

OPTN Lung Transplantation Committee

Descriptive Data Request

Lung Continuous Distribution - Blood Type Rating Scale Modification Three Month Monitoring Report

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Executive Summary

On September 27th, 2023 the OPTN Lung Transplantation Committee modified how blood type is incorporated into lung continuous distribution (CD) allocation to provide more proportional access to lung transplantation for candidates of all blood types and to improve access to lung transplantation for blood type O candidates. This report compares 3 months of data from before CD implementation (Pre-CD era; December 08, 2022 - March 08, 2023), after CD implementation with the original blood type rating scale (Post-CD era; June 28, 2023 - September 26, 2023), and after CD implementation with the modified blood type rating scale (Post-CD + ABO Mod; September 27, 2023 - December 26, 2023). Based on the first three months with the new blood type rating scale:

- The waiting list mortality rate remained similar or decreased slightly for candidates of all blood types.
- The median time to transplant remained similar or decreased for candidates of all blood types.
- Compared to the Pre-CD era, the transplant rate increased for blood types A, AB, and B and decreased slightly for blood type O. However, the transplant rate for blood type O increased from the Post-CD era to the Post-CD + ABO Modification era.
- Distances from the donor hospital to transplant program increased across all blood types from the Pre-CD era to the Post-CD era. From the Post-CD era to the Post-CD + ABO Modification era distances increased again for blood type A and B recipients.
- Median medical urgency points at transplant increased slightly for blood type O recipients.
- In both the Post-CD and Post-CD + ABO Modification eras blood type O recipients had the highest median CAS score at transplant (excluding the blood type points from their score).

Overall, it is still early post-implementation. Changes such as those to behavior or clinical practice may have an impact on the system. The implications of the policy change will continue to be monitored closely with regular reports to the OPTN Lung Transplantation Committee.

Background/Purpose

Continuous distribution of lungs was implemented on March 9th, 2023. One of the goals of continuous distribution is to increase transplant opportunities for patients who are medically harder to match based on biological characteristics like blood type. Simulation modeling reviewed in the development of the lung continuous distribution policy indicated that the policy would increase transplants for blood type O candidates, who are blood type compatible with fewer donors than candidates of other blood types. However, the 3-month monitoring report of continuous distribution revealed the proportion of lung transplants performed for blood type O candidates declined.

Accordingly, on September 27th, 2023 the Lung Transplantation Committee modified how blood type is incorporated into lung allocation to provide more proportional access to lung transplantation for candidates of all blood types, and to improve access to lung transplantation for blood type O candidates. The purpose of this report is to provide early metrics summarizing the impact of the policy change. In an effort to provide data as soon as possible, this report was produced before the 90 day data lag allotted by OPTN policy has fully passed; therefore, data are subject to change. As more data accumulate over time, more extensive analyses will be performed. The OPTN will respond to further requests by the OPTN Lung Transplantation Committee.

Committee Request

The blood type rating scale change will be monitored three months post-implementation. After the initial three-month post-implementation monitoring report, monitoring of the blood type rating scale change will be incorporated into ongoing continuous distribution monitoring reports, which will be presented to the committee annually for 3 years following the allocation change on March 9th, 2023. Within each of these reports, there will be a separate section that evaluates the outlined changes to the blood type rating scale. The analyses will compare metrics from before continuous distribution, under continuous distribution with the previous blood type rating scale, and under continuous distribution with the updated rating scale. Metrics to be evaluated include:

- Number of candidates ever waiting by blood type
- Number of waiting list removals for death or too sick by blood type
- Median waiting time for transplant by blood type
- Number of transplants by recipient blood type
- Number of transplants by recipient blood type and diagnosis group
- Number of transplants by donor blood type and recipient blood type
- Distribution of medical urgency points at the time of transplant by recipient blood type
- Distribution of distance traveled by recipient blood type
- Post-transplant outcomes by recipient blood type

All analyses will be performed after sufficient follow-up data have accrued, which is dependent on submission of follow-up forms. The OPTN and SRTR contractors will work with the Committee to define the specific analyses requested for ongoing monitoring of each annual update. The OPTN equity in access dashboard will also be used to evaluate the impact of this policy on transplant rates by various candidate attributes.

Methods

Data Sources:

Organ Procurement and Transplantation Network (OPTN) data were used for this analysis. The OPTN data system includes data on all donors, waitlisted candidates, and transplant recipients in the US, submitted by members of the OPTN. Continuous distribution (CD) was implemented on March 9th, 2023 and the modified blood type rating scale was implemented on September 27th, 2023. This report compares metrics for 3 months before CD implementation (December 08, 2022 to March 08, 2023), 3 months of CD with the original blood type rating scale (June 28, 2023 to September 26, 2023), and the first 3 months of CD with the new blood type rating scale (September 27, 2023 to December 26, 2023). The dates were set to ensure that each era contains exactly 90 days. In an effort to provide data as soon as possible, this report was produced with OPTN data as of January

26, 2024 and before the 90 day data lag allotted by OPTN policy has fully passed. Data are subject to change due to future database submission or correction.

All analyses described below compare metrics Pre-CD, Post-CD, and Post-CD with the blood type rating scale modification (Post-CD + ABO Mod), unless otherwise stated. For categorical variables, counts and frequencies were reported. For continuous variables, medians and ranges were reported. Diagnosis groups utilized in this monitoring report align with those outlined in OPTN lung allocation policy: A- obstructive lung disease, B- pulmonary vascular disease, C- cystic fibrosis and immunodeficiency disorder, and D- restrictive lung disease {OPTN Policies, https://optn.transplant.hrsa.gov/media/1200/optn_policies.pdf Accessed 1/24/2024}.

Waiting List

Cohort: Candidates added to the lung waiting list, removed from the waiting list, or ever waiting for a lung-alone transplant from December 08, 2022 through March 08, 2023 (Pre-CD), June 28, 2023 through September 26, 2023 (Post-CD), and September 27, 2023 through December 26, 2023 (Post-CD + ABO Mod) were included.

Analysis: Exceptions in each era were determined based on submissions to the National Lung Review Board. Under the previous allocation system (LAS), a single registration could only have one approved and active exception request at a time (although a registration could submit more than one request if the first request was denied). Under continuous distribution, using the CAS, a single registration can have multiple exception requests. Prior to CD implementation, centers could submit CAS exception requests through an interim process so that those requests, if approved, would be in place at the start of implementation. Twenty-six lung requests and one heart/lung request were submitted through this process and were not included in these analyses. Exceptions were analyzed at the registration level whenever possible (where one registration can have more than one exception request submitted and approved under CD). However, when the metric of interest depended on the outcome of a specific request submission (i.e., request approvals), analyses were performed at the form submission level.

Waiting list mortality rates are reported as the number of deaths or removals for too sick per 100 patient-years. This rate is calculated by dividing the number of individuals who died on the waiting list or were removed from the waiting list for being too sick to transplant by the number of years patients spent waiting. For each policy era, active and inactive waiting time were 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 death is attributed only to the era in which it occurred.

Transplant

Cohort: Recipients that received a lung-alone transplant from December 08, 2022 through March 08, 2023 (Pre-CD), June 28, 2023 through September 26, 2023 (Post-CD), and September 27, 2023 through December 26, 2023 (Post-CD + ABO Mod) were included.

Analysis: Medical urgency points and CAS at transplant were calculated based on clinical data entered in the OPTN Waiting List. Candidates have both a calculated and match version of these scores which differ when a candidate has an approved exception request, which causes the match score to be higher than the calculated score. For all analyses, the match scores (the same scores used for allocation) were used as reported at the time of transplant.

Transplant rates are reported as the number of transplants per 100 patient-years. This rate is calculated by dividing the number of all deceased donor lung transplants by the number of years patients spent waiting. For each policy era, active waiting time within the era 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 transplant is attributed only to the era in which it occurred.

Median Waiting Time

Cohort: All registrations added to the waiting list for a lung-alone transplant from December 08, 2022 through March 08, 2023 (Pre-CD), June 28, 2023 through September 26, 2023 (Post-CD), and September 27, 2023 through December 26, 2023 (Post-CD + ABO Mod) were included.

Analysis: We calculated the median waiting time by blood type using a competing risk analysis. Because these analyses were run without the data lag, results may vary slightly as more data accrue.

Results

Candidates Ever Waiting

Compared to the Pre-CD era, the number of blood type O candidates ever waiting increased and the number of candidates ever waiting with other blood types decreased.

Figure 1: Number of Candidates Ever Waiting by Era and Blood Type

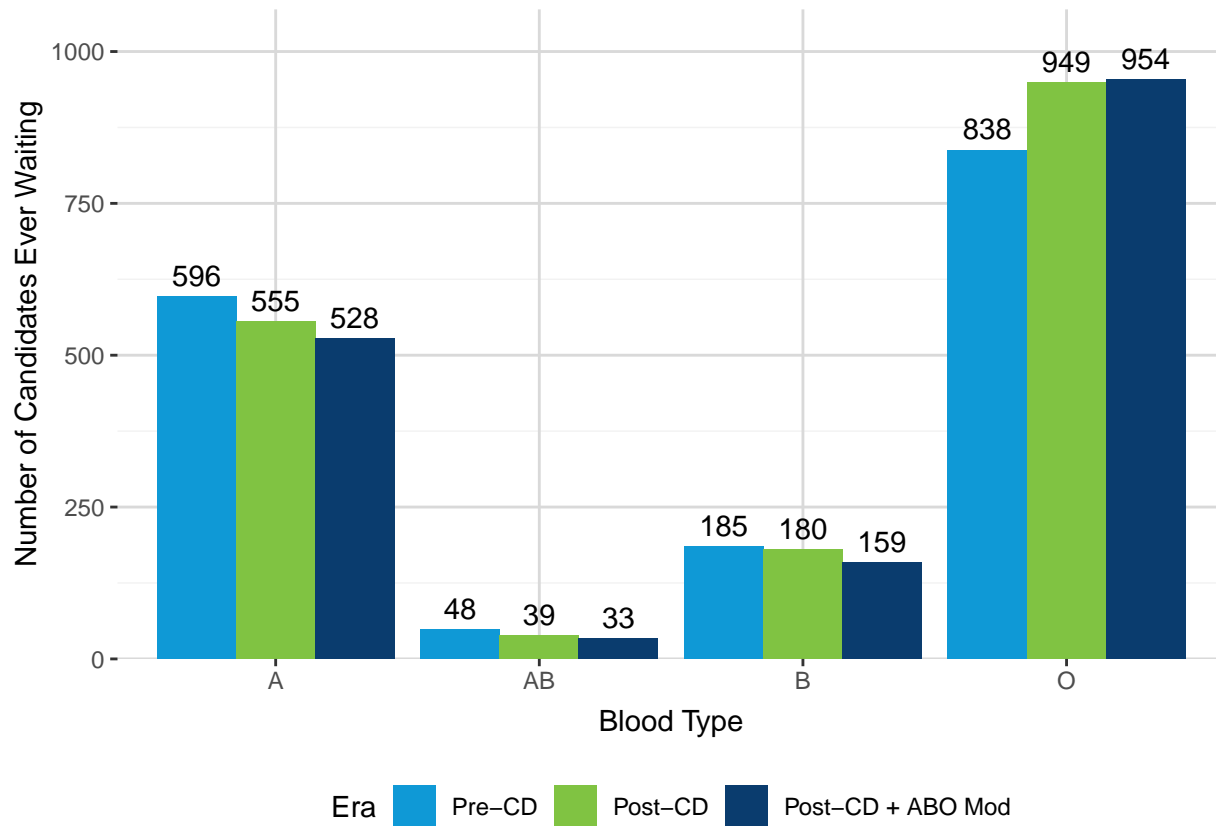


Table 1: Number of Candidates Ever Waiting by Era and Blood Type

Blood Type	Pre-CD	Post-CD	Post-CD + ABO Mod
A	596 (35.8%)	555 (32.2%)	528 (31.5%)
AB	48 (2.9%)	39 (2.3%)	33 (2.0%)
B	185 (11.1%)	180 (10.4%)	159 (9.5%)
O	838 (50.3%)	949 (55.1%)	954 (57.0%)
Total	1,667 (100.0%)	1,723 (100.0%)	1,674 (100.0%)

Registrations Added to the Waiting List

Compared to the Pre-CD era, more blood type O registrations were added to the waiting list.

Figure 2: Number of Registrations Added to the Waiting List by Era and Blood Type

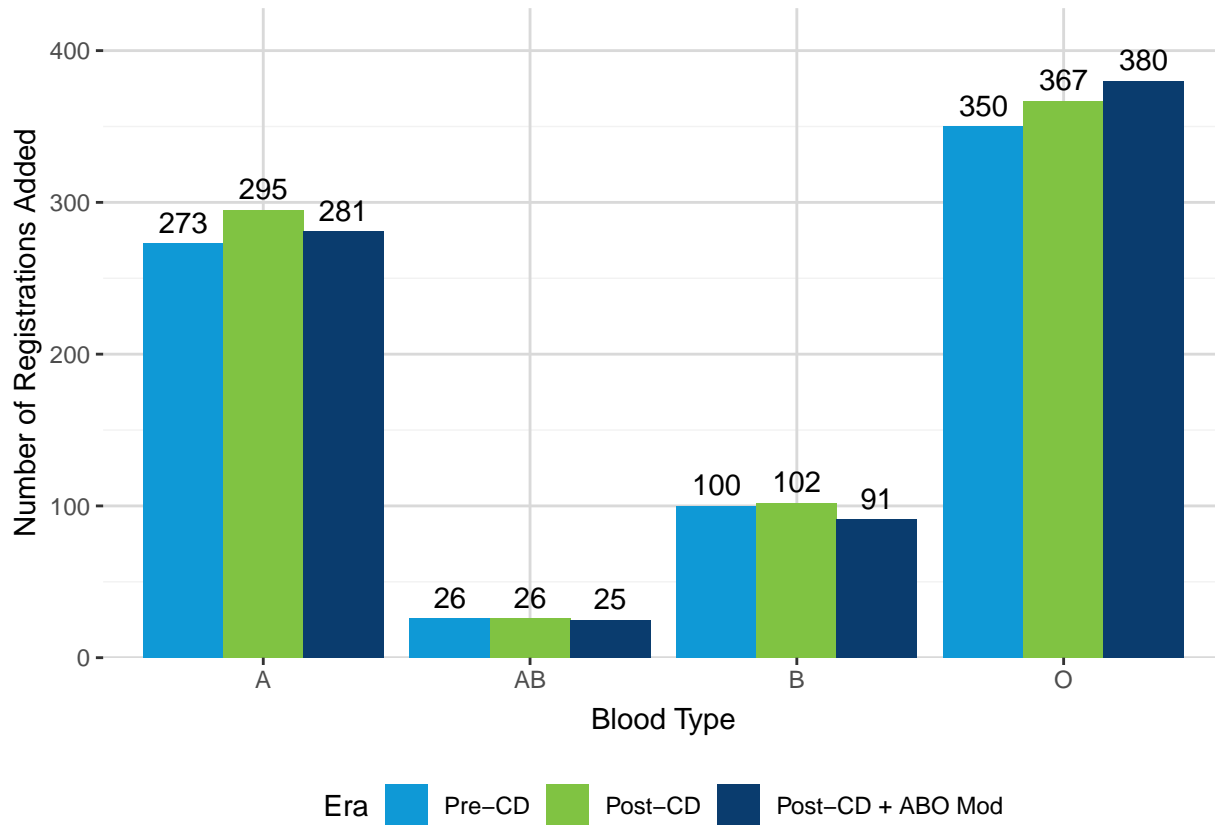


Table 2: Number of Registrations Added to the Waiting List by Era and Blood Type

Blood Type	Pre-CD	Post-CD	Post-CD + ABO Mod
A	273 (36.4%)	295 (37.3%)	281 (36.2%)
AB	26 (3.5%)	26 (3.3%)	25 (3.2%)
B	100 (13.4%)	102 (12.9%)	91 (11.7%)
O	350 (46.7%)	367 (46.5%)	380 (48.9%)
Total	749 (100.0%)	790 (100.0%)	777 (100.0%)

Candidates Removed from the Waiting List

Compared to the Pre-CD era, the waiting list mortality rate remained similar or decreased slightly under the Post-CD + ABO Modification era for candidates with blood types A, B, and O. The waiting list mortality rate for blood type AB candidates had large confidence intervals due to the small sample size.

Figure 3: Deaths or Removals for Too Sick per 100 Patient Years on the Waiting List by Era and Blood Type

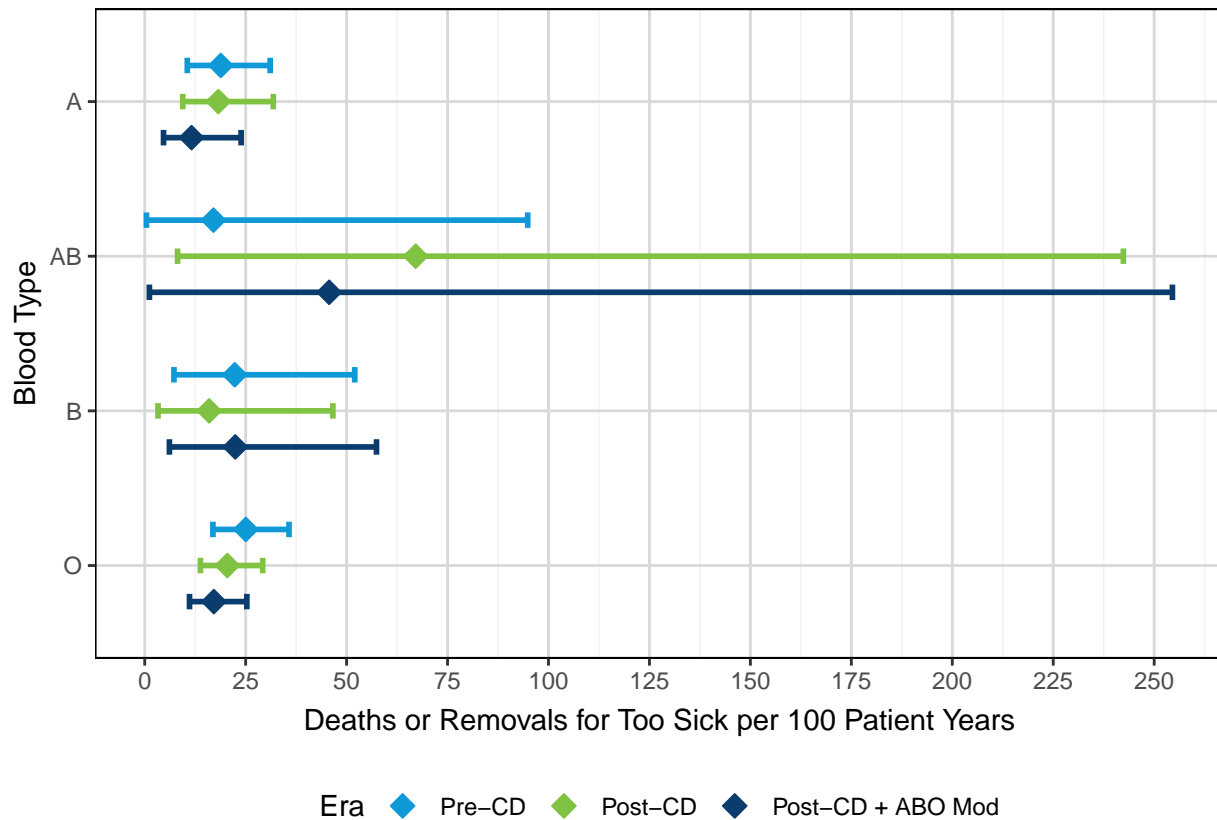


Table 3: Deaths or Removals for Too Sick per 100 Patient Years on the Waiting List by Era and Blood Type

Blood Type	Era	Deaths or Removals for Too Sick per 100 Patient Years	95% Confidence Interval
A	Pre-CD	18.84	(10.54, 31.07)
	Post-CD	18.23	(9.42, 31.85)
	Post-CD + ABO Mod	11.59	(4.66, 23.88)
AB	Pre-CD	17.02	(0.43, 94.85)
	Post-CD	67.10	(8.13, 242.37)
	Post-CD + ABO Mod	45.68	(1.16, 254.52)
B	Pre-CD	22.29	(7.24, 52.01)
	Post-CD	15.95	(3.29, 46.60)
	Post-CD + ABO Mod	22.42	(6.11, 57.40)
O	Pre-CD	25.03	(16.89, 35.74)
	Post-CD	20.46	(13.80, 29.21)
	Post-CD + ABO Mod	17.13	(11.09, 25.29)

Compared to the Pre-CD and Post-CD eras, the number of candidates removed from the waiting list for death or too sick in the Post-CD + ABO Modification era decreased or remained similar for all blood types.

Figure 4: Number of Candidates Removed from the Waiting List for Death or Too Sick by Era and Blood Type

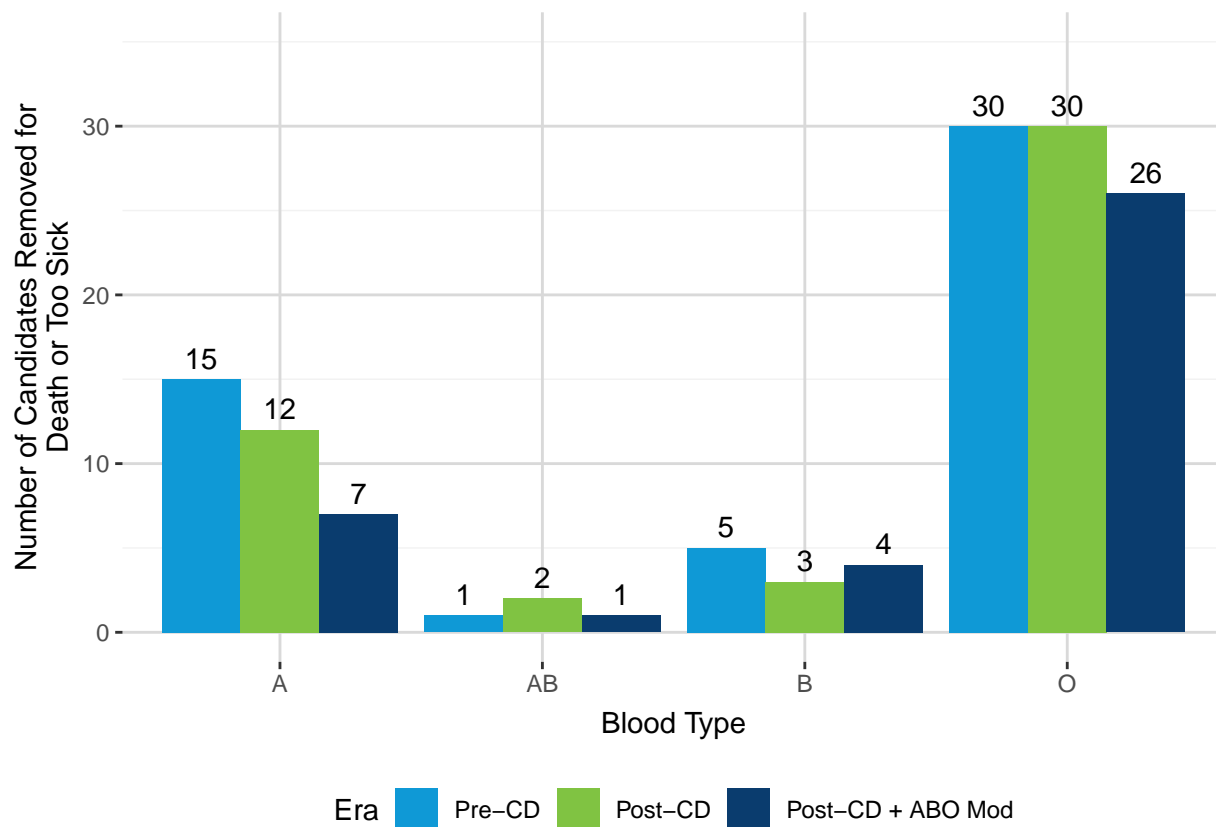


Table 4: Number of Candidates Removed from the Waiting List for Death or Too Sick by Era and Blood Type

Blood Type	Pre-CD	Post-CD	Post-CD + ABO Mod
A	15 (29.4%)	12 (25.5%)	7 (18.4%)
AB	1 (2.0%)	2 (4.3%)	1 (2.6%)
B	5 (9.8%)	3 (6.4%)	4 (10.5%)
O	30 (58.8%)	30 (63.8%)	26 (68.4%)
Total	51 (100.0%)	47 (100.0%)	38 (100.0%)

Median Time to Transplant

Compared to the Pre-CD and Post-CD eras the median time to transplant decreased or remained similar for candidates with blood types A, AB, and O. For candidates with blood type B, the median time to transplant decreased from the Pre-CD to Post-CD era and then increased slightly under the Post-CD + ABO Modification era.

Figure 5: Median Time to Transplant (Days) by Era and Recipient Blood Type

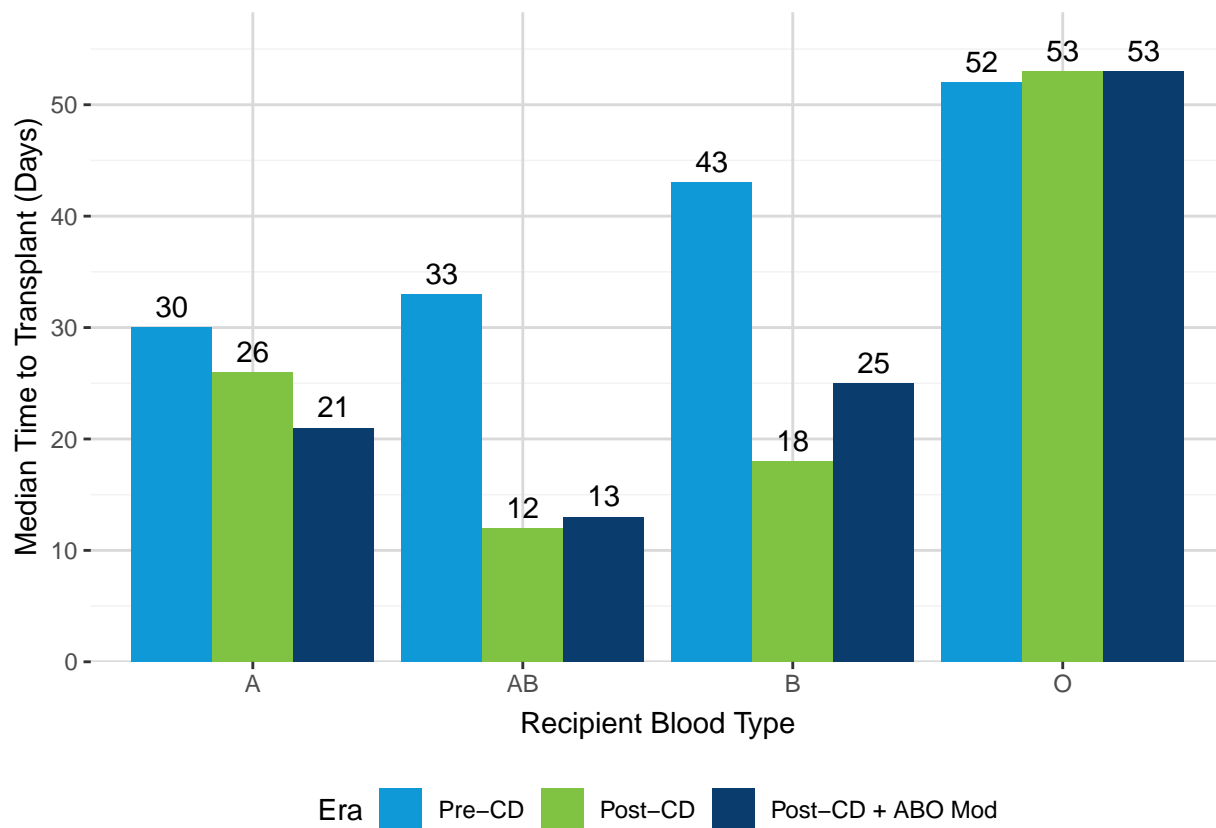


Table 5: Median Time to Transplant (Days) by Era and Recipient Blood Type

Recipient Blood Type	Era	N Registrations	Median Time to Transplant (Days)
A	Pre-CD	273	30
	Post-CD	295	26
	Post-CD + ABO Mod	281	21
AB	Pre-CD	26	33
	Post-CD	26	12
	Post-CD + ABO Mod	25	13
B	Pre-CD	100	43
	Post-CD	102	18
	Post-CD + ABO Mod	91	25
O	Pre-CD	350	52
	Post-CD	367	53
	Post-CD + ABO Mod	380	53

Transplants

Compared to the Pre-CD era, the transplant rate in the Post-CD + ABO Modification era increased for blood types A, AB, and B and decreased slightly for blood type O. However, the transplant rate for blood type O increased from the Post-CD era to the Post-CD + ABO Modification era.

Figure 6: Lung Transplants per 100 Patient Years on the Waiting List by Era and Recipient Blood Type

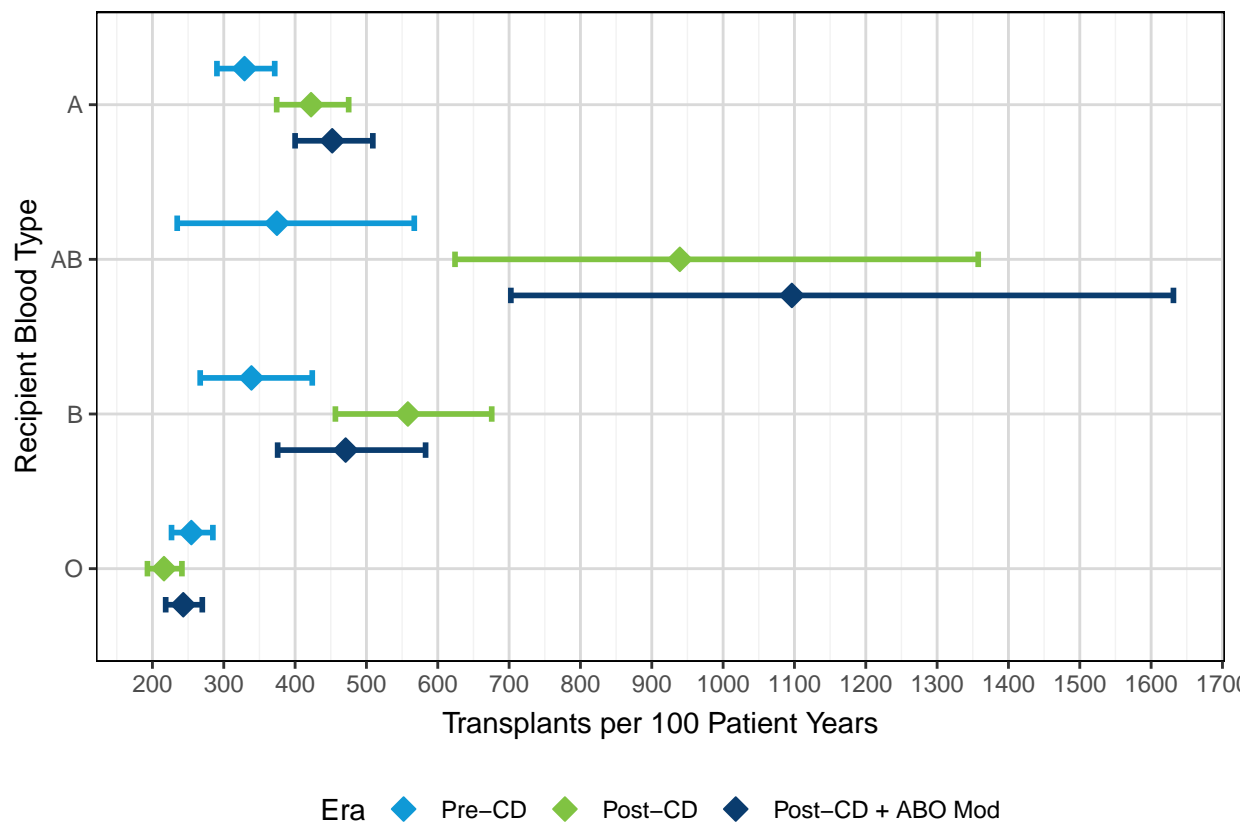


Table 6: Lung Transplants per 100 Patient Years on the Waiting List by Era and Recipient Blood Type

Recipient Blood Type	Era	Transplants per 100 Patient Years	95% Confidence Interval
A	Pre-CD	329.07	(290.42, 371.42)
	Post-CD	422.40	(374.20, 475.09)
	Post-CD + ABO Mod	452.05	(400.01, 508.98)
AB	Pre-CD	374.53	(234.72, 567.05)
	Post-CD	939.34	(624.18, 1357.61)
	Post-CD + ABO Mod	1096.37	(702.47, 1631.31)
B	Pre-CD	338.79	(266.93, 424.04)
	Post-CD	558.10	(456.47, 675.62)
	Post-CD + ABO Mod	470.82	(375.55, 582.91)
O	Pre-CD	254.52	(226.76, 284.75)
	Post-CD	216.18	(193.03, 241.33)
	Post-CD + ABO Mod	243.24	(218.59, 269.90)

Compared to the Pre-CD era, in the Post-CD + ABO Modification era, the number of lung-alone transplants increased or remained similar for recipients of all blood types. However, the number of lung-alone transplants decreased from the Post-CD to Post-CD + ABO Modification era for recipients with blood types A, B, and AB. This result was expected because the new policy gave the most blood type points to blood type O candidates.

Figure 7: Number of Lung Transplants by Era and Recipient Blood Type

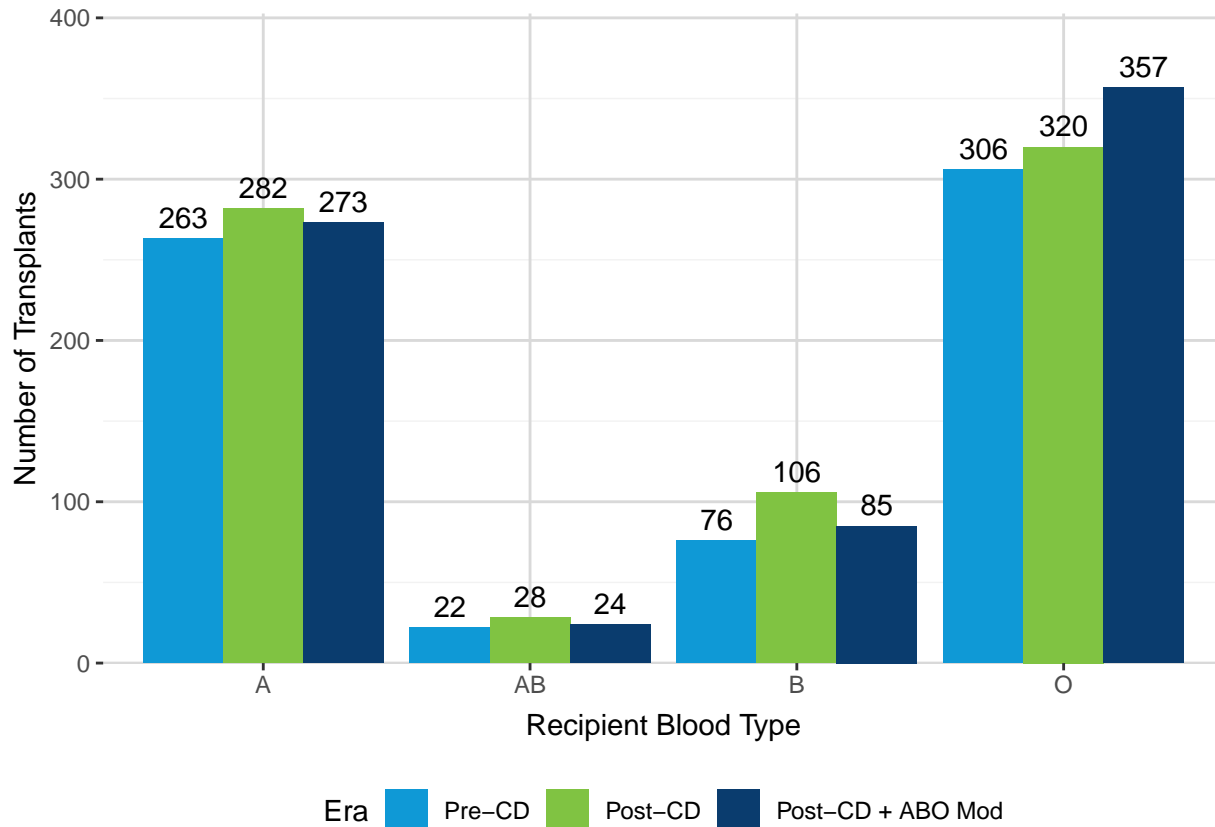
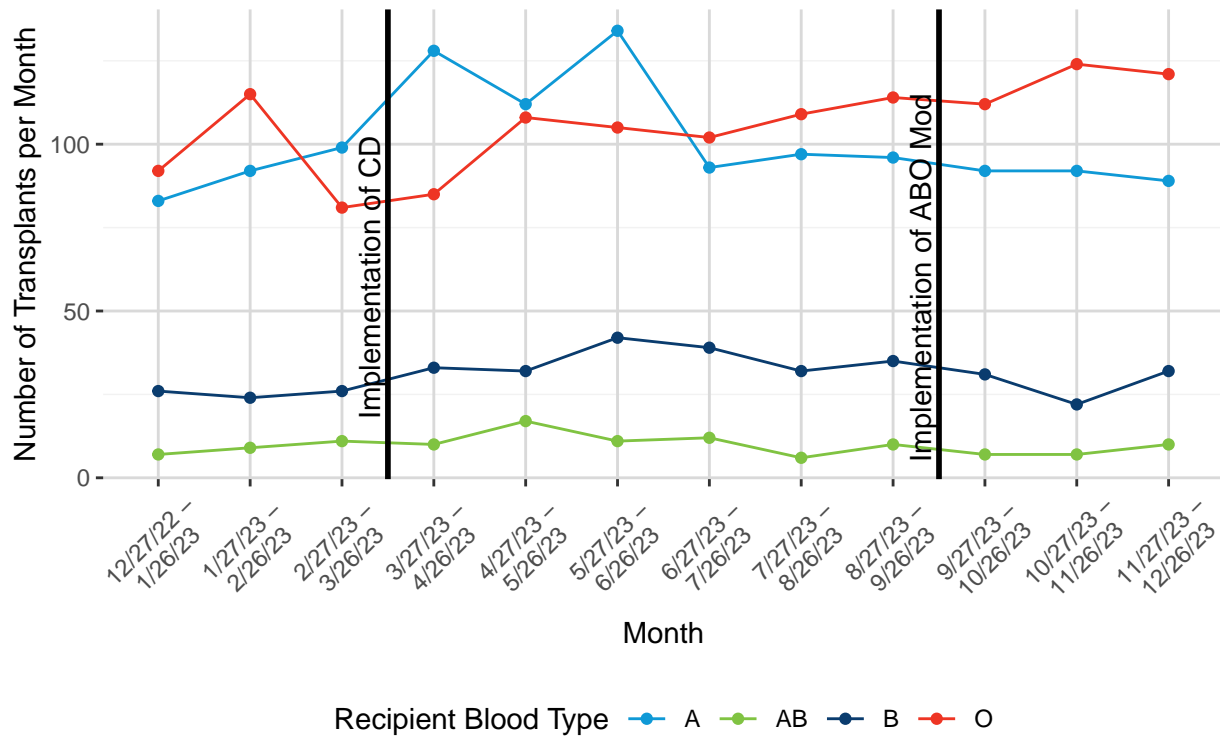


Table 7: Number of Lung Transplants by Era and Recipient Blood Type

Recipient Blood Type	Pre-CD	Post-CD	Post-CD + ABO Mod
A	263 (39.4%)	282 (38.3%)	273 (36.9%)
AB	22 (3.3%)	28 (3.8%)	24 (3.2%)
B	76 (11.4%)	106 (14.4%)	85 (11.5%)
O	306 (45.9%)	320 (43.5%)	357 (48.3%)
Total	667 (100.0%)	736 (100.0%)	739 (100.0%)

Since the implementation of CD, the number of transplants per month to blood type O recipients has been increasing; this increase continued after the implementation of the blood type modification.

Figure 8: Number of Lung Transplants Per Month by Recipient Blood Type



Note that all months are defined from the 27th to the 26th; therefore, the months do not perfectly line up with the defined policy eras. In addition, the 2/27/23 - 3/26/23 month includes data from both the Pre-CD and Post-CD eras.

Table 8: Number of Lung Transplants Per Month by Recipient Blood Type

Month	Era	Recipient Blood Type			
		A	AB	B	O
12/27/22 - 1/26/23	Pre-CD	83	7	26	92
1/27/23 - 2/26/23	Pre-CD	92	9	24	115
2/27/23 - 3/26/23	Pre-CD and Post-CD	99	11	26	81
3/27/23 - 4/26/23	Post-CD	128	10	33	85
4/27/23 - 5/26/23	Post-CD	112	17	32	108
5/27/23 - 6/26/23	Post-CD	134	11	42	105
6/27/23 - 7/26/23	Post-CD	93	12	39	102
7/27/23 - 8/26/23	Post-CD	97	6	32	109
8/27/23 - 9/26/23	Post-CD	96	10	35	114
9/27/23 - 10/26/23	Post-CD + ABO Mod	92	7	31	112
10/27/23 - 11/26/23	Post-CD + ABO Mod	92	7	22	124
11/27/23 - 12/26/23	Post-CD + ABO Mod	89	10	32	121

^a Note that all months are defined from the 27th to the 26th; therefore, the months do not perfectly line up with the defined policy eras. In addition, the 2/27/23 - 3/26/23 month includes data from both the Pre-CD and Post-CD eras.

In the Post-CD era more blood type O donor lungs were transplanted to A and B recipients; however, after the ABO modification was implemented more blood type O donor lungs went to blood type O recipients.

Figure 9: Number of Lung Transplants by Era, Donor Blood Type, and Recipient Blood Type

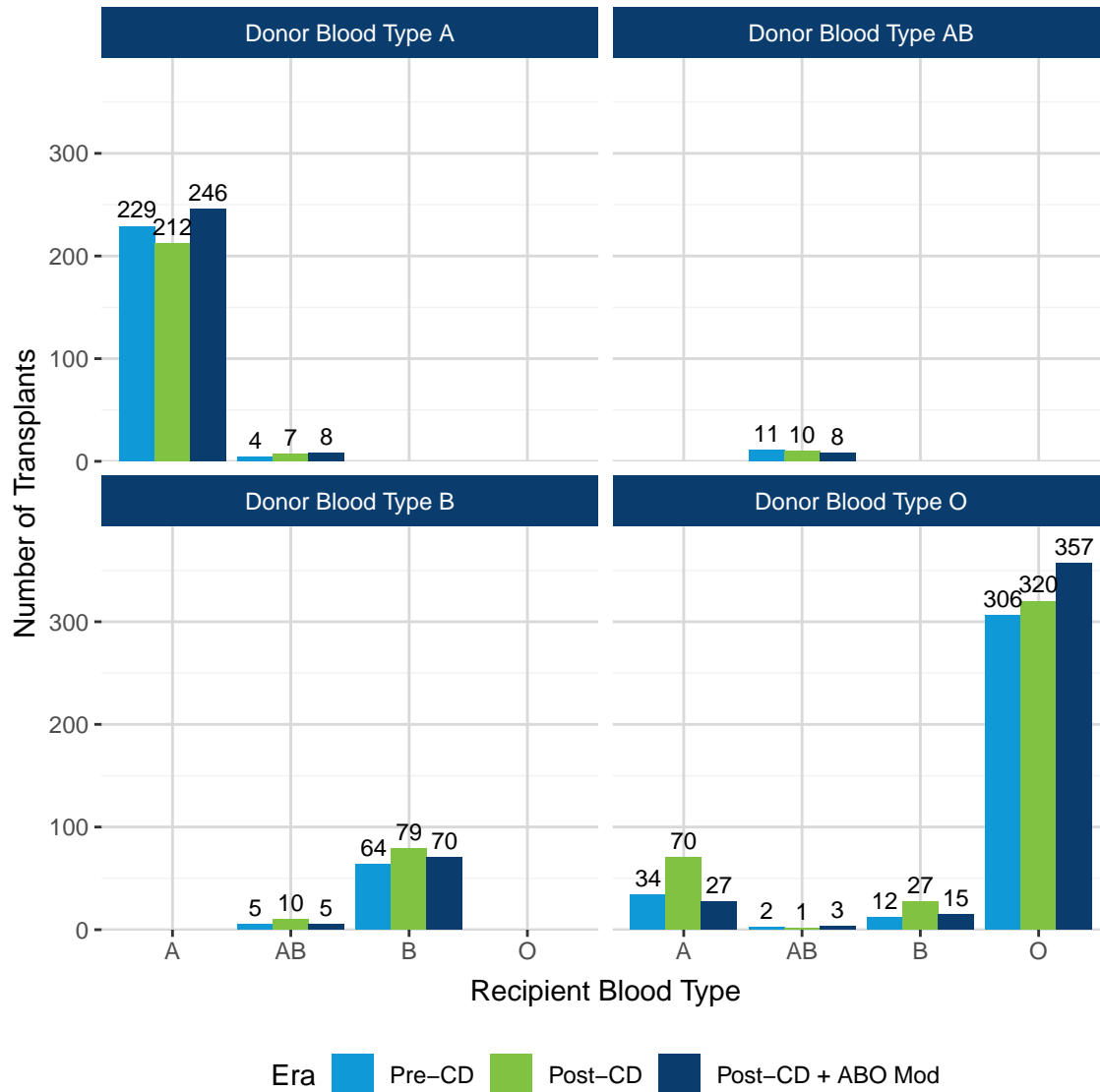


Table 9: Number of Lung Transplants by Era, Donor Blood Type, and Recipient Blood Type

Donor Blood Type	Era	Recipient Blood Type				Total
		A	AB	B	O	
A	Pre-CD	229 (98.28%)	4 (1.72%)	0 (0.00%)	0 (0.00%)	233 (100.00%)
	Post-CD	212 (96.80%)	7 (3.20%)	0 (0.00%)	0 (0.00%)	219 (100.00%)
	Post-CD + ABO Mod	246 (96.85%)	8 (3.15%)	0 (0.00%)	0 (0.00%)	254 (100.00%)
B	Pre-CD	0 (0.00%)	5 (7.25%)	64 (92.75%)	0 (0.00%)	69 (100.00%)
	Post-CD	0 (0.00%)	10 (11.24%)	79 (88.76%)	0 (0.00%)	89 (100.00%)
	Post-CD + ABO Mod	0 (0.00%)	5 (6.67%)	70 (93.33%)	0 (0.00%)	75 (100.00%)
AB	Pre-CD	0 (0.00%)	11 (100.00%)	0 (0.00%)	0 (0.00%)	11 (100.00%)
	Post-CD	0 (0.00%)	10 (100.00%)	0 (0.00%)	0 (0.00%)	10 (100.00%)
	Post-CD + ABO Mod	0 (0.00%)	8 (100.00%)	0 (0.00%)	0 (0.00%)	8 (100.00%)
O	Pre-CD	34 (9.60%)	2 (0.56%)	12 (3.39%)	306 (86.44%)	354 (100.00%)
	Post-CD	70 (16.75%)	1 (0.24%)	27 (6.46%)	320 (76.56%)	418 (100.00%)
	Post-CD + ABO Mod	27 (6.72%)	3 (0.75%)	15 (3.73%)	357 (88.81%)	402 (100.00%)

In the Post-CD + ABO Modification era, the largest increase in transplants was observed for recipients in diagnosis group D with blood type O.

Figure 10: Number of Lung Transplants by Era, Recipient Blood Type, and Diagnosis Group

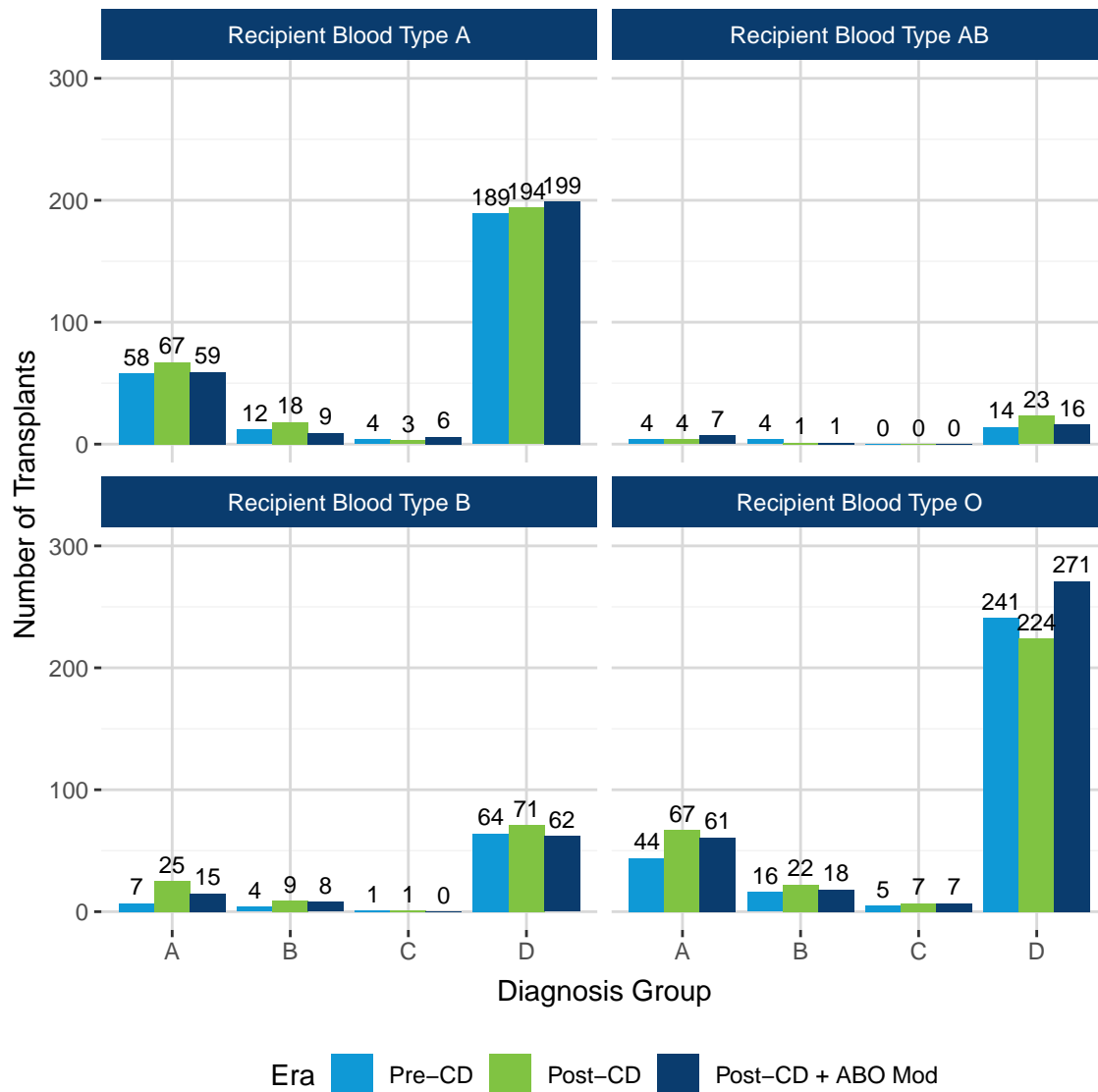


Table 10: Number of Lung Transplants by Era, Recipient Blood Type, and Diagnosis Group

Era	Diagnosis Group	Recipient Blood Type			
		A	AB	B	O
Pre-CD	A	58 (22.1%)	4 (18.2%)	7 (9.2%)	44 (14.4%)
	B	12 (4.6%)	4 (18.2%)	4 (5.3%)	16 (5.2%)
	C	4 (1.5%)	0 (0.0%)	1 (1.3%)	5 (1.6%)
	D	189 (71.9%)	14 (63.6%)	64 (84.2%)	241 (78.8%)
	Total	263 (100.0%)	22 (100.0%)	76 (100.0%)	306 (100.0%)
Post-CD	A	67 (23.8%)	4 (14.3%)	25 (23.6%)	67 (20.9%)
	B	18 (6.4%)	1 (3.6%)	9 (8.5%)	22 (6.9%)
	C	3 (1.1%)	0 (0.0%)	1 (0.9%)	7 (2.2%)
	D	194 (68.8%)	23 (82.1%)	71 (67.0%)	224 (70.0%)
	Total	282 (100.0%)	28 (100.0%)	106 (100.0%)	320 (100.0%)
Post-CD + ABO Mod	A	59 (21.6%)	7 (29.2%)	15 (17.6%)	61 (17.1%)
	B	9 (3.3%)	1 (4.2%)	8 (9.4%)	18 (5.0%)
	C	6 (2.2%)	0 (0.0%)	0 (0.0%)	7 (2.0%)
	D	199 (72.9%)	16 (66.7%)	62 (72.9%)	271 (75.9%)
	Total	273 (100.0%)	24 (100.0%)	85 (100.0%)	357 (100.0%)

Distribution of Distance

Median distances from the donor hospital to transplant program increased across all blood types from the Pre-CD era to the Post-CD era. From the Post-CD era to the Post-CD + ABO Modification era median distances increased again for blood type A and B recipients.

Figure 11: Distribution of Distance (in Nautical Miles) from Donor Hospital to Transplant Program by Era and Recipient Blood Type

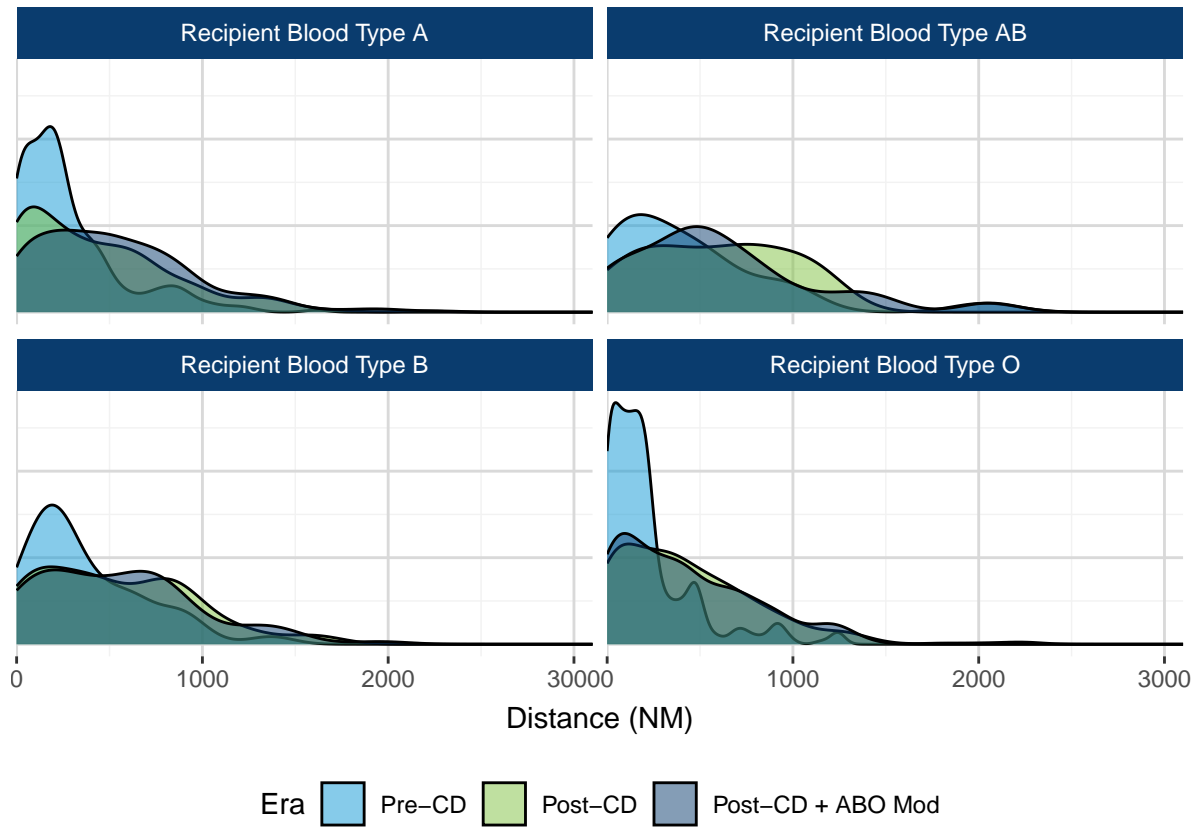


Table 11: Distribution of Distance (in Nautical Miles) from Donor Hospital to Transplant Program by Era and Recipient Blood Type

Recipient Blood Type	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
A	Pre-CD	263	0	0	81.00	204.0	278.23	378.00	1613
	Post-CD	282	0	0	84.75	346.0	436.59	668.25	2205
	Post-CD + ABO Mod	273	0	0	222.00	471.0	540.19	763.00	2284
AB	Pre-CD	22	0	22	113.75	310.0	447.91	598.50	2036
	Post-CD	28	0	9	277.00	583.0	590.86	874.75	1188
	Post-CD + ABO Mod	24	0	4	327.00	523.0	615.54	771.75	2058
B	Pre-CD	76	0	2	166.75	275.5	374.32	564.75	1410
	Post-CD	106	0	0	184.25	466.0	537.58	840.00	1652
	Post-CD + ABO Mod	85	0	2	202.00	514.0	550.94	784.00	1957
O	Pre-CD	306	0	0	64.00	155.5	222.41	246.50	1241
	Post-CD	320	0	0	137.50	359.5	439.02	645.00	2244
	Post-CD + ABO Mod	357	0	0	114.00	357.0	420.39	658.00	1418
Total	Pre-CD	667	0	0	76.50	193.0	269.16	365.50	2036
	Post-CD	736	0	0	127.00	378.5	458.06	697.00	2244
	Post-CD + ABO Mod	739	0	0	168.00	417.0	486.00	729.50	2284

Distribution of Allocation Scores at Transplant

Medical urgency points are not available for candidates that were transplanted in the Pre-CD era. Compared to the Post-CD era, median medical urgency points at transplant increased slightly for blood type O recipients in the Post-CD + ABO Modification era.

Figure 12: Distribution of Medical Urgency Points at Transplant by Era and Recipient Blood Type

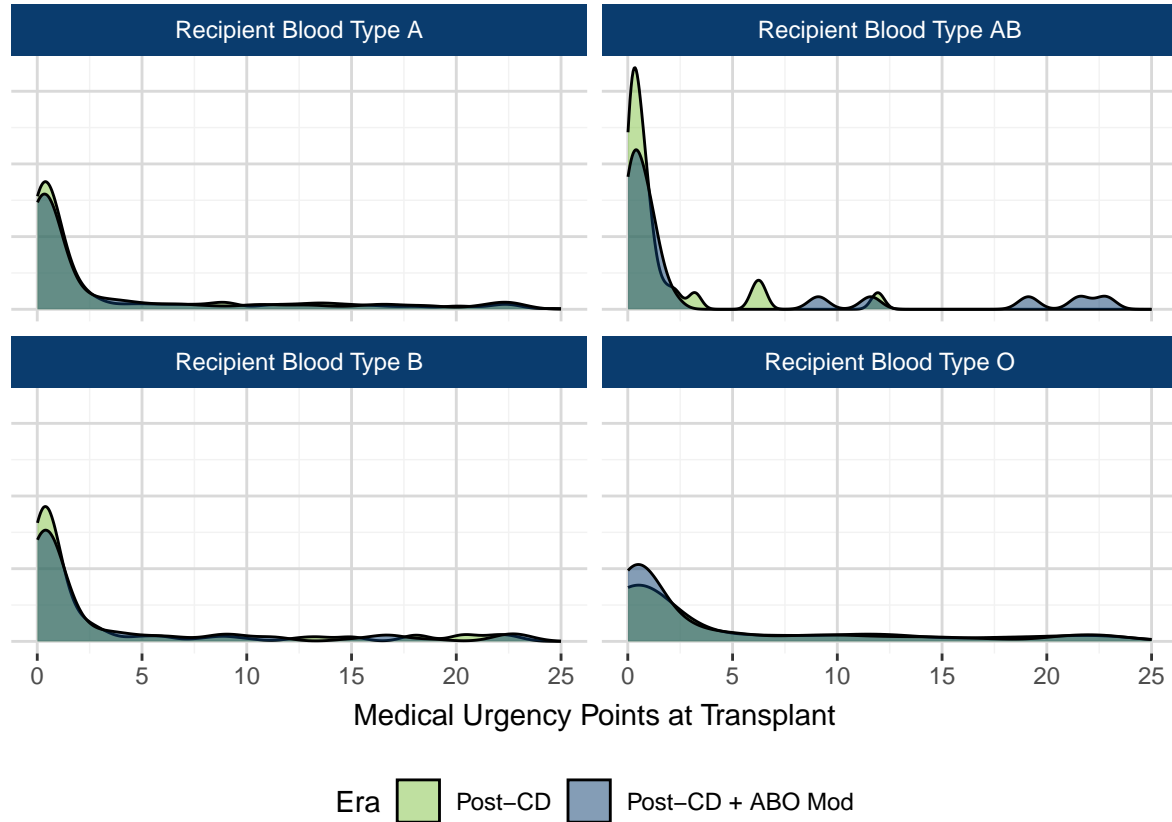


Table 12: Distribution of Medical Urgency Points at Transplant by Era and Recipient Blood Type

Recipient Blood Type	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
A	Post-CD	282	0	0.02	0.20	0.59	3.62	3.31	24.75
	Post-CD + ABO Mod	273	0	0.02	0.18	0.51	3.74	3.83	23.01
AB	Post-CD	28	0	0.05	0.26	0.58	1.50	1.16	11.93
	Post-CD + ABO Mod	24	0	0.02	0.17	0.71	4.00	1.53	22.80
B	Post-CD	106	0	0.03	0.19	0.64	3.64	2.65	22.80
	Post-CD + ABO Mod	85	0	0.04	0.23	0.54	3.54	3.31	23.01
O	Post-CD	320	0	0.01	0.19	0.73	4.78	7.84	23.75
	Post-CD + ABO Mod	357	0	0.01	0.27	0.87	4.53	5.60	25.00
Total	Post-CD	736	0	0.01	0.20	0.64	4.05	4.83	24.75
	Post-CD + ABO Mod	739	0	0.01	0.23	0.60	4.10	4.80	25.00

CAS scores are not available for candidates that were transplanted in the Pre-CD era. Compared to the Post-CD era, median CAS at transplant increased slightly for blood type B and O recipients in the Post-CD + ABO Modification era. This change was expected due to the increase in allocation points granted to blood type B and O candidates.

Figure 13: Distribution of CAS at Transplant by Era and Recipient Blood Type

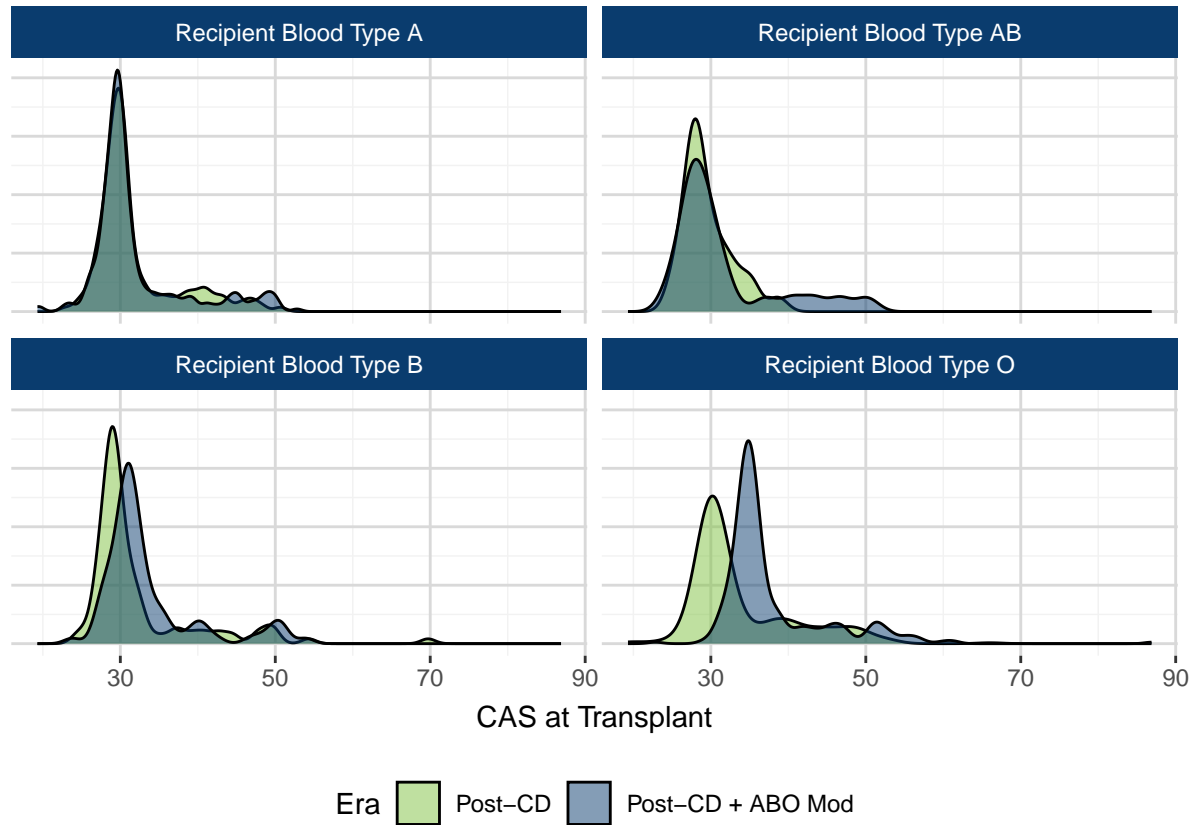


Table 13: Distribution of CAS at Transplant by Era and Recipient Blood Type

Recipient Blood Type	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
A	Post-CD	282	0	22.64	28.85	30.06	31.83	32.22	50.91
	Post-CD + ABO Mod	273	0	19.31	28.76	29.81	31.96	31.77	52.79
AB	Post-CD	28	0	25.11	27.75	28.38	29.55	31.20	38.69
	Post-CD + ABO Mod	24	0	24.58	27.42	29.08	31.52	31.49	50.17
B	Post-CD	106	0	24.30	28.61	29.42	32.22	32.07	69.72
	Post-CD + ABO Mod	85	0	23.77	30.00	31.49	33.54	33.74	53.92
O	Post-CD	320	0	19.39	29.68	30.85	33.77	37.51	66.03
	Post-CD + ABO Mod	357	0	22.85	34.17	35.33	37.92	38.52	86.88
Total	Post-CD	736	0	19.39	29.01	30.33	32.64	33.21	69.72
	Post-CD + ABO Mod	739	0	19.31	30.01	33.92	35.00	36.43	86.88

CAS scores are not available for candidates that were transplanted in the Pre-CD era. The following results describe candidates' CAS scores at transplant, minus the points the candidates received based on their blood type. In both the Post-CD and Post-CD + ABO Modification eras blood type O recipients had the highest median CAS scores at transplant (excluding the blood type points from their score).

Figure 14: Distribution of CAS at Transplant Excluding Blood Type Points by Era and Recipient Blood Type

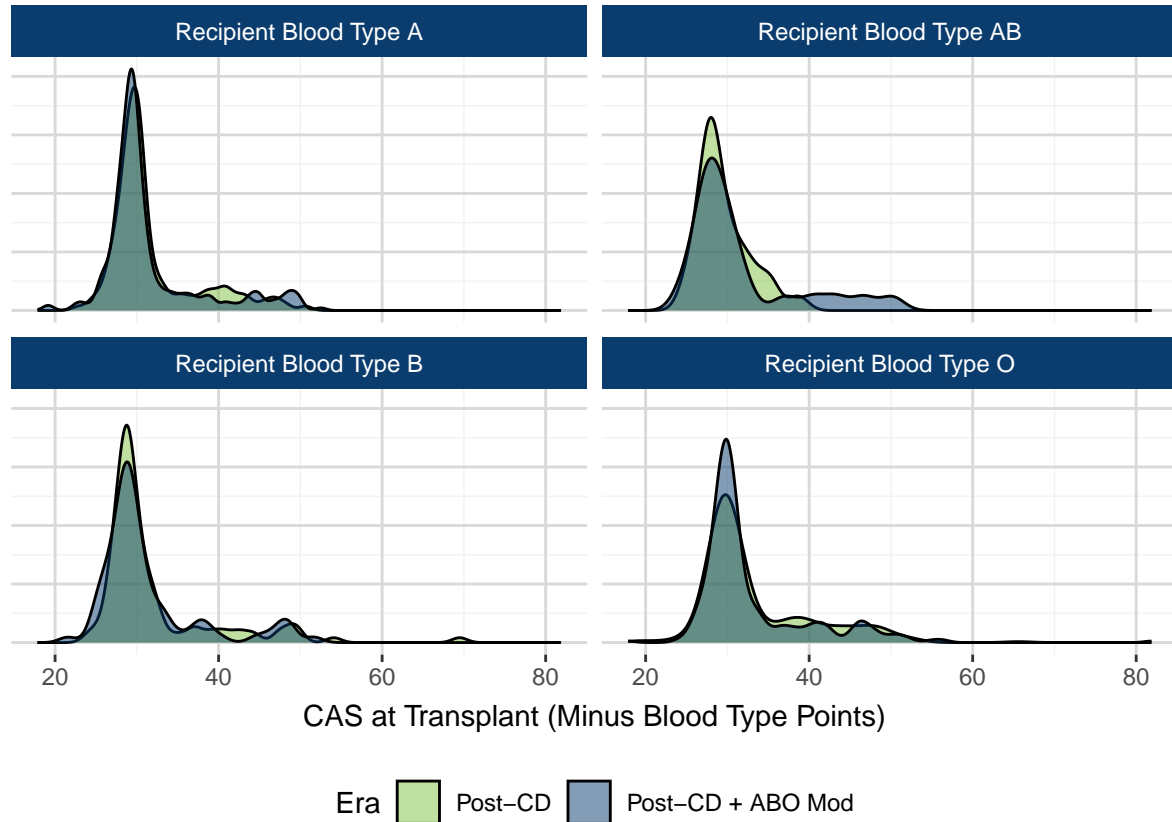


Table 14: Distribution of CAS at Transplant Excluding Blood Type Points by Era and Recipient Blood Type

Recipient Blood Type	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
A	Post-CD	282	0	22.60	28.81	30.02	31.78	32.17	50.87
	Post-CD + ABO Mod	273	0	19.00	28.45	29.51	31.65	31.46	52.48
AB	Post-CD	28	0	25.11	27.75	28.38	29.55	31.20	38.69
	Post-CD + ABO Mod	24	0	24.58	27.42	29.08	31.52	31.49	50.17
B	Post-CD	106	0	24.06	28.37	29.18	31.98	31.83	69.48
	Post-CD + ABO Mod	85	0	21.53	27.77	29.25	31.30	31.50	51.68
O	Post-CD	320	0	18.94	29.22	30.40	33.31	37.06	65.58
	Post-CD + ABO Mod	357	0	17.85	29.17	30.33	32.92	33.52	81.88
Total	Post-CD	736	0	18.94	28.77	30.06	32.39	33.01	69.48
	Post-CD + ABO Mod	739	0	17.85	28.69	29.88	32.22	32.73	81.88