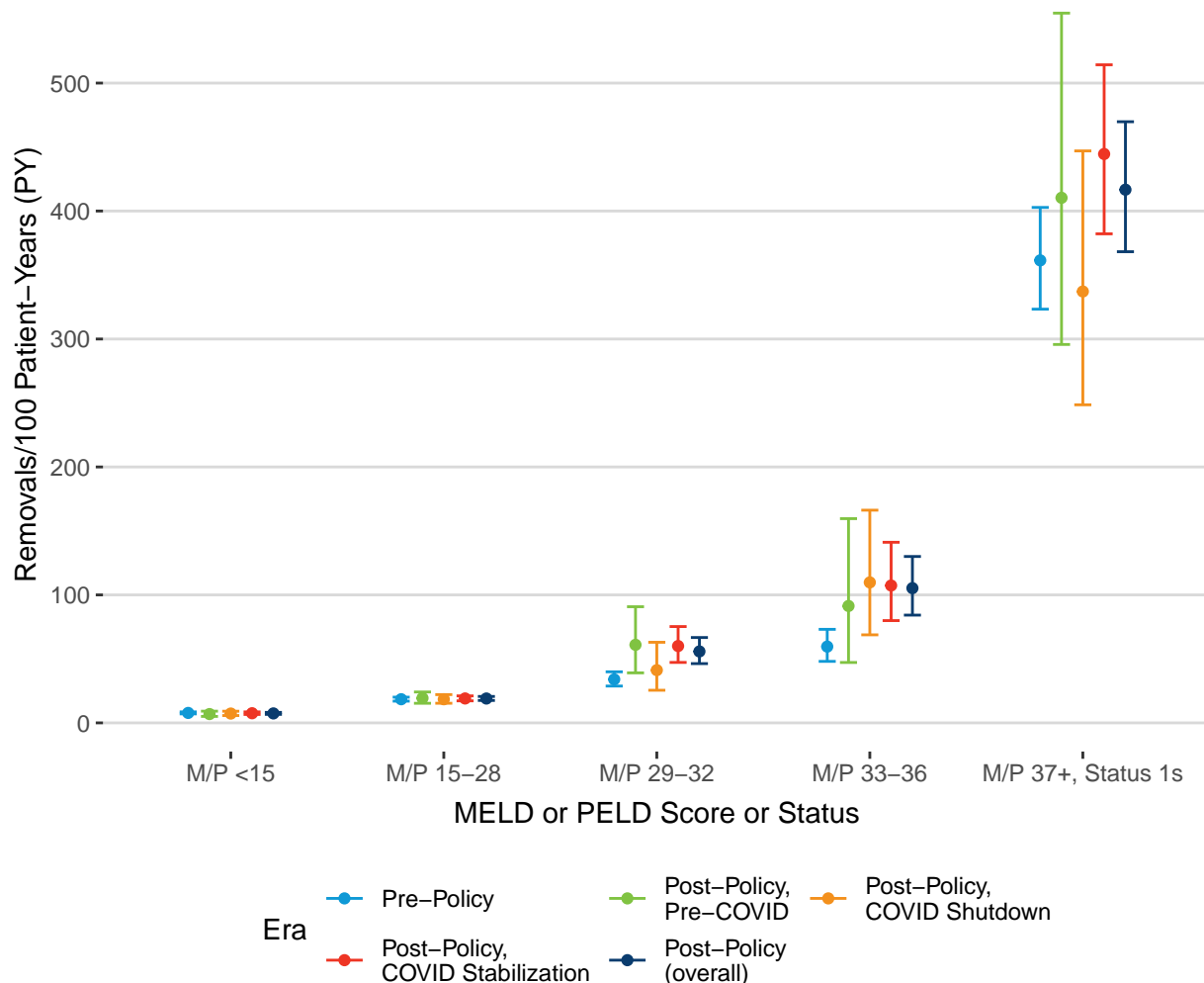
Rates of removal for death or too sick to transplant significantly increased post-implementation for MELD/PELD 29-32 and MELD/PELD 33-36 (as indicated by non-overlapping confidence intervals), but did not significantly change for all other status groups.

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), but did not significantly change for lower MELD/PELD score groups.

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 during COVID-19 eras, 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.

Figure 9. Liver-Along 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

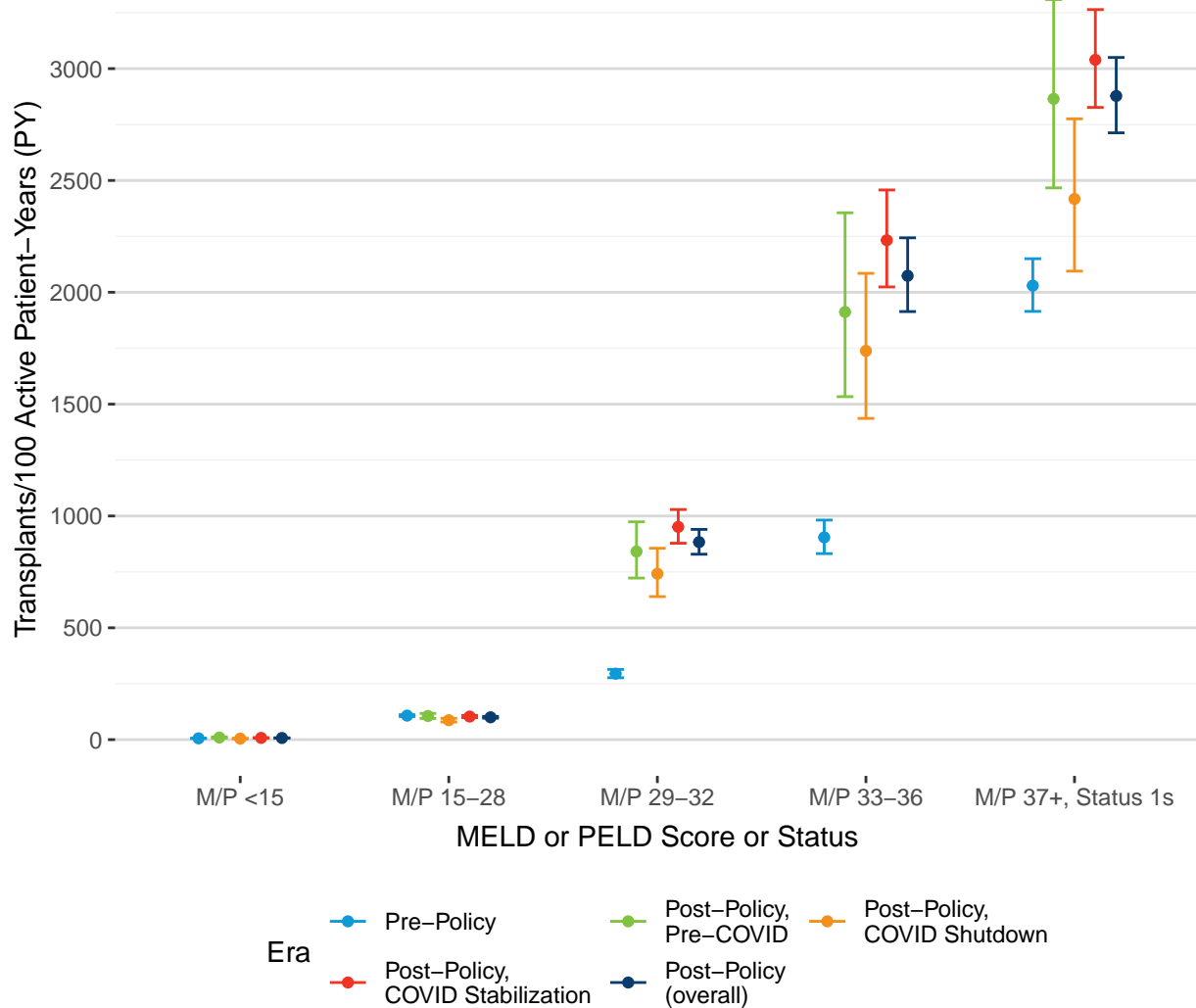


Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 9. Liver-Along 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

Score or Status Group	Era	N Ever Waiting	N Removals	PY	Removals per 100 PY	95% CI
M/P <15	Pre-Policy	12938	385	4951.3	7.78	7.02, 8.59
	Post-Policy, Pre-COVID	7676	47	682.2	6.89	5.06, 9.16
	Post-Policy, COVID Shutdown	7938	76	1043.3	7.28	5.74, 9.12
	Post-Policy, COVID Stabilization	10364	230	3054.1	7.53	6.59, 8.57
	Post-Policy (overall)	12069	354	4783.9	7.40	6.65, 8.21
M/P 15-28	Pre-Policy	10932	553	2991.2	18.49	16.98, 20.09
	Post-Policy, Pre-COVID	5155	79	408.0	19.36	15.33, 24.13
	Post-Policy, COVID Shutdown	5548	121	654.7	18.48	15.33, 22.08
	Post-Policy, COVID Stabilization	8493	380	1992.0	19.08	17.21, 21.09
	Post-Policy (overall)	10429	581	3052.4	19.03	17.52, 20.65
M/P 29-32	Pre-Policy	3290	150	441.1	34.00	28.78, 39.9
	Post-Policy, Pre-COVID	752	24	39.3	61.00	39.08, 90.76
	Post-Policy, COVID Shutdown	776	21	51.0	41.21	25.51, 62.99
	Post-Policy, COVID Stabilization	1550	75	124.9	60.05	47.23, 75.27
	Post-Policy (overall)	2352	121	216.8	55.82	46.32, 66.7
M/P 33-36	Pre-Policy	1652	92	154.3	59.62	48.06, 73.12
	Post-Policy, Pre-COVID	291	12	13.1	91.36	47.21, 159.59
	Post-Policy, COVID Shutdown	376	22	20.0	109.79	68.8, 166.22
	Post-Policy, COVID Stabilization	880	51	47.5	107.34	79.92, 141.13
	Post-Policy (overall)	1298	86	81.7	105.29	84.22, 130.03
M/P 37+, Status 1s	Pre-Policy	1808	327	90.5	361.43	323.31, 402.81
	Post-Policy, Pre-COVID	337	42	10.2	410.33	295.73, 554.65
	Post-Policy, COVID Shutdown	366	48	14.2	337.12	248.56, 446.97
	Post-Policy, COVID Stabilization	1118	181	40.7	444.58	382.17, 514.28
	Post-Policy (overall)	1634	267	64.1	416.69	368.2, 469.78

Figure 10. Liver-Alone Transplant Rates Per 100 Active Person-Years Waiting by MELD or PELD Score or Status and Era

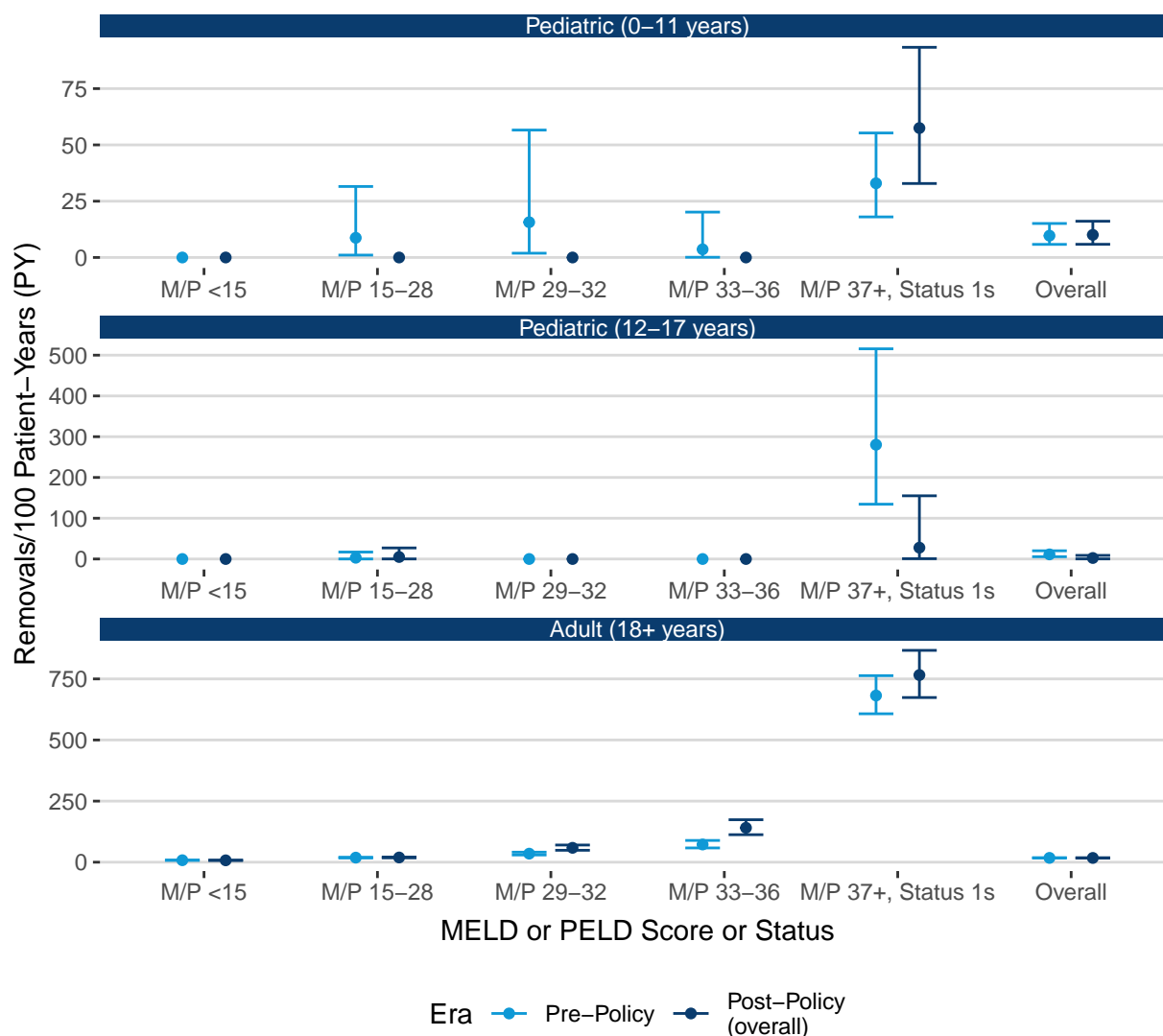


Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 10. Liver-Along Transplant Rates Per 100 Active Person-Years Waiting by MELD or PELD Score or Status and Era

Score or Status Group	Era	N Ever Waiting	N Transplants	Active PY	Transplants/100 Active PY	95% CI
M/P <15	Pre-Policy	11729	232	4000.7	5.80	5.08, 6.6
	Post-Policy, Pre-COVID	6431	52	550.4	9.45	7.06, 12.39
	Post-Policy, COVID Shutdown	6737	37	810.8	4.56	3.21, 6.29
	Post-Policy, COVID Stabilization	9053	188	2403.8	7.82	6.74, 9.02
	Post-Policy (overall)	10887	277	3766.5	7.35	6.51, 8.27
M/P 15-28	Pre-Policy	10299	2605	2425.4	107.40	103.32, 111.61
	Post-Policy, Pre-COVID	4457	348	329.1	105.73	94.91, 117.44
	Post-Policy, COVID Shutdown	4844	450	518.1	86.86	79.02, 95.27
	Post-Policy, COVID Stabilization	7820	1647	1595.4	103.23	98.31, 108.34
	Post-Policy (overall)	9812	2443	2445.2	99.91	95.99, 103.95
M/P 29-32	Pre-Policy	3175	980	332.4	294.86	276.69, 313.91
	Post-Policy, Pre-COVID	578	179	21.3	841.19	722.47, 973.85
	Post-Policy, COVID Shutdown	617	188	25.3	741.84	639.58, 855.79
	Post-Policy, COVID Stabilization	1415	626	65.8	951.21	878.14, 1028.73
	Post-Policy (overall)	2189	990	112.1	883.15	828.99, 939.92
M/P 33-36	Pre-Policy	1525	571	63.1	904.38	831.71, 981.7
	Post-Policy, Pre-COVID	207	88	4.6	1911.90	1533.4, 2355.52
	Post-Policy, COVID Shutdown	292	116	6.7	1738.10	1436.22, 2084.68
	Post-Policy, COVID Stabilization	801	418	18.7	2232.84	2023.89, 2457.5
	Post-Policy (overall)	1209	621	29.9	2073.79	1913.87, 2243.5
M/P 37+, Status 1s	Pre-Policy	1762	1159	57.1	2029.82	1914.63, 2150.13
	Post-Policy, Pre-COVID	302	185	6.5	2864.87	2466.9, 3308.76
	Post-Policy, COVID Shutdown	328	201	8.3	2417.30	2094.65, 2775.58
	Post-Policy, COVID Stabilization	1070	756	24.9	3039.32	2826.5, 3263.92
	Post-Policy (overall)	1588	1138	39.5	2877.72	2712.93, 3049.9

Figure 11. 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



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy: 02/04/2020–10/31/2020

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

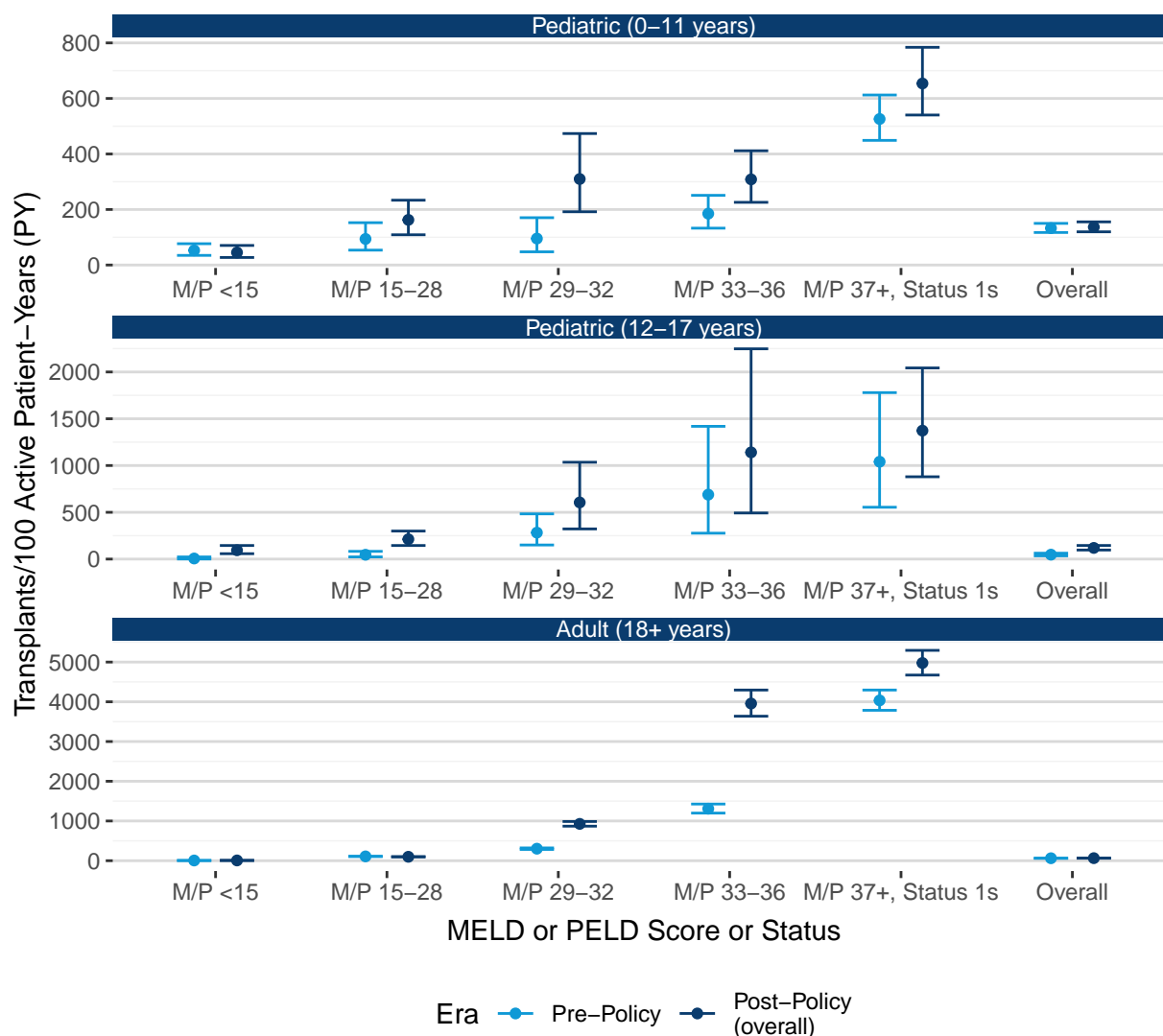
For pediatric (0-11 years) liver candidates, there were few events that occurred at most score or status groups, leading to waiting list dropout rates of 0 or rates with substantially large variability in both the pre- and post-policy eras. Most pediatric candidate removals occurred with MELD or PELD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

Age at Listing	Score or Status Group	Era	N Ever Waiting	N Removals	PY	Removals per 100 PY	95% CI
Pediatric (0-11 years)	M/P <15	Pre-Policy	316	0	86.8	0.00	-, -
		Post-Policy (overall)	261	0	87.7	0.00	-, -
	M/P 15-28	Pre-Policy	174	2	22.9	8.73	1.06, 31.53
		Post-Policy (overall)	139	0	23.2	0.00	-, -
	M/P 29-32	Pre-Policy	109	2	12.8	15.67	1.9, 56.59
		Post-Policy (overall)	68	0	7.7	0.00	-, -
	M/P 33-36	Pre-Policy	185	1	27.6	3.62	0.09, 20.15
		Post-Policy (overall)	132	0	19.8	0.00	-, -
	M/P 37+, Status 1s	Pre-Policy	297	14	42.5	32.96	18.02, 55.3
		Post-Policy (overall)	195	16	27.8	57.48	32.85, 93.34
	Overall	Pre-Policy	633	19	196.5	9.67	5.82, 15.1
		Post-Policy (overall)	519	17	169.1	10.06	5.86, 16.1
Pediatric (12-17 years)	M/P <15	Pre-Policy	121	0	49.9	0.00	-, -
		Post-Policy (overall)	114	0	46.9	0.00	-, -
	M/P 15-28	Pre-Policy	104	1	32.7	3.06	0.08, 17.03
		Post-Policy (overall)	89	1	20.5	4.87	0.12, 27.15
	M/P 29-32	Pre-Policy	46	0	4.6	0.00	-, -
		Post-Policy (overall)	24	0	3.3	0.00	-, -
	M/P 33-36	Pre-Policy	19	0	1.1	0.00	-, -
		Post-Policy (overall)	12	0	0.8	0.00	-, -
	M/P 37+, Status 1s	Pre-Policy	37	10	3.6	280.34	134.43, 515.55
		Post-Policy (overall)	41	1	3.6	27.82	0.7, 155
	Overall	Pre-Policy	221	11	97.6	11.27	5.63, 20.17
		Post-Policy (overall)	220	2	81.4	2.46	0.3, 8.88
Adult (18+ years)	M/P <15	Pre-Policy	12502	385	4814.6	8.00	7.22, 8.84
		Post-Policy (overall)	11695	354	4649.4	7.61	6.84, 8.45
	M/P 15-28	Pre-Policy	10654	550	2935.8	18.73	17.2, 20.37
		Post-Policy (overall)	10203	580	3009.1	19.27	17.74, 20.91
	M/P 29-32	Pre-Policy	3135	148	423.7	34.93	29.53, 41.03
		Post-Policy (overall)	2260	121	205.8	58.81	48.8, 70.27
	M/P 33-36	Pre-Policy	1448	91	125.6	72.45	58.33, 88.95
		Post-Policy (overall)	1154	86	61.1	140.72	112.56, 173.79
	M/P 37+, Status 1s	Pre-Policy	1474	303	44.4	681.97	607.34, 763.24
		Post-Policy (overall)	1398	250	32.6	765.78	673.79, 866.82
	Overall	Pre-Policy	19653	1489	8435.5	17.65	16.77, 18.57
		Post-Policy (overall)	18903	1404	8052.2	17.44	16.54, 18.37

Figure 12. Liver-Alone Transplant Rates Per 100 Active Person-Years Waiting by MELD or PELD Score or Status, Age at Listing, and Era

Pre-Policy: 02/05/2019–11/02/2019; Post-Policy: 02/04/2020–10/31/2020

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

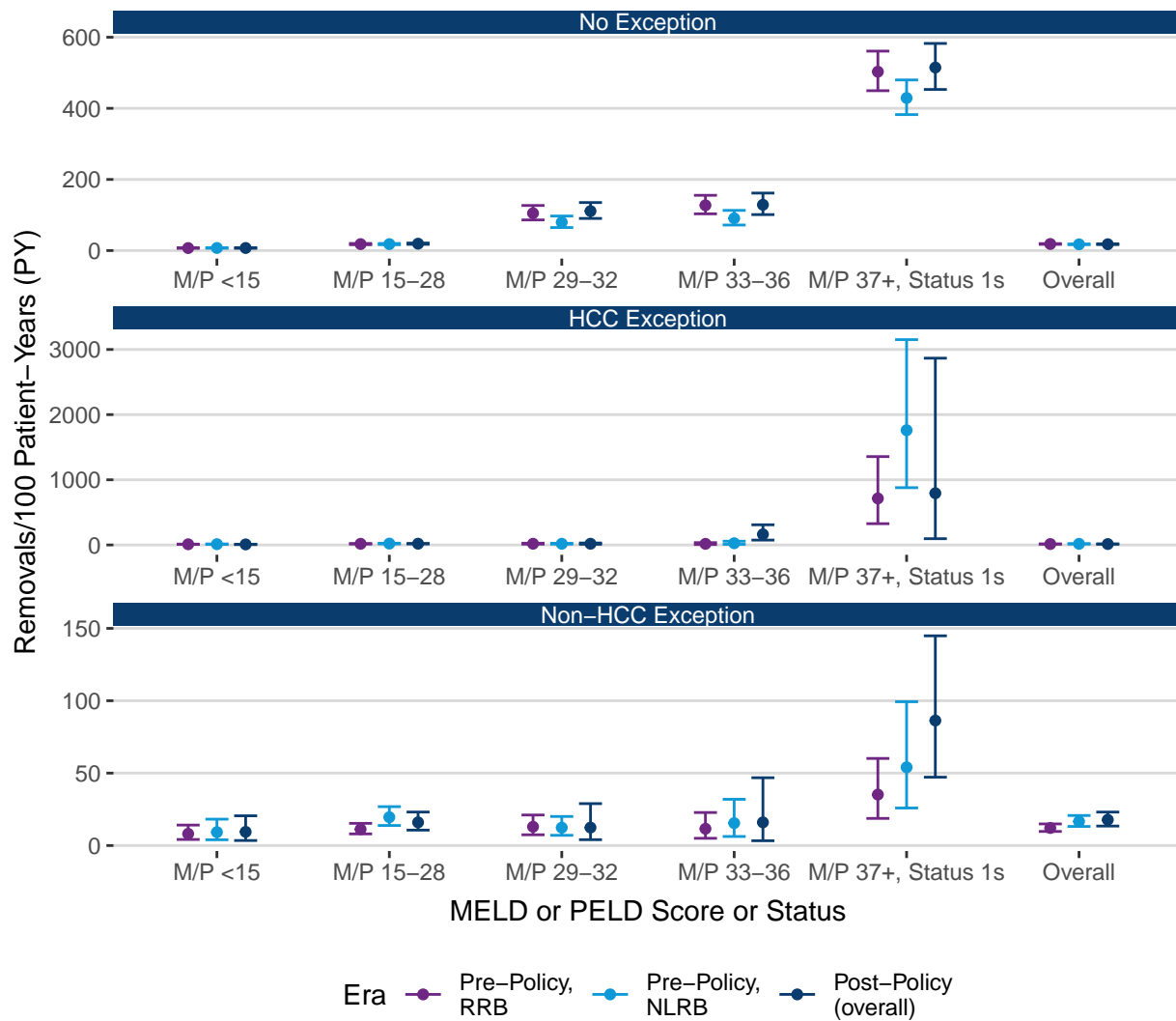
Increased waiting list transplant rates for pediatric (0-11 years) liver candidates occurred for MELD/PELD scores 29-32 post-policy, though no other changes were significant.

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

Age at Listing	Score or Status Group	Era	N Ever Waiting	N Transplants	Active PY	Transplants/100 Active PY	95% CI	
Pediatric (0-11 years)	M/P <15	Pre-Policy	267	27	51.2	52.73	34.75, 76.72	
		Post-Policy (overall)	218	19	42.1	45.13	27.17, 70.47	
	M/P 15-28	Pre-Policy	166	16	17.0	93.88	53.66, 152.45	
		Post-Policy (overall)	134	29	17.8	162.60	108.89, 233.51	
	M/P 29-32	Pre-Policy	108	11	11.5	95.28	47.56, 170.48	
		Post-Policy (overall)	66	21	6.8	309.82	191.78, 473.6	
	M/P 33-36	Pre-Policy	180	41	22.2	185.03	132.78, 251.01	
		Post-Policy (overall)	128	46	14.9	308.47	225.84, 411.46	
	M/P 37+, Status 1s	Pre-Policy	288	166	31.6	525.95	448.99, 612.33	
		Post-Policy (overall)	183	116	17.7	653.80	540.25, 784.17	
	Overall	Pre-Policy	633	261	196.5	132.84	117.21, 149.97	
		Post-Policy (overall)	519	231	169.1	136.63	119.58, 155.43	
	Pediatric (12-17 years)	M/P <15	Pre-Policy	97	2	31.8	6.28	0.76, 22.7
			Post-Policy (overall)	88	20	21.3	93.96	57.4, 145.12
M/P 15-28		Pre-Policy	95	11	23.8	46.18	23.05, 82.63	
		Post-Policy (overall)	82	32	15.1	212.17	145.12, 299.52	
M/P 29-32		Pre-Policy	46	13	4.6	282.61	150.48, 483.27	
		Post-Policy (overall)	22	13	2.1	605.23	322.26, 1034.96	
M/P 33-36		Pre-Policy	18	7	1.0	688.68	276.88, 1418.94	
		Post-Policy (overall)	12	8	0.7	1140.63	492.44, 2247.49	
M/P 37+, Status 1s		Pre-Policy	33	13	1.2	1040.57	554.06, 1779.41	
		Post-Policy (overall)	39	24	1.7	1373.04	879.73, 2042.98	
Overall		Pre-Policy	221	46	97.6	47.15	34.52, 62.89	
		Post-Policy (overall)	220	97	81.4	119.18	96.64, 145.39	
Adult (18+ years)		M/P <15	Pre-Policy	11366	203	3917.7	5.18	4.49, 5.95
			Post-Policy (overall)	10581	237	3703.1	6.40	5.61, 7.27
	M/P 15-28	Pre-Policy	10038	2578	2384.5	108.11	103.98, 112.37	
		Post-Policy (overall)	9598	2383	2412.5	98.78	94.85, 102.83	
	M/P 29-32	Pre-Policy	3021	956	316.2	302.32	283.46, 322.11	
		Post-Policy (overall)	2101	956	103.2	926.60	868.79, 987.25	
	M/P 33-36	Pre-Policy	1327	523	40.0	1308.75	1198.98, 1425.88	
		Post-Policy (overall)	1069	567	14.3	3956.32	3637.33, 4295.79	
	M/P 37+, Status 1s	Pre-Policy	1441	980	24.3	4034.97	3786.27, 4295.72	
		Post-Policy (overall)	1366	998	20.1	4976.37	4672.37, 5294.94	
	Overall	Pre-Policy	19653	5240	8435.5	62.12	60.45, 63.82	
		Post-Policy (overall)	18903	5141	8052.2	63.85	62.11, 65.62	

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



Pre-Policy, RRB: 02/05/2019–05/13/2020; Pre-Policy, NLRB: 05/14/2020–11/02/2019; Post-Policy (overall): 02/04/2020–10/31/2020
 National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.

The pre-policy era was broken up into Regional Review Board (RRB) (02/05/2019 to 05/13/2019) and NLRB (05/14/2019 to f pre_end) periods, given the changes to the structure and inner workings of the exceptions review and scoring processes under the NLRB. Non-exception candidates did not experience significant changes in waiting list drop out rates across periods. This was true for non-HCC exception candidates and the majority of HCC exception candidates as well. However, HCC exception candidates with MELD/PELD 33-36 saw a statistically significant increase in waiting list drop out rates post-policy compared to both pre-policy eras. This may be due to the substantially smaller number of candidates falling in this group post-policy.

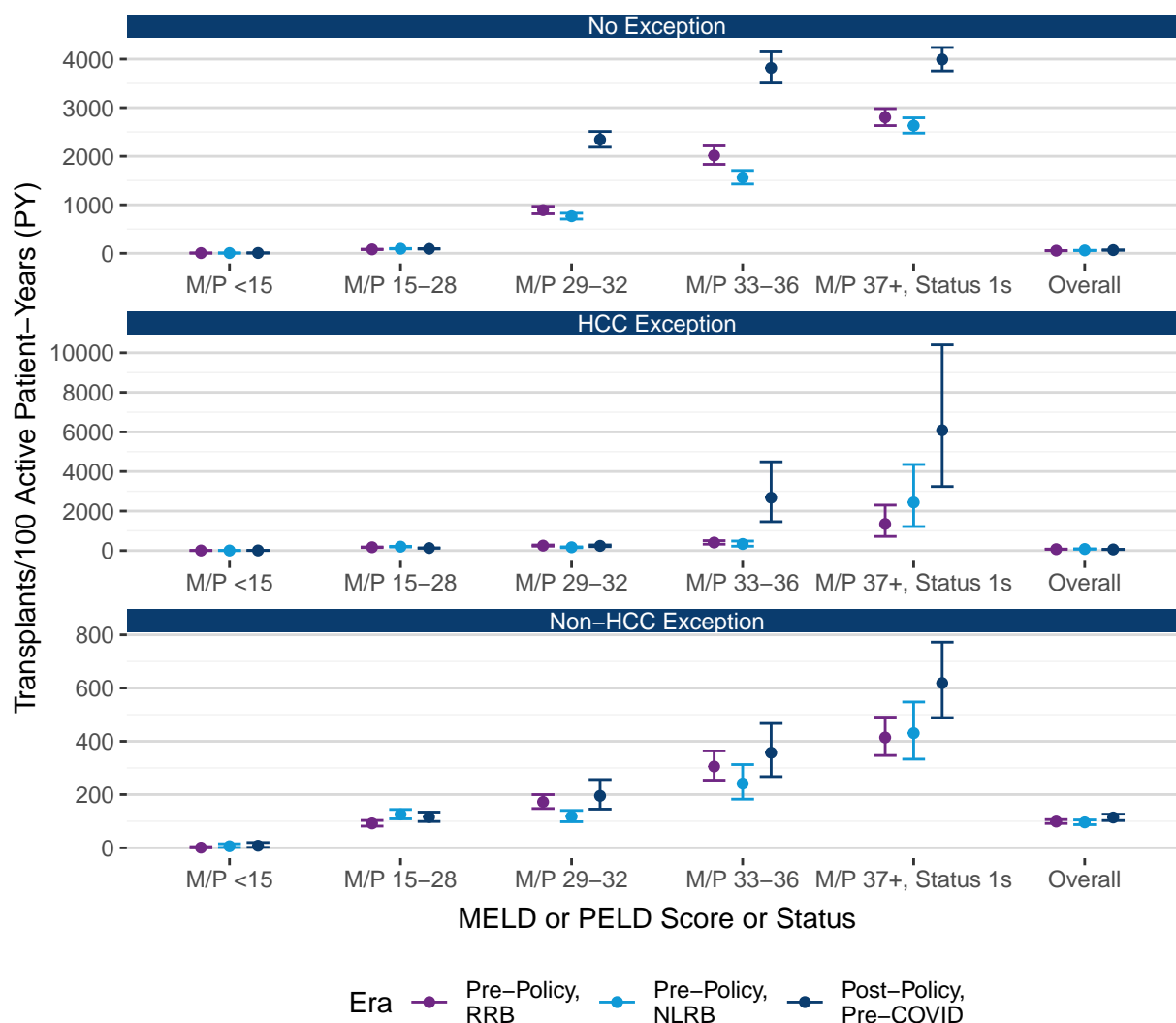
Table 13. Liver-Along Waitlist Rates of Removal Due to Death or Too Sick to Transplant Per 100 Person-Years Waiting by MELD or PELD Score or Status, Exception Status, and Era

Exception Status = No Exception						
Score or Status Group	Era	N Ever Waiting	N Removals	PY	Removals per 100 PY	95% CI
M/P <15	Pre-Policy, RRB	9550	291	4102.1	7.09	6.3, 7.96
	Pre-Policy, NLRB	10983	319	4374.7	7.29	6.51, 8.14
	Post-Policy (overall)	9196	286	3958.8	7.22	6.41, 8.11
M/P 15-28	Pre-Policy, RRB	7983	431	2376.1	18.14	16.47, 19.93
	Pre-Policy, NLRB	8883	453	2499.2	18.13	16.5, 19.87
	Post-Policy (overall)	7892	439	2273.6	19.31	17.54, 21.2
M/P 29-32	Pre-Policy, RRB	1863	108	102.8	105.03	86.16, 126.81
	Pre-Policy, NLRB	2061	99	124.1	79.75	64.81, 97.09
	Post-Policy (overall)	1782	100	90.0	111.05	90.36, 135.07
M/P 33-36	Pre-Policy, RRB	1222	97	76.2	127.37	103.28, 155.37
	Pre-Policy, NLRB	1341	79	87.1	90.71	71.82, 113.06
	Post-Policy (overall)	1121	74	57.5	128.78	101.12, 161.68
M/P 37+, Status 1s	Pre-Policy, RRB	1574	323	64.2	502.97	449.6, 560.92
	Pre-Policy, NLRB	1670	307	71.5	429.08	382.42, 479.87
	Post-Policy (overall)	1498	251	48.8	514.75	453.03, 582.53
Overall	Pre-Policy, RRB	15818	1263	6820.3	18.52	17.51, 19.57
	Pre-Policy, NLRB	17701	1270	7257.1	17.50	16.55, 18.49
	Post-Policy (overall)	15786	1164	6531.1	17.82	16.81, 18.88

Exception Status = HCC Exception						
Score or Status Group	Era	N Ever Waiting	N Removals	PY	Removals per 100 PY	95% CI
M/P <15	Pre-Policy, RRB	2546	84	818.2	10.27	8.19, 12.71
	Pre-Policy, NLRB	1471	58	494.1	11.74	8.91, 15.17
	Post-Policy (overall)	2484	63	763.8	8.25	6.34, 10.55
M/P 15-28	Pre-Policy, RRB	1919	69	396.4	17.41	13.54, 22.03
	Pre-Policy, NLRB	1376	63	303.6	20.75	15.94, 26.55
	Post-Policy (overall)	1996	115	609.8	18.86	15.57, 22.64
M/P 29-32	Pre-Policy, RRB	754	28	150.6	18.59	12.35, 26.87
	Pre-Policy, NLRB	771	34	189.5	17.94	12.43, 25.08
	Post-Policy (overall)	397	16	87.0	18.38	10.51, 29.85
M/P 33-36	Pre-Policy, RRB	186	7	40.6	17.22	6.92, 35.48
	Pre-Policy, NLRB	110	6	22.9	26.23	9.63, 57.09
	Post-Policy (overall)	41	9	5.5	163.03	74.55, 309.48
M/P 37+, Status 1s	Pre-Policy, RRB	28	9	1.3	714.13	326.55, 1355.64
	Pre-Policy, NLRB	26	11	0.6	1760.96	879.07, 3150.85
	Post-Policy (overall)	17	2	0.3	793.48	96.09, 2866.32
Overall	Pre-Policy, RRB	3147	197	1409.1	13.98	12.1, 16.07
	Pre-Policy, NLRB	1939	172	1011.1	17.01	14.56, 19.75
	Post-Policy (overall)	3157	205	1467.3	13.97	12.12, 16.02

Score or Status Group	Era	Exception Status = Non-HCC Exception				95% CI
		N Ever Waiting	N Removals	PY	Removals per 100 PY	
M/P <15	Pre-Policy, RRB	1002	12	148.5	8.08	4.18, 14.12
	Pre-Policy, NLRB	526	8	86.6	9.23	3.99, 18.19
	Post-Policy (overall)	413	6	63.6	9.43	3.46, 20.53
M/P 15-28	Pre-Policy, RRB	1246	40	355.8	11.24	8.03, 15.31
	Pre-Policy, NLRB	719	38	194.3	19.55	13.84, 26.84
	Post-Policy (overall)	583	28	175.1	15.99	10.63, 23.11
M/P 29-32	Pre-Policy, RRB	610	16	123.3	12.98	7.42, 21.07
	Pre-Policy, NLRB	473	16	129.6	12.35	7.06, 20.05
	Post-Policy (overall)	175	5	40.3	12.40	4.03, 28.93
M/P 33-36	Pre-Policy, RRB	311	8	69.1	11.58	5, 22.81
	Pre-Policy, NLRB	207	7	45.2	15.49	6.23, 31.92
	Post-Policy (overall)	140	3	18.7	16.02	3.3, 46.82
M/P 37+, Status 1s	Pre-Policy, RRB	229	13	37.0	35.17	18.73, 60.14
	Pre-Policy, NLRB	120	10	18.5	54.01	25.9, 99.33
	Post-Policy (overall)	128	14	16.2	86.32	47.19, 144.83
Overall	Pre-Policy, RRB	1708	89	734.5	12.12	9.73, 14.91
	Pre-Policy, NLRB	989	79	474.6	16.64	13.18, 20.74
	Post-Policy (overall)	808	56	314.7	17.79	13.44, 23.11

Figure 14. Liver-Alone Transplant Rates Per 100 Active Person-Years Waiting by MELD or PELD Score or Status, Exception Status, and Era



Pre-Policy, RRB: 02/05/2019–05/13/2020; Pre-Policy, NLRB: 05/14/2020–11/02/2019; Post-Policy (overall): 02/04/2020–10/31/2020
 National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.

The waiting list transplant rate for non-exception candidates increased over the policy eras, overall. The increase from pre-policy eras to post-policy era was true for non-exceptions with MELD/PELD scores 29 and higher or Status 1s. The transplant rate for HCC exception candidates significantly increased from pre-policy under RRB to pre-policy under NLRB, and decreased post-policy compared to both pre-policy eras. Significant increases in transplant rates for HCC exceptions occurred for MELD/PELD scores 33-36, and decreases for MELD/PELD scores 15-28. While waiting list transplant rates increased overall for non-HCC exception candidates, this was not significant.

Table 14. Liver-Alone Transplant Rates Per 100 Active Person-Years Waiting by MELD or PELD Score or Status, Exception Status, and Era

Exception Status = No Exception						
Score or Status Group	Era	N Ever Waiting	N Transplants	Active PY	Transplants/100 Active PY	95% CI
M/P <15	Pre-Policy, RRB	8408	159	3263.9	4.87	4.14, 5.69
	Pre-Policy, NLRB	9855	201	3519.9	5.71	4.95, 6.56
	Post-Policy (overall)	8146	221	3076.6	7.18	6.27, 8.2
M/P 15-28	Pre-Policy, RRB	7439	1560	1931.2	80.78	76.82, 84.89
	Pre-Policy, NLRB	8302	1913	2018.6	94.77	90.57, 99.11
	Post-Policy (overall)	7325	1641	1791.3	91.61	87.23, 96.15
M/P 29-32	Pre-Policy, RRB	1778	526	59.1	889.83	815.4, 969.23
	Pre-Policy, NLRB	1984	618	80.8	764.46	705.37, 827.18
	Post-Policy (overall)	1688	819	35.0	2343.30	2185.54, 2509.44
M/P 33-36	Pre-Policy, RRB	1135	444	22.0	2015.92	1832.75, 2212.45
	Pre-Policy, NLRB	1253	487	31.2	1561.99	1426.33, 1707.08
	Post-Policy (overall)	1045	557	14.6	3818.65	3508.07, 4149.36
M/P 37+, Status Is	Pre-Policy, RRB	1527	1001	35.7	2801.45	2630.57, 2980.52
	Pre-Policy, NLRB	1624	1092	41.5	2630.20	2476.49, 2790.95
	Post-Policy (overall)	1453	1068	26.7	3992.83	3756.92, 4239.67
Overall	Pre-Policy, RRB	15818	3690	6820.3	54.10	52.37, 55.88
	Pre-Policy, NLRB	17701	4311	7257.1	59.40	57.64, 61.2
	Post-Policy (overall)	15786	4306	6531.1	65.93	63.98, 67.93

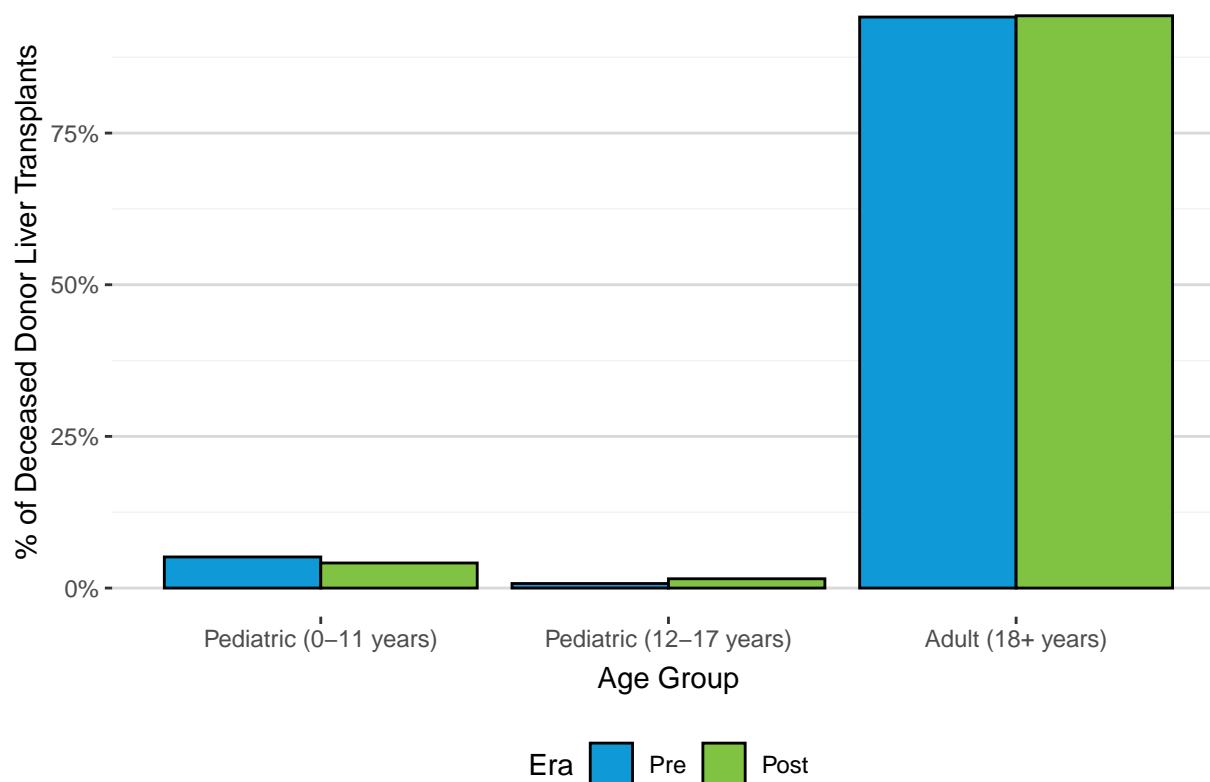
Exception Status = HCC Exception						
Score or Status Group	Era	N Ever Waiting	N Transplants	Active PY	Transplants/100 Active PY	95% CI
M/P <15	Pre-Policy, RRB	2444	32	702.6	4.55	3.12, 6.43
	Pre-Policy, NLRB	1410	20	417.0	4.80	2.93, 7.41
	Post-Policy (overall)	2359	47	640.0	7.34	5.4, 9.77
M/P 15-28	Pre-Policy, RRB	1867	557	333.2	167.16	153.57, 181.64
	Pre-Policy, NLRB	1335	493	249.6	197.51	180.46, 215.74
	Post-Policy (overall)	1948	644	508.1	126.74	117.14, 136.92
M/P 29-32	Pre-Policy, RRB	722	288	114.9	250.66	222.54, 281.34
	Pre-Policy, NLRB	748	247	148.9	165.90	145.86, 187.93
	Post-Policy (overall)	344	122	51.4	237.33	197.09, 283.37
M/P 33-36	Pre-Policy, RRB	167	84	20.7	405.02	323.06, 501.44
	Pre-Policy, NLRB	94	28	8.4	332.68	221.06, 480.82
	Post-Policy (overall)	33	14	0.5	2675.39	1462.66, 4488.85
M/P 37+, Status Is	Pre-Policy, RRB	28	13	1.0	1344.19	715.73, 2298.61
	Pre-Policy, NLRB	26	11	0.5	2433.33	1214.71, 4353.91
	Post-Policy (overall)	17	13	0.2	6083.33	3239.12, 10402.69
Overall	Pre-Policy, RRB	3147	974	1409.1	69.12	64.85, 73.6
	Pre-Policy, NLRB	1939	799	1011.1	79.03	73.64, 84.7
	Post-Policy (overall)	3157	840	1467.3	57.25	53.44, 61.25

Score or Status Group	Era	Exception Status = Non-HCC Exception				95% CI
		N Ever Waiting	N Transplants	Active PY	Transplants/100 Active PY	
M/P <15	Pre-Policy, RRB	963	1	116.6	0.86	0.02, 4.78
	Pre-Policy, NLRB	504	4	66.3	6.03	1.64, 15.44
	Post-Policy (overall)	403	4	50.8	7.88	2.15, 20.18
M/P 15-28	Pre-Policy, RRB	1211	292	317.9	91.86	81.63, 103.03
	Pre-Policy, NLRB	705	203	161.6	125.58	108.9, 144.1
	Post-Policy (overall)	574	173	149.6	115.68	99.08, 134.26
M/P 29-32	Pre-Policy, RRB	588	174	101.0	172.25	147.61, 199.84
	Pre-Policy, NLRB	458	124	105.2	117.86	98.03, 140.52
	Post-Policy (overall)	159	51	26.1	195.15	145.3, 256.58
M/P 33-36	Pre-Policy, RRB	292	125	40.9	305.43	254.24, 363.9
	Pre-Policy, NLRB	183	57	23.6	241.27	182.74, 312.6
	Post-Policy (overall)	134	53	14.8	357.12	267.5, 467.12
M/P 37+, Status 1s	Pre-Policy, RRB	227	133	32.1	414.17	346.78, 490.84
	Pre-Policy, NLRB	119	66	15.3	430.56	333, 547.78
	Post-Policy (overall)	124	78	12.6	618.78	489.12, 772.26
Overall	Pre-Policy, RRB	1708	725	734.5	98.71	91.65, 106.16
	Pre-Policy, NLRB	989	454	474.6	95.65	87.05, 104.87
	Post-Policy (overall)	808	359	314.7	114.07	102.58, 126.5

Section II. Deceased Donor Liver Transplants

Liver-Alone Transplants

Figure 15. Deceased Donor Liver-Alone Transplants by Age Group and Era

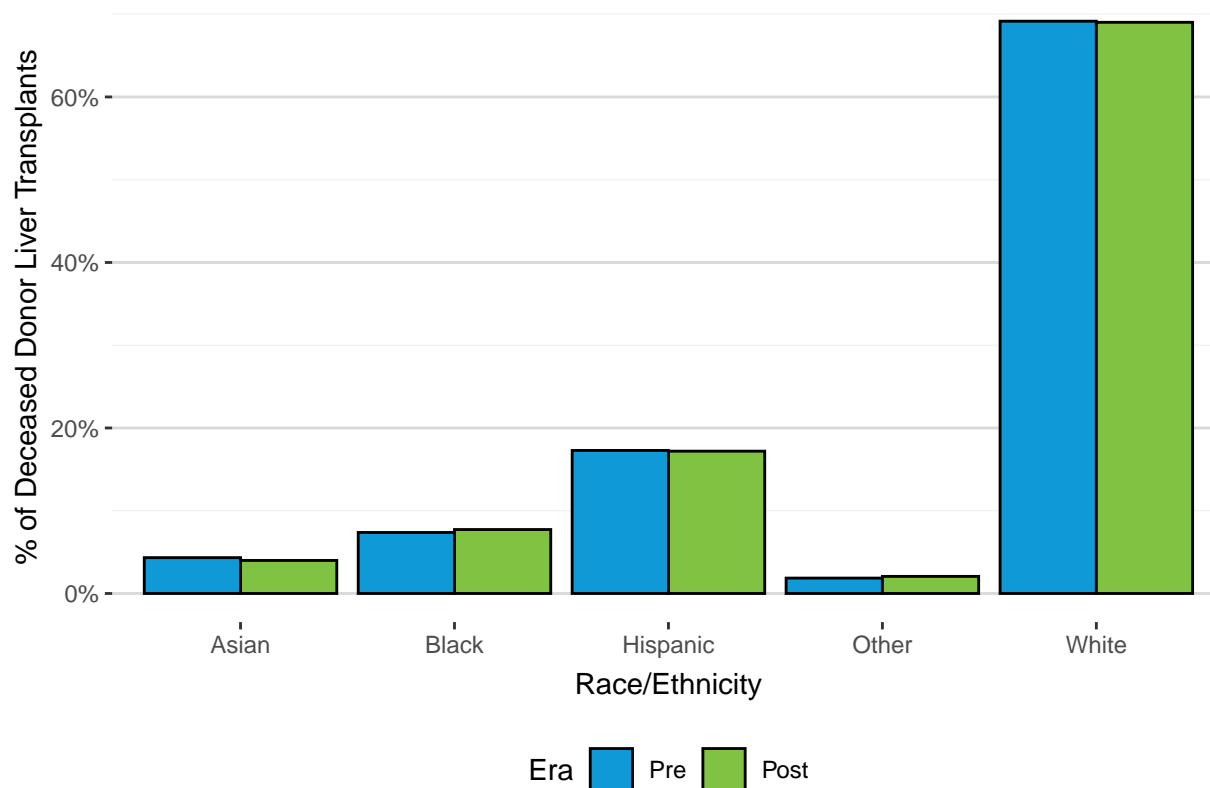


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Table 15. Number and Percent of Deceased Donor Liver-Alone Transplants by Age Group and Era

Age at Transplant	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Pediatric (0-11 years)	226	5.1%	32	3.7%	43	4.3%	103	4.2%	178	4.1%
Pediatric (12-17 years)	33	0.7%	16	1.8%	7	0.7%	43	1.8%	66	1.5%
Adult (18+ years)	4150	94.1%	822	94.5%	958	95.0%	2285	94.0%	4065	94.3%

From the pre- to post-policy implementation eras, deceased donor liver transplant volume slightly decreased for pediatric (0-11 years) and adult (18+ years) recipients, while doubling for older pediatrics (12-17 years). However, the distributions remained fairly similar for adults versus all pediatrics during both policy eras. These observations should be interpreted with caution as the COVID-19 emergency that followed shortly after policy implementation impacted center transplant practices across the U.S.

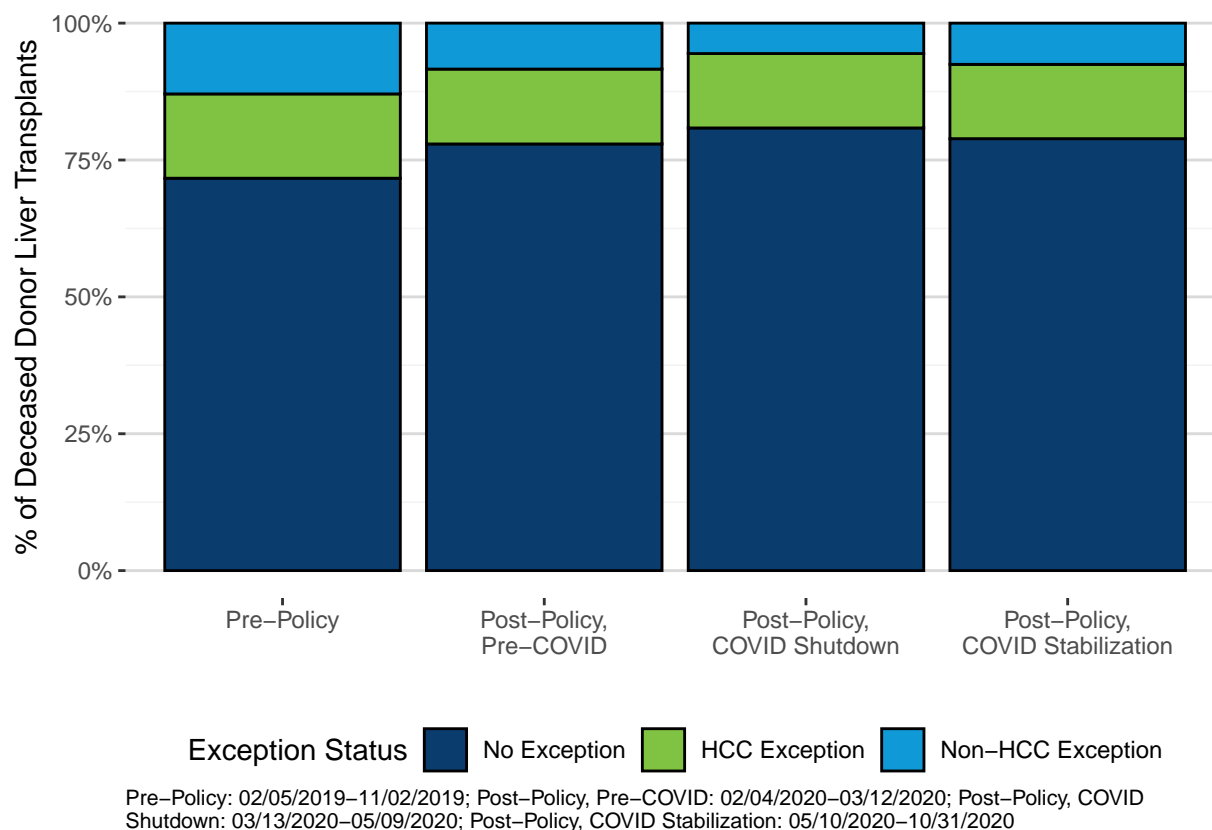
Figure 16. Deceased Donor Liver-Alone Transplants by Race/Ethnicity and Era

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Table 16. Number and Percent of Deceased Donor Liver-Alone Transplants by Race/Ethnicity and Era

Race/Ethnicity	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Asian	191	4.3%	27	3.1%	30	3.0%	115	4.7%	172	4.0%
Black	325	7.4%	66	7.6%	79	7.8%	188	7.7%	333	7.7%
Hispanic	762	17.3%	156	17.9%	179	17.8%	406	16.7%	741	17.2%
Other	82	1.9%	14	1.6%	15	1.5%	60	2.5%	89	2.1%
White	3049	69.2%	607	69.8%	705	69.9%	1662	68.4%	2974	69.0%

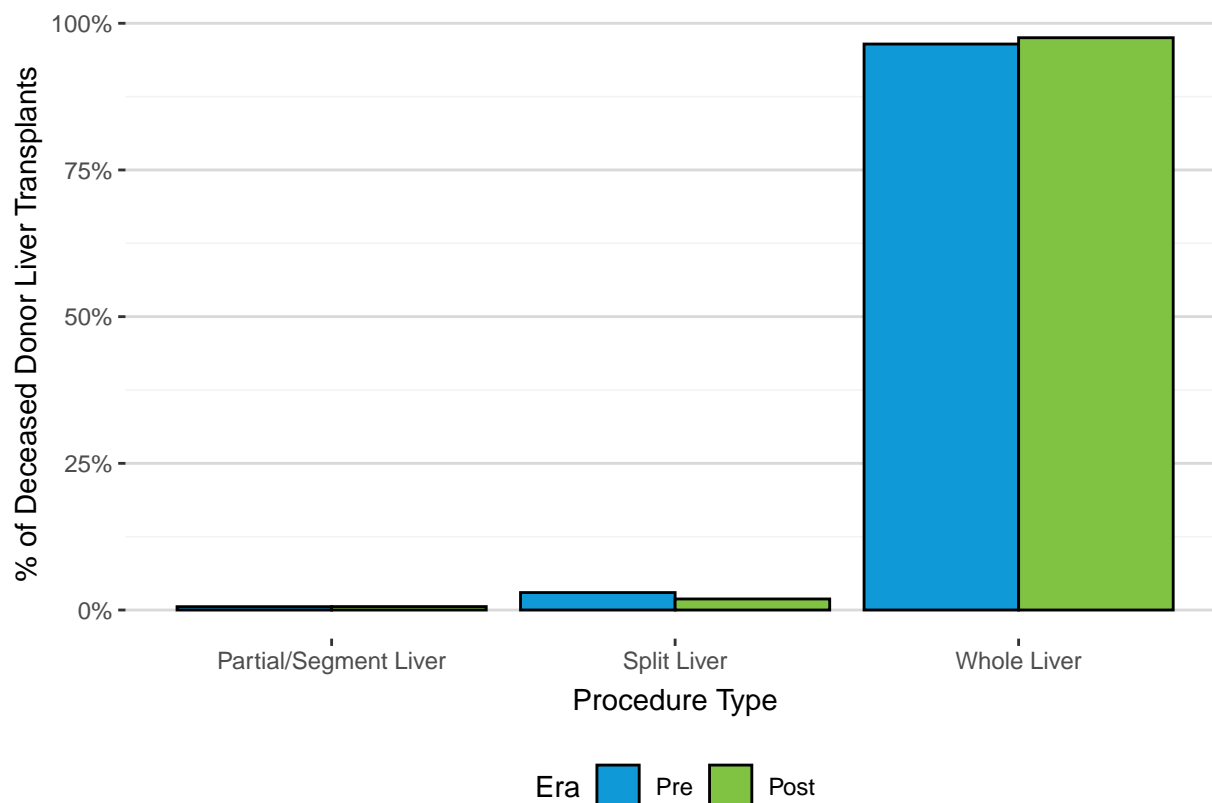
Proportions of transplant recipients by race/ethnicity remained relatively unchanged pre- to post-policy. Changes in deceased donor transplant volume post-policy must be considered in light of the COVID-19 emergency declaration.

Figure 17. Deceased Donor Liver-Alone Transplants by Exception Status and Era**Table 17. Number and Percent of Deceased Donor Liver-Alone Transplants by Exception Status and Era**

Exception Status	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
No Exception	3160	71.7%	678	77.9%	815	80.9%	1918	78.9%	3411	79.2%
HCC Exception	679	15.4%	119	13.7%	137	13.6%	330	13.6%	586	13.6%
Non-HCC Exception	570	12.9%	73	8.4%	56	5.6%	183	7.5%	312	7.2%

Following policy implementation, the proportion of deceased donor, liver-alone transplants decreased for those with an exception - HCC or otherwise - and increased for those with no exception. The most marked change was the decrease in the percentage of non-HCC exception recipients. HCC exception recipients accounted for a similar percentage of transplants pre- and post-policy eras.

It should also be noted that the pre-policy era encompasses time under both the RRB and NLRB systems. The first implementation of the National Liver Review Board policy was on May 14, 2019 (late pre-policy era) and additional changes to the structure of the NLRB occurred when the new allocation policy was implemented.

Figure 18. Deceased Donor Liver-Alone Transplants by Procedure Type and Era

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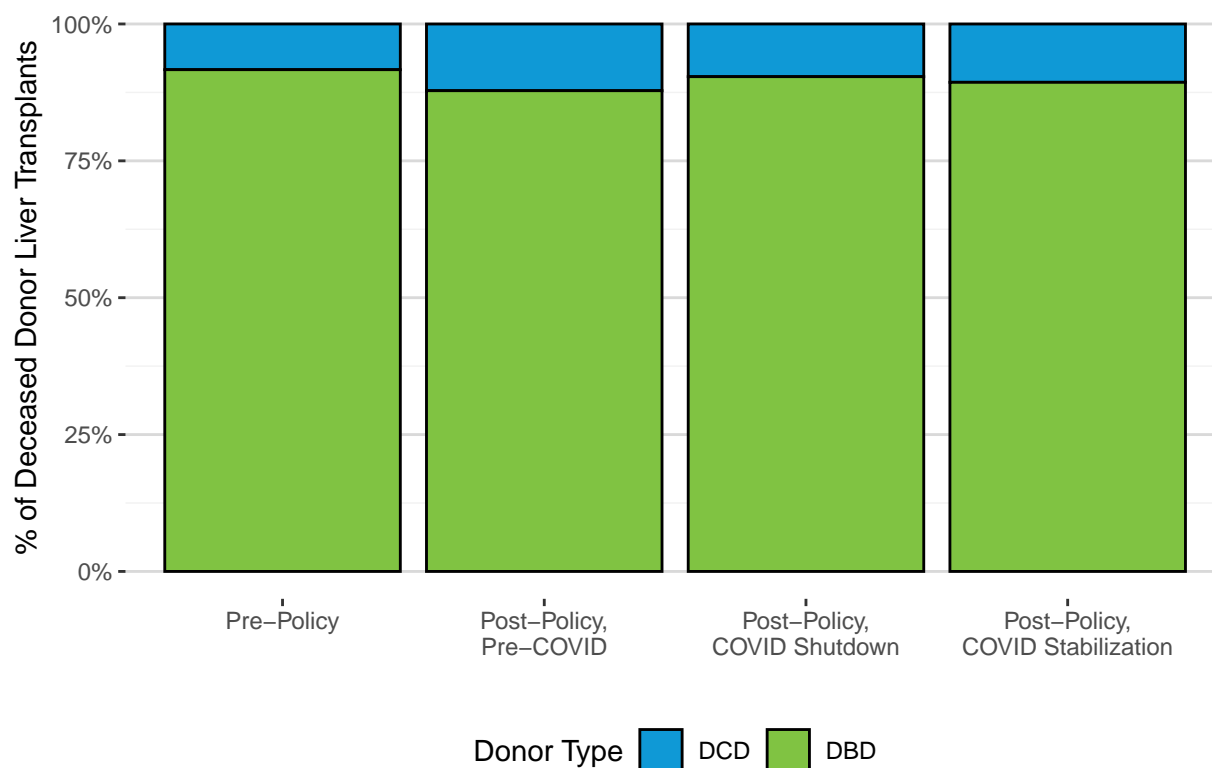
Table 18. Number and Percent of Deceased Donor Liver-Alone Transplants by Procedure Type and Era

Procedure Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Partial/Segment Liver	25	0.6%	7	0.8%	6	0.6%	12	0.5%	25	0.6%
Split Liver	131	3.0%	13	1.5%	16	1.6%	52	2.1%	81	1.9%
Whole Liver	4253	96.5%	850	97.7%	986	97.8%	2367	97.4%	4203	97.5%

Following policy implementation, the volume and proportion of split liver deceased donor transplants decreased. The already small volumes of split liver transplants decreasing may have been due to a number of factors, including the decrease in pediatric deceased donor liver transplants and additional complexity of the procedure during this time period. These changes post-policy must be considered in light of the COVID-19 emergency declaration.

Following policy implementation, the volume and proportion of deceased donor liver transplants from donation after circulatory death (DCD) donors increased; however, there has been an increasing practice of using DCD organs over time for all organs. Changes in deceased donor transplant volume post-policy must be considered in light of the COVID-19 emergency declaration.

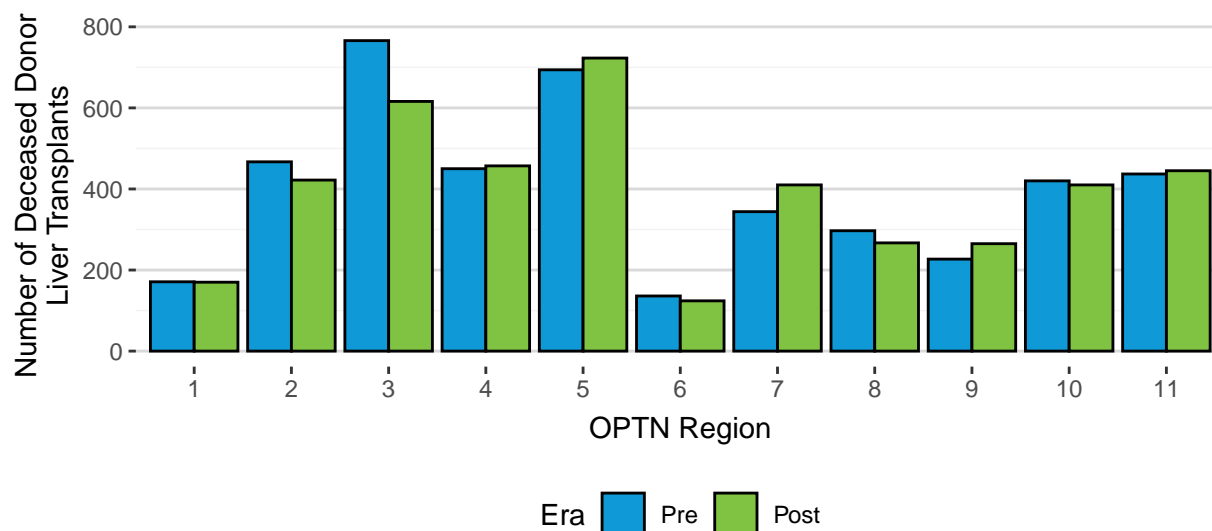
Figure 19. Deceased Donor Liver-Alone Transplants by Donor Type and Era



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 19. Number and Percent of Deceased Donor Liver Transplants by Donor Type and Era

Donor Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
DCD	368	8.3%	106	12.2%	97	9.6%	259	10.7%	462	10.7%
DBD	4041	91.7%	764	87.8%	911	90.4%	2172	89.3%	3847	89.3%

Figure 20. Deceased Donor Liver-Alone Transplants by OPTN Region and Era

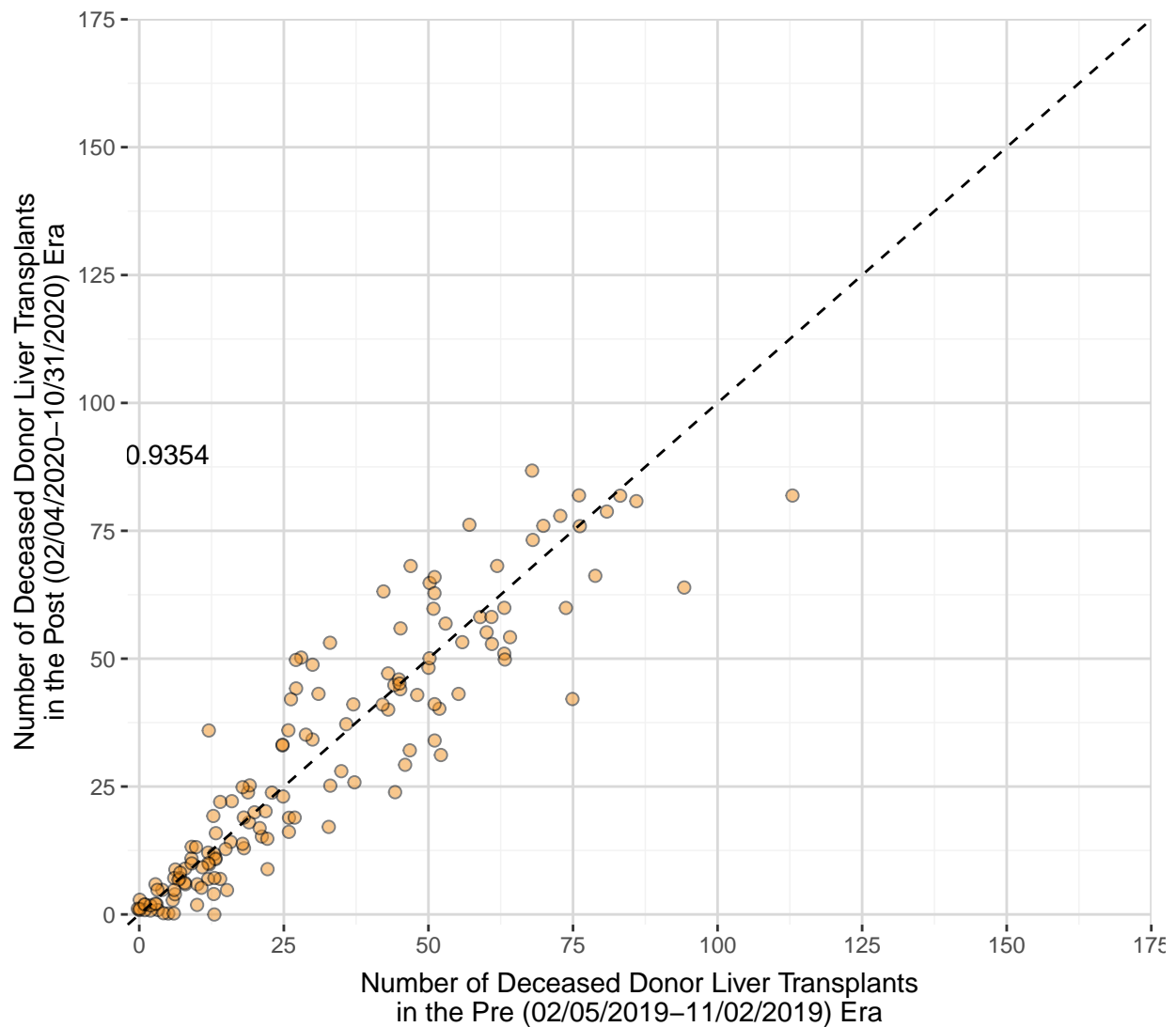
National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.

Table 20. Number and Percent of Deceased Donor Liver Transplants by OPTN Region and Era

OPTN Region	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
1	171	3.9%	52	6.0%	36	3.6%	82	3.4%	170	3.9%
2	467	10.6%	76	8.7%	104	10.3%	242	10.0%	422	9.8%
3	766	17.4%	110	12.6%	146	14.5%	360	14.8%	616	14.3%
4	450	10.2%	99	11.4%	114	11.3%	244	10.0%	457	10.6%
5	694	15.7%	154	17.7%	180	17.9%	389	16.0%	723	16.8%
6	136	3.1%	25	2.9%	26	2.6%	73	3.0%	124	2.9%
7	344	7.8%	94	10.8%	85	8.4%	231	9.5%	410	9.5%
8	297	6.7%	51	5.9%	57	5.7%	159	6.5%	267	6.2%
9	227	5.1%	49	5.6%	55	5.5%	161	6.6%	265	6.1%
10	420	9.5%	84	9.7%	94	9.3%	232	9.5%	410	9.5%
11	437	9.9%	76	8.7%	111	11.0%	258	10.6%	445	10.3%
National	4409	100.0%	870	100.0%	1008	100.0%	2431	100.0%	4309	100.0%

From pre- to post-policy implementation, some OPTN Regions saw drops in deceased donor liver transplant volume while others saw relatively little change. OPTN Regions 4, 5, 7, 9, and 11 experienced slight increases in transplants pre- to post-policy. Changes in deceased donor transplant volume must be considered in light of the COVID-19 emergency declaration and its differential impact across the country.

For more details on the differential impact of COVID-19, visit the [CDC COVID-19 Data Tracker](#). The tables by DSA and state located in the **Appendix** echo these results.

Figure 21. Scatter Plot of Transplant Center Deceased Donor Liver-Alone Transplant Volume

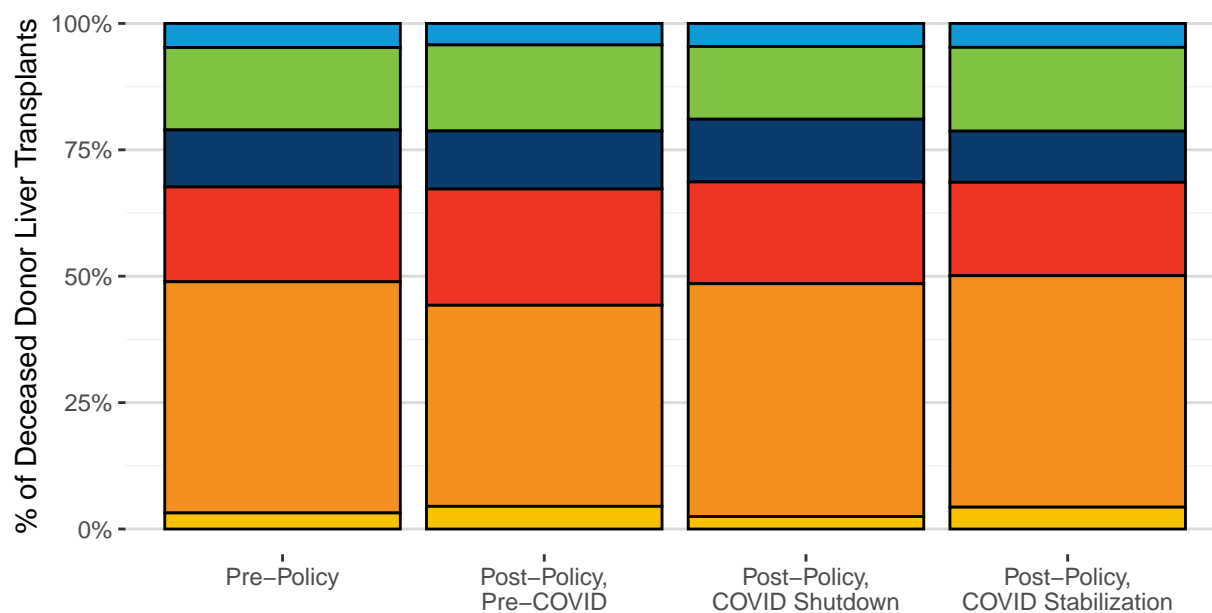
* There was 1 program that is not included due to new activation after the pre era.

** Note that the Post (02/04/2020–10/31/2020) Era contains months during the COVID-19 pandemic.

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 gray shaded region represents a 95% confidence ellipse, assuming a multivariate t-distribution, around the data points. While this is not a true statistical test of a hypothesis that there was a significant change in the number of deceased donor liver transplants performed, it provides some context as to how often and where programs that may fall outside of the rest of the group may be.

The majority of programs performed similar number of deceased donor liver transplants Pre (02/05/2019–11/02/2019) and Post (02/04/2020–10/31/2020) policy, overall. A Spearman's rank correlation (ρ) is provided to measure the strength and direction of the monotonic, not necessarily linear, relationship between the number of deceased donor liver transplants by program pre- and post-policy. There is a strong positive, monotonic relationship between these two measures.

Figure 22. Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status and Era

Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 20. Number and Percent of Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status Group and Era

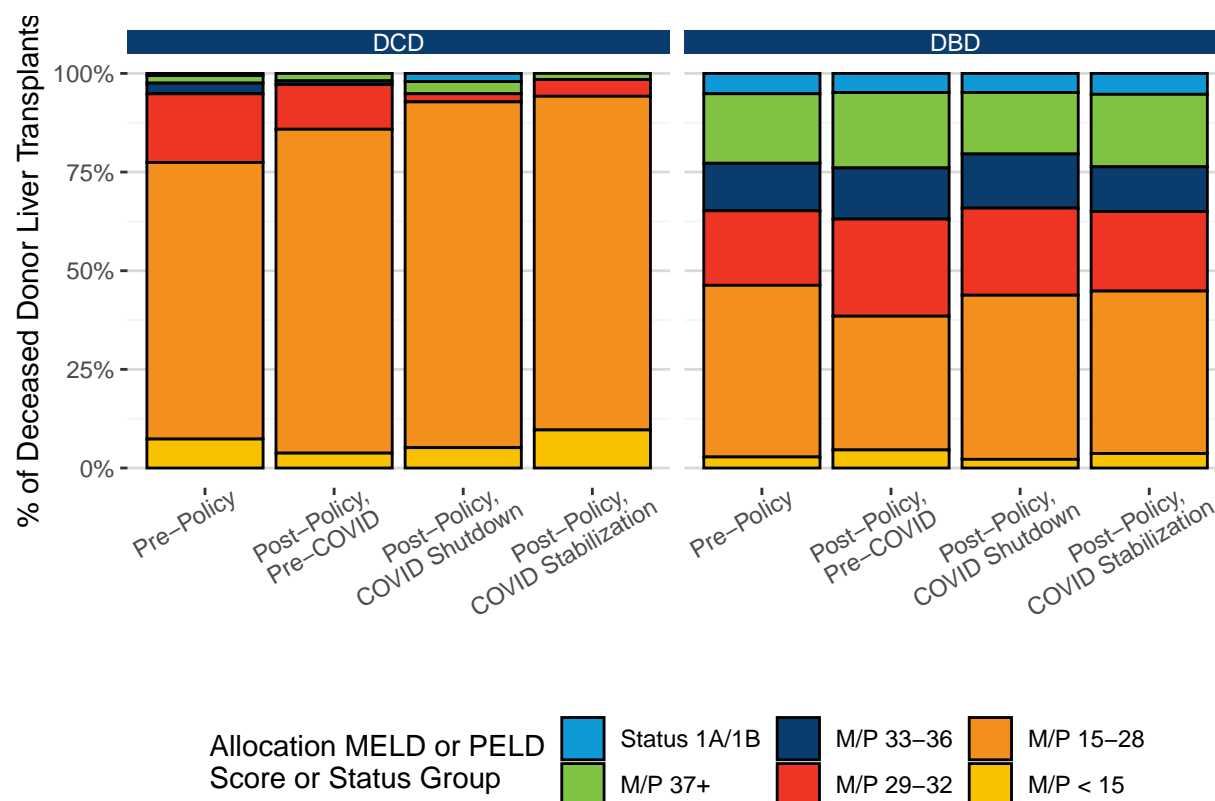
Score or Status Group	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Status 1A/1B	210	4.8%	37	4.3%	46	4.6%	115	4.7%	198	4.6%
M/P 37+	719	16.3%	148	17.0%	145	14.4%	403	16.6%	696	16.2%
M/P 33-36	497	11.3%	100	11.5%	125	12.4%	246	10.1%	471	10.9%
M/P 29-32	827	18.8%	200	23.0%	203	20.1%	449	18.5%	852	19.8%
M/P 15-28	2016	45.7%	346	39.8%	464	46.0%	1113	45.8%	1923	44.6%
M/P < 15	140	3.2%	39	4.5%	25	2.5%	105	4.3%	169	3.9%

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	%
Status 1A/1B	210	4.8%	37	4.3%	46	4.6%	115	4.7%	198	4.6%
M/P 37+	719	16.3%	148	17.0%	145	14.4%	403	16.6%	696	16.2%
M/P 33-36	497	11.3%	100	11.5%	125	12.4%	246	10.1%	471	10.9%
M/P 29-32	827	18.8%	200	23.0%	203	20.1%	449	18.5%	852	19.8%
M/P 15-28	2016	45.7%	346	39.8%	464	46.0%	1113	45.8%	1923	44.6%
M/P < 15	140	3.2%	39	4.5%	25	2.5%	105	4.3%	169	3.9%

Similar percentages of transplants occurred within each score group pre- and post-policy eras.

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. Allocation score distributions and any changes or lack thereof should be interpreted with caution in light of the COVID-19 emergency declaration.

Figure 23. Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status, Donor Type, and Era



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

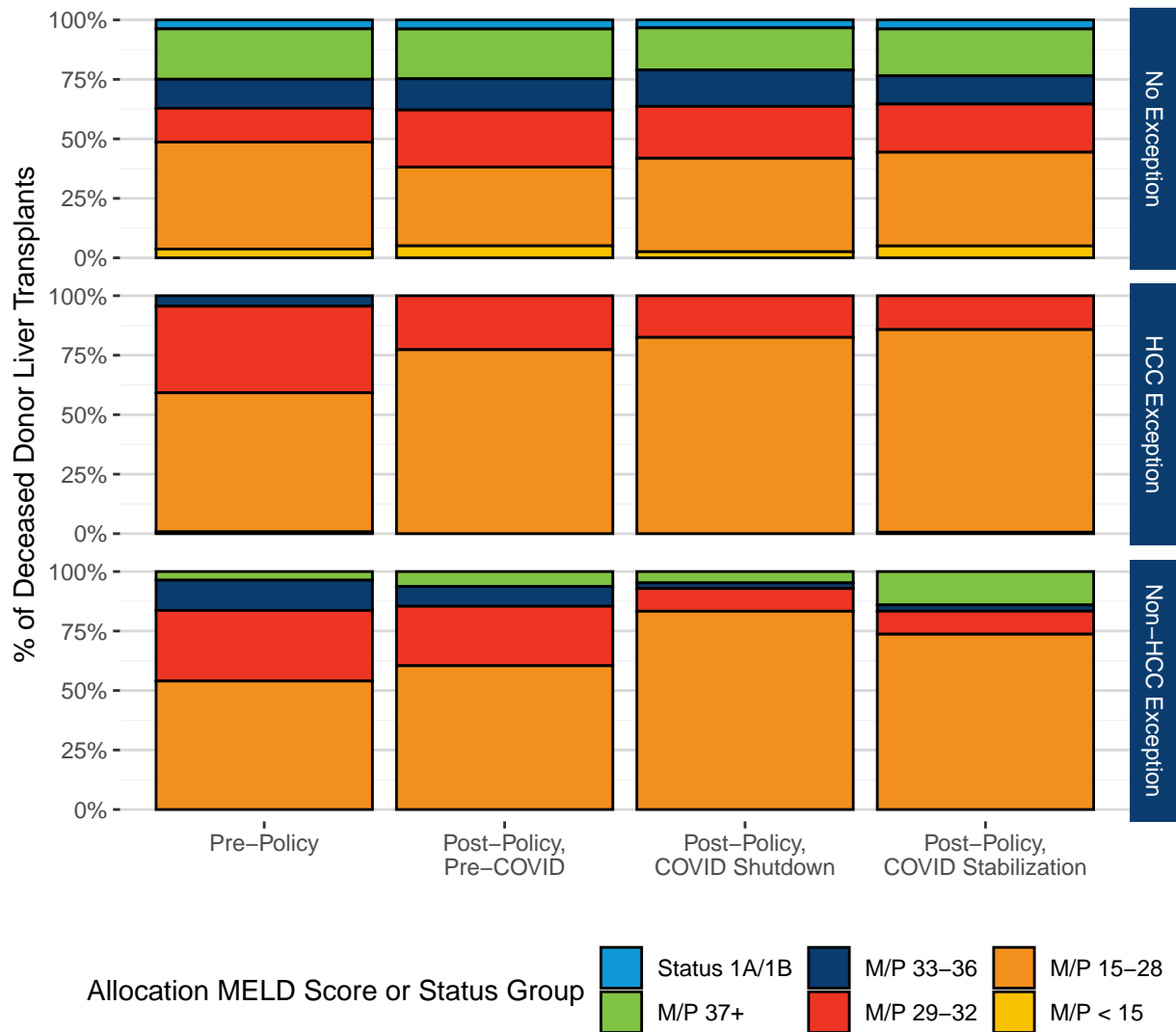
Table 21. Number and Percent of Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status, Donor Type, and Era

Donor Type	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	%
DCD	Status 1A/1B	2	0.5%	0	0.0%	2	2.1%	0	0.0%	2	0.4%
	M/P 37+	7	1.9%	2	1.9%	3	3.1%	4	1.5%	9	1.9%
	M/P 33-36	10	2.7%	1	0.9%	0	0.0%	0	0.0%	1	0.2%
	M/P 29-32	64	17.4%	12	11.3%	2	2.1%	11	4.2%	25	5.4%
	M/P 15-28	258	70.1%	87	82.1%	85	87.6%	219	84.6%	391	84.6%
	M/P < 15	27	7.3%	4	3.8%	5	5.2%	25	9.7%	34	7.4%
DBD	Status 1A/1B	208	5.1%	37	4.8%	44	4.8%	115	5.3%	196	5.1%
	M/P 37+	712	17.6%	146	19.1%	142	15.6%	399	18.4%	687	17.9%
	M/P 33-36	487	12.1%	99	13.0%	125	13.7%	246	11.3%	470	12.2%
	M/P 29-32	763	18.9%	188	24.6%	201	22.1%	438	20.2%	827	21.5%
	M/P 15-28	1758	43.5%	259	33.9%	379	41.6%	894	41.2%	1532	39.8%
	M/P < 15	113	2.8%	35	4.6%	20	2.2%	80	3.7%	135	3.5%

Donor Type	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	%
DCD	Status 1A/1B	2	0.5%	0	0.0%	2	2.1%	0	0.0%	2	0.4%
	M/P 37+	7	1.9%	2	1.9%	3	3.1%	4	1.5%	9	1.9%
	M/P 33-36	10	2.7%	1	0.9%	0	0.0%	0	0.0%	1	0.2%
	M/P 29-32	64	17.4%	12	11.3%	2	2.1%	11	4.2%	25	5.4%
	M/P 15-28	258	70.1%	87	82.1%	85	87.6%	219	84.6%	391	84.6%
	M/P < 15	27	7.3%	4	3.8%	5	5.2%	25	9.7%	34	7.4%
DBD	Status 1A/1B	208	5.1%	37	4.8%	44	4.8%	115	5.3%	196	5.1%
	M/P 37+	712	17.6%	146	19.1%	142	15.6%	399	18.4%	687	17.9%
	M/P 33-36	487	12.1%	99	13.0%	125	13.7%	246	11.3%	470	12.2%
	M/P 29-32	763	18.9%	188	24.6%	201	22.1%	438	20.2%	827	21.5%
	M/P 15-28	1758	43.5%	259	33.9%	379	41.6%	894	41.2%	1532	39.8%
	M/P < 15	113	2.8%	35	4.6%	20	2.2%	80	3.7%	135	3.5%

There was a substantial difference in distribution of allocation scores for transplant recipients of DCD versus DBD donors, both pre- and post-policy. Differences pre- to post-policy in the proportion of score groups was most notable for DCD donors, even within the post-policy eras themselves. Due to the COVID-19 emergency declaration, this finding should be interpreted with caution.

Figure 24. Adult (18+ years) Deceased Donor Liver-Alone Transplants by Allocation MELD Score at Transplant, Exception Status and Era



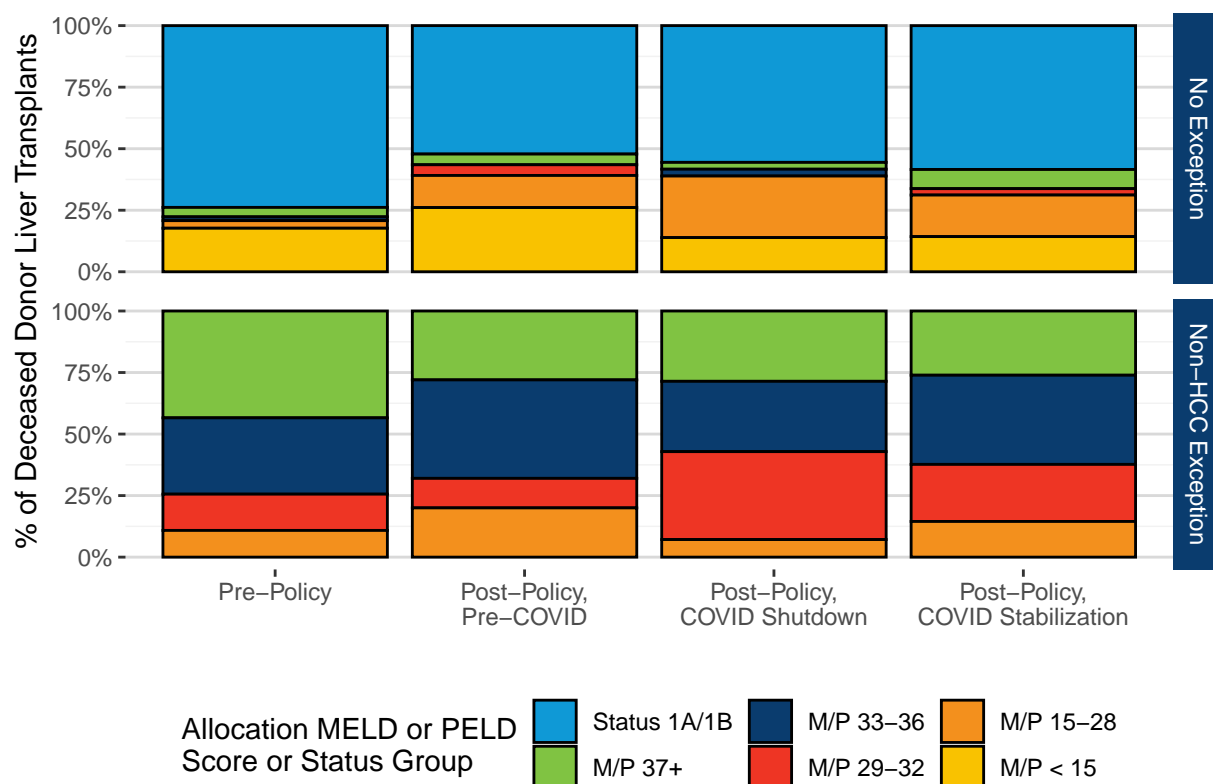
Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 22. Number and Percent of Adult (18+ years) Deceased Donor Liver-Alone Transplants by Allocation MELD Score at Transplant, Exception Status and Era

Exception Status	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	%
No Exception	Status 1A/1B	114	3.8%	25	3.8%	26	3.3%	70	3.8%	121	3.7%
	M/P 37+	642	21.2%	137	20.9%	138	17.7%	363	19.7%	638	19.5%
	M/P 33-36	369	12.2%	86	13.1%	119	15.3%	218	11.8%	423	12.9%
	M/P 29-32	430	14.2%	157	24.0%	170	21.8%	373	20.3%	700	21.4%
	M/P 15-28	1363	45.0%	217	33.1%	306	39.3%	725	39.4%	1248	38.1%
	M/P < 15	112	3.7%	33	5.0%	20	2.6%	92	5.0%	145	4.4%
HCC Exception	Status 1A/1B	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	M/P 37+	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	M/P 33-36	30	4.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	M/P 29-32	247	36.4%	27	22.7%	24	17.5%	47	14.2%	98	16.7%
	M/P 15-28	397	58.5%	92	77.3%	113	82.5%	281	85.2%	486	82.9%
	M/P < 15	5	0.7%	0	0.0%	0	0.0%	2	0.6%	2	0.3%
Non-HCC Exception	Status 1A/1B	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	M/P 37+	16	3.6%	3	6.2%	2	4.8%	16	14.0%	21	10.3%
	M/P 33-36	56	12.7%	4	8.3%	1	2.4%	3	2.6%	8	3.9%
	M/P 29-32	131	29.7%	12	25.0%	4	9.5%	11	9.6%	27	13.2%
	M/P 15-28	238	54.0%	29	60.4%	35	83.3%	84	73.7%	148	72.5%
	M/P < 15	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Exception Status	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	%
No Exception	Status 1A/1B	114	3.8%	25	3.8%	26	3.3%	70	3.8%	121	3.7%
	M/P 37+	642	21.2%	137	20.9%	138	17.7%	363	19.7%	638	19.5%
	M/P 33-36	369	12.2%	86	13.1%	119	15.3%	218	11.8%	423	12.9%
	M/P 29-32	430	14.2%	157	24.0%	170	21.8%	373	20.3%	700	21.4%
	M/P 15-28	1363	45.0%	217	33.1%	306	39.3%	725	39.4%	1248	38.1%
	M/P < 15	112	3.7%	33	5.0%	20	2.6%	92	5.0%	145	4.4%
HCC Exception	M/P 33-36	30	4.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	M/P 29-32	247	36.4%	27	22.7%	24	17.5%	47	14.2%	98	16.7%
	M/P 15-28	397	58.5%	92	77.3%	113	82.5%	281	85.2%	486	82.9%
	M/P < 15	5	0.7%	0	0.0%	0	0.0%	2	0.6%	2	0.3%
	M/P 37+	16	3.6%	3	6.2%	2	4.8%	16	14.0%	21	10.3%
Non-HCC Exception	M/P 33-36	56	12.7%	4	8.3%	1	2.4%	3	2.6%	8	3.9%
	M/P 29-32	131	29.7%	12	25.0%	4	9.5%	11	9.6%	27	13.2%
	M/P 15-28	238	54.0%	29	60.4%	35	83.3%	84	73.7%	148	72.5%
	M/P < 15	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

The distributions of allocation MELD scores or status at transplant by exception status for adult (age 18+) recipients show changes in distributions, particularly for HCC and non-HCC exception recipients.

Figure 25. Pediatric (< 18 years) Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score at Transplant, Exception Status and Era

Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 23. Number and Percent of Pediatric (< 18 years) Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score at Transplant, Exception Status, and Era

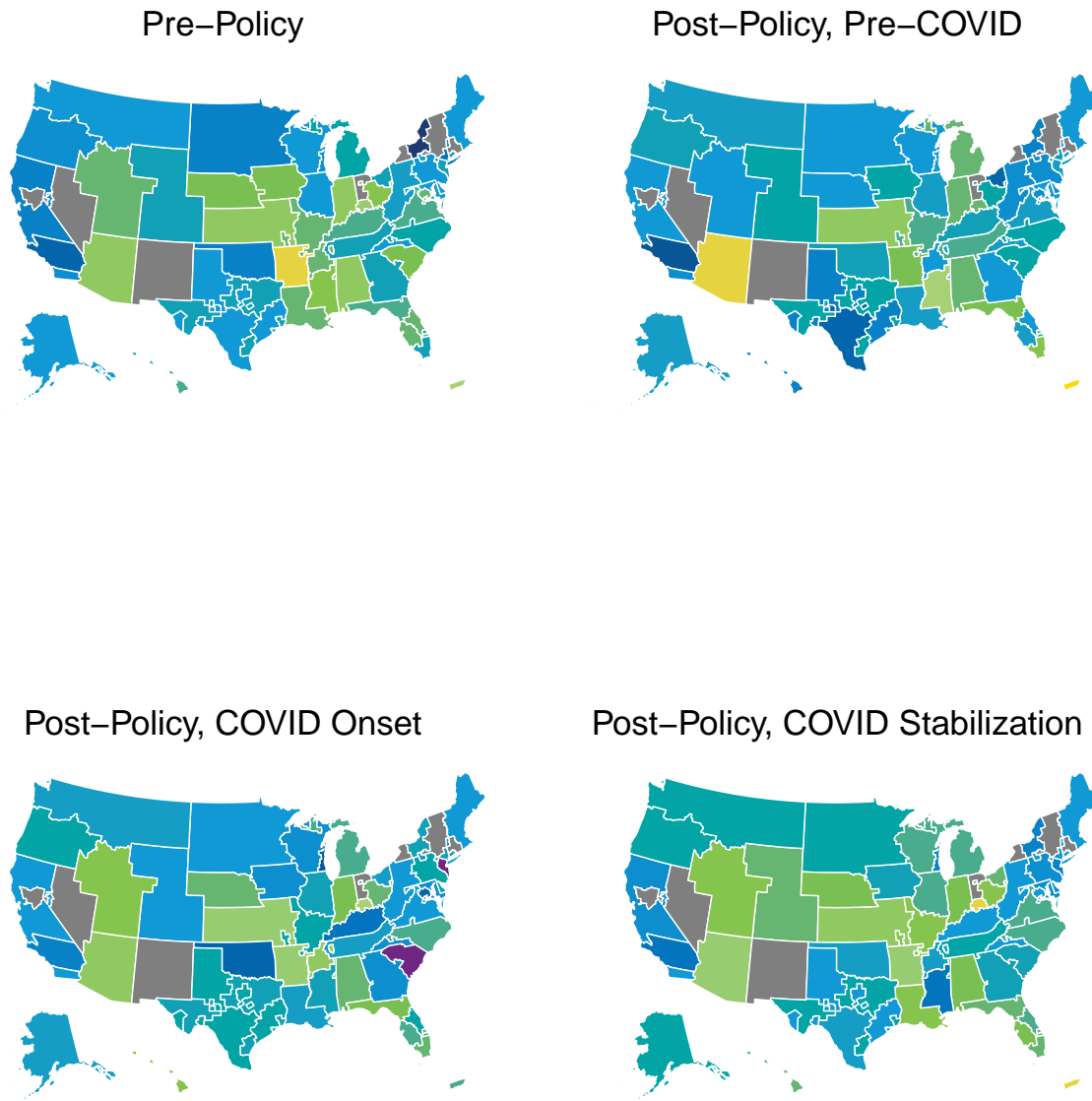
Exception Status	Score or Status Group	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
No Exception	Status 1A/1B	96	73.8%	12	52.2%	20	55.6%	45	58.4%	77	56.6%
	M/P 37+	5	3.8%	1	4.3%	1	2.8%	6	7.8%	8	5.9%
	M/P 33-36	2	1.5%	0	0.0%	1	2.8%	0	0.0%	1	0.7%
	M/P 29-32	0	0.0%	1	4.3%	0	0.0%	2	2.6%	3	2.2%
	M/P 15-28	4	3.1%	3	13.0%	9	25.0%	13	16.9%	25	18.4%
	M/P < 15	23	17.7%	6	26.1%	5	13.9%	11	14.3%	22	16.2%
Non-HCC Exception	Status 1A/1B	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	M/P 37+	56	43.4%	7	28.0%	4	28.6%	18	26.1%	29	26.9%
	M/P 33-36	40	31.0%	10	40.0%	4	28.6%	25	36.2%	39	36.1%
	M/P 29-32	19	14.7%	3	12.0%	5	35.7%	16	23.2%	24	22.2%
	M/P 15-28	14	10.9%	5	20.0%	1	7.1%	10	14.5%	16	14.8%
	M/P < 15	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Exception Status	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	%
No Exception	Status 1A/1B	96	73.8%	12	52.2%	20	55.6%	45	58.4%	77	56.6%
	PELD >40	1	0.8%	0	0.0%	1	2.8%	4	5.2%	5	3.7%
	M/P 37-40	4	3.1%	1	4.3%	0	0.0%	2	2.6%	3	2.2%
	M/P 33-36	2	1.5%	0	0.0%	1	2.8%	0	0.0%	1	0.7%
	M/P 29-32	0	0.0%	1	4.3%	0	0.0%	2	2.6%	3	2.2%
	M/P 15-28	4	3.1%	3	13.0%	9	25.0%	13	16.9%	25	18.4%
	M/P < 15	23	17.7%	6	26.1%	5	13.9%	11	14.3%	22	16.2%
Non-HCC Exception	PELD >40	22	17.1%	2	8.0%	2	14.3%	5	7.2%	9	8.3%
	M/P 37-40	34	26.4%	5	20.0%	2	14.3%	13	18.8%	20	18.5%
	M/P 33-36	40	31.0%	10	40.0%	4	28.6%	25	36.2%	39	36.1%
	M/P 29-32	19	14.7%	3	12.0%	5	35.7%	16	23.2%	24	22.2%
	M/P 15-28	14	10.9%	5	20.0%	1	7.1%	10	14.5%	16	14.8%

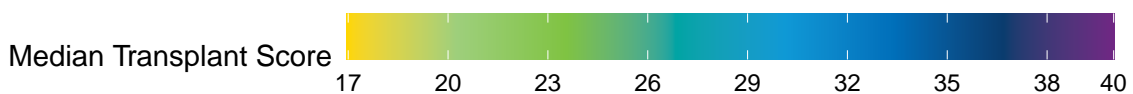
Similarly reviewing allocation score or status at transplant for pediatric recipients (age < 18), there have been changes in the distribution of scores by exception status. There was a shift in many of the high-PELD scores over 35 towards the median post-policy, aligning with the median PELD at transplant score that most exceptions are awarded based off of at 35.

The range of median transplant scores (MTS) by DSA was 18 to 37 in the pre-policy era. Within the 3 post-policy eras, the range of MTS by DSA was anywhere from 17 to 40. It is important to keep in mind that all post-policy periods are relatively short compared to the full pre-implementation period. However, the most recent post-policy era (Post-Policy, COVID Stabilization) does illustrate an attenuation of MTS from the extremes.

Figure 26. Median Deceased Donor Liver-Alone Recipient Allocation MELD or PELD Score at Transplant by DSA of Transplant Center and Era



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020



It was also crucial to quantify the variation in median allocation MELD or PELD 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.

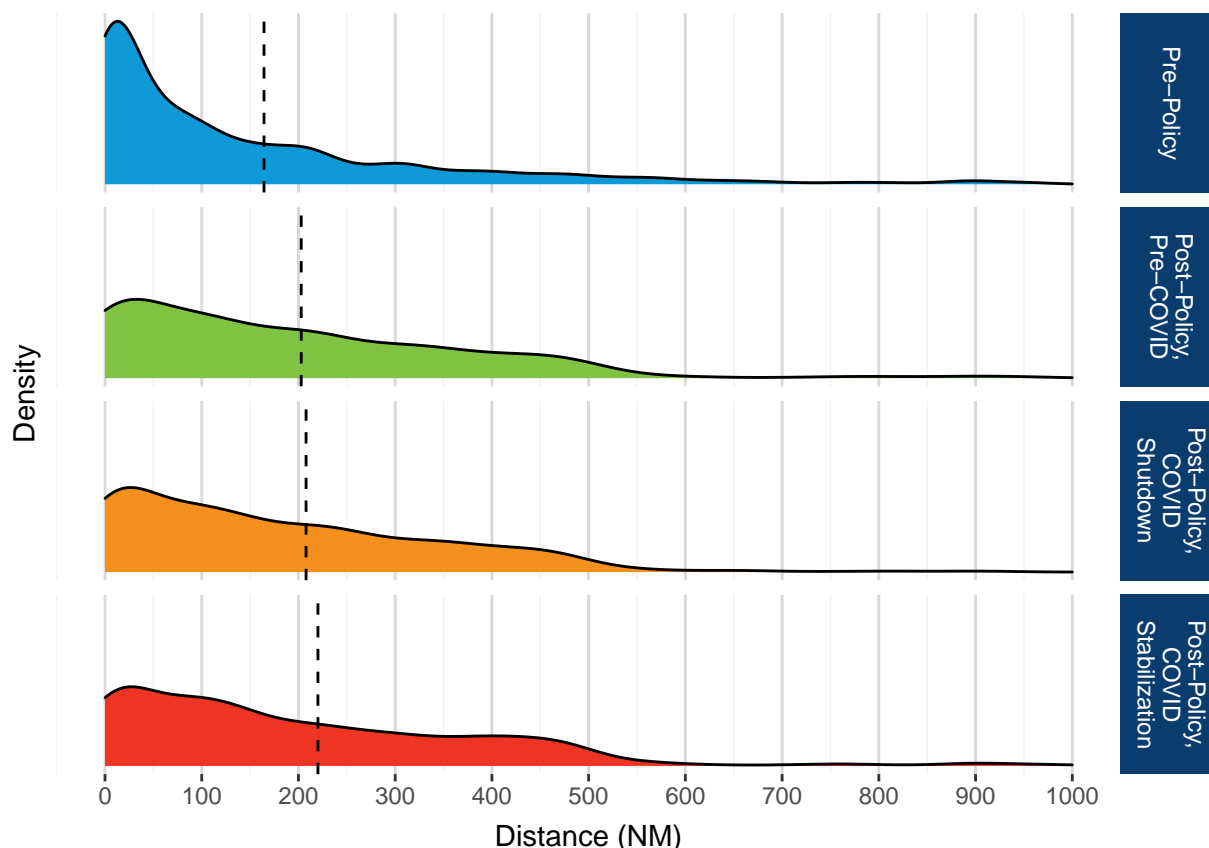
While patterns of decreasing variation of median allocation score at transplant are beginning to emerge, these changes should be interpreted with caution in light of the COVID-19 emergency declaration. Particularly in these smaller post-policy implementation time periods and as the sample size per geographic unit gets smaller.

Table 24. Variance and Standard Deviation of Median Deceased Donor Liver-Along Recipient Allocation MELD or PELD 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	8.25	2.87	4.67	2.16	4.29	2.07	6.96	2.64	4.82	2.20
DSA	15.11	3.89	13.68	3.70	18.00	4.24	13.21	3.64	11.92	3.45
State	17.93	4.23	15.82	3.98	19.14	4.38	12.29	3.51	13.15	3.63
Transplant Center	24.50	4.95	36.82	6.07	31.94	5.65	28.49	5.34	24.92	4.99

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 distance between donor hospital and transplant center. There has been a shift towards farther distances in the post-policy periods.

Figure 27. Distribution of Distance from Donor Hospital to Transplant Center for Deceased Donor Liver-Alone Transplants by Era



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

** Dotted lines indicate average distance within each era.

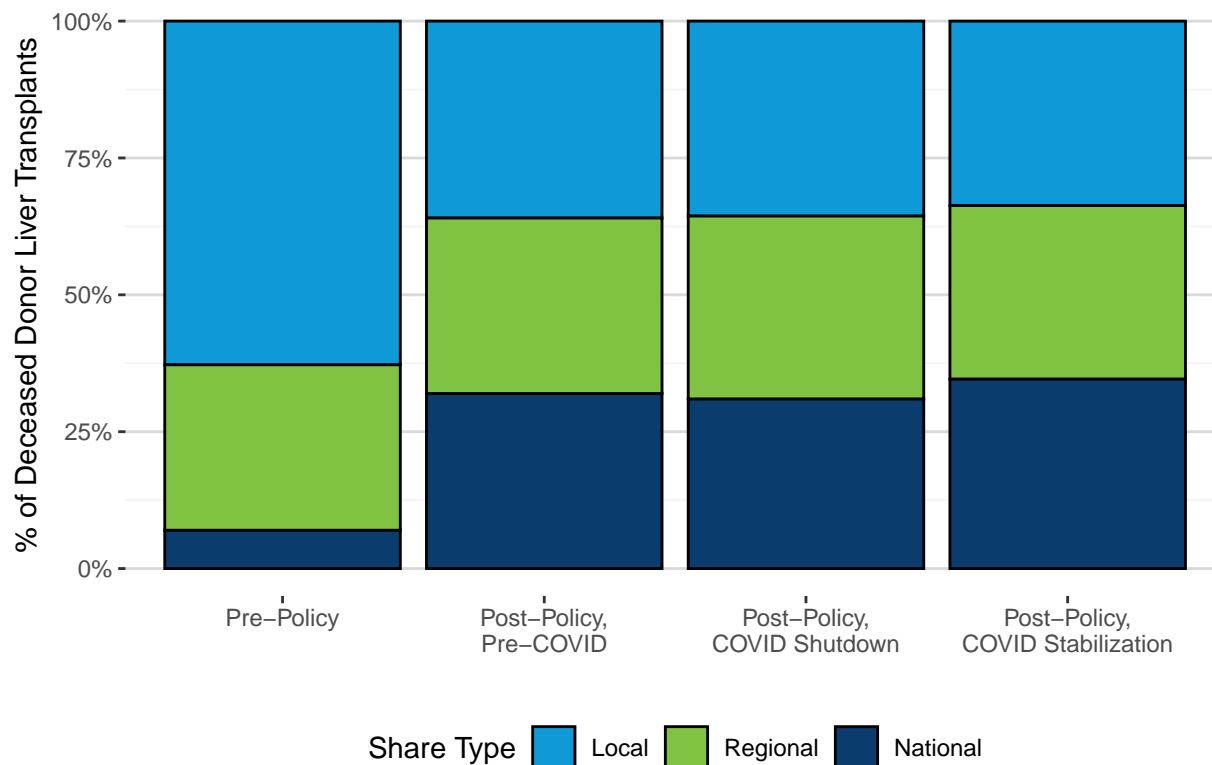
*** There were 64 pre-policy and 71 post-policy transplants > 1000 NM that were excluded.

Table 25. Summary of Distance from Donor Hospital to Transplant Center for Deceased Donor Liver-Alone Transplants by Era

Policy Era	Distance (NM)					
	Minimum	25th Percentile	Mean	Median	75th Percentile	Maximum
Pre-Policy	0	12.00	164.40	79.0	215	2310
Post-Policy, Pre-COVID	0	47.00	202.85	146.0	307	1592
Post-Policy, COVID Shutdown	0	41.75	207.87	145.5	297	2108
Post-Policy, COVID Stabilization	0	56.00	220.16	151.0	321	2336
Post-Policy (overall)	0	51.00	213.79	148.0	314	2336

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. There are fairly equal percentages of liver transplants in the local, regional, and national share types across the post-policy eras.

Figure 28. Deceased Donor Liver-Alone Transplants by Donor Share Type and Era



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 26. Number and Percent of Deceased Donor Liver-Alone Transplants by Donor Share Type and Era

Share Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Local	2768	62.8%	313	36.0%	359	35.6%	819	33.7%	1491	34.6%
Regional	1333	30.2%	279	32.1%	337	33.4%	771	31.7%	1387	32.2%
National	308	7.0%	278	32.0%	312	31.0%	841	34.6%	1431	33.2%

Share Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Local	2768	62.8%	313	36.0%	359	35.6%	819	33.7%	1491	34.6%
Regional	1333	30.2%	279	32.1%	337	33.4%	771	31.7%	1387	32.2%
National	308	7.0%	278	32.0%	312	31.0%	841	34.6%	1431	33.2%

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 150 NM but within 500 NM of the donor hospital, corresponding to the >150-250 NM and >250-500 NM classifications.

Figure 29. Deceased Donor Liver-Alone Transplants by Classification Distance and Era

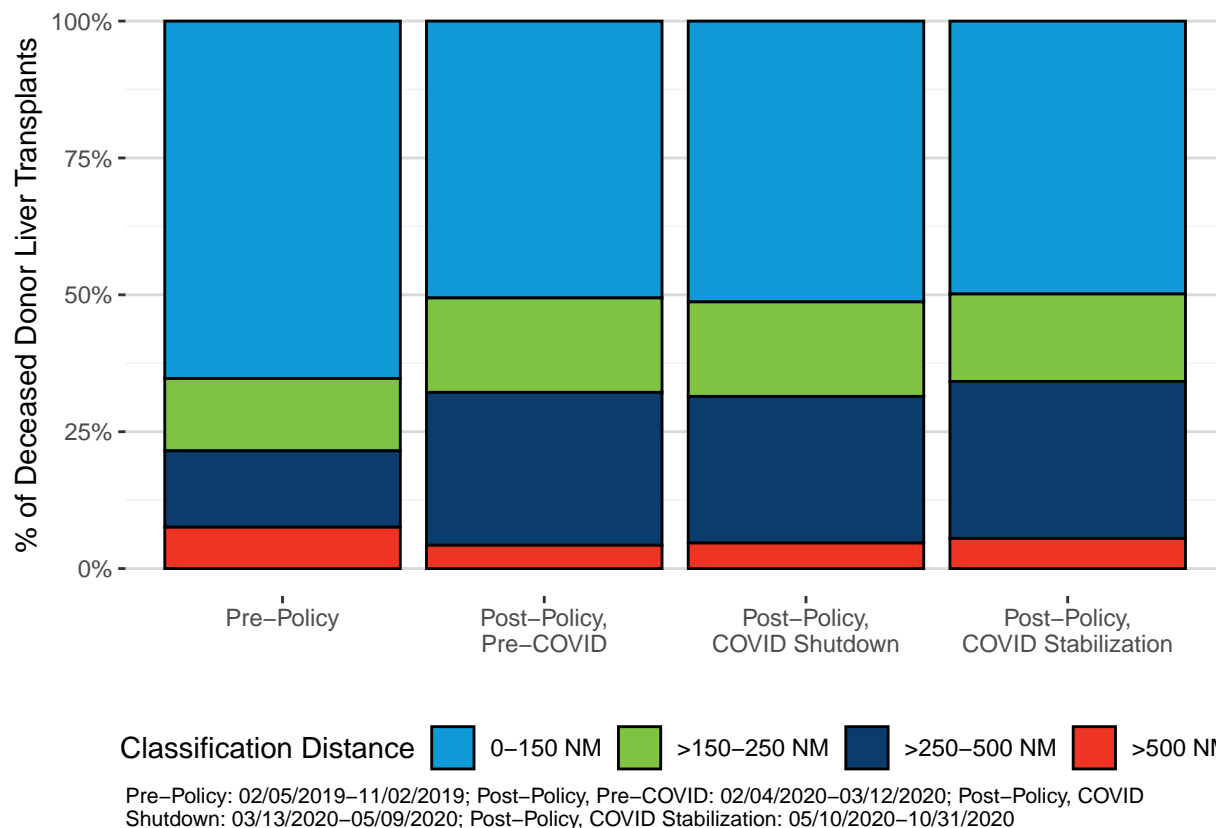


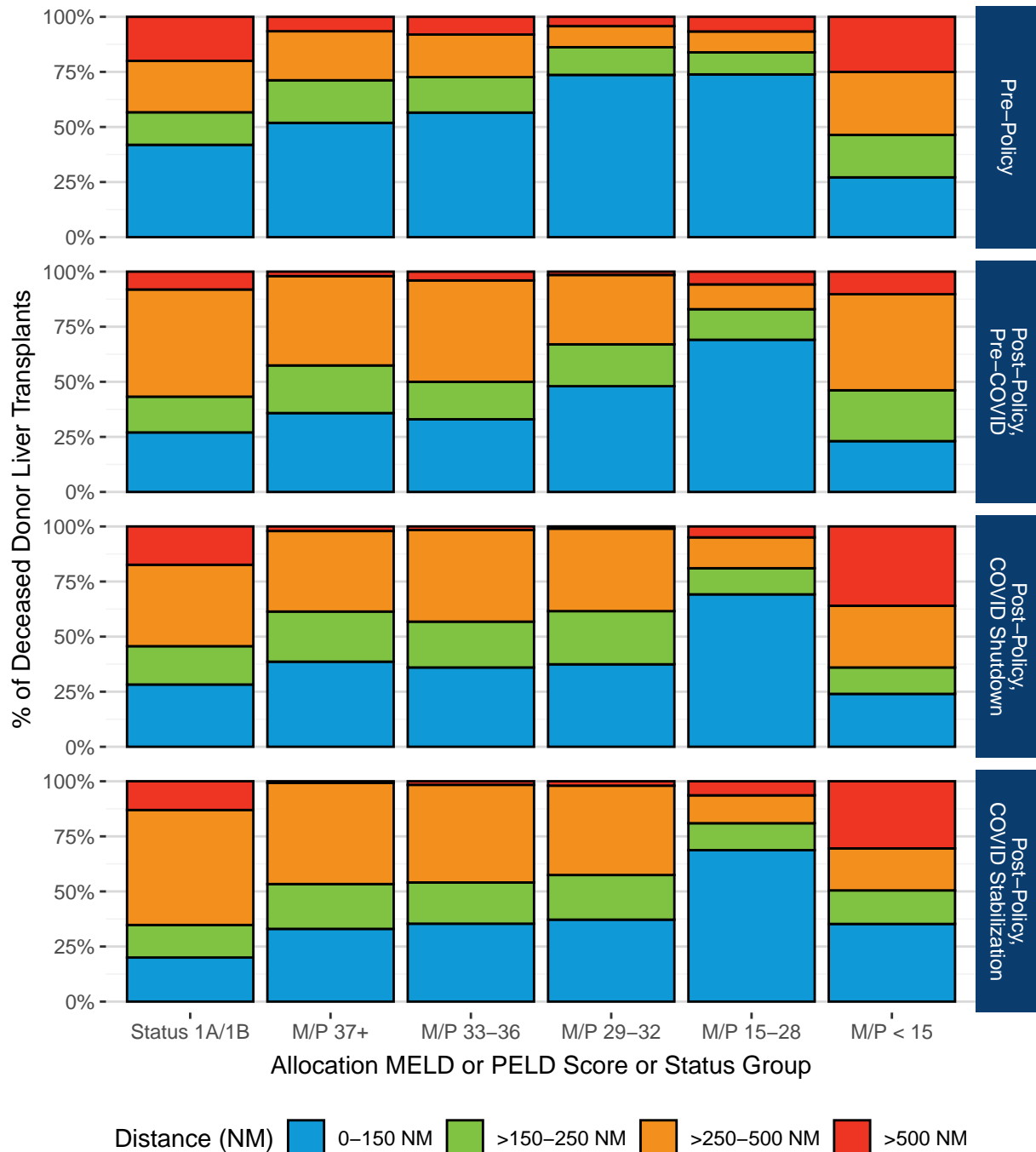
Table 27. Number and Percent of Deceased Donor Liver-Alone Transplants by Classification Distance and Era

Classification Distance	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
0-150 NM	2878	65.3%	440	50.6%	517	51.3%	1212	49.9%	2169	50.3%
>150-250 NM	583	13.2%	150	17.2%	174	17.3%	388	16.0%	712	16.5%
>250-500 NM	615	13.9%	243	27.9%	270	26.8%	697	28.7%	1210	28.1%
>500 NM	333	7.6%	37	4.3%	47	4.7%	134	5.5%	218	5.1%

Classification Distance	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
0-150 NM	2878	65.3%	440	50.6%	517	51.3%	1212	49.9%	2169	50.3%
>150-250 NM	583	13.2%	150	17.2%	174	17.3%	388	16.0%	712	16.5%
>250-500 NM	615	13.9%	243	27.9%	270	26.8%	697	28.7%	1210	28.1%
>500 NM	333	7.6%	37	4.3%	47	4.7%	134	5.5%	218	5.1%

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 and PELD scores of 15-28 and < 15 remained similar to pre-policy distributions.

Figure 30. Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status, Classification Distance, and Era

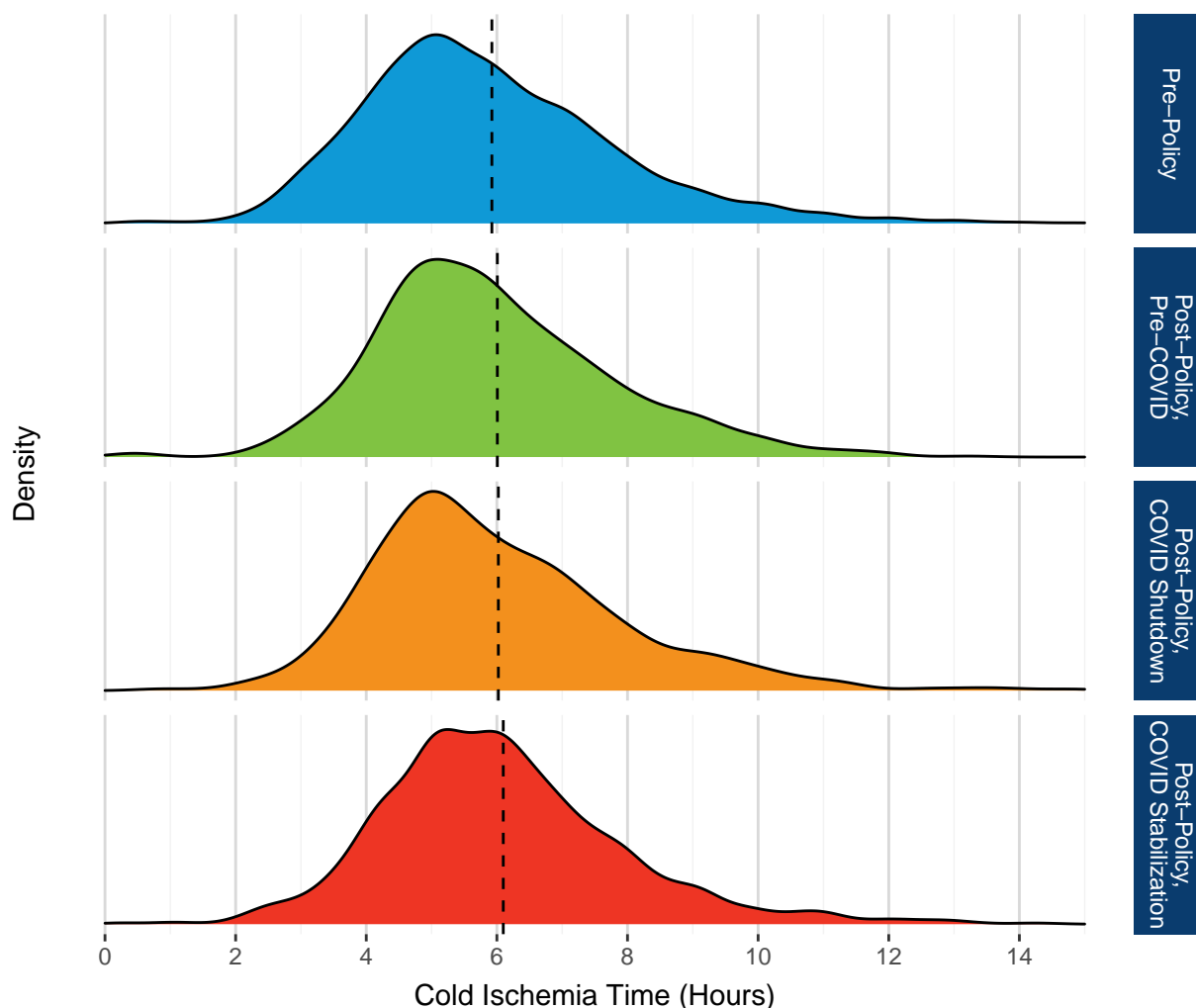


Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 28. Number and Percent of Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status, Classification Distance, and Era

Score or Status Group	Classification Distance	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
Status 1A/1B	0-150 NM	88	41.9%	10	27.0%	13	28.3%	23	20.0%	46	23.2%
	>150-250 NM	31	14.8%	6	16.2%	8	17.4%	17	14.8%	31	15.7%
	>250-500 NM	49	23.3%	18	48.6%	17	37.0%	60	52.2%	95	48.0%
	>500 NM	42	20.0%	3	8.1%	8	17.4%	15	13.0%	26	13.1%
M/P 37+	0-150 NM	373	51.9%	53	35.8%	56	38.6%	133	33.0%	242	34.8%
	>150-250 NM	139	19.3%	32	21.6%	33	22.8%	82	20.3%	147	21.1%
	>250-500 NM	160	22.3%	60	40.5%	53	36.6%	185	45.9%	298	42.8%
	>500 NM	47	6.5%	3	2.0%	3	2.1%	3	0.7%	9	1.3%
M/P 33-36	0-150 NM	281	56.5%	33	33.0%	45	36.0%	87	35.4%	165	35.0%
	>150-250 NM	80	16.1%	17	17.0%	26	20.8%	46	18.7%	89	18.9%
	>250-500 NM	96	19.3%	46	46.0%	52	41.6%	109	44.3%	207	43.9%
	>500 NM	40	8.0%	4	4.0%	2	1.6%	4	1.6%	10	2.1%
M/P 29-32	0-150 NM	609	73.6%	96	48.0%	76	37.4%	167	37.2%	339	39.8%
	>150-250 NM	104	12.6%	38	19.0%	49	24.1%	91	20.3%	178	20.9%
	>250-500 NM	79	9.6%	63	31.5%	76	37.4%	182	40.5%	321	37.7%
	>500 NM	35	4.2%	3	1.5%	2	1.0%	9	2.0%	14	1.6%
M/P 15-28	0-150 NM	1489	73.9%	239	69.1%	321	69.2%	765	68.7%	1325	68.9%
	>150-250 NM	202	10.0%	48	13.9%	55	11.9%	136	12.2%	239	12.4%
	>250-500 NM	191	9.5%	39	11.3%	65	14.0%	141	12.7%	245	12.7%
	>500 NM	134	6.6%	20	5.8%	23	5.0%	71	6.4%	114	5.9%
M/P < 15	0-150 NM	38	27.1%	9	23.1%	6	24.0%	37	35.2%	52	30.8%
	>150-250 NM	27	19.3%	9	23.1%	3	12.0%	16	15.2%	28	16.6%
	>250-500 NM	40	28.6%	17	43.6%	7	28.0%	20	19.0%	44	26.0%
	>500 NM	35	25.0%	4	10.3%	9	36.0%	32	30.5%	45	26.6%

Classification Distance	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	%
0-150 NM	Status 1A/1B	88	3.1%	10	2.3%	13	2.5%	23	1.9%	46	2.1%
	M/P 37+	373	13.0%	53	12.0%	56	10.8%	133	11.0%	242	11.2%
	M/P 33-36	281	9.8%	33	7.5%	45	8.7%	87	7.2%	165	7.6%
	M/P 29-32	609	21.2%	96	21.8%	76	14.7%	167	13.8%	339	15.6%
	M/P 15-28	1489	51.7%	239	54.3%	321	62.1%	765	63.1%	1325	61.1%
	M/P < 15	38	1.3%	9	2.0%	6	1.2%	37	3.1%	52	2.4%
>150-250 NM	Status 1A/1B	31	5.3%	6	4.0%	8	4.6%	17	4.4%	31	4.4%
	M/P 37+	139	23.8%	32	21.3%	33	19.0%	82	21.1%	147	20.6%
	M/P 33-36	80	13.7%	17	11.3%	26	14.9%	46	11.9%	89	12.5%
	M/P 29-32	104	17.8%	38	25.3%	49	28.2%	91	23.5%	178	25.0%
	M/P 15-28	202	34.6%	48	32.0%	55	31.6%	136	35.1%	239	33.6%
	M/P < 15	27	4.6%	9	6.0%	3	1.7%	16	4.1%	28	3.9%
>250-500 NM	Status 1A/1B	49	8.0%	18	7.4%	17	6.3%	60	8.6%	95	7.9%
	M/P 37+	160	26.0%	60	24.7%	53	19.6%	185	26.5%	298	24.6%
	M/P 33-36	96	15.6%	46	18.9%	52	19.3%	109	15.6%	207	17.1%
	M/P 29-32	79	12.8%	63	25.9%	76	28.1%	182	26.1%	321	26.5%
	M/P 15-28	191	31.1%	39	16.0%	65	24.1%	141	20.2%	245	20.2%
	M/P < 15	40	6.5%	17	7.0%	7	2.6%	20	2.9%	44	3.6%
>500 NM	Status 1A/1B	42	12.6%	3	8.1%	8	17.0%	15	11.2%	26	11.9%
	M/P 37+	47	14.1%	3	8.1%	3	6.4%	3	2.2%	9	4.1%
	M/P 33-36	40	12.0%	4	10.8%	2	4.3%	4	3.0%	10	4.6%
	M/P 29-32	35	10.5%	3	8.1%	2	4.3%	9	6.7%	14	6.4%
	M/P 15-28	134	40.2%	20	54.1%	23	48.9%	71	53.0%	114	52.3%
	M/P < 15	35	10.5%	4	10.8%	9	19.1%	32	23.9%	45	20.6%

Figure 31. Distribution of Cold Ischemia Time by Era

Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

** Dotted lines indicate average cold ischemia time within each era.

*** There were 26 pre-policy and 79 post-policy transplant recipients with missing cold ischemia time that are not included.

^ There were 12 pre-policy and 9 post-policy transplant recipients with cold ischemia time > 15 hours not included.

The average cold ischemia time increased by roughly 5-10 minutes in the post-policy eras compared to pre-policy. Changes in cold ischemia time post-policy should take into consideration the missingness of this measurement for approximately 3% of transplants at this time (versus 0.6% pre-policy) as well as the COVID-19 emergency declaration.

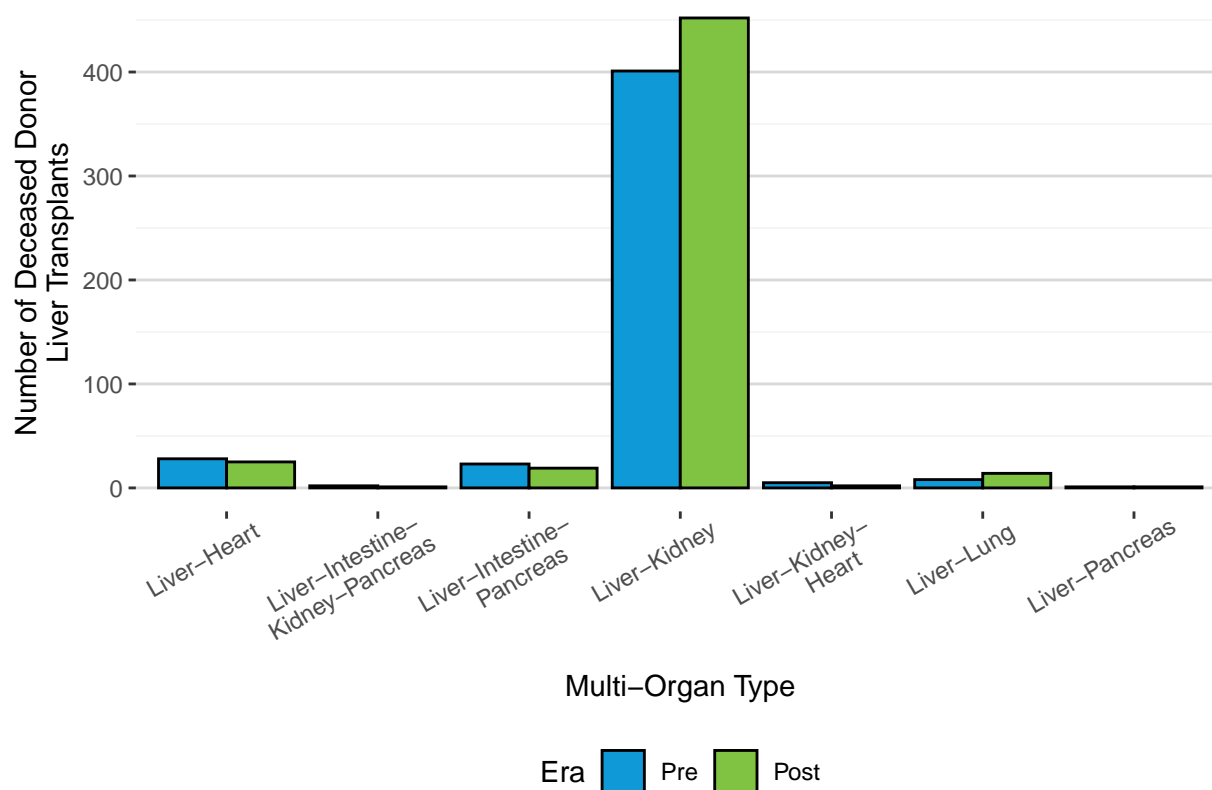
Table 29. Distribution of Cold Ischemia Time and Era

Policy Era	N	N Missing	Time (hours)					
			Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
Pre-Policy	4383	26	0.28	4.53	5.60	5.92	7.00	34.67
Post-Policy, Pre-COVID	858	12	0.42	4.75	5.70	6.01	7.00	43.00
Post-Policy, COVID Shutdown	992	16	0.83	4.70	5.63	6.02	7.00	17.63
Post-Policy, COVID Stabilization	2380	51	0.07	4.90	5.90	6.10	7.02	29.55
Post-Policy (overall)	4230	79	0.07	4.80	5.79	6.06	7.00	43.00

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



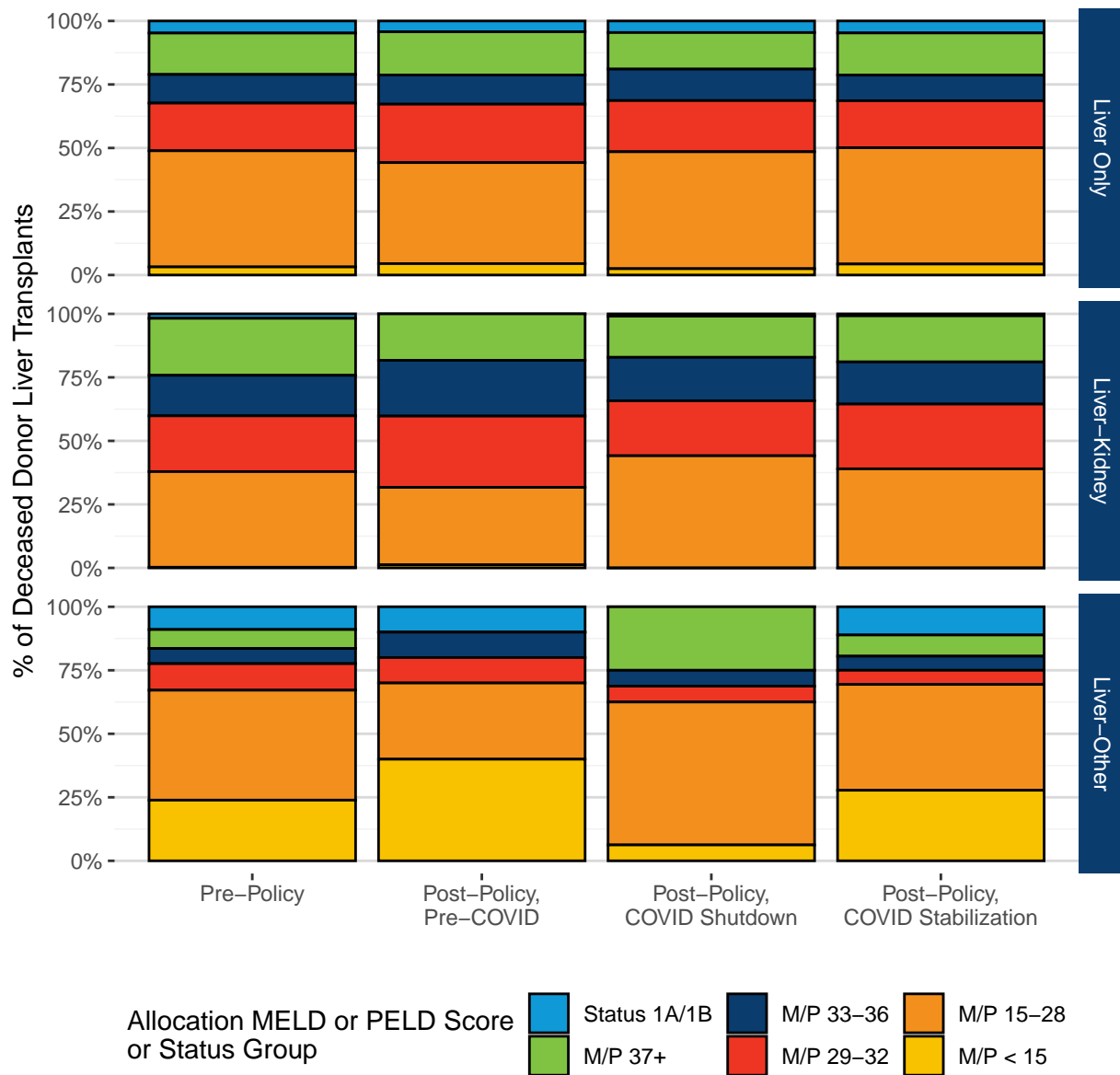
National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.

Table 30. Number and Percent of Deceased Donor Liver Transplants by Multi-Organ Type and Era

Multi-Organ Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Liver Only	4409	90.4%	870	90.4%	1008	88.8%	2431	89.2%	4309	89.3%
Liver-Heart	28	0.6%	6	0.6%	7	0.6%	12	0.4%	25	0.5%
Liver-Intestine-Kidney-Pancreas	2	0.0%	1	0.1%	0	0.0%	0	0.0%	1	0.0%
Liver-Intestine-Pancreas	23	0.5%	0	0.0%	7	0.6%	12	0.4%	19	0.4%
Liver-Kidney	401	8.2%	82	8.5%	111	9.8%	259	9.5%	452	9.4%
Liver-Kidney-Heart	5	0.1%	0	0.0%	0	0.0%	2	0.1%	2	0.0%
Liver-Lung	8	0.2%	3	0.3%	2	0.2%	9	0.3%	14	0.3%
Liver-Pancreas	1	0.0%	0	0.0%	0	0.0%	1	0.0%	1	0.0%

Multi-Organ Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Liver Only	4409	90.4%	870	90.4%	1008	88.8%	2431	89.2%	4309	89.3%
Liver-Heart	28	0.6%	6	0.6%	7	0.6%	12	0.4%	25	0.5%
Liver-Intestine-Kidney-Pancreas	2	0.0%	1	0.1%	0	0.0%	0	0.0%	1	0.0%
Liver-Intestine-Pancreas	23	0.5%	0	0.0%	7	0.6%	12	0.4%	19	0.4%
Liver-Kidney	401	8.2%	82	8.5%	111	9.8%	259	9.5%	452	9.4%
Liver-Kidney-Heart	5	0.1%	0	0.0%	0	0.0%	2	0.1%	2	0.0%
Liver-Lung	8	0.2%	3	0.3%	2	0.2%	9	0.3%	14	0.3%
Liver-Pancreas	1	0.0%	0	0.0%	0	0.0%	1	0.0%	1	0.0%

Figure 33. Deceased Donor Liver Transplants by Multi-Organ Type, Allocation MELD or PELD Score or Status, and Era



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 31. Number and Percent of Deceased Donor Liver Transplants by Multi-Organ Type, Allocation MELD or PELD Score or Status, and Era

Multi-Organ Type	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	%
Liver Only	Status 1A/1B	210	4.8%	37	4.3%	46	4.6%	115	4.7%	198	4.6%
	M/P 37+	719	16.3%	148	17.0%	145	14.4%	403	16.6%	696	16.2%
	M/P 33-36	497	11.3%	100	11.5%	125	12.4%	246	10.1%	471	10.9%
	M/P 29-32	827	18.8%	200	23.0%	203	20.1%	449	18.5%	852	19.8%
	M/P 15-28	2016	45.7%	346	39.8%	464	46.0%	1113	45.8%	1923	44.6%
	M/P < 15	140	3.2%	39	4.5%	25	2.5%	105	4.3%	169	3.9%
Liver-Kidney	Status 1A/1B	7	1.7%	0	0.0%	1	0.9%	2	0.8%	3	0.7%
	M/P 37+	90	22.4%	15	18.3%	18	16.2%	47	18.1%	80	17.7%
	M/P 33-36	64	16.0%	18	22.0%	19	17.1%	43	16.6%	80	17.7%
	M/P 29-32	88	21.9%	23	28.0%	24	21.6%	66	25.5%	113	25.0%
	M/P 15-28	151	37.7%	25	30.5%	49	44.1%	101	39.0%	175	38.7%
	M/P < 15	1	0.2%	1	1.2%	0	0.0%	0	0.0%	1	0.2%
Liver-Other	Status 1A/1B	6	9.0%	1	10.0%	0	0.0%	4	11.1%	5	8.1%
	M/P 37+	5	7.5%	0	0.0%	4	25.0%	3	8.3%	7	11.3%
	M/P 33-36	4	6.0%	1	10.0%	1	6.2%	2	5.6%	4	6.5%
	M/P 29-32	7	10.4%	1	10.0%	1	6.2%	2	5.6%	4	6.5%
	M/P 15-28	29	43.3%	3	30.0%	9	56.2%	15	41.7%	27	43.5%
	M/P < 15	16	23.9%	4	40.0%	1	6.2%	10	27.8%	15	24.2%

Multi-Organ Type	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	%
Liver Only	Status 1A/1B	210	4.8%	37	4.3%	46	4.6%	115	4.7%	198	4.6%
	M/P 37+	719	16.3%	148	17.0%	145	14.4%	403	16.6%	696	16.2%
	M/P 33-36	497	11.3%	100	11.5%	125	12.4%	246	10.1%	471	10.9%
	M/P 29-32	827	18.8%	200	23.0%	203	20.1%	449	18.5%	852	19.8%
	M/P 15-28	2016	45.7%	346	39.8%	464	46.0%	1113	45.8%	1923	44.6%
	M/P < 15	140	3.2%	39	4.5%	25	2.5%	105	4.3%	169	3.9%
Liver-Kidney	Status 1A/1B	7	1.7%	0	0.0%	1	0.9%	2	0.8%	3	0.7%
	M/P 37+	90	22.4%	15	18.3%	18	16.2%	47	18.1%	80	17.7%
	M/P 33-36	64	16.0%	18	22.0%	19	17.1%	43	16.6%	80	17.7%
	M/P 29-32	88	21.9%	23	28.0%	24	21.6%	66	25.5%	113	25.0%
	M/P 15-28	151	37.7%	25	30.5%	49	44.1%	101	39.0%	175	38.7%
	M/P < 15	1	0.2%	1	1.2%	0	0.0%	0	0.0%	1	0.2%
Liver-Other	Status 1A/1B	6	9.0%	1	10.0%	0	0.0%	4	11.1%	5	8.1%
	M/P 37+	5	7.5%	0	0.0%	4	25.0%	3	8.3%	7	11.3%
	M/P 33-36	4	6.0%	1	10.0%	1	6.2%	2	5.6%	4	6.5%
	M/P 29-32	7	10.4%	1	10.0%	1	6.2%	2	5.6%	4	6.5%
	M/P 15-28	29	43.3%	3	30.0%	9	56.2%	15	41.7%	27	43.5%
	M/P < 15	16	23.9%	4	40.0%	1	6.2%	10	27.8%	15	24.2%

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

Table 32. Number and Percent of Deceased Donor Liver Transplants by Multi-Organ Type, Classification Distance, and Era

Multi-Organ Type	Classification Distance	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
Liver Only	0-150 NM	2878	65.3%	440	50.6%	517	51.3%	1212	49.9%	2169	50.3%
	>150-250 NM	583	13.2%	150	17.2%	174	17.3%	388	16.0%	712	16.5%
	>250-500 NM	615	13.9%	243	27.9%	270	26.8%	697	28.7%	1210	28.1%
	>500 NM	333	7.6%	37	4.3%	47	4.7%	134	5.5%	218	5.1%
Liver-Kidney	0-150 NM	260	64.8%	45	54.9%	64	57.7%	136	52.5%	245	54.2%
	>150-250 NM	55	13.7%	12	14.6%	19	17.1%	53	20.5%	84	18.6%
	>250-500 NM	67	16.7%	22	26.8%	27	24.3%	64	24.7%	113	25.0%
	>500 NM	19	4.7%	3	3.7%	1	0.9%	6	2.3%	10	2.2%
Liver-Other	0-150 NM	28	41.8%	6	60.0%	7	43.8%	17	47.2%	30	48.4%
	>150-250 NM	11	16.4%	0	0.0%	4	25.0%	7	19.4%	11	17.7%
	>250-500 NM	15	22.4%	3	30.0%	1	6.2%	6	16.7%	10	16.1%
	>500 NM	13	19.4%	1	10.0%	4	25.0%	6	16.7%	11	17.7%

Multi-Organ Type	Classification Distance	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
Liver Only	0-150 NM	2878	65.3%	440	50.6%	517	51.3%	1212	49.9%	2169	50.3%
	>150-250 NM	583	13.2%	150	17.2%	174	17.3%	388	16.0%	712	16.5%
	>250-500 NM	615	13.9%	243	27.9%	270	26.8%	697	28.7%	1210	28.1%
	>500 NM	333	7.6%	37	4.3%	47	4.7%	134	5.5%	218	5.1%
Liver-Kidney	0-150 NM	260	64.8%	45	54.9%	64	57.7%	136	52.5%	245	54.2%
	>150-250 NM	55	13.7%	12	14.6%	19	17.1%	53	20.5%	84	18.6%
	>250-500 NM	67	16.7%	22	26.8%	27	24.3%	64	24.7%	113	25.0%
	>500 NM	19	4.7%	3	3.7%	1	0.9%	6	2.3%	10	2.2%
Liver-Other	0-150 NM	28	41.8%	6	60.0%	7	43.8%	17	47.2%	30	48.4%
	>150-250 NM	11	16.4%	0	0.0%	4	25.0%	7	19.4%	11	17.7%
	>250-500 NM	15	22.4%	3	30.0%	1	6.2%	6	16.7%	10	16.1%
	>500 NM	13	19.4%	1	10.0%	4	25.0%	6	16.7%	11	17.7%

Changes in distribution of distance from donor hospital to transplant program were similar for liver-kidney 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 34. Number and Percent of Deceased Donor Liver Transplants by Multi-Organ Type, Share Type, and Era

Multi-Organ Type	Share Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
Liver Only	Local	2768	62.8%	313	36.0%	359	35.6%	819	33.7%	1491	34.6%
	Regional	1333	30.2%	279	32.1%	337	33.4%	771	31.7%	1387	32.2%
	National	308	7.0%	278	32.0%	312	31.0%	841	34.6%	1431	33.2%
Liver-Kidney	Local	259	64.6%	31	37.8%	42	37.8%	87	33.6%	160	35.4%
	Regional	122	30.4%	24	29.3%	33	29.7%	101	39.0%	158	35.0%
	National	20	5.0%	27	32.9%	36	32.4%	71	27.4%	134	29.6%
Liver-Other	Local	22	32.8%	3	30.0%	6	37.5%	10	27.8%	19	30.6%
	Regional	15	22.4%	3	30.0%	5	31.2%	11	30.6%	19	30.6%
	National	30	44.8%	4	40.0%	5	31.2%	15	41.7%	24	38.7%

Multi-Organ Type	Share Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Onset		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
Liver Only	Local	2768	62.8%	313	36.0%	359	35.6%	819	33.7%	1491	34.6%
	Regional	1333	30.2%	279	32.1%	337	33.4%	771	31.7%	1387	32.2%
	National	308	7.0%	278	32.0%	312	31.0%	841	34.6%	1431	33.2%
Liver-Kidney	Local	259	64.6%	31	37.8%	42	37.8%	87	33.6%	160	35.4%
	Regional	122	30.4%	24	29.3%	33	29.7%	101	39.0%	158	35.0%
	National	20	5.0%	27	32.9%	36	32.4%	71	27.4%	134	29.6%
Liver-Other	Local	22	32.8%	3	30.0%	6	37.5%	10	27.8%	19	30.6%
	Regional	15	22.4%	3	30.0%	5	31.2%	11	30.6%	19	30.6%
	National	30	44.8%	4	40.0%	5	31.2%	15	41.7%	24	38.7%

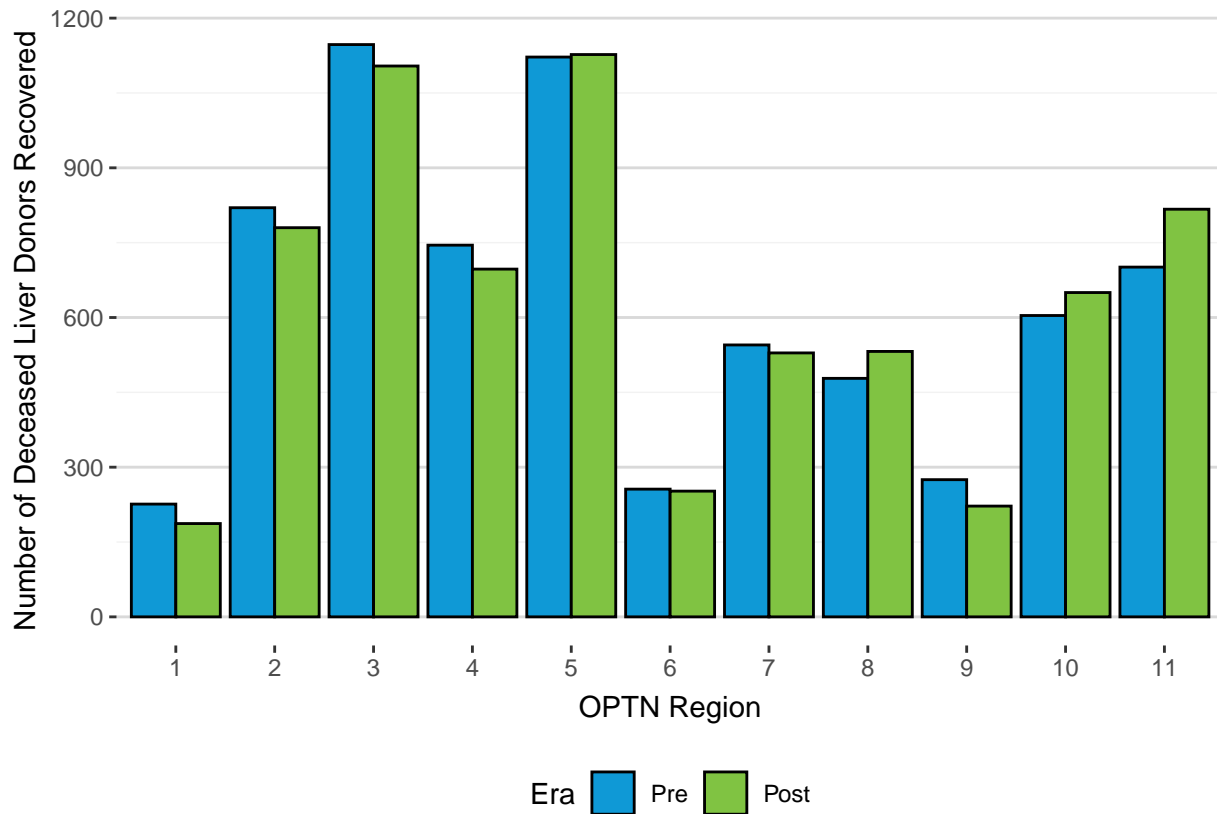
For all multi-organ groups, a more even split in the percentage of transplants shared locally, regionally, and nationally occurred in the post-policy eras compared to pre-policy.

Section III. Liver Utilization

Overall, there were the same number of deceased liver donors recovered in the nation post-policy as there were pre-policy. However, volumes were variable across the country. Below illustrates this by OPTN region. A table is provided in the **Appendix** highlighting 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.

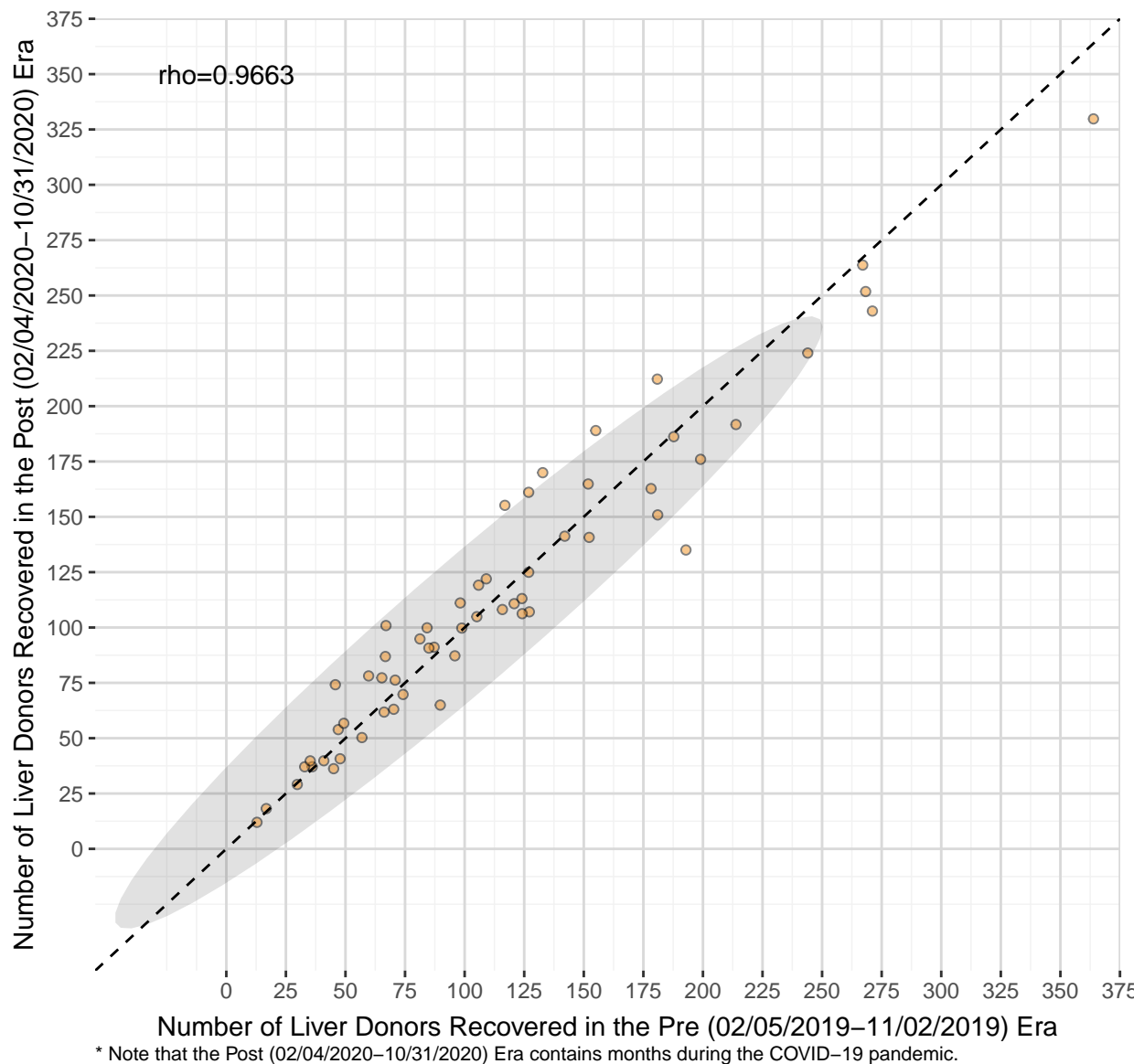
Figure 34. Deceased Liver Donors Recovered by OPTN Region and Era



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

Table 34. Number of Deceased Liver Donors Recovered by OPTN Region and Era

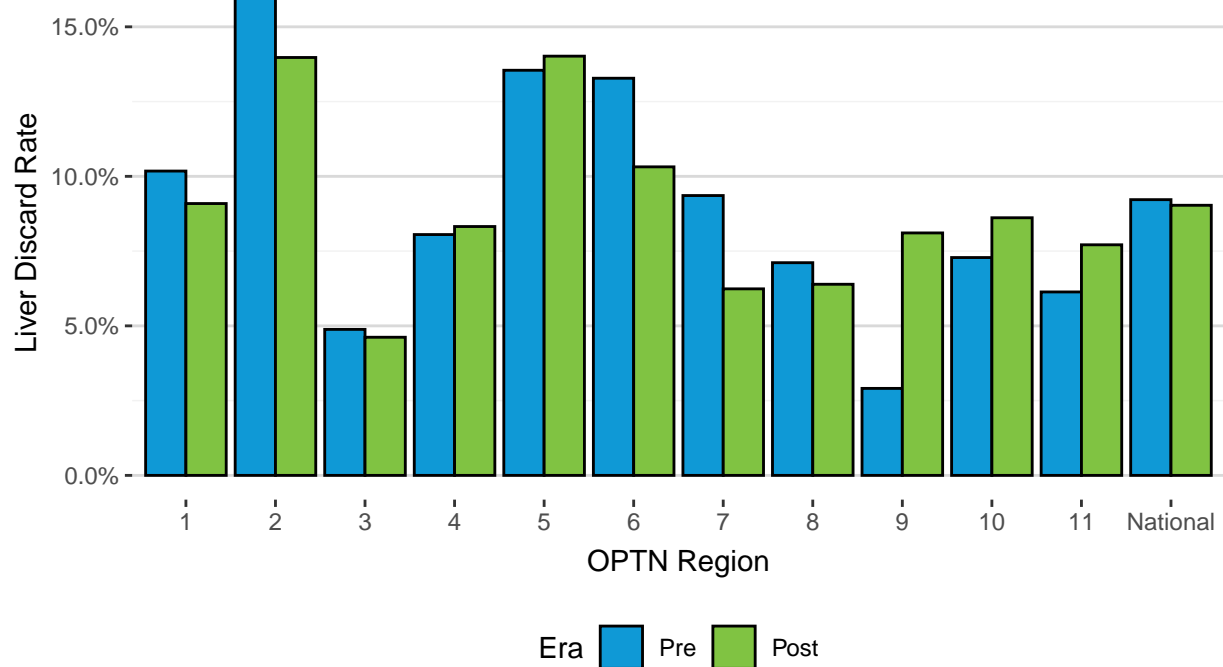
OPTN Region	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
1	226	3.3%	32	3.0%	39	3.2%	116	2.5%	187	2.7%
2	820	11.9%	127	11.9%	154	12.6%	499	10.9%	780	11.3%
3	1147	16.6%	146	13.6%	193	15.7%	765	16.6%	1104	16.0%
4	745	10.8%	117	10.9%	139	11.3%	441	9.6%	697	10.1%
5	1122	16.2%	184	17.2%	215	17.5%	728	15.8%	1127	16.3%
6	256	3.7%	43	4.0%	38	3.1%	171	3.7%	252	3.7%
7	545	7.9%	93	8.7%	79	6.4%	357	7.8%	529	7.7%
8	478	6.9%	87	8.1%	75	6.1%	370	8.0%	532	7.7%
9	275	4.0%	30	2.8%	30	2.4%	162	3.5%	222	3.2%
10	604	8.7%	103	9.6%	111	9.0%	436	9.5%	650	9.4%
11	701	10.1%	109	10.2%	154	12.6%	554	12.0%	817	11.8%
National	6919	100.0%	1071	100.0%	1227	100.0%	4599	100.0%	6897	100.0%

Figure 35. Scatter Plot of OPO Volume by Era

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 gray shaded region represents a 95% confidence ellipse, assuming a multivariate t-distribution, around the data points. While this is not a true statistical test of a hypothesis that there was a significant change in the number of liver donors recovered, it provides some context as to how often and where OPOs that may fall outside of the rest of the group may be.

The vast majority of OPOs recovered similar number of livers Pre (02/05/2019-11/02/2019) and Post (02/04/2020-10/31/2020) policy, overall. A Spearman's rank correlation (ρ) is provided to measure the strength and direction of the monotonic, not necessarily linear, relationship between the number of deceased liver donors recovered by OPO pre- and post-policy. There is a strong positive, monotonic relationship between these two measures.

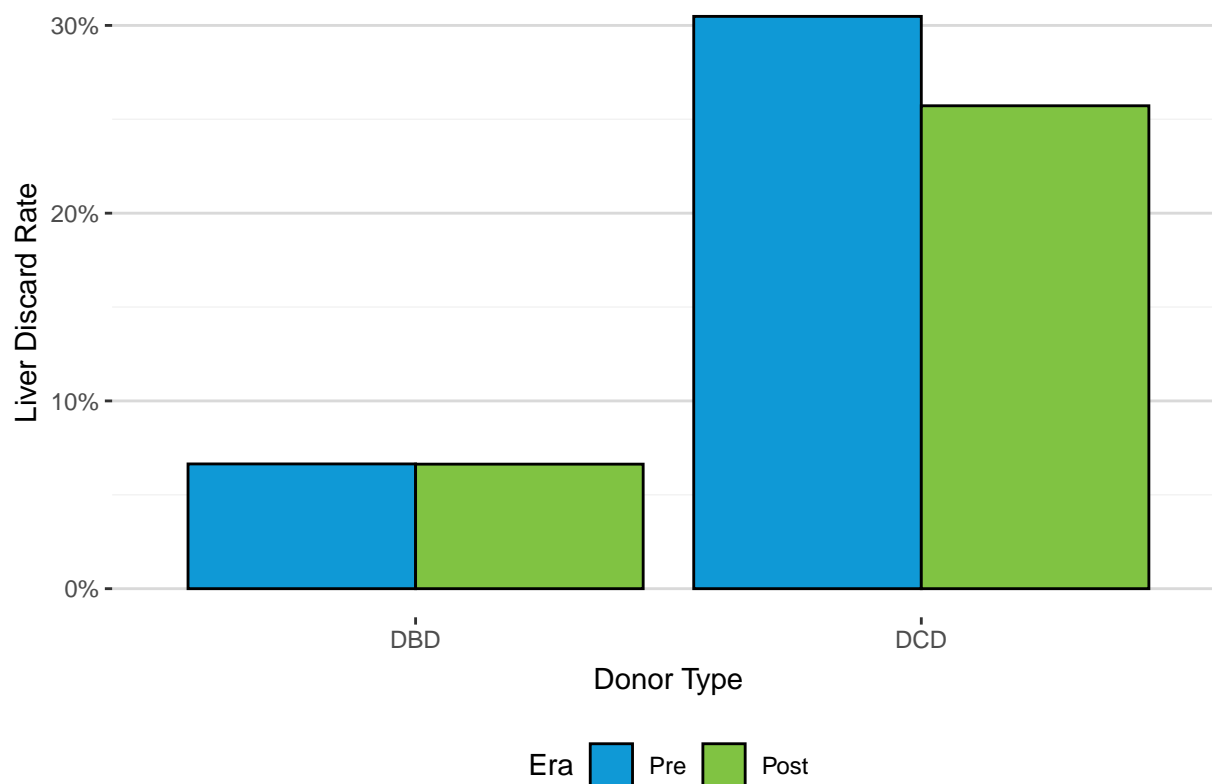
Figure 36. Liver Discard Rate by OPTN Region and Era

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

Table 34. Liver Discard Rate by OPTN Region and Era

OPTN Region	Pre-Policy	Post-Policy, Pre-COVID	Post-Policy, COVID Shutdown	Post-Policy, COVID Stabilization	Post-Policy (overall)
	%	%	%	%	%
1	10.18	9.38	10.26	8.62	9.09
2	16.22	12.60	14.29	14.23	13.97
3	4.88	5.48	3.63	4.71	4.62
4	8.05	5.98	5.04	9.98	8.32
5	13.55	14.67	11.63	14.56	14.02
6	13.28	13.95	10.53	9.36	10.32
7	9.36	7.53	6.33	5.88	6.24
8	7.11	12.64	1.33	5.95	6.39
9	2.91	10.00	10.00	7.41	8.11
10	7.28	14.56	6.31	7.80	8.62
11	6.13	6.42	7.14	8.12	7.71
National	9.22	10.27	7.82	9.07	9.03

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 post-policy periods. Changes in discard rates by OPTN region differ. These changes must be considered in light of the COVID emergency declaration.

Figure 37. Liver Discard Rate by Donor Type and Era

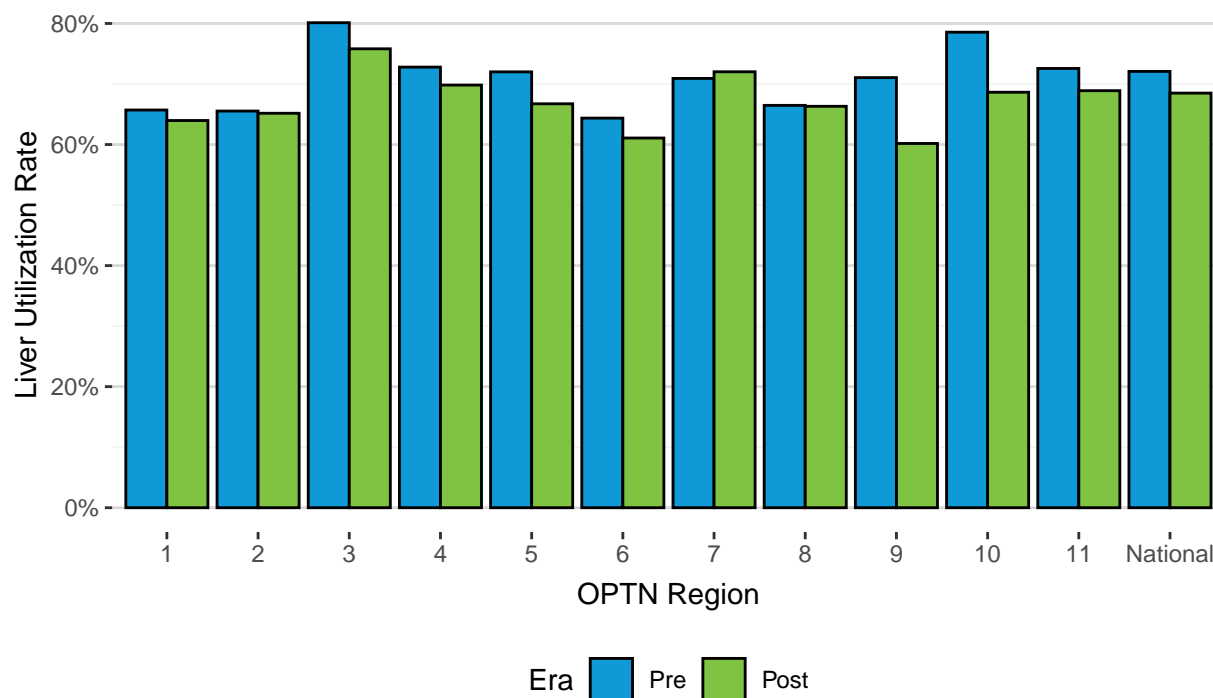
National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.

Table 35. Liver Discard Rate by Donor Type and Era

Donor Type	Pre-Policy	Post-Policy, Pre-COVID	Post-Policy, COVID Shutdown	Post-Policy, COVID Stabilization	Post-Policy (overall)
	%	%	%	%	%
DBD	6.64	6.93	6.75	6.53	6.63
DCD	30.48	29.01	16.79	26.83	25.72

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.

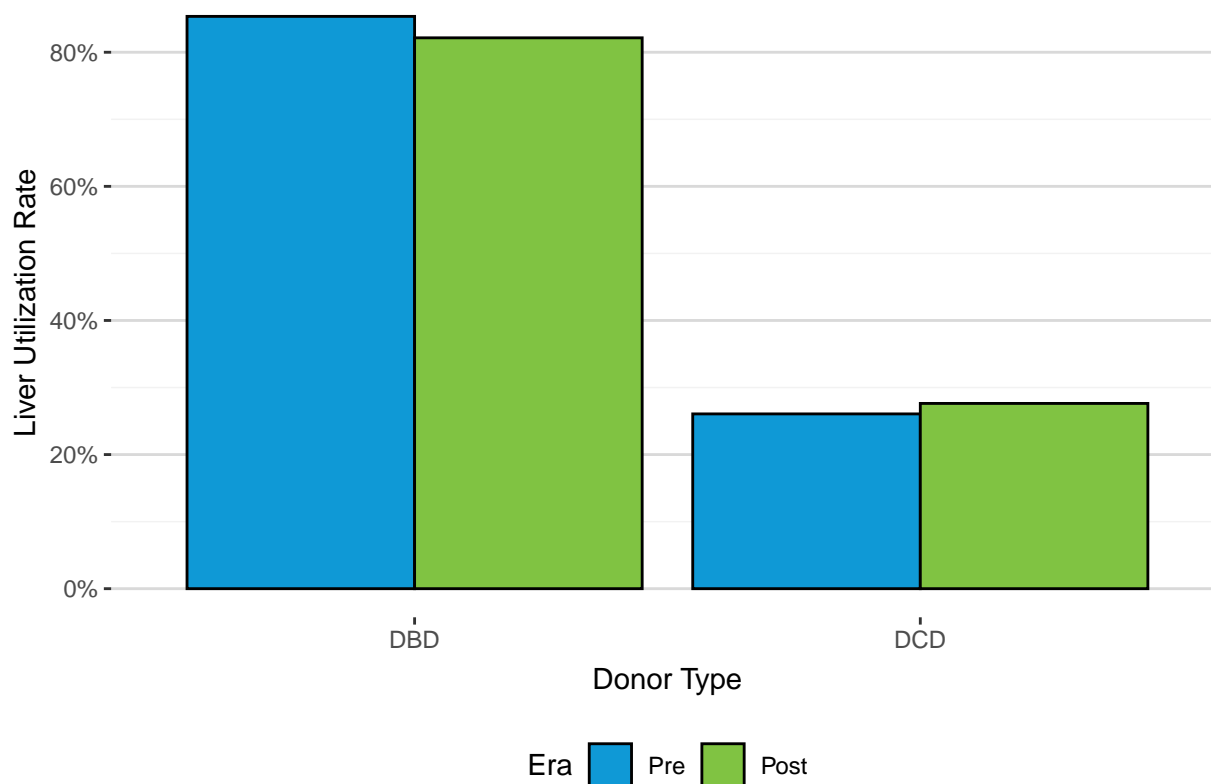
Figure 38. Liver Utilization Rate by OPTN Region and Era

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

Table 36. Liver Utilization Rate by OPTN Region and Era

OPTN Region	Pre-Policy	Post-Policy, Pre-COVID	Post-Policy, COVID Shutdown	Post-Policy, COVID Stabilization	Post-Policy (overall)
	%	%	%	%	%
1	65.71	67.44	78.00	59.22	63.97
2	65.53	68.94	69.79	63.01	65.17
3	80.13	68.32	80.17	76.33	75.82
4	72.79	76.39	75.00	66.72	69.83
5	72.01	64.63	67.36	67.09	66.73
6	64.37	66.07	53.97	61.75	61.08
7	70.92	68.80	72.55	72.77	72.02
8	66.47	65.55	67.89	66.17	66.32
9	71.06	50.00	57.45	63.03	60.18
10	78.56	73.77	72.73	66.67	68.64
11	72.57	64.63	74.50	68.35	68.90
National	72.08	67.62	71.60	67.91	68.50

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. Changes in deceased liver donor utilization rate must be considered in light of the COVID-19 emergency declaration.

Figure 39. 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 37. Liver Utilization Rate by Donor Type and Era

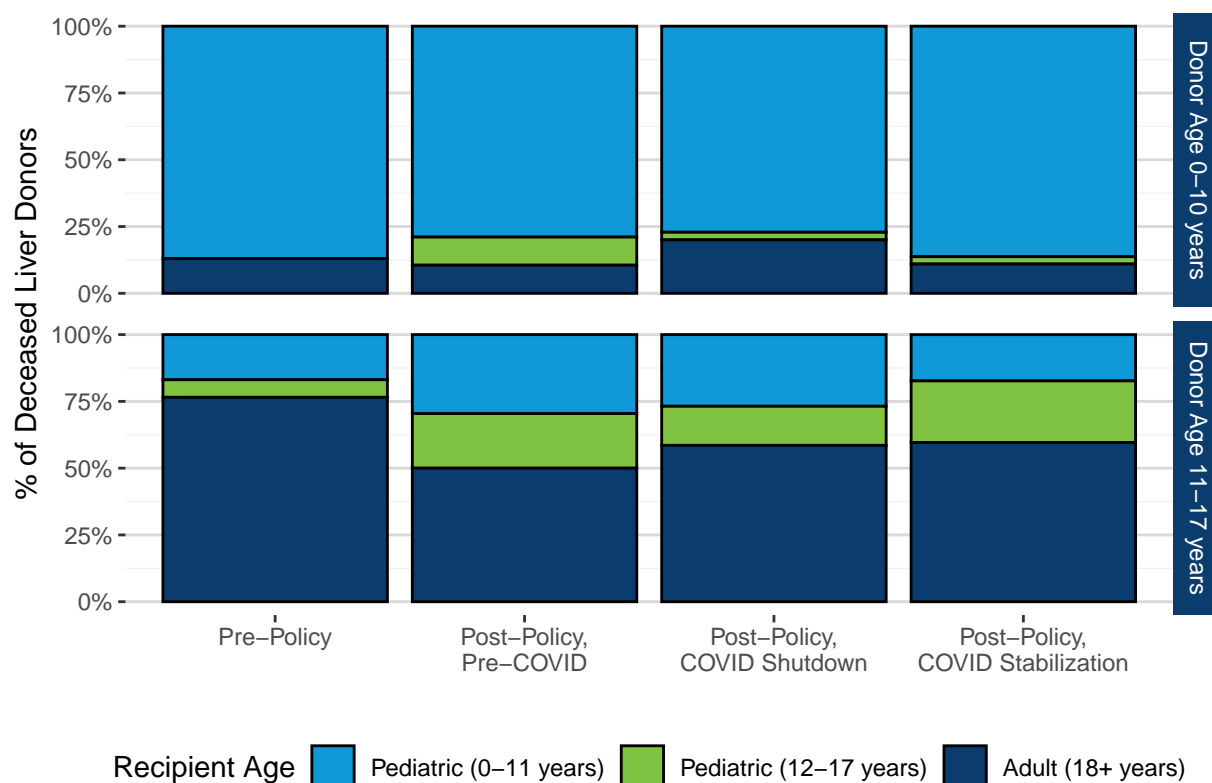
Donor Type	Pre-Policy	Post-Policy, Pre-COVID	Post-Policy, COVID Shutdown	Post-Policy, COVID Stabilization	Post-Policy (overall)
	%	%	%	%	%
DBD	85.35	81.45	82.84	82.12	82.15
DCD	26.07	29.87	31.23	26.30	27.63

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.

With the changes to allocation priority of pediatric candidates for pediatric donors, monitoring the age of transplant recipients of particular age groups of donors was of interest. The distributions and volumes below must be considered in light of the COVID-19 emergency declaration.

Donors under 11 years continued to go to transplant recipients of similarly young ages. On the other hand, there were increases in the number and percentage of all pediatric recipients (ages 0-17) of older pediatric (age 11-17) donors post-policy.

Figure 40. Pediatric (Age < 18 years) Deceased Liver Donors by Deceased Donor Liver-Alone Transplant Recipient Age Group and Era



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 38. Number and Percent of Pediatric (Age < 18 years) Deceased Liver Donors by Deceased Donor Liver-Alone Transplant Recipient Age Group and Era

Donor Age	Recipient Age	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
Pediatric (0-10 years)	Pediatric (0-11 years)	134	87.0%	15	78.9%	27	77.1%	63	86.3%	105	82.7%
	Pediatric (12-17 years)	0	0.0%	2	10.5%	1	2.9%	2	2.7%	5	3.9%
	Adult (18+ years)	20	13.0%	2	10.5%	7	20.0%	8	11.0%	17	13.4%
Pediatric (11-17 years)	Pediatric (0-11 years)	36	16.9%	13	29.5%	11	26.8%	18	17.3%	42	22.2%
	Pediatric (12-17 years)	14	6.6%	9	20.5%	6	14.6%	24	23.1%	39	20.6%
	Adult (18+ years)	163	76.5%	22	50.0%	24	58.5%	62	59.6%	108	57.1%

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

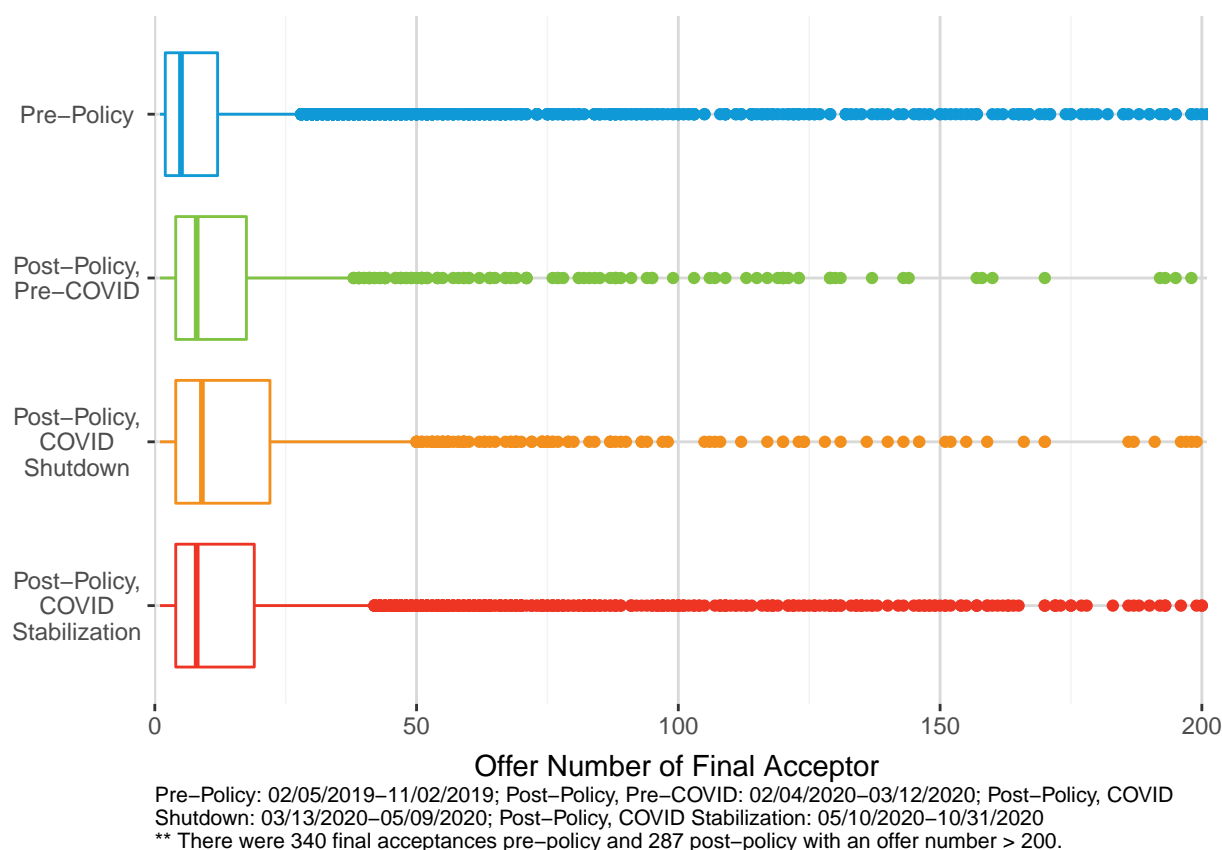
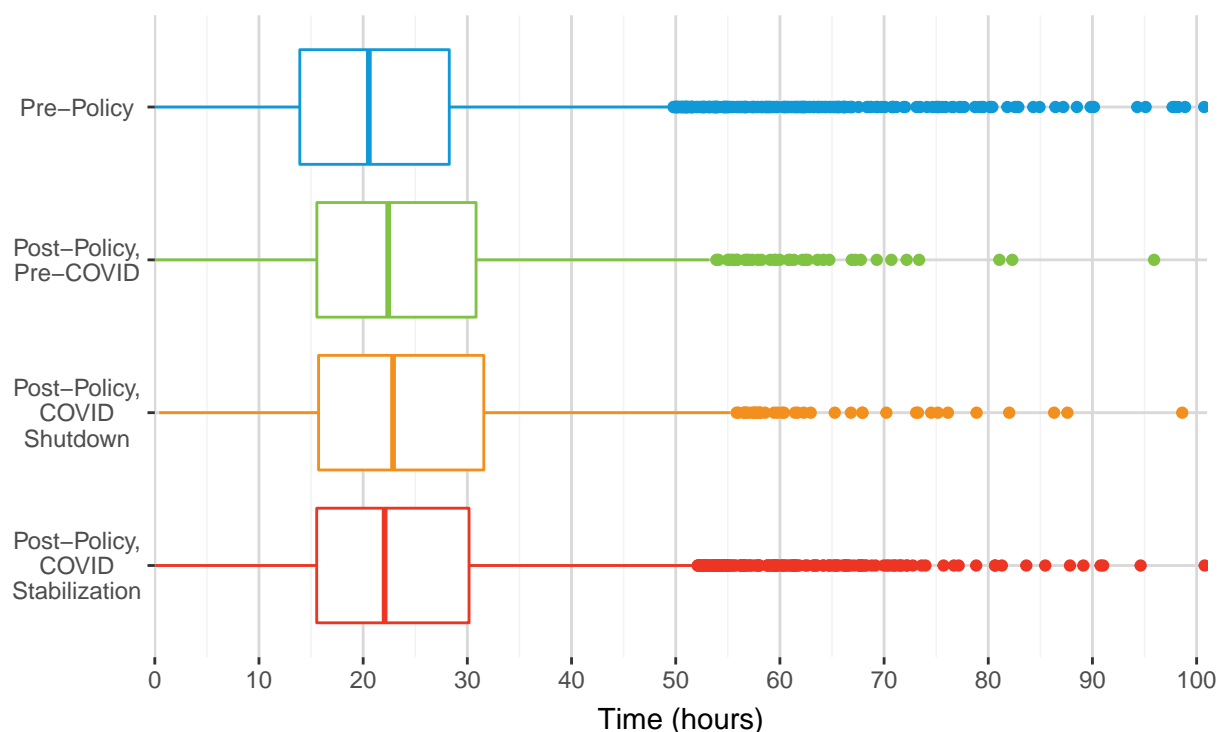


Table 39. Distribution of Sequence Number of Final Acceptor on Liver Match Run by Era

Era	N Matches	Final Acceptor Sequence Number						
		Min	25th Percentile	Median	Mean	75th Percentile	90th Percentile	Max
Pre-Policy	6332	1	2	5	77	14	48	9353
Post-Policy, Pre-COVID	989	1	4	9	96	22	84	7517
Post-Policy, COVID Shutdown	1138	1	4	10	85	25	68	7128
Post-Policy, COVID Stabilization	4223	1	4	9	99	23	77	7555
Post-Policy (overall)	6350	1	4	9	96	23	75	7555

Figure 42. Distribution of Time from First Electronic Offer to Cross Clamp for Deceased Liver Donors by Era

Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

* There were 0 matches pre-policy and 1 post-policy with a time > 100 hours that are not included.

** There was 1 matches pre-policy and 1 post-policy with the first electronic offer prior to cross-clamp that are not included.

Table 40. Distribution of Time from First Electronic Offer to Cross Clamp for Deceased Liver Donors by Era

Era	N Matches	Time (Hours)					
		Minimum	25th Percentile	Median	Mean	75th Percentile	Maximum
Pre-Policy	8070	0.02	13.93	20.59	22.55	28.32	353.92
Post-Policy, Pre-COVID	1298	0.01	15.56	22.42	24.25	30.85	105.80
Post-Policy, COVID Shutdown	1483	0.43	15.72	22.87	24.87	31.58	98.62
Post-Policy, COVID Stabilization	5657	0.03	15.54	22.06	23.91	30.17	109.89
Post-Policy (overall)	8438	0.01	15.55	22.28	24.13	30.54	109.89

Average time from first electronic offer being sent to actual cross clamp time increased by roughly 1.5 hours pre- to post-policy. However, this was variable among post-policy eras and changes must be considered in light of the COVID-19 emergency declaration.

Section IV. Intestine

There were 84 intestine candidates added to the waiting list pre-policy and 107 post-policy. Few intestine registrations were removed in the pre-policy era (4) or post-policy era (1) due to death or too sick to transplant.

A total of 66 deceased intestine donors were recovered pre-policy and 63 were recovered post-policy. Almost the same number of deceased donor intestine transplants occurred pre- and post-policy (46 pre- and 45 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.

While the number of deceased donor intestine transplants was similar in both eras, there was an increase in intestine-alone and intestine-pancreas transplant recipients with the trade-off being fewer intestine-liver-pancreas and intestine-kidney transplant recipients in the post-policy era.

Table 41. Number of Deceased Donor Intestine Transplants by Multi-Organ Type and Era

Multi-Organ Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
Intestine Only	17	37.0%	4	50.0%	2	22.2%	15	53.6%	21	46.7%
Intestine-Kidney	3	6.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Intestine-Kidney-Pancreas	0	0.0%	0	0.0%	0	0.0%	1	3.6%	1	2.2%
Intestine-Liver-Kidney	2	4.3%	1	12.5%	0	0.0%	0	0.0%	1	2.2%
Intestine-Liver-Pancreas	23	50.0%	0	0.0%	7	77.8%	12	42.9%	19	42.2%
Intestine-Pancreas	1	2.2%	3	37.5%	0	0.0%	0	0.0%	3	6.7%

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

Table 42. Number of Deceased Donor Intestine Transplants by Classification Distance and Era

Classification Distance	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
0-150 NM	7	15.2%	2	25.0%	1	11.1%	6	21.4%	9	20.0%
>150-250 NM	4	8.7%	0	0.0%	2	22.2%	3	10.7%	5	11.1%
>250-500 NM	11	23.9%	2	25.0%	1	11.1%	7	25.0%	10	22.2%
>500 NM	24	52.2%	4	50.0%	5	55.6%	12	42.9%	21	46.7%

Conclusion

This report provides a review of the first nine months 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. Some of the main findings from this report include:

- Decreased variance in median allocation MELD or PELD score at transplant when examined by different geographies, including by state, DSA and OPTN region
- Increased percentage of non-exception transplant recipients, similar percentage of HCC exception transplant recipients, and decreased percentage of non-HCC exception transplant recipients
- Increased distance (nautical miles) from donor hospital to transplant program of recipient
- Liver waiting list transplant rate increases for MELD or PELD scores 29 and higher, with no changes by candidate exception status
- Liver waiting list mortality rate increases for MELD or PELD scores 29 - 36 and decreases for non-exception transplant candidates
- Similar national liver discard and utilization rates

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 this time.

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 Deceased Donor Liver Transplant Information

Table 43. Number of Deceased Donor Liver-Alone Transplants by State and Era

State	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
AL	66	1.5%	10	1.1%	11	1.1%	32	1.3%	53	1.2%
AR	26	0.6%	4	0.5%	4	0.4%	11	0.5%	19	0.4%
AZ	173	3.9%	33	3.8%	36	3.6%	81	3.3%	150	3.5%
CA	476	10.8%	104	12.0%	131	13.0%	275	11.3%	510	11.8%
CO	76	1.7%	17	2.0%	9	0.9%	41	1.7%	67	1.6%
CT	25	0.6%	4	0.5%	6	0.6%	12	0.5%	22	0.5%
DC	56	1.3%	6	0.7%	14	1.4%	33	1.4%	53	1.2%
DE	2	0.0%	1	0.1%	0	0.0%	0	0.0%	1	0.0%
FL	346	7.8%	45	5.2%	73	7.2%	174	7.2%	292	6.8%
GA	152	3.4%	20	2.3%	32	3.2%	76	3.1%	128	3.0%
HI	8	0.2%	2	0.2%	1	0.1%	6	0.2%	9	0.2%
IA	21	0.5%	3	0.3%	2	0.2%	10	0.4%	15	0.3%
IL	154	3.5%	40	4.6%	42	4.2%	117	4.8%	199	4.6%
IN	79	1.8%	15	1.7%	10	1.0%	41	1.7%	66	1.5%
KS	44	1.0%	4	0.5%	5	0.5%	15	0.6%	24	0.6%
KY	38	0.9%	6	0.7%	12	1.2%	22	0.9%	40	0.9%
LA	136	3.1%	23	2.6%	21	2.1%	51	2.1%	95	2.2%
MA	146	3.3%	48	5.5%	30	3.0%	70	2.9%	148	3.4%
MD	94	2.1%	14	1.6%	22	2.2%	59	2.4%	95	2.2%
MI	110	2.5%	27	3.1%	6	0.6%	52	2.1%	85	2.0%
MN	99	2.2%	23	2.6%	26	2.6%	59	2.4%	108	2.5%
MO	105	2.4%	15	1.7%	21	2.1%	62	2.6%	98	2.3%
MS	22	0.5%	5	0.6%	4	0.4%	6	0.2%	15	0.3%
NC	122	2.8%	25	2.9%	25	2.5%	73	3.0%	123	2.9%
NE	51	1.2%	12	1.4%	20	2.0%	31	1.3%	63	1.5%
NJ	33	0.7%	7	0.8%	3	0.3%	13	0.5%	23	0.5%
NY	227	5.1%	49	5.6%	55	5.5%	161	6.6%	265	6.1%
OH	231	5.2%	42	4.8%	78	7.7%	139	5.7%	259	6.0%
OK	27	0.6%	8	0.9%	8	0.8%	29	1.2%	45	1.0%
OR	42	1.0%	13	1.5%	9	0.9%	26	1.1%	48	1.1%
PA	282	6.4%	48	5.5%	65	6.4%	137	5.6%	250	5.8%
PR	18	0.4%	3	0.3%	1	0.1%	10	0.4%	14	0.3%
SC	46	1.0%	2	0.2%	7	0.7%	20	0.8%	29	0.7%
SD	8	0.2%	0	0.0%	0	0.0%	6	0.2%	6	0.1%
TN	134	3.0%	26	3.0%	35	3.5%	86	3.5%	147	3.4%
TX	423	9.6%	91	10.5%	106	10.5%	215	8.8%	412	9.6%
UT	45	1.0%	17	2.0%	13	1.3%	33	1.4%	63	1.5%
VA	97	2.2%	17	2.0%	32	3.2%	57	2.3%	106	2.5%
WA	86	2.0%	10	1.1%	16	1.6%	41	1.7%	67	1.6%
WI	83	1.9%	31	3.6%	17	1.7%	49	2.0%	97	2.3%

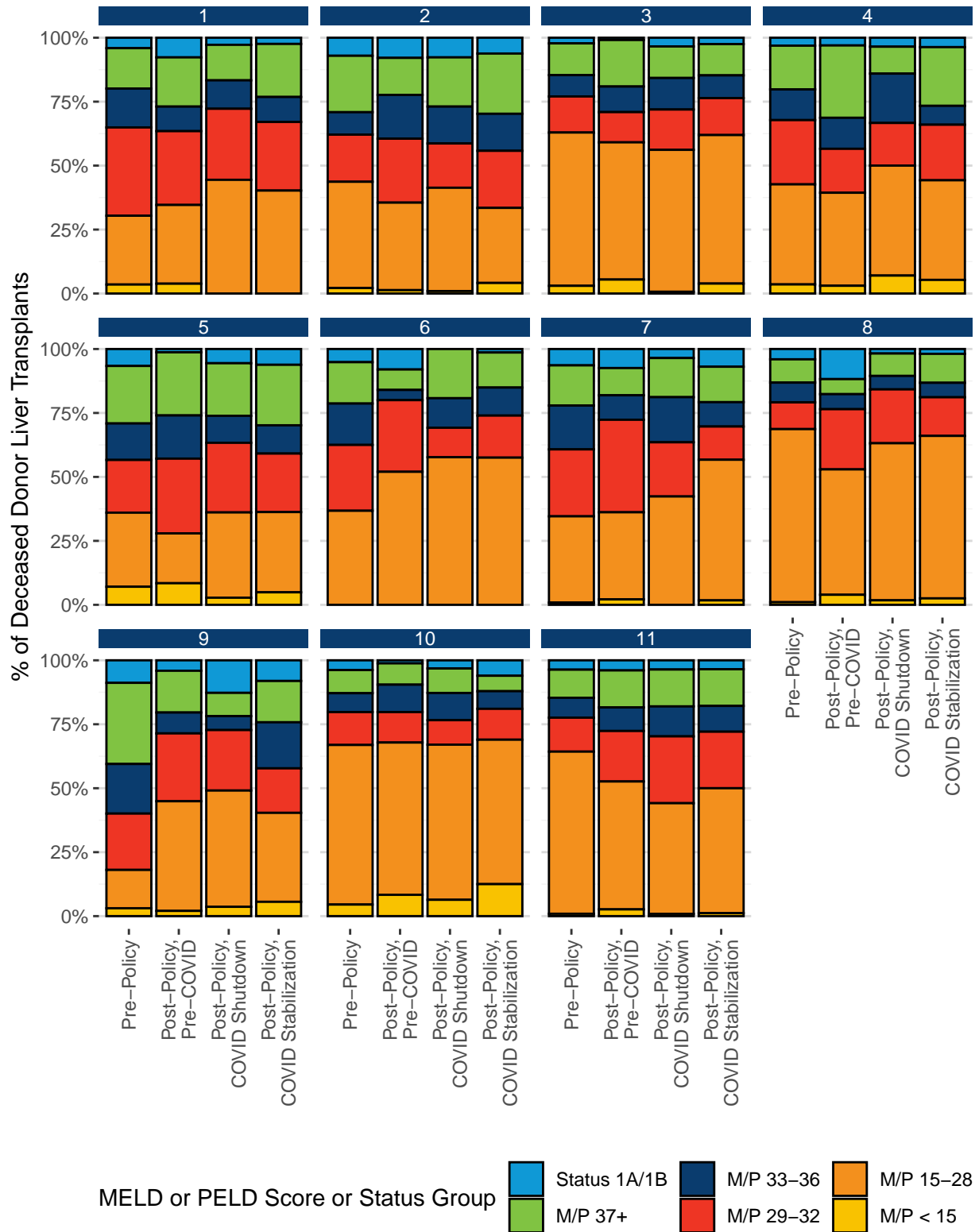
Table 43. Number of Deceased Donor Liver-Alone Transplants by DSA and Era

DSA	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
ALOB	86	2.0%	19	2.2%	19	1.9%	32	1.3%	70	1.6%
AROR	37	0.8%	5	0.6%	5	0.5%	18	0.7%	28	0.6%
AZOB	102	2.3%	25	2.9%	24	2.4%	58	2.4%	107	2.5%
CADN	150	3.4%	25	2.9%	41	4.1%	83	3.4%	149	3.5%
CAGS	31	0.7%	7	0.8%	6	0.6%	32	1.3%	45	1.0%
CAOP	195	4.4%	36	4.1%	53	5.3%	100	4.1%	189	4.4%
CASD	50	1.1%	5	0.6%	11	1.1%	16	0.7%	32	0.7%
CORS	69	1.6%	19	2.2%	14	1.4%	49	2.0%	82	1.9%
CTOP	24	0.5%	2	0.2%	6	0.6%	11	0.5%	19	0.4%
DCTC	52	1.2%	8	0.9%	5	0.5%	25	1.0%	38	0.9%
FLFH	75	1.7%	11	1.3%	10	1.0%	40	1.6%	61	1.4%
FLMP	68	1.5%	11	1.3%	18	1.8%	23	0.9%	52	1.2%
FLUF	71	1.6%	7	0.8%	20	2.0%	39	1.6%	66	1.5%
FLWC	115	2.6%	17	2.0%	25	2.5%	68	2.8%	110	2.6%
GALL	140	3.2%	19	2.2%	32	3.2%	74	3.0%	125	2.9%
HIOP	9	0.2%	2	0.2%	1	0.1%	7	0.3%	10	0.2%
IAOP	36	0.8%	4	0.5%	3	0.3%	23	0.9%	30	0.7%
ILIP	157	3.6%	33	3.8%	34	3.4%	111	4.6%	178	4.1%
INOP	71	1.6%	19	2.2%	18	1.8%	56	2.3%	93	2.2%
KYDA	54	1.2%	12	1.4%	16	1.6%	41	1.7%	69	1.6%
LAOP	102	2.3%	16	1.8%	24	2.4%	51	2.1%	91	2.1%
MAOB	126	2.9%	23	2.6%	25	2.5%	53	2.2%	101	2.3%
MDPC	67	1.5%	12	1.4%	23	2.3%	22	0.9%	57	1.3%
MIOP	116	2.6%	26	3.0%	22	2.2%	56	2.3%	104	2.4%
MNOP	92	2.1%	17	2.0%	7	0.7%	46	1.9%	70	1.6%
MOMA	90	2.0%	15	1.7%	12	1.2%	60	2.5%	87	2.0%
MSOP	36	0.8%	12	1.4%	7	0.7%	19	0.8%	38	0.9%
MWOB	103	2.3%	22	2.5%	29	2.9%	67	2.8%	118	2.7%
NCCM	45	1.0%	10	1.1%	13	1.3%	28	1.2%	51	1.2%
NCNC	81	1.8%	18	2.1%	28	2.8%	62	2.6%	108	2.5%
NEOR	25	0.6%	8	0.9%	12	1.2%	9	0.4%	29	0.7%
NJTO	83	1.9%	19	2.2%	14	1.4%	33	1.4%	66	1.5%
NMOP	18	0.4%	6	0.7%	3	0.3%	15	0.6%	24	0.6%
NVLV	70	1.6%	30	3.4%	17	1.7%	26	1.1%	73	1.7%
NYAP	26	0.6%	6	0.7%	1	0.1%	19	0.8%	26	0.6%
NYFL	21	0.5%	10	1.1%	5	0.5%	7	0.3%	22	0.5%
NYRT	134	3.0%	10	1.1%	17	1.7%	47	1.9%	74	1.7%
NYWN	12	0.3%	2	0.2%	2	0.2%	6	0.2%	10	0.2%
OHLB	50	1.1%	9	1.0%	10	1.0%	33	1.4%	52	1.2%
OHLC	36	0.8%	5	0.6%	21	2.1%	21	0.9%	47	1.1%
OHLP	59	1.3%	11	1.3%	16	1.6%	32	1.3%	59	1.4%
OHOV	40	0.9%	9	1.0%	1	0.1%	21	0.9%	31	0.7%
OKOP	52	1.2%	7	0.8%	11	1.1%	33	1.4%	51	1.2%
ORUO	36	0.8%	14	1.6%	10	1.0%	29	1.2%	53	1.2%

(continued)

DSA	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
PADV	205	4.6%	44	5.1%	53	5.3%	124	5.1%	221	5.1%
PATF	79	1.8%	18	2.1%	29	2.9%	51	2.1%	98	2.3%
PRLI	45	1.0%	8	0.9%	7	0.7%	30	1.2%	45	1.0%
SCOP	77	1.7%	14	1.6%	18	1.8%	40	1.6%	72	1.7%
TNDS	125	2.8%	27	3.1%	21	2.1%	91	3.7%	139	3.2%
TNMS	27	0.6%	2	0.2%	9	0.9%	15	0.6%	26	0.6%
TXGC	171	3.9%	44	5.1%	40	4.0%	70	2.9%	154	3.6%
TXSA	77	1.7%	12	1.4%	17	1.7%	42	1.7%	71	1.6%
TXSB	164	3.7%	34	3.9%	45	4.5%	83	3.4%	162	3.8%
UTOP	43	1.0%	8	0.9%	14	1.4%	29	1.2%	51	1.2%
VATB	71	1.6%	11	1.3%	21	2.1%	41	1.7%	73	1.7%
WALC	119	2.7%	19	2.2%	21	2.1%	59	2.4%	99	2.3%
WIDN	45	1.0%	11	1.3%	11	1.1%	18	0.7%	40	0.9%
WIUW	49	1.1%	15	1.7%	11	1.1%	37	1.5%	63	1.5%

Figure 43. Deceased Donor Liver-Alone Transplants by MELD or PELD Score or Status, OPTN Region of Transplant Center, and Era



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 44. Number of Deceased Donor Liver-Alone Transplants by Allocation MELD or PELD Score or Status, OPTN Region of Transplant Center, and Era

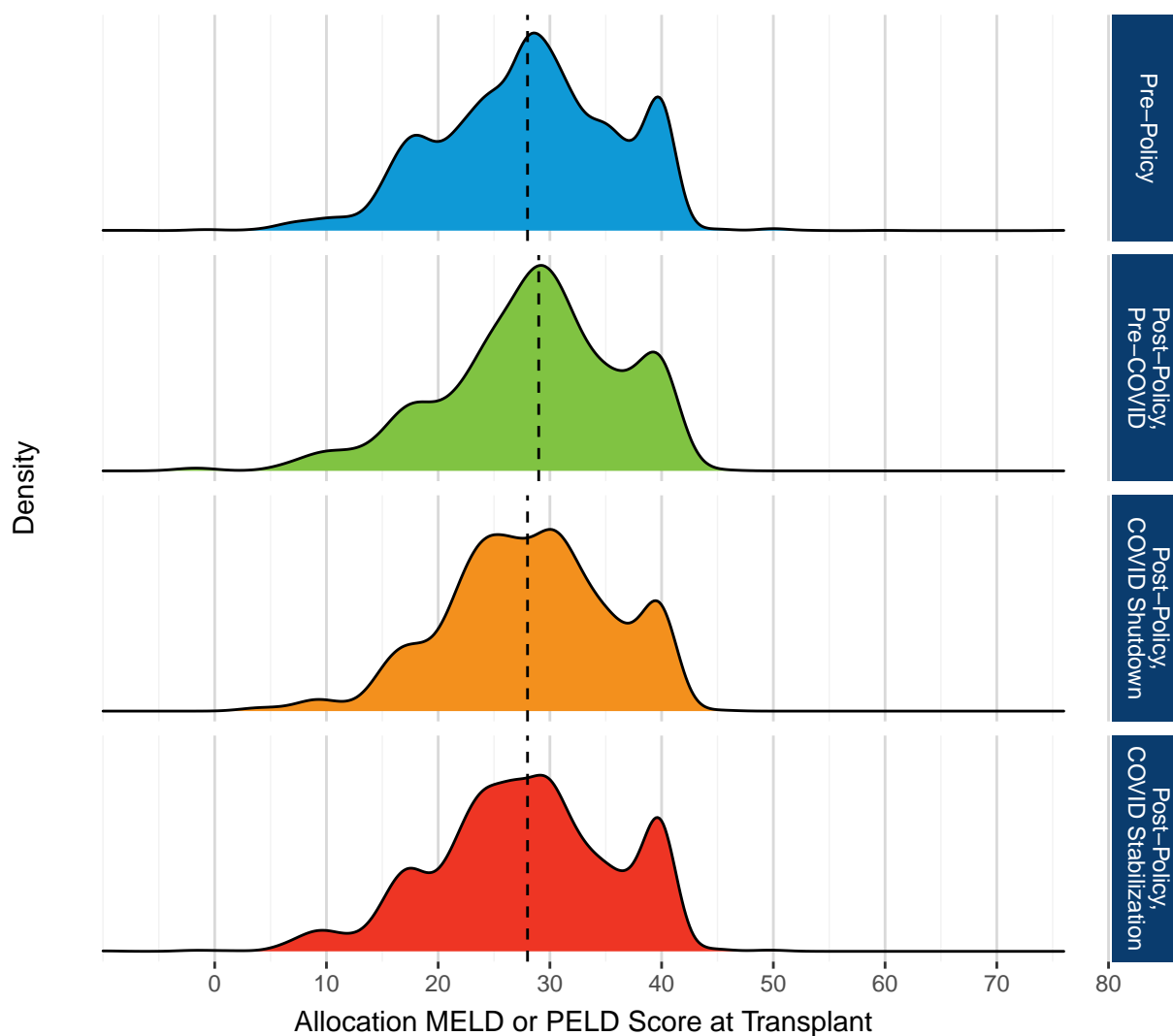
OPTN Region	Score or Status Group	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
1	Status 1A/1B	7	4.1%	4	7.7%	1	2.8%	2	2.4%	7	4.1%
	M/P 37+	27	15.8%	10	19.2%	5	13.9%	17	20.7%	32	18.8%
	M/P 33-36	26	15.2%	5	9.6%	4	11.1%	8	9.8%	17	10.0%
	M/P 29-32	59	34.5%	15	28.8%	10	27.8%	22	26.8%	47	27.6%
	M/P 15-28	46	26.9%	16	30.8%	16	44.4%	33	40.2%	65	38.2%
	M/P < 15	6	3.5%	2	3.8%	0	0.0%	0	0.0%	2	1.2%
2	Status 1A/1B	33	7.1%	6	7.9%	8	7.7%	15	6.2%	29	6.9%
	M/P 37+	103	22.1%	11	14.5%	20	19.2%	57	23.6%	88	20.9%
	M/P 33-36	41	8.8%	13	17.1%	15	14.4%	35	14.5%	63	14.9%
	M/P 29-32	86	18.4%	19	25.0%	18	17.3%	54	22.3%	91	21.6%
	M/P 15-28	194	41.5%	26	34.2%	42	40.4%	71	29.3%	139	32.9%
	M/P < 15	10	2.1%	1	1.3%	1	1.0%	10	4.1%	12	2.8%
3	Status 1A/1B	17	2.2%	1	0.9%	5	3.4%	9	2.5%	15	2.4%
	M/P 37+	95	12.4%	20	18.2%	18	12.3%	44	12.2%	82	13.3%
	M/P 33-36	64	8.4%	11	10.0%	18	12.3%	32	8.9%	61	9.9%
	M/P 29-32	108	14.1%	13	11.8%	23	15.8%	52	14.4%	88	14.3%
	M/P 15-28	459	59.9%	59	53.6%	81	55.5%	209	58.1%	349	56.7%
	M/P < 15	23	3.0%	6	5.5%	1	0.7%	14	3.9%	21	3.4%
4	Status 1A/1B	14	3.1%	3	3.0%	4	3.5%	9	3.7%	16	3.5%
	M/P 37+	77	17.1%	28	28.3%	12	10.5%	56	23.0%	96	21.0%
	M/P 33-36	54	12.0%	12	12.1%	22	19.3%	18	7.4%	52	11.4%
	M/P 29-32	113	25.1%	17	17.2%	19	16.7%	53	21.7%	89	19.5%
	M/P 15-28	176	39.1%	36	36.4%	49	43.0%	95	38.9%	180	39.4%
	M/P < 15	16	3.6%	3	3.0%	8	7.0%	13	5.3%	24	5.3%
5	Status 1A/1B	46	6.6%	2	1.3%	10	5.6%	24	6.2%	36	5.0%
	M/P 37+	156	22.5%	38	24.7%	37	20.6%	92	23.7%	167	23.1%
	M/P 33-36	99	14.3%	26	16.9%	19	10.6%	43	11.1%	88	12.2%
	M/P 29-32	143	20.6%	45	29.2%	49	27.2%	89	22.9%	183	25.3%
	M/P 15-28	201	29.0%	30	19.5%	60	33.3%	122	31.4%	212	29.3%
	M/P < 15	49	7.1%	13	8.4%	5	2.8%	19	4.9%	37	5.1%
6	Status 1A/1B	7	5.1%	2	8.0%	0	0.0%	1	1.4%	3	2.4%
	M/P 37+	22	16.2%	2	8.0%	5	19.2%	10	13.7%	17	13.7%
	M/P 33-36	22	16.2%	1	4.0%	3	11.5%	8	11.0%	12	9.7%
	M/P 29-32	35	25.7%	7	28.0%	3	11.5%	12	16.4%	22	17.7%
	M/P 15-28	50	36.8%	13	52.0%	15	57.7%	42	57.5%	70	56.5%
7	Status 1A/1B	22	6.4%	7	7.4%	3	3.5%	16	6.9%	26	6.3%
	M/P 37+	54	15.7%	10	10.6%	13	15.3%	32	13.9%	55	13.4%
	M/P 33-36	59	17.2%	9	9.6%	15	17.6%	22	9.5%	46	11.2%
	M/P 29-32	90	26.2%	34	36.2%	18	21.2%	30	13.0%	82	20.0%
	M/P 15-28	116	33.7%	32	34.0%	36	42.4%	127	55.0%	195	47.6%
	M/P < 15	3	0.9%	2	2.1%	0	0.0%	4	1.7%	6	1.5%
8	Status 1A/1B	12	4.0%	6	11.8%	1	1.8%	3	1.9%	10	3.7%
	M/P 37+	27	9.1%	3	5.9%	5	8.8%	18	11.3%	26	9.7%
	M/P 33-36	23	7.7%	3	5.9%	3	5.3%	9	5.7%	15	5.6%
	M/P 29-32	31	10.4%	12	23.5%	12	21.1%	24	15.1%	48	18.0%
	M/P 15-28	201	67.7%	25	49.0%	35	61.4%	101	63.5%	161	60.3%
	M/P < 15	3	1.0%	2	3.9%	1	1.8%	4	2.5%	7	2.6%
9	Status 1A/1B	20	8.8%	2	4.1%	7	12.7%	13	8.1%	22	8.3%
	M/P 37+	72	31.7%	8	16.3%	5	9.1%	26	16.1%	39	14.7%
	M/P 33-36	44	19.4%	4	8.2%	3	5.5%	29	18.0%	36	13.6%
	M/P 29-32	50	22.0%	13	26.5%	13	23.6%	28	17.4%	54	20.4%
	M/P 15-28	34	15.0%	21	42.9%	25	45.5%	56	34.8%	102	38.5%
	M/P < 15	7	3.1%	1	2.0%	2	3.6%	9	5.6%	12	4.5%
	Status 1A/1B	16	3.8%	1	1.2%	3	3.2%	14	6.0%	18	4.4%

(continued)

OPTN Region	Score or Status Group	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
10	M/P 37+	38	9.0%	7	8.3%	9	9.6%	14	6.0%	30	7.3%
	M/P 33-36	31	7.4%	9	10.7%	10	10.6%	16	6.9%	35	8.5%
	M/P 29-32	54	12.9%	10	11.9%	9	9.6%	28	12.1%	47	11.5%
	M/P 15-28	262	62.4%	50	59.5%	57	60.6%	131	56.5%	238	58.0%
	M/P < 15	19	4.5%	7	8.3%	6	6.4%	29	12.5%	42	10.2%
11	Status 1A/1B	16	3.7%	3	3.9%	4	3.6%	9	3.5%	16	3.6%
	M/P 37+	48	11.0%	11	14.5%	16	14.4%	37	14.3%	64	14.4%
	M/P 33-36	34	7.8%	7	9.2%	13	11.7%	26	10.1%	46	10.3%
	M/P 29-32	58	13.3%	15	19.7%	29	26.1%	57	22.1%	101	22.7%
	M/P 15-28	277	63.4%	38	50.0%	48	43.2%	126	48.8%	212	47.6%
	M/P < 15	4	0.9%	2	2.6%	1	0.9%	3	1.2%	6	1.3%

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 or PELD candidate transplants. The figure below shows the distribution of allocation scores at transplant. This excludes any Status 1A or Status 1B deceased donor liver transplants.

The overall distribution of allocation scores at transplant remained fairly unchanged in the post-policy eras. Due to the COVID-19 emergency declaration, this finding should be interpreted with caution.

Figure 44. Distribution of Deceased Donor Liver-Alone Recipient Allocation MELD or PELD Score at Transplant by Era

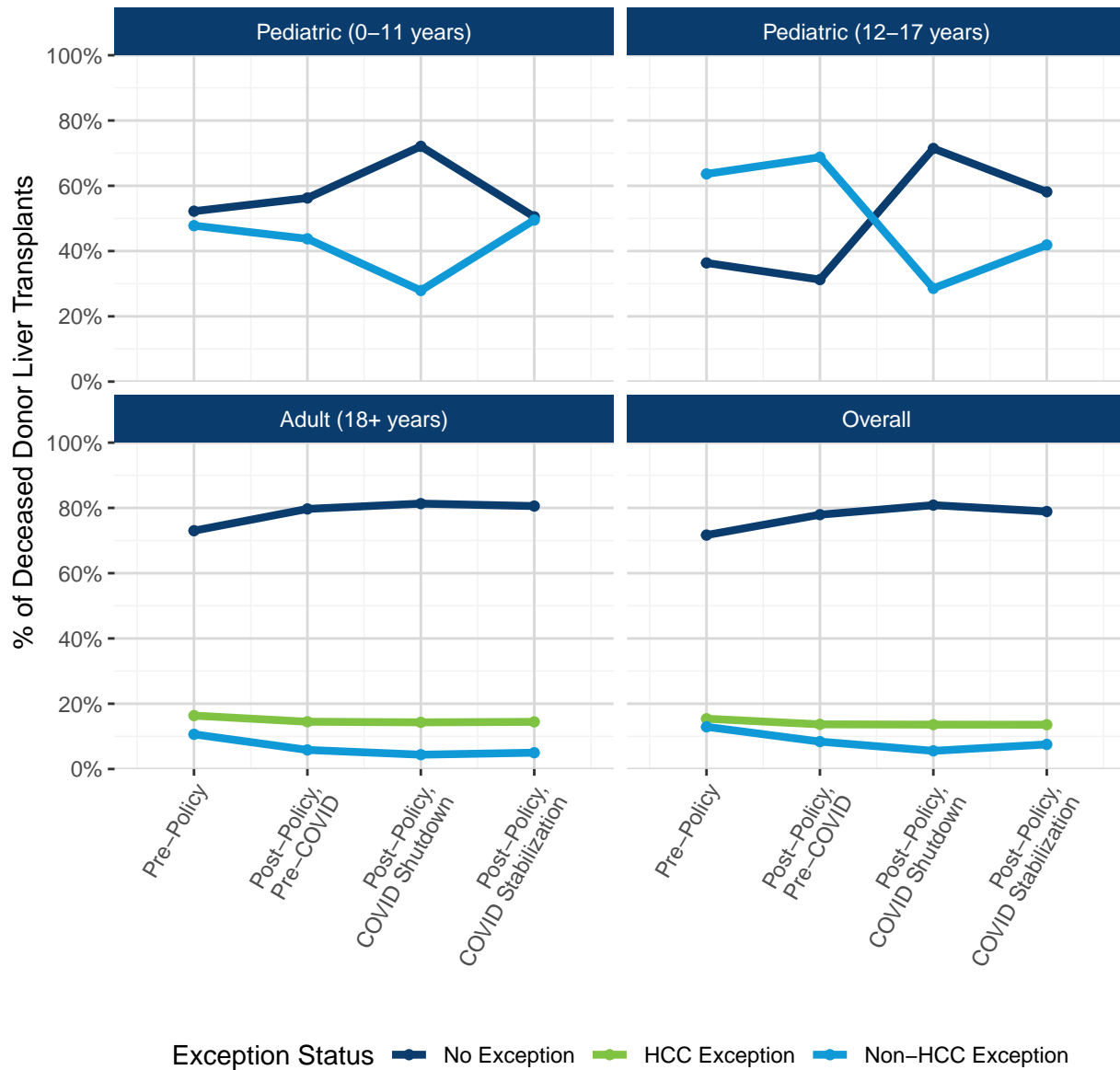
Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

** Dotted lines indicate median score within each era.

Table 45. Distribution of Deceased Donor Liver-Alone Recipient Allocation MELD or PELD Score at Transplant by Era

Policy Era	N	Allocation MELD or PELD at Transplant					
		Minimum	25th Percentile	Mean	Median	75th Percentile	Maximum
Pre-Policy	4199	-10	23	28	28	34	76
Post-Policy, Pre-COVID	833	-2	24	28	29	34	45
Post-Policy, COVID Shutdown	962	3	24	28	28	33	45
Post-Policy, COVID Stabilization	2316	-10	23	28	28	33	50
Post-Policy (overall)	4111	-10	23	28	28	33	50

Figure 45. Percentage of Deceased Donor Liver-Alone Transplants by Exception Type, Age at Transplant, and Era



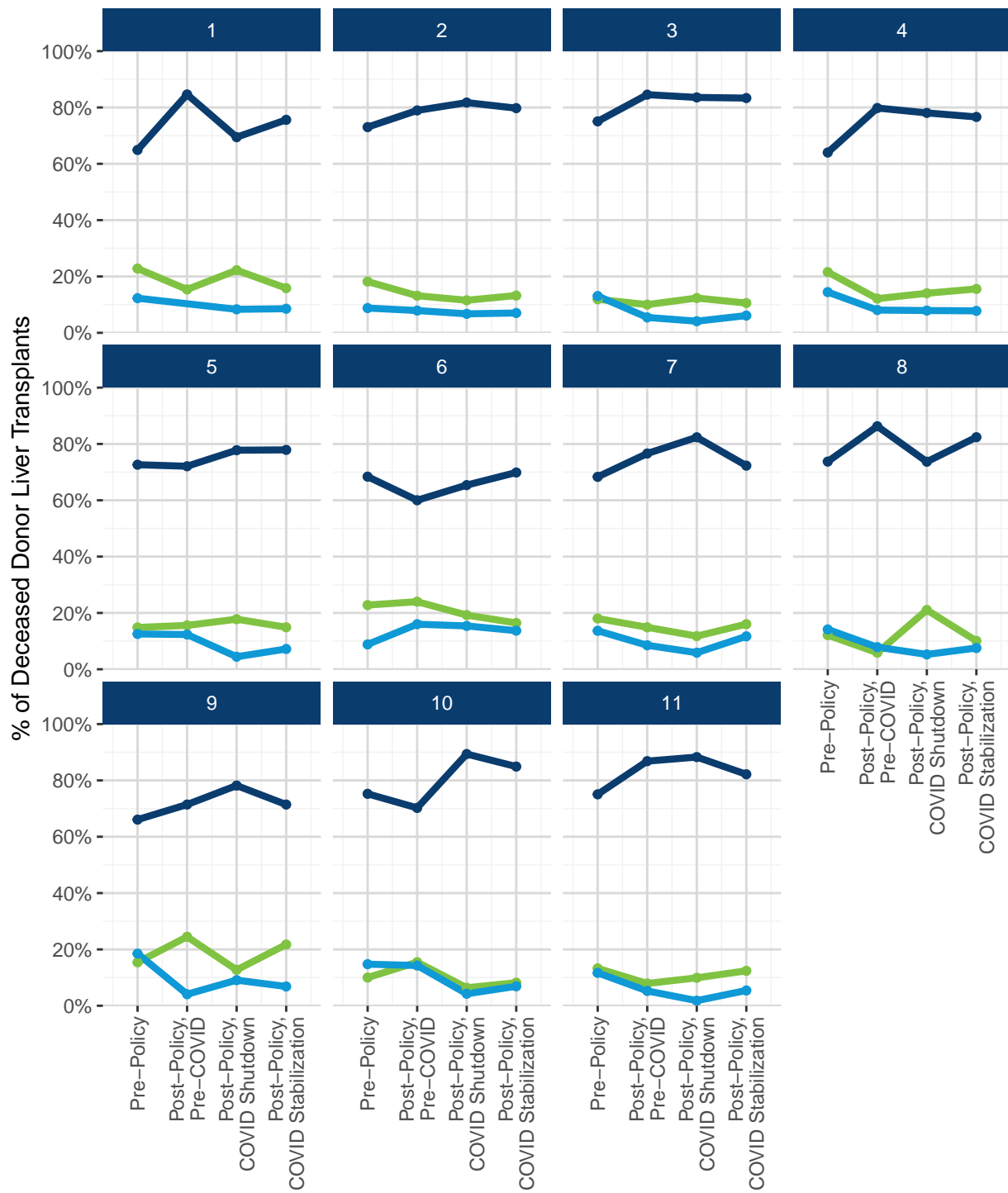
Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

Table 46. Deceased Donor Liver-Alone Transplants by Exception Type, Age at Transplant, and Era

Recipient Age	Exception Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
Pediatric (0-11 years)	No Exception	118	52.2%	18	56.2%	31	72.1%	52	50.5%	101	56.7%
	Non-HCC Exception	108	47.8%	14	43.8%	12	27.9%	51	49.5%	77	43.3%
Pediatric (12-17 years)	No Exception	12	36.4%	5	31.2%	5	71.4%	25	58.1%	35	53.0%
	Non-HCC Exception	21	63.6%	11	68.8%	2	28.6%	18	41.9%	31	47.0%
Adult (18+ years)	No Exception	3030	73.0%	655	79.7%	779	81.3%	1841	80.6%	3275	80.6%
	HCC Exception	679	16.4%	119	14.5%	137	14.3%	330	14.4%	586	14.4%
	Non-HCC Exception	441	10.6%	48	5.8%	42	4.4%	114	5.0%	204	5.0%
Overall	No Exception	3160	71.7%	678	77.9%	815	80.9%	1918	78.9%	3411	79.2%
	HCC Exception	679	15.4%	119	13.7%	137	13.6%	330	13.6%	586	13.6%
	Non-HCC Exception	570	12.9%	73	8.4%	56	5.6%	183	7.5%	312	7.2%

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 46. Percentage of Deceased Donor Liver-Alone Transplants by Exception Type, OPTN Region and Era



Exception Status — No Exception — HCC Exception — Non-HCC Exception

Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

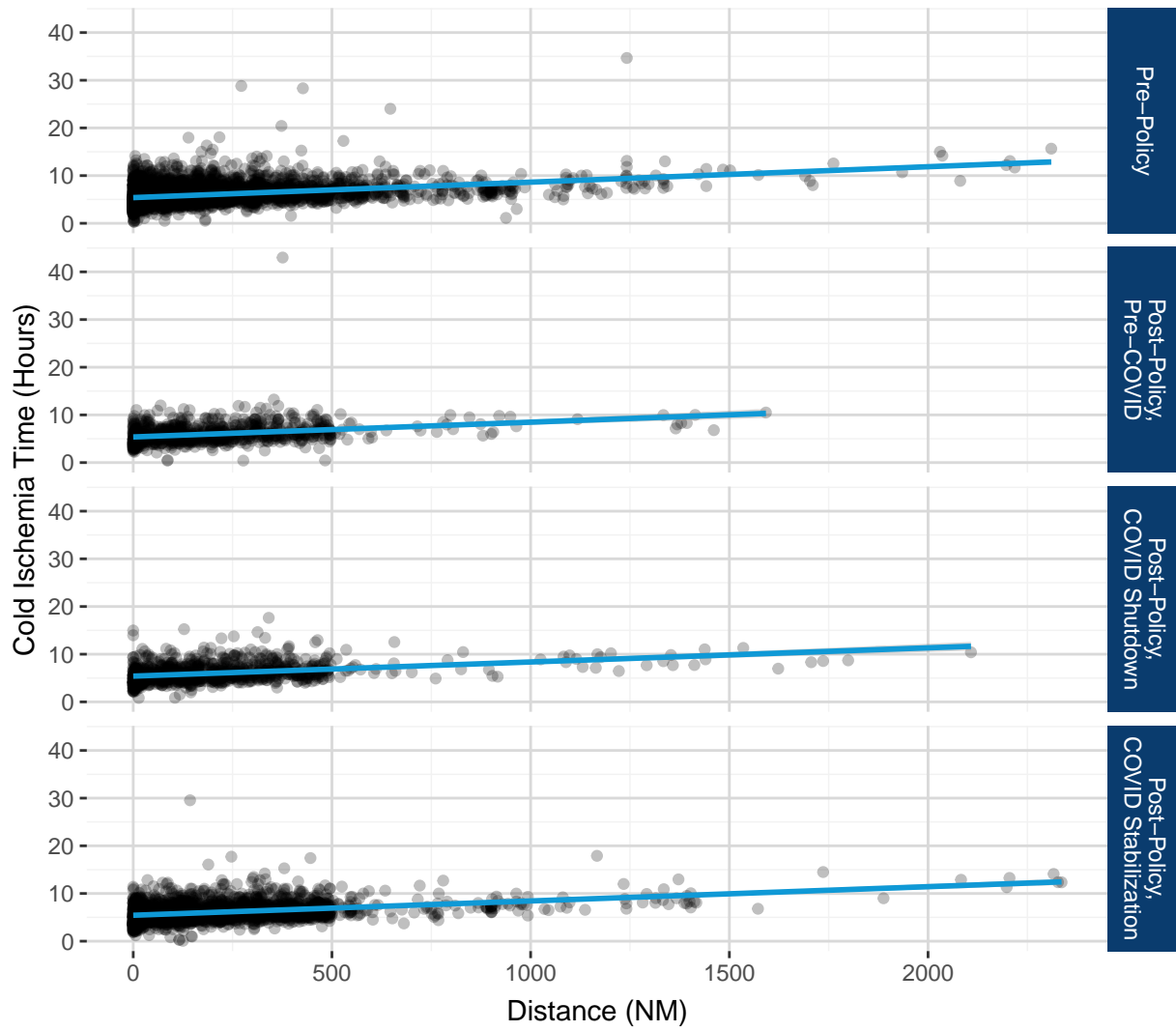
Table 47. Deceased Donor Liver-Alone Transplants by Exception Type, OPTN Region, and Era

OPTN Region	Exception Type	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
		N	%	N	%	N	%	N	%	N	%
1	No Exception	111	64.9%	44	84.6%	25	69.4%	62	75.6%	131	77.1%
	HCC Exception	39	22.8%	8	15.4%	8	22.2%	13	15.9%	29	17.1%
	Non-HCC Exception	21	12.3%	NA	NA	3	8.3%	7	8.5%	10	5.9%
2	No Exception	341	73.0%	60	78.9%	85	81.7%	193	79.8%	338	80.1%
	HCC Exception	85	18.2%	10	13.2%	12	11.5%	32	13.2%	54	12.8%
	Non-HCC Exception	41	8.8%	6	7.9%	7	6.7%	17	7.0%	30	7.1%
3	No Exception	575	75.1%	93	84.5%	122	83.6%	300	83.3%	515	83.6%
	HCC Exception	91	11.9%	11	10.0%	18	12.3%	38	10.6%	67	10.9%
	Non-HCC Exception	100	13.1%	6	5.5%	6	4.1%	22	6.1%	34	5.5%
4	No Exception	288	64.0%	79	79.8%	89	78.1%	187	76.6%	355	77.7%
	HCC Exception	97	21.6%	12	12.1%	16	14.0%	38	15.6%	66	14.4%
	Non-HCC Exception	65	14.4%	8	8.1%	9	7.9%	19	7.8%	36	7.9%
5	No Exception	504	72.6%	111	72.1%	140	77.8%	303	77.9%	554	76.6%
	HCC Exception	103	14.8%	24	15.6%	32	17.8%	58	14.9%	114	15.8%
	Non-HCC Exception	87	12.5%	19	12.3%	8	4.4%	28	7.2%	55	7.6%
6	No Exception	93	68.4%	15	60.0%	17	65.4%	51	69.9%	83	66.9%
	HCC Exception	31	22.8%	6	24.0%	5	19.2%	12	16.4%	23	18.5%
	Non-HCC Exception	12	8.8%	4	16.0%	4	15.4%	10	13.7%	18	14.5%
7	No Exception	235	68.3%	72	76.6%	70	82.4%	167	72.3%	309	75.4%
	HCC Exception	62	18.0%	14	14.9%	10	11.8%	37	16.0%	61	14.9%
	Non-HCC Exception	47	13.7%	8	8.5%	5	5.9%	27	11.7%	40	9.8%
8	No Exception	219	73.7%	44	86.3%	42	73.7%	131	82.4%	217	81.3%
	HCC Exception	36	12.1%	3	5.9%	12	21.1%	16	10.1%	31	11.6%
	Non-HCC Exception	42	14.1%	4	7.8%	3	5.3%	12	7.5%	19	7.1%
9	No Exception	150	66.1%	35	71.4%	43	78.2%	115	71.4%	193	72.8%
	HCC Exception	35	15.4%	12	24.5%	7	12.7%	35	21.7%	54	20.4%
	Non-HCC Exception	42	18.5%	2	4.1%	5	9.1%	11	6.8%	18	6.8%
10	No Exception	316	75.2%	59	70.2%	84	89.4%	197	84.9%	340	82.9%
	HCC Exception	42	10.0%	13	15.5%	6	6.4%	19	8.2%	38	9.3%
	Non-HCC Exception	62	14.8%	12	14.3%	4	4.3%	16	6.9%	32	7.8%
11	No Exception	328	75.1%	66	86.8%	98	88.3%	212	82.2%	376	84.5%
	HCC Exception	58	13.3%	6	7.9%	11	9.9%	32	12.4%	49	11.0%
	Non-HCC Exception	51	11.7%	4	5.3%	2	1.8%	14	5.4%	20	4.5%

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.

Figure 47. Scatter Plot of Cold Ischemia Time and Distance from Donor Hospital to Transplant Center by Era



Pre-Policy: 02/05/2019–11/02/2019; Post-Policy, Pre-COVID: 02/04/2020–03/12/2020; Post-Policy, COVID Shutdown: 03/13/2020–05/09/2020; Post-Policy, COVID Stabilization: 05/10/2020–10/31/2020

** There were 26 pre-policy and 79 post-policy transplant recipients with missing data that are not included.

Additional Utilization Information**Table 48. Number of Deceased Liver Donors Recovered by OPO and Era**

OPO Code	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
ALOB	124	1.8%	23	2.1%	22	1.8%	68	1.5%	113	1.6%
AROR	48	0.7%	5	0.5%	5	0.4%	31	0.7%	41	0.6%
AZOB	188	2.7%	34	3.2%	31	2.5%	121	2.6%	186	2.7%
CADN	244	3.5%	32	3.0%	54	4.4%	138	3.0%	224	3.2%
CAGS	46	0.7%	9	0.8%	8	0.7%	57	1.2%	74	1.1%
CAOP	364	5.3%	45	4.2%	69	5.6%	216	4.7%	330	4.8%
CASD	74	1.1%	12	1.1%	15	1.2%	43	0.9%	70	1.0%
CORS	98	1.4%	22	2.1%	13	1.1%	76	1.7%	111	1.6%
CTOP	45	0.7%	3	0.3%	7	0.6%	26	0.6%	36	0.5%
DCTC	90	1.3%	9	0.8%	10	0.8%	46	1.0%	65	0.9%
FLFH	116	1.7%	12	1.1%	13	1.1%	83	1.8%	108	1.6%
FLMP	99	1.4%	14	1.3%	24	2.0%	62	1.3%	100	1.4%
FLUF	127	1.8%	10	0.9%	23	1.9%	92	2.0%	125	1.8%
FLWC	152	2.2%	20	1.9%	29	2.4%	116	2.5%	165	2.4%
GALL	214	3.1%	20	1.9%	34	2.8%	138	3.0%	192	2.8%
HIOP	13	0.2%	2	0.2%	1	0.1%	9	0.2%	12	0.2%
IAOP	47	0.7%	5	0.5%	3	0.2%	46	1.0%	54	0.8%
ILIP	267	3.9%	37	3.5%	42	3.4%	185	4.0%	264	3.8%
INOP	117	1.7%	28	2.6%	19	1.5%	108	2.3%	155	2.2%
KYDA	67	1.0%	15	1.4%	18	1.5%	68	1.5%	101	1.5%
LAOP	152	2.2%	22	2.1%	28	2.3%	91	2.0%	141	2.0%
MAOB	181	2.6%	29	2.7%	32	2.6%	90	2.0%	151	2.2%
MDPC	96	1.4%	15	1.4%	28	2.3%	44	1.0%	87	1.3%
MIOP	199	2.9%	34	3.2%	29	2.4%	113	2.5%	176	2.6%
MNOP	127	1.8%	24	2.2%	11	0.9%	72	1.6%	107	1.6%
MOMA	142	2.1%	18	1.7%	15	1.2%	108	2.3%	141	2.0%
MSOP	49	0.7%	13	1.2%	7	0.6%	37	0.8%	57	0.8%
MWOB	155	2.2%	34	3.2%	31	2.5%	124	2.7%	189	2.7%
NCCM	71	1.0%	10	0.9%	17	1.4%	49	1.1%	76	1.1%
NCNC	127	1.8%	22	2.1%	37	3.0%	102	2.2%	161	2.3%
NEOR	36	0.5%	8	0.7%	13	1.1%	16	0.3%	37	0.5%
NJTO	124	1.8%	23	2.1%	19	1.5%	64	1.4%	106	1.5%
NMOP	33	0.5%	6	0.6%	5	0.4%	26	0.6%	37	0.5%
NVLV	106	1.5%	35	3.3%	19	1.5%	65	1.4%	119	1.7%
NYAP	35	0.5%	6	0.6%	4	0.3%	30	0.7%	40	0.6%
NYFL	30	0.4%	10	0.9%	5	0.4%	14	0.3%	29	0.4%
NYRT	193	2.8%	11	1.0%	19	1.5%	105	2.3%	135	2.0%
NYWN	17	0.2%	3	0.3%	2	0.2%	13	0.3%	18	0.3%
OHLB	87	1.3%	11	1.0%	13	1.1%	67	1.5%	91	1.3%
OHLC	60	0.9%	6	0.6%	24	2.0%	48	1.0%	78	1.1%
OHLP	84	1.2%	14	1.3%	23	1.9%	63	1.4%	100	1.4%
OHOV	57	0.8%	10	0.9%	3	0.2%	37	0.8%	50	0.7%

(continued)

OPO Code	Pre-Policy		Post-Policy, Pre-COVID		Post-Policy, COVID Shutdown		Post-Policy, COVID Stabilization		Post-Policy (overall)	
	N	%	N	%	N	%	N	%	N	%
OKOP	85	1.2%	8	0.7%	14	1.1%	69	1.5%	91	1.3%
ORUO	65	0.9%	15	1.4%	10	0.8%	52	1.1%	77	1.1%
PADV	377	5.4%	54	5.0%	64	5.2%	234	5.1%	352	5.1%
PATF	133	1.9%	26	2.4%	33	2.7%	111	2.4%	170	2.5%
PRLI	66	1.0%	7	0.7%	8	0.7%	47	1.0%	62	0.9%
SCOP	105	1.5%	15	1.4%	21	1.7%	69	1.5%	105	1.5%
TNDS	181	2.6%	32	3.0%	27	2.2%	153	3.3%	212	3.1%
TNMS	41	0.6%	2	0.2%	10	0.8%	28	0.6%	40	0.6%
TXGC	268	3.9%	53	4.9%	50	4.1%	149	3.2%	252	3.7%
TXSA	121	1.7%	15	1.4%	21	1.7%	75	1.6%	111	1.6%
TXSB	271	3.9%	41	3.8%	54	4.4%	148	3.2%	243	3.5%
UTOP	67	1.0%	11	1.0%	14	1.1%	62	1.3%	87	1.3%
VATB	109	1.6%	13	1.2%	24	2.0%	85	1.8%	122	1.8%
WALC	178	2.6%	26	2.4%	27	2.2%	110	2.4%	163	2.4%
WIDN	70	1.0%	13	1.2%	12	1.0%	38	0.8%	63	0.9%
WIUW	81	1.2%	19	1.8%	14	1.1%	62	1.3%	95	1.4%