

OPTN Lung Transplantation Committee

Descriptive Data Request

Lung Continuous Distribution 18-Month Monitoring Report

DHHS Contract No. 250-2019-00001C
Date Completed: December 10th, 2024

Prepared for:

Lung Transplantation Committee
Committee Meeting
Date of Meeting: December 10th, 2024

By:

Samantha Weiss, MS
and Chelsea Hawkins, PhD
UNOS Research Department

Contents

Executive Summary	2
Background/Purpose	3
Committee Request	3
Methods	4
Results	7
Overall	8
Blood Type	16
Pediatrics	30
Prior Living Donors	43
Center Geography & Size	44
Post-Transplant Patient Survival	47

Executive Summary

Monitoring began upon implementation of continuous distribution (CD) on March 9, 2023. An 18-month monitoring report was not in the original post-implementation monitoring plan, but the OPTN Lung Transplantation Committee requested an additional report to evaluate six focus areas related to the policy implementation, including:

1. Overall

- The waiting list mortality rate decreased after the implementation of lung CD and increased slightly after the blood type modification was implemented.
- The transplant rate increased after the implementation of CD; much of this increase is likely explained by an increase in the number of lung donors over time.
- Utilization of non-DCD donors increased after the implementation of lung CD and then again after the implementation of the blood type modification. The utilization of DCD donors remained stable since the implementation of lung CD.
- The median number of programs that received offers before the final acceptor on the match run increased after the implementation of lung CD and remained stable after the blood type modification was implemented.

2. Blood Type

- The waiting list mortality rate for blood type O candidates decreased after the implementation of lung CD and then remained stable after the implementation of the blood type modification. The waiting list mortality rate for candidates of other blood types remained stable or decreased with the policy changes.
- The transplant rate for blood type O candidates decreased after the implementation of lung CD and then increased above pre-CD levels after the blood type modification was implemented. The transplant rate for candidates of other blood types was higher after CD was implemented compared to pre-CD levels.
- The median waiting time for blood type O candidates after the blood type modification was similar to their pre-CD median waiting time. The median waiting time for candidates of other blood types was lower under CD compared to pre-CD levels.
- Blood type O candidates continue to be more medically urgent at the time of transplant compared to candidates of other blood types.

3. Pediatrics

- The waiting list mortality rate for pediatric candidates remained similar before and after CD implementation.
- The transplant rate increased slightly for candidates between 12-17 years old after CD implementation.
- The number of pediatric lungs transplanted to adult recipients increased and the percent of adult lungs transplanted to pediatric recipients increased after CD implementation.

4. Prior Living Donors

- Less than 10 prior living donors were listed for a lung transplant after the implementation of CD and all of these candidates were transplanted.

5. Center Geography & Size

- There were no noticeable trends in the percent change in waiting list mortality rates or transplant rates after CD implementation by center size or location.
- After CD implementation most centers experienced either an increase in their transplant rate, decrease in their waiting list mortality rate, or both.

6. Post-Transplant Patient Survival

- Patient survival six months after transplant was 93.2% both before and after the implementation of lung CD.
- Under CD, patients that were more medically urgent at the time of transplant had slightly lower survival at six months compared to patients that were less medically urgent.
- There were no statistically significant differences in six-month post-transplant survival by candidate blood type, age, or diagnosis group.

The implications of the policy change will continue to be monitored closely. The next full monitoring report will be produced in Spring 2025, at two-years post-implementation.

Background/Purpose

On March 9, 2023 the lung allocation policy switched to a continuous distribution framework. Continuous distribution (CD) uses a composite allocation score to determine the preferential order of candidates on a match run when a medically suitable lung donor becomes available. This point-based system replaces the previous, classification-based system. Under the classification-based system, candidates were first arranged into ordered groups (e.g., “blood type identical, within 250 nautical miles of the donor hospital”) and then, within each group, preferentially ordered by Lung Allocation Score (LAS). In contrast, continuous distribution does not use candidate groupings. All candidates are prioritized using a composite allocation score (CAS) that takes into account medical, biological, and other factors permitted by the Final Rule to determine preferential ordering on a match run. These attributes include:

- Medical urgency: a metric that captures the patient’s predicted 1-year survival on the waiting list without a transplant (this measure was a component of LAS)
- Post-transplant survival: a metric that captures the patient’s predicted 5-year survival were they to receive a transplant (a 1-year version of this measure was a component of LAS)
- Biological disadvantage: a measure of how disadvantaged a candidate is to receive a transplant based on aspects of their biology, including blood type, CPRA (calculated panel reactive antibody), and height
- Patient access: a measure that considers whether the candidate is pediatric or a prior living donor
- Efficiency: a measure that captures the efficiency of the transplant, in terms of both distance from the donor hospital to transplant center and logistical planning

Based on data from the three-month monitoring report showing that the number of transplants declined in the first three months of CD for blood type O candidates, a policy change was implemented on September 27, 2023 which altered the blood type rating scale. This report will evaluate the impact of the modified blood type rating scale, in addition to the evaluation of lung CD as a whole.

An 18-month monitoring report was not included in the original CD post-implementation monitoring plan. However, the OPTN Lung Transplantation Committee requested an interim report to evaluate six specific focus areas related to the implementation of CD. These six focus areas include:

- Overall
- Blood Type
- Pediatrics
- Prior Living Donors
- Center Geography & Size
- Post-Transplant Patient Survival

As a result, this monitoring report does not include all the analyses and stratifications that were included in the 1-year monitoring report. A more complete and detailed monitoring report will be available at the two-year post-implementation mark. 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. The OPTN will respond to further requests by the OPTN Lung Transplantation Committee.

In addition to the analyses included in this report, the **OPTN Lung Policy Monitoring Dashboard** has been developed to further assist with post-implementation monitoring. This dashboard displays counts of lung waiting list additions, removals for death or too sick, and transplants across policy eras and stratified by various patient criteria. It also includes information on lung donors, non-use rates, utilization rates, and match efficiency.

Committee Request

Rather than replicate the analyses included in the **Lung Continuous Distribution One-Year Monitoring Report**, the OPTN Lung Transplantation Committee requested that this 18-month report focus on six specific focus areas. This section outlines the requests made by the Lung Committee for this specific monitoring report. The 2-year monitoring report (available in Spring 2025) will revert to the full monitoring report with all analyses included in the original policy monitoring evaluation plan.

Metrics to be evaluated in the 18-month report include:

- Overall (3 eras: 1 year pre-CD, 6.5 months post-CD, 1 year post-CD with ABO modification)
 - Waiting list mortality rate and transplant rate
 - Distance, utilization, and non-use rate by donor type
 - Distribution of offers before the final acceptor and after the final acceptor
- Blood Type (3 eras: 1 year pre-CD, 6.5 months post-CD, 1 year post-CD with ABO modification)
 - Waiting list mortality rate and transplant rate by blood type
 - Median time to transplant by blood type
 - Distance by blood type
 - Distribution of medical urgency points and CAS at transplant (minus blood type points) by blood type
- Pediatrics (2 eras: 18 months pre-CD, 18 months post-CD)
 - Waiting list mortality rate and transplant rate by pediatric age group
 - Transplants by recipient age group and pediatric age group
 - Distribution of recipient height stratified by donor age group and recipient age group
 - Cumulative percent of offers received by pediatric candidates
 - Distance
 - Pediatric utilization rate and non-use rate by donor type
- Prior Living Donors (2 eras: 18 months pre-CD, 18 months post-CD)
 - Number of prior living donors added to the waiting list
 - Number of prior living donors removed from the waiting list and their removal reason
- Center Geography & Size (2 eras: 18 months pre-CD, 18 months post-CD)
 - Waiting list mortality rate and transplant rate by OPTN region and center size
- Post-Transplant Patient Survival (2 eras: 9 months pre-CD, 9 months post-CD)
 - Six-month post-transplant survival overall and by medical urgency points, blood type, age, and diagnosis group

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 United States, submitted by members of the OPTN. Continuous distribution was implemented on March 9, 2023 and the blood type modification was implemented on September 27, 2023. Due to the nature of the analyses included, there are three different cohorts used throughout the report, which are defined in the following ways:

- Overall and Blood Type sections are divided into three eras
 - Pre: 1 year before CD was implemented (March 09, 2022 to March 08, 2023)
 - Post: 6.5 months between CD implementation and the blood type modification (March 09, 2023 - September 26, 2023)
 - Post + ABO Mod: 1 year after the blood type modification was implemented (September 27, 2023 to September 26, 2024)
- Pediatrics, Prior Living Donors, and Center Geography & Size sections are divided into two eras
 - Pre: approximately 18 months before CD was implemented (August 18, 2021 to March 08, 2023)
 - Post: approximately 18 months after CD was implemented (March 09, 2023 to September 26, 2024)
- Post-Transplant Patient Survival section is divided into two eras
 - Pre: 9 months before CD was implemented (June 09, 2022 to March 08, 2023)
 - Post: 9 months after CD was implemented (March 09, 2023 to December 08, 2023)

In an effort to provide data as soon as possible, this report was produced with OPTN data as of November 15, 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.

For continuous variables, medians and ranges were reported, and for categorical variables, counts and frequencies were reported. All analyses involving counts of waiting list additions, transplants, or removals for death or too sick

stratified by a single variable have been omitted from this report and instead are available on the OPTN Lung Policy Monitoring Dashboard. For all rates, 95% confidence intervals were reported, as well as the number of unique patients on the waiting list that belonged to each grouping. 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 11/15/2024}.

Waiting List

Cohort: For all analyses, candidates added to the lung waiting list, removed from the waiting list, or ever waiting for a lung-alone transplant between the cohort start and end dates displayed in the *Data Sources* section were included.

Analysis: Waiting list mortality rates are reported as the number of deaths or removals for too sick per 100 patient years. Patient years is a type of measurement that takes into account both the number of patients that experience an event and the amount of time they spend waiting for an event. For example, if 100 patients waited for one year that would amount to 100 patient years of data. Similarly, if 10 patients waited for 10 years that would also amount to 100 patient years of data. For a subject like transplant, time waiting is sometimes just as important as the event itself. For example, we are interested in the number of transplants or removals for death or too sick, but also interested in how long candidates waited during the study period. It is important to use this type of rate because the waiting list is dynamic and people are added and removed at different points in time. We set rates to per 100 patient years for ease in comparing rates across populations that might vary in size or duration of time waited. For this analysis, 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 or removal for too sick is attributed only to the era in which it occurred. Waiting list mortality rates were calculated for the population as a whole, as well as for sub-populations based on a variety of different attributes.

Transplant

Cohort: For all analyses, recipients that received a lung-alone transplant between the cohort start and end dates displayed in the *Data Sources* section were included.

Analysis: For all analyses using CAS attributes, the match score at the time of transplant was used. 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 and inactive waiting time within the era analyzed 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 transplant is attributed only to the era in which it occurred. Transplant rates were calculated for the population as a whole, as well as for sub-populations based on a variety of different attributes.

Utilization

Cohort: All donors from which at least one organ was recovered for the purposes of transplantation between the cohort start and end dates displayed in the *Data Sources* section were included.

Analysis: The utilization rate is defined as the percent of lungs that are transplanted based on all possible lungs from every deceased donor with at least one organ recovered for the purpose of transplant; this assumes that each donor has two possible lungs for donation. The non-use rate is defined as the number of lungs recovered for the purpose of transplant but not transplanted out of all lungs recovered for transplant.

Median Waiting Time

Cohort: For all analyses, all registrations added to the waiting list for a lung-alone transplant between the cohort start and end dates displayed in the *Data Sources* section were included.

Analysis: We calculated the median waiting time based on a variety of different attributes using a competing risk analysis. Because these analyses were run without the data lag, results may vary slightly as more data accrue.

Match Run Analysis

Cohort: All lung match runs submitted between the cohort start and end dates displayed in the *Data Sources* section were included. For most analyses, only matches with an acceptance were included, and offers after the final acceptance were excluded. However, when counting the number of programs offered after the final acceptor, all offers up until the match was closed (which includes offers after the final acceptance) were included.

Analysis: We calculated descriptive metrics for the number of offers sent in the pre and post eras, as well as the sequence number of the final acceptor. We also calculated the cumulative percent of offers received for pediatric candidates up to each sequence number on the match run, using the following equation:

$$\frac{\text{Number of offers received by pediatric candidates up to sequence number } i}{\text{Number of offers sent to all candidates up to sequence number } i, \text{ on match runs with at least one pediatric offer sent}}$$

Post-Transplant Patient Survival

Cohort: For all analyses, recipients that received a lung-alone transplant between the cohort start and end dates displayed in the *Data Sources* section were included. The cohort for survival analyses was restricted to transplant recipients with at least 6 months of follow-up time after applying lags to account for time delays in reporting per typical OPTN conventions.

Analysis: We calculated unadjusted six-month post-transplant patient survival using Kaplan-Meier methodology.

Results

For this report, the Results are broken into the six focus areas:

- Overall
- Blood Type
- Pediatrics
- Prior Living Donors
- Center Geography & Size
- Post-Transplant Patient Survival

Along with the analyses included in this report, the **OPTN Lung Policy Monitoring Dashboard** has been developed to further assist with post-implementation monitoring. The policy monitoring dashboard displays counts of lung waiting list additions, removals for death or too sick, and transplants across policy eras and stratified by various patient criteria. In addition, it includes information on lung donors, non-use rates, utilization rates, and match efficiency. The intent is that the dashboard will allow for near-continuous monitoring of any policy change by all members of the lung transplantation community. As a result, lung monitoring reports will shift to a key metrics framework, which are more concise and focus explicitly on evaluating the key metrics of a policy change. Charts from previous monitoring reports that are duplicative of the dynamic and interactive charts in the dashboard have been eliminated from this monitoring report to prevent redundancy.

Overall

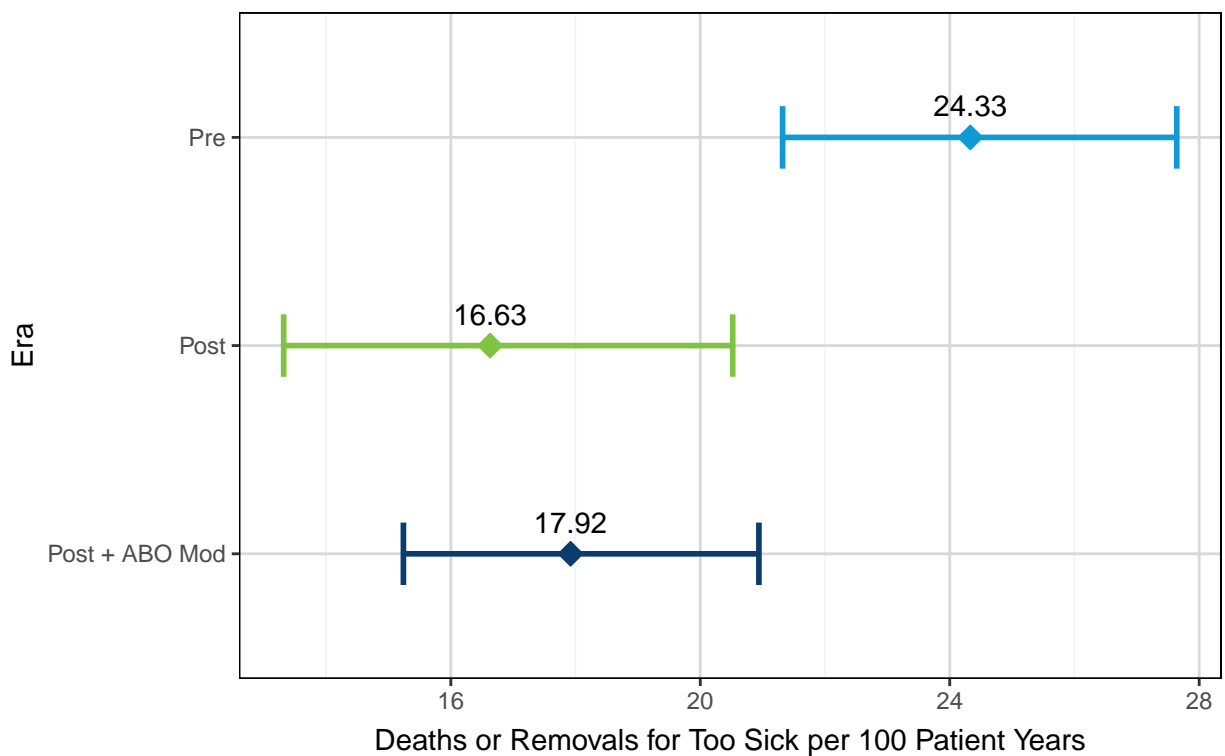
This section evaluates general trends associated with the implementation of Continuous Distribution and the Blood Type Modification policies. For this section, all analyses are displayed across the following three eras:

- Pre: 1 year before CD implementation (March 09, 2022 - March 08, 2023)
- Post: 6.5 months between CD implementation and the ABO modification (March 09, 2023 - September 26, 2023)
- Post + ABO Mod: 1 year after the ABO modification (September 27, 2023 - September 26, 2024)

It is important to note that the Post policy era is shorter than the Pre and Post + ABO Mod eras.

The number of deaths or removals for too sick per 100 patient years on the waiting list decreased from 24.33 in the pre era to 16.63 in the post era and then increased slightly to 17.92 after the blood type modification was implemented.

Figure 1: Deaths or Removals for Too Sick per 100 Patient Years on the Waiting List by Era



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

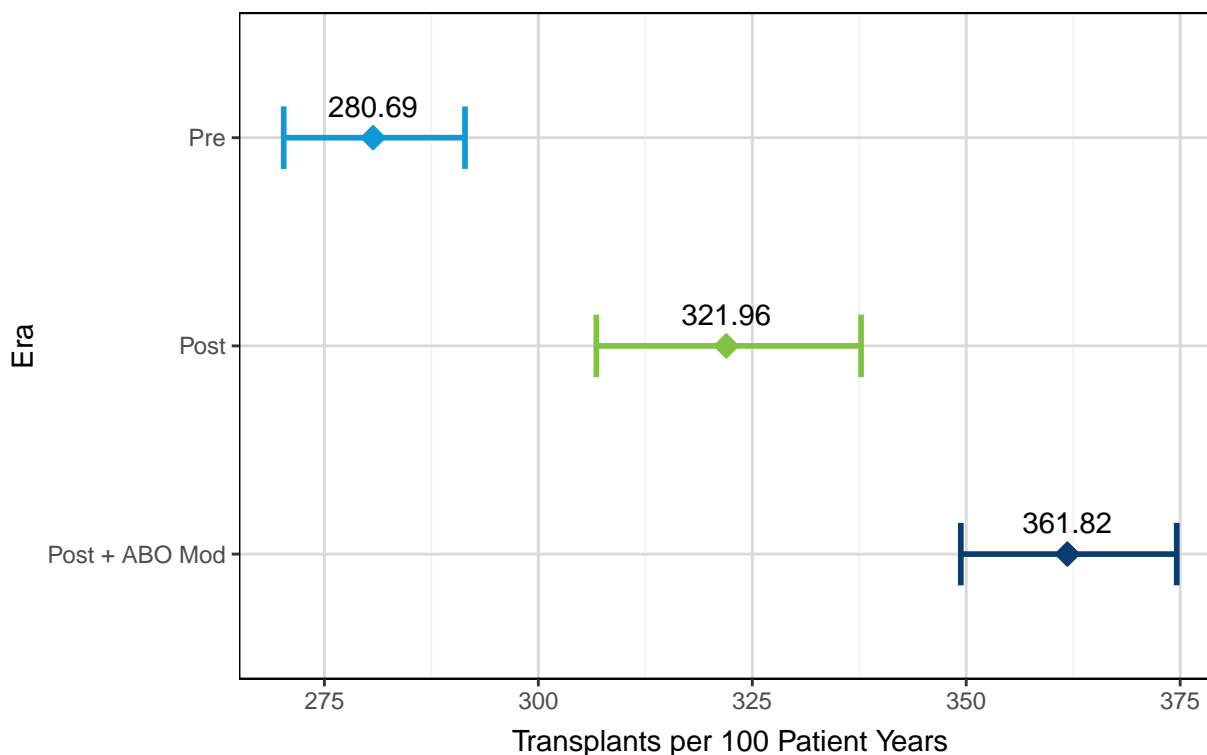
Table 1: Deaths or Removals for Too Sick per 100 Patient Years on the Waiting List by Era

Era	N Patients	Deaths or Removals for Too Sick per 100 Patient Years	95% Confidence Interval
Pre	3985	24.33	(21.32, 27.64)
Post	2738	16.63	(13.32, 20.52)
Post + ABO Mod	4302	17.92	(15.24, 20.94)

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

The number of transplants per 100 patient years on the waiting list increased from 280.69 in the pre era to 321.96 in the post era and increased again to 361.82 after the blood type modification was implemented.

Figure 2: Lung Transplants per 100 Patient Years on the Waiting List by Era



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

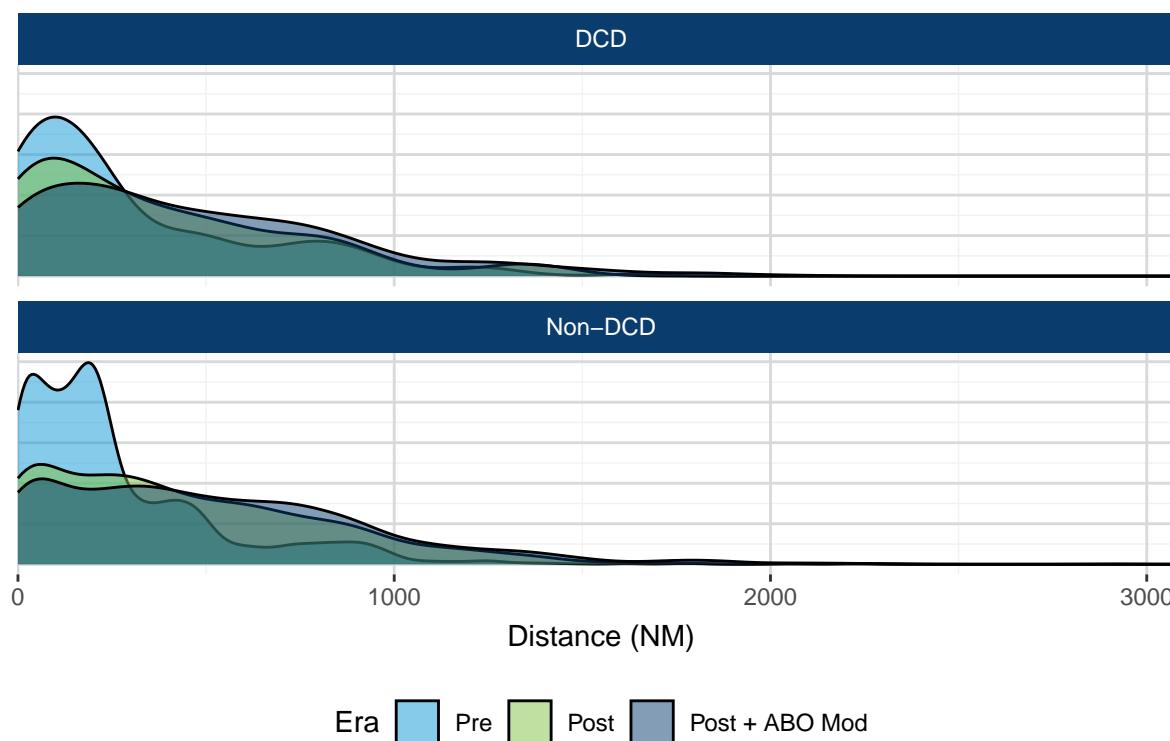
Table 2: Lung Transplants per 100 Patient Years on the Waiting List by Era

Era	N Patients	Transplants per 100 Patient Years	95% Confidence Interval
Pre	3985	280.69	(270.24, 291.43)
Post	2738	321.96	(306.77, 337.71)
Post + ABO Mod	4302	361.82	(349.37, 374.60)

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Median distance from the donor hospital to transplant program increased for both DCD organs and non-DCD organs from the pre policy era to post policy era and then again after the blood type modification was implemented.

Figure 3: Distribution of Distance (in Nautical Miles) from Donor Hospital to Transplant Program by Era and Donor Type



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Table 3: Distribution of Distance (in Nautical Miles) from Donor Hospital to Transplant Program by Era and Donor Type

Donor Type	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
DCD	Pre	206	0	0	52.25	176.5	304.77	467.50	1624
	Post	182	0	0	65.25	259.0	371.53	570.25	1410
	Post + ABO Mod	402	0	0	168.75	382.5	475.07	716.75	2055
Non-DCD	Pre	2535	0	0	78.00	192.0	266.15	370.00	2225
	Post	1514	0	0	145.50	368.0	446.87	681.00	2920
	Post + ABO Mod	2801	0	0	194.00	448.0	518.24	760.00	2349
Total	Pre	2741	0	0	77.00	192.0	269.06	378.00	2225
	Post	1696	0	0	130.00	359.0	438.78	676.25	2920
	Post + ABO Mod	3203	0	0	188.50	442.0	512.83	757.00	2349

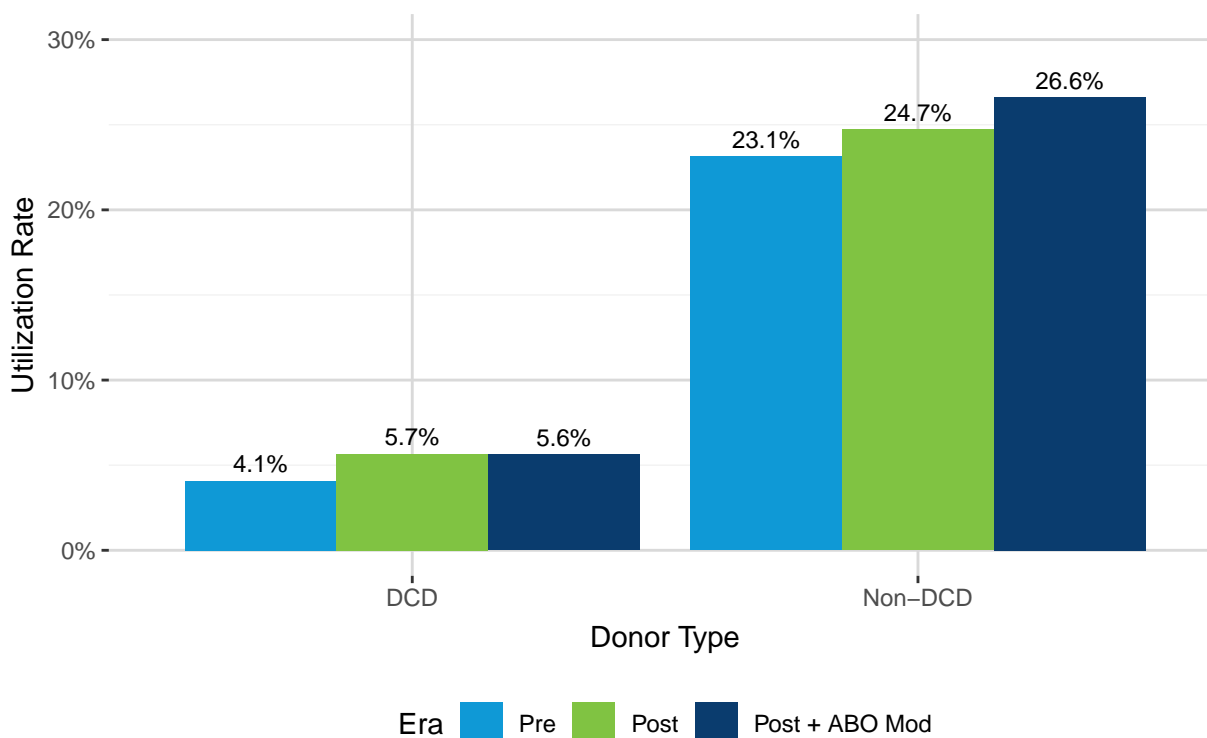
^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Utilization Rate

Utilization rate is defined as the percent of lungs that are transplanted based on all possible lungs from every deceased donor with at least one organ recovered for the purpose of transplant; this definition assumes that each donor has two possible lungs for donation.

Utilization rates increased slightly for both DCD and non-DCD donors from the pre policy era to the post policy era. The utilization rate for non-DCD donors increased slightly again after the blood type modification was implemented.

Figure 4: Donor Utilization Rates by Era and Donor Type



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Table 4: Donor Utilization Rates by Era and Donor Type

DCD Status	Era	N Donor Lungs	N Lungs Transplanted	Utilization Rate
DCD	Pre	4905	401	4.1%
	Post	3243	367	5.7%
	Post + ABO Mod	7035	793	5.6%
Non-DCD	Pre	10287	4758	23.1%
	Post	5866	2901	24.7%
	Post + ABO Mod	9997	5322	26.6%
All Donors	Pre	15192	5159	17.0%
	Post	9109	3268	17.9%
	Post + ABO Mod	17032	6115	18.0%

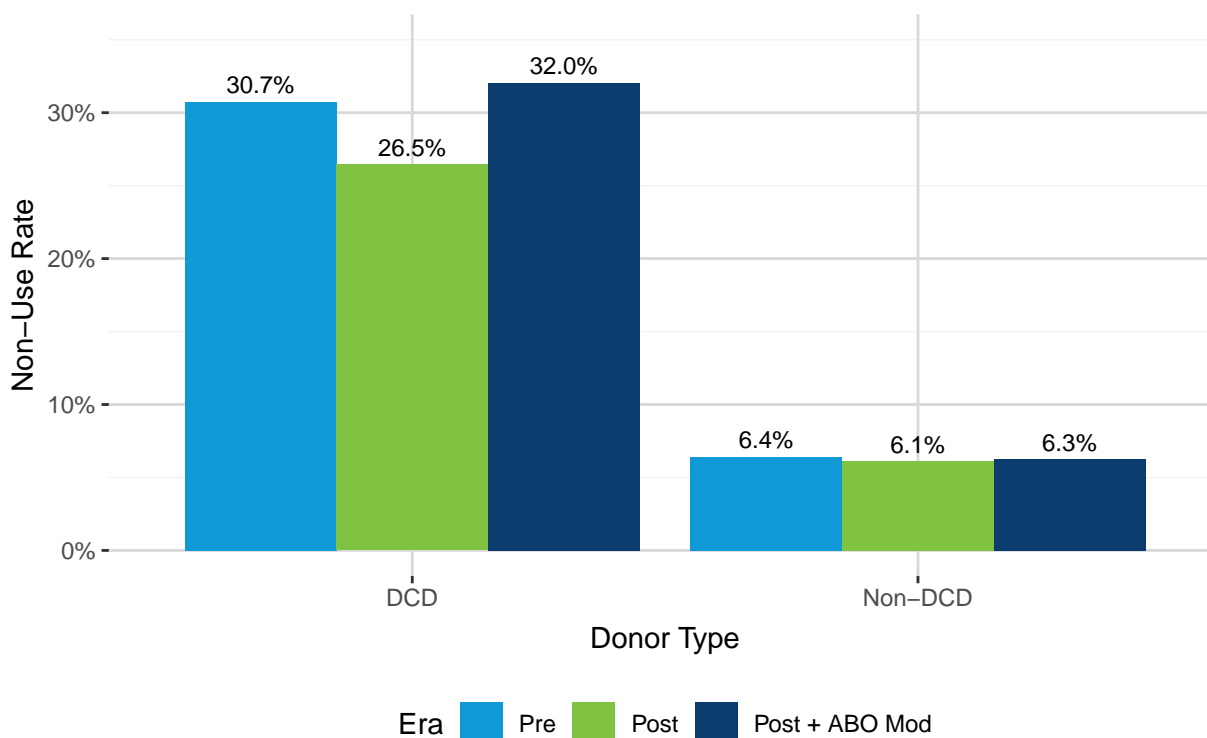
^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Non-Use Rate

Non-use rate is defined as the number of lungs recovered for the purpose of transplant but not transplanted out of all lungs recovered for transplant.

The non-use rate decreased slightly for DCD donors from the pre policy era to the post policy era and then increased after the blood type modification was implemented. The non-use rate remained similar for non-DCD donors across the policy implementations.

Figure 5: Donor Non-Use Rates by Era and Donor Type



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Table 5: Donor Non-Use Rates by Era and Donor Type

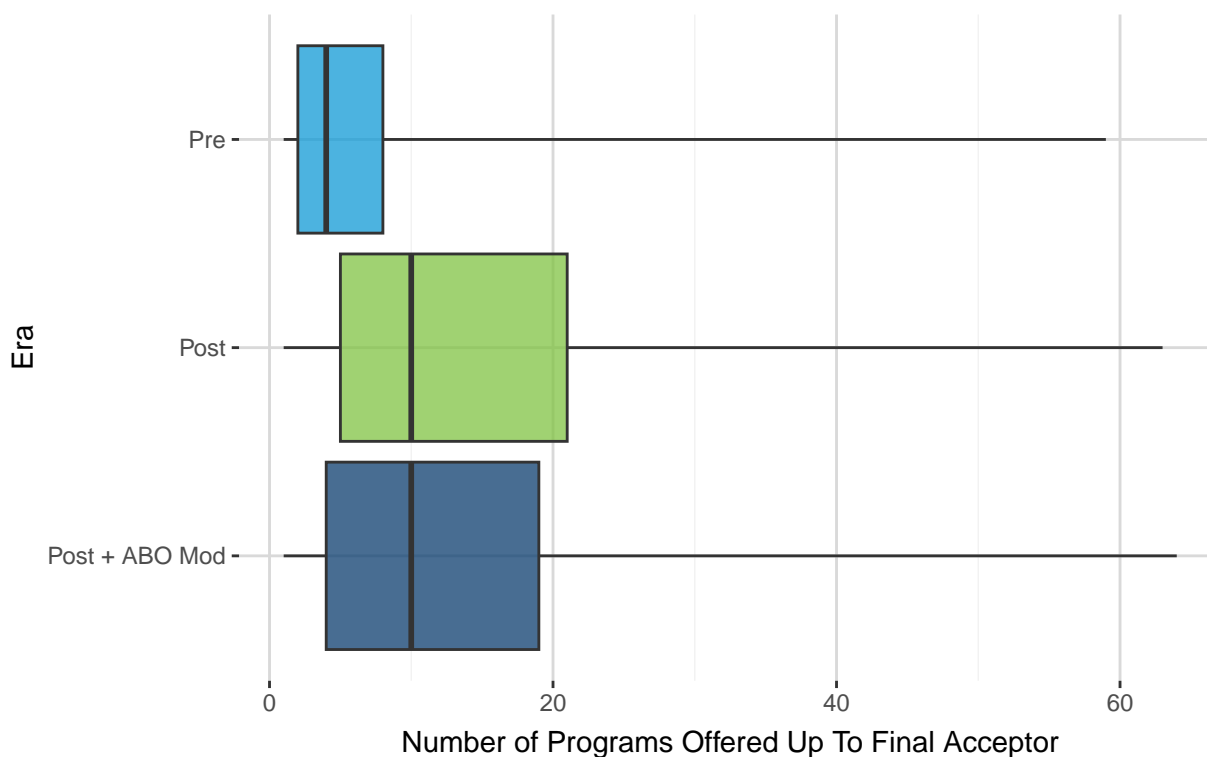
DCD Status	Era	N Lungs Recovered	N Lungs Transplanted	Non-Use Rate
DCD	Pre	579	401	30.7%
	Post	499	367	26.5%
	Post + ABO Mod	1167	793	32.0%
Non-DCD	Pre	5084	4758	6.4%
	Post	3090	2901	6.1%
	Post + ABO Mod	5677	5322	6.3%
All Donors	Pre	5663	5159	8.9%
	Post	3589	3268	8.9%
	Post + ABO Mod	6844	6115	10.7%

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Match Run Efficiency

The median number of unique programs offered up to the final acceptor increased from 4 in the pre policy era to 10 in the post policy era and remained stable after the blood type modification was implemented.

Figure 6: Distribution of the Number of Unique Programs Offered Up to the Final Acceptor on Lung Match Runs by Era



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

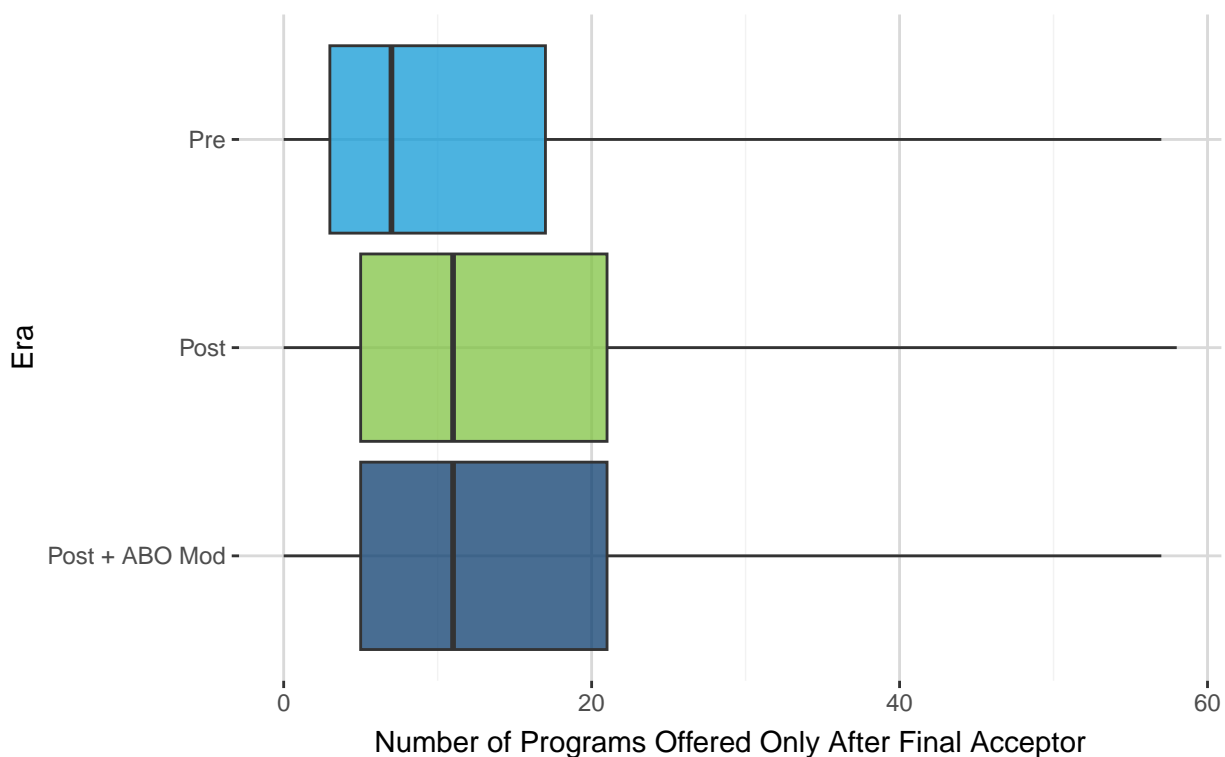
Table 6: Distribution of the Number of Unique Programs Offered Up to the Final Acceptor on Lung Match Runs by Era

Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
Pre	2949	0	1	2	4	6.77	8	59
Post	1831	0	1	5	10	14.52	21	63
Post + ABO Mod	3336	0	1	4	10	13.98	19	64

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

The median number of programs that received their first organ offer after the sequence number of the final acceptor increased from 7 in the pre policy era to 11 in the post policy era and remained stable after the blood type modification was implemented.

Figure 7: Distribution of the Number of Unique Programs Offered Only After the Final Acceptor on Lung Match Runs by Era



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Table 7: Distribution of the Number of Unique Programs Offered Only After the Final Acceptor on Lung Match Runs by Era

Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
Pre	2949	0	0	3	7	11.82	17	57
Post	1831	0	0	5	11	14.03	21	58
Post + ABO Mod	3336	0	0	5	11	14.24	21	57

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Blood Type

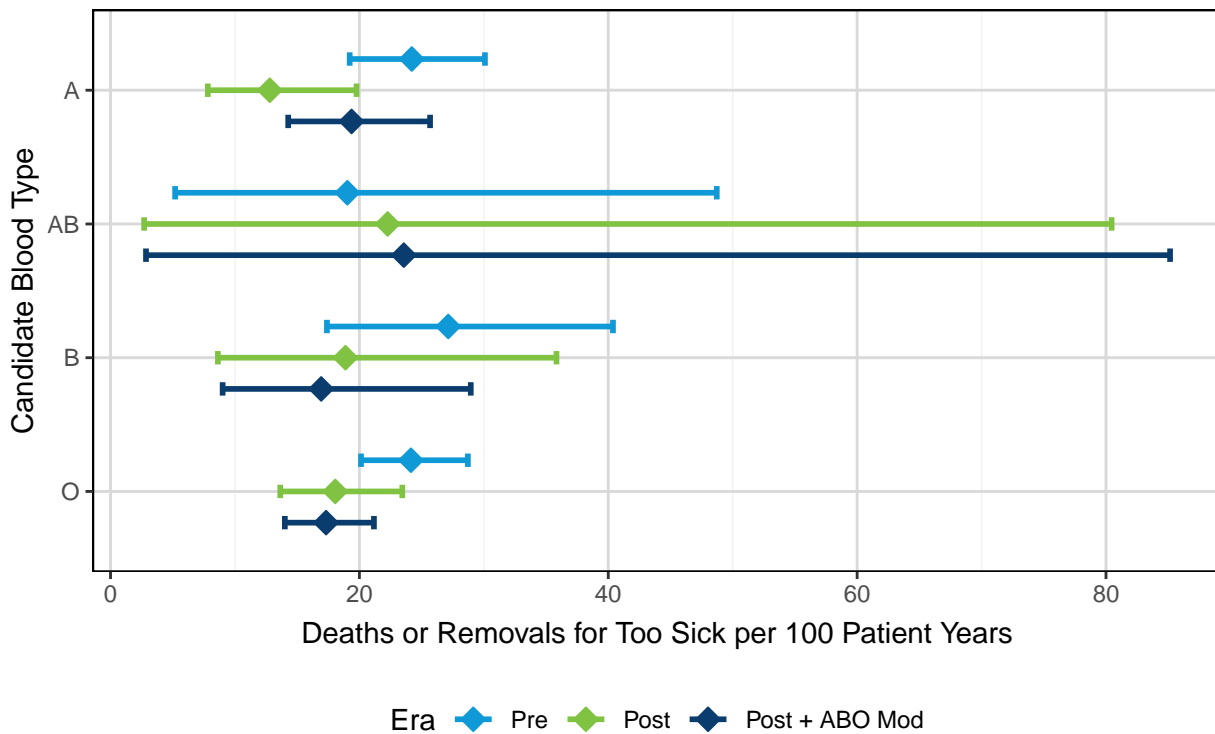
This section evaluates trends associated with blood type; all analyses are displayed across the following three eras:

- Pre: 1 year before CD implementation (March 09, 2022 - March 08, 2023)
- Post: 6.5 months between CD implementation and the ABO modification (March 09, 2023 - September 26, 2023)
- Post + ABO Mod: 1 year after the ABO modification (September 27, 2023 - September 26, 2024)

It is important to note that the Post policy era is shorter than the Pre and Post + ABO Mod eras.

Compared to the pre policy era, the number of deaths or removals for too sick per 100 patient years was slightly lower for candidates with blood types A, B, and O in the post policy era and after the blood type modification was implemented. The number of deaths or removals for too sick per 100 patient years for blood type AB candidates had large confidence intervals due to the small sample size.

Figure 8: Deaths or Removals for Too Sick per 100 Patient Years on the Waiting List by Era and Candidate Blood Type



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

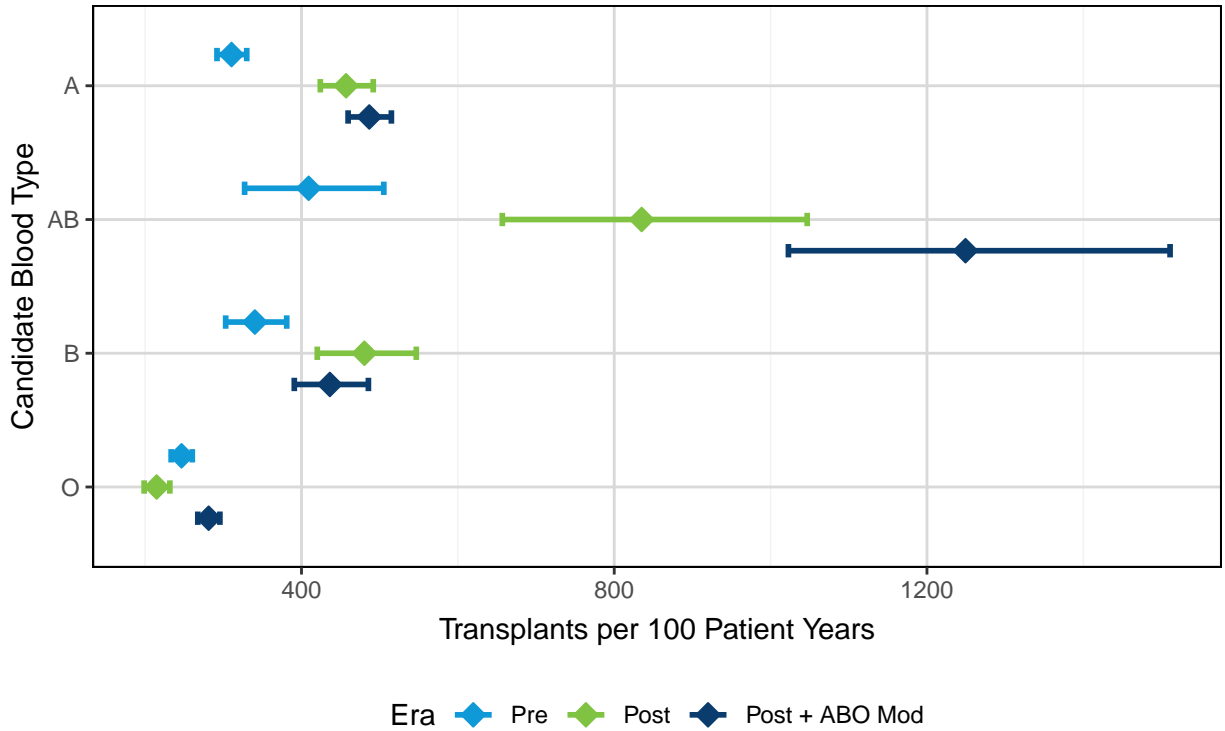
Table 8: Deaths or Removals for Too Sick per 100 Patient Years on the Waiting List by Era and Candidate Blood Type

Candidate Blood Type	Era	N Patients	Deaths or Removals for Too Sick per 100 Patient Years	95% Confidence Interval
A	Pre	1463	24.21	(19.22, 30.09)
	Post	1001	12.80	(7.82, 19.77)
	Post + ABO Mod	1518	19.37	(14.28, 25.68)
AB	Pre	118	19.03	(5.19, 48.72)
	Post	86	22.27	(2.70, 80.45)
	Post + ABO Mod	126	23.57	(2.85, 85.15)
B	Pre	441	27.14	(17.39, 40.38)
	Post	313	18.88	(8.63, 35.84)
	Post + ABO Mod	444	16.93	(9.01, 28.95)
O	Pre	1963	24.14	(20.13, 28.72)
	Post	1338	18.06	(13.64, 23.45)
	Post + ABO Mod	2214	17.32	(14.01, 21.17)

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Compared to the pre policy era, the transplant rate increased for candidates with blood types A, AB, and B in the post policy era and after the blood type modification was implemented. For candidates with blood type O, the transplate rate decreased from the pre policy era to the post policy era and then increased after the blood type modification was implemented.

Figure 9: Lung Transplants per 100 Patient Years on the Waiting List by Era and Candidate Blood Type



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

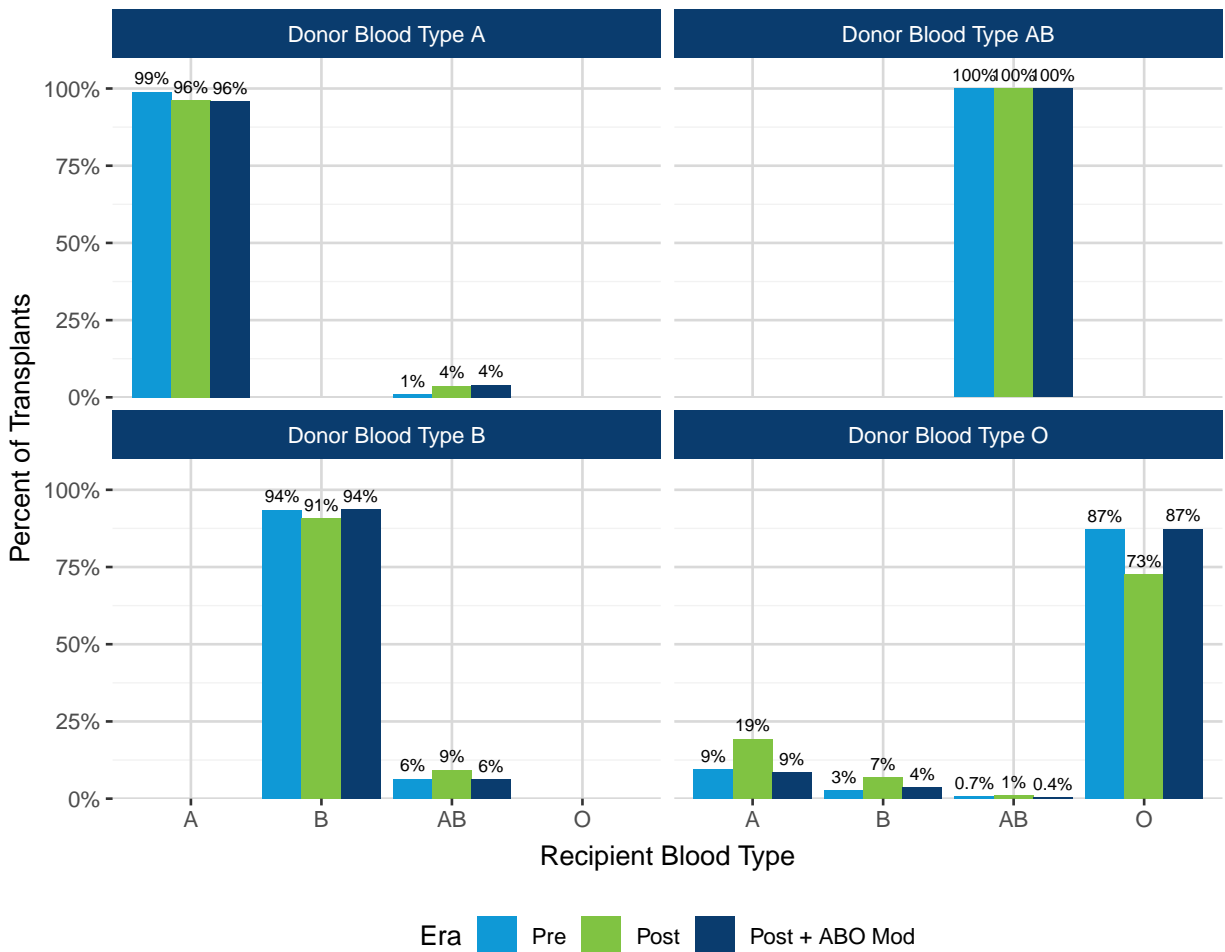
Table 9: Lung Transplants per 100 Patient Years on the Waiting List by Era and Candidate Blood Type

Candidate Blood Type	Era	N Patients	Transplants per 100 Patient Years	95% Confidence Interval
A	Pre	1463	310.50	(291.91, 329.97)
	Post	1001	456.99	(424.08, 491.78)
	Post + ABO Mod	1518	486.71	(459.62, 514.97)
AB	Pre	118	409.15	(327.27, 505.30)
	Post	86	835.11	(656.87, 1046.82)
	Post + ABO Mod	126	1249.27	(1022.80, 1510.96)
B	Pre	441	340.40	(303.03, 381.11)
	Post	313	480.43	(420.21, 546.85)
	Post + ABO Mod	444	436.28	(390.80, 485.59)
O	Pre	1963	246.55	(233.31, 260.34)
	Post	1338	214.73	(198.73, 231.67)
	Post + ABO Mod	2214	281.26	(267.40, 295.65)

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

In the post policy era a larger proportion of blood type O donor lungs were transplanted to blood type A and B recipients compared to the pre policy era. However, after the blood type modification was implemented, the proportion of blood type O donor lungs going to blood type O recipients returned to pre-CD levels.

Figure 10: Percent of Lung Transplants by Era, Donor Blood Type, and Recipient Blood Type



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

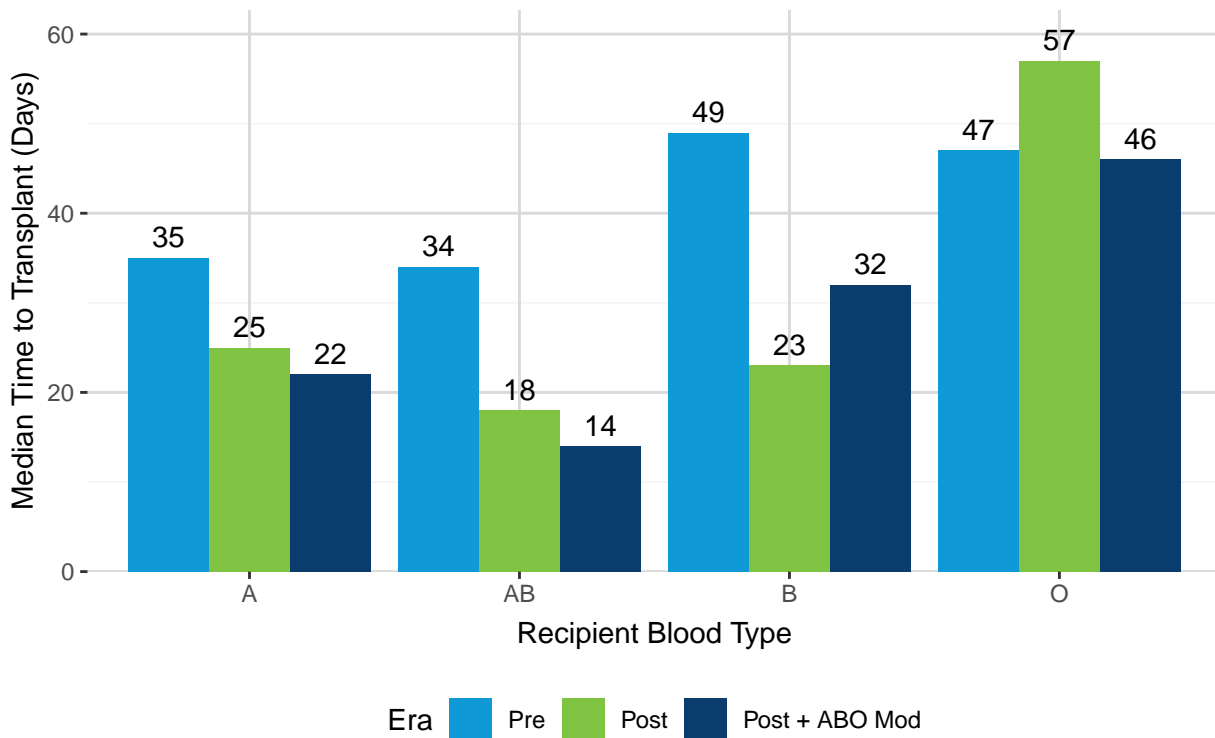
Table 10: Percent of Lung Transplants by Era, Donor Blood Type, and Recipient Blood Type

Donor Blood Type	Recipient Blood Type	Era		
		Pre	Post	Post + ABO Mod
A	A	906 (98.9%)	541 (96.3%)	1059 (95.9%)
	AB	10 (1.1%)	21 (3.7%)	45 (4.1%)
	B	0 (0.0%)	0 (0.0%)	0 (0.0%)
	O	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Total	916 (100.0%)	562 (100.0%)	1104 (100.0%)
AB	A	0 (0.0%)	0 (0.0%)	0 (0.0%)
	AB	48 (100.0%)	28 (100.0%)	36 (100.0%)
	B	0 (0.0%)	0 (0.0%)	0 (0.0%)
	O	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Total	48 (100.0%)	28 (100.0%)	36 (100.0%)
B	A	0 (0.0%)	0 (0.0%)	0 (0.0%)
	AB	18 (6.5%)	17 (9.3%)	18 (6.3%)
	B	260 (93.5%)	166 (90.7%)	269 (93.7%)
	O	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Total	278 (100.0%)	183 (100.0%)	287 (100.0%)
O	A	141 (9.4%)	179 (19.4%)	151 (8.5%)
	AB	10 (0.7%)	9 (1.0%)	7 (0.4%)
	B	41 (2.7%)	64 (6.9%)	67 (3.8%)
	O	1307 (87.2%)	671 (72.7%)	1551 (87.3%)
	Total	1499 (100.0%)	923 (100.0%)	1776 (100.0%)

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Compared to the pre policy era, the median time to transplant decreased for candidates with blood types A, AB, and B in the post policy era; however, median waiting time increased slightly for candidates with blood type B after the blood type modification was implemented. For candidates with blood type O, median time to transplant increased from the pre policy era to the post policy era and then decreased after the blood type modification was implemented to a duration similar to the pre policy era.

Figure 11: Median Time to Transplant (Days) by Era and Recipient Blood Type



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

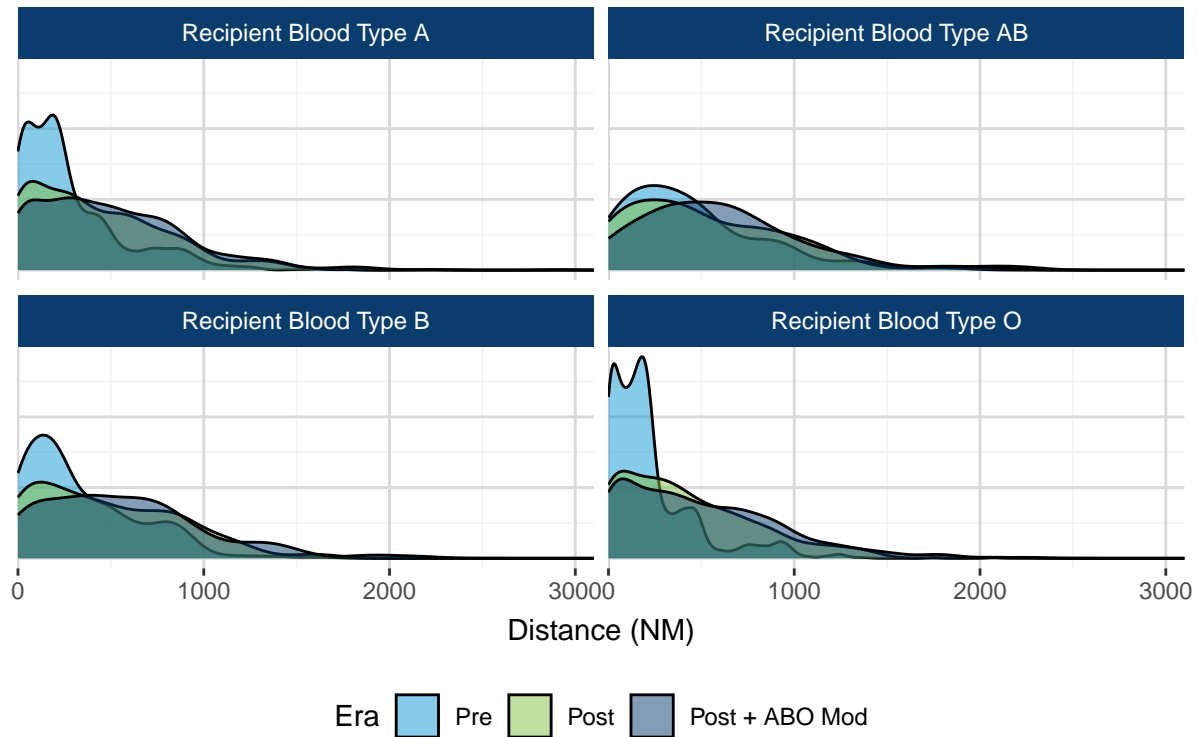
Table 11: Median Time to Transplant (Days) by Era and Recipient Blood Type

Recipient Blood Type	Era	N Registrations	Median Time to Transplant (Days)
A	Pre	1153	35
	Post	701	25
	Post + ABO Mod	1288	22
AB	Pre	105	34
	Post	63	18
	Post + ABO Mod	118	14
B	Pre	372	49
	Post	213	23
	Post + ABO Mod	377	32
O	Pre	1417	47
	Post	862	57
	Post + ABO Mod	1669	46

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Median distance from the donor hospital to transplant program increased across all blood types from the pre policy era to the post policy era, and again after the blood type modification was implemented.

Figure 12: Distribution of Distance (in Nautical Miles) from Donor Hospital to Transplant Program by Era and Recipient Blood Type



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Table 12: Distribution of Distance (in Nautical Miles) from Donor Hospital to Transplant Program by Era and Recipient Blood Type

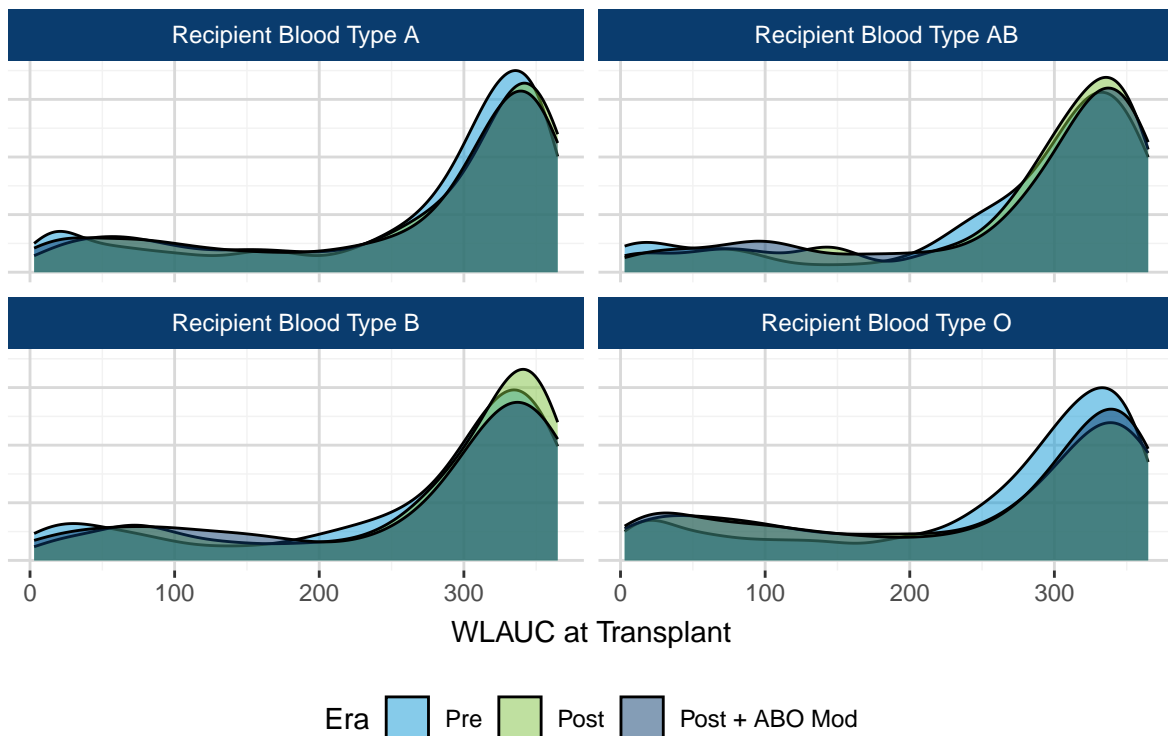
Recipient Blood Type	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
A	Pre	1047	0	0	77.50	202.0	280.79	395.50	1777
	Post	720	0	0	124.50	345.5	430.00	651.25	2920
	Post + ABO Mod	1210	0	0	199.25	442.0	502.16	740.75	2284
AB	Pre	86	0	0	160.25	364.5	484.53	634.50	2225
	Post	75	0	0	182.00	410.0	505.37	792.50	1769
	Post + ABO Mod	106	0	4	298.25	558.0	598.23	825.00	2058
B	Pre	301	0	0	104.00	223.0	336.71	511.00	1624
	Post	230	0	0	154.75	409.5	475.17	761.00	1652
	Post + ABO Mod	336	0	0	233.00	512.0	571.15	798.00	2185
O	Pre	1307	0	0	68.00	166.0	229.90	282.50	2069
	Post	671	0	0	130.00	348.0	428.29	644.00	2244
	Post + ABO Mod	1551	0	0	161.50	421.0	502.67	757.50	2349
Total	Pre	2741	0	0	77.00	192.0	269.06	378.00	2225
	Post	1696	0	0	130.00	359.0	438.78	676.25	2920
	Post + ABO Mod	3203	0	0	188.50	442.0	512.83	757.00	2349

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

The following figure and table show the distribution of waiting list area under the curve (WLAUC) for transplant recipients by era and recipient blood type. WLAUC is derived from the area under the estimated 1-year survival curve for each patient and represents the estimated number of days a patient is expected to live up to the next year on the waiting list without a transplant. Smaller WLAUC values mean that candidates are more medically urgent and larger WLAUC values mean that candidates are less medically urgent. WLAUC is used to calculate the number of CAS medical urgency points that candidates receive.

Overall, compared to the pre policy era, the median WLAUC at transplant increased by a couple of days after lung CD was implemented, and remained similar after the blood type modification policy was implemented. However, under all policy eras, blood type O candidates continue to be more medically urgent at the time of transplant compared to candidates of other blood types.

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



In this figure, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

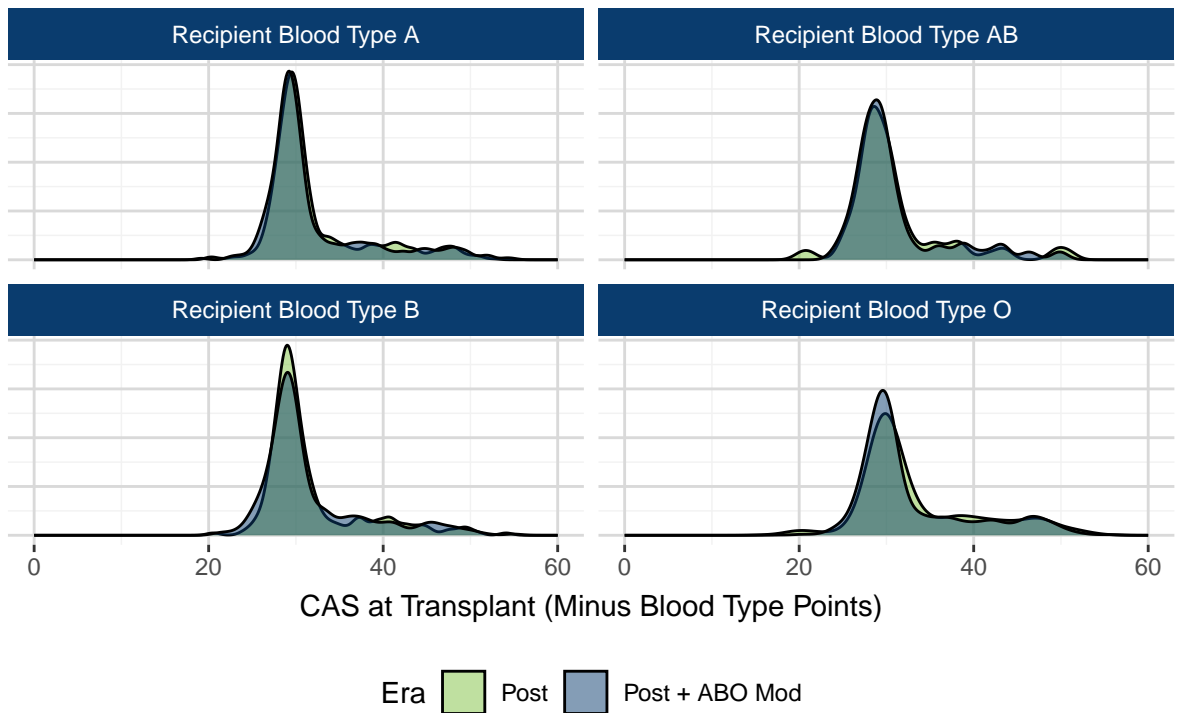
Table 13: Distribution of WLAUC at Transplant by Era and Recipient Blood Type

Recipient Blood Type	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
A	Pre	1047	0	4.41	233.47	312.48	264.66	338.92	364.68
	Post	720	0	9.33	220.89	318.38	267.17	347.95	363.82
	Post + ABO Mod	1210	0	4.04	195.90	317.31	261.67	345.23	364.72
AB	Pre	86	0	8.22	249.42	315.33	271.62	340.74	361.86
	Post	75	0	5.21	265.65	311.82	276.41	341.25	361.13
	Post + ABO Mod	106	0	9.02	246.95	318.96	274.18	345.26	362.69
B	Pre	301	0	7.60	222.50	312.38	261.87	342.31	363.00
	Post	230	0	9.81	244.48	320.64	272.86	346.62	364.77
	Post + ABO Mod	336	0	4.00	174.33	319.07	262.49	346.09	363.01
O	Pre	1307	0	4.47	218.99	300.76	257.78	334.70	364.88
	Post	671	0	6.26	125.46	300.93	240.98	344.53	364.54
	Post + ABO Mod	1551	0	2.86	127.37	302.29	241.57	343.19	364.84
Total	Pre	2741	0	4.41	225.27	307.80	261.29	338.02	364.88
	Post	1696	0	5.21	179.76	313.59	257.99	346.19	364.77
	Post + ABO Mod	3203	0	2.86	157.74	311.07	252.43	344.60	364.84

^a In this table, the Pre era spans March 09, 2022 to March 08, 2023, the Post era spans March 09, 2023 to September 26, 2023, and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

CAS was not available for candidates that were transplanted in the pre policy era. The following results describe candidates' CAS at transplant, minus the points the candidates received based on their blood type. In both the post policy era and after the blood type modification, blood type O recipients had the highest median CAS 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



In this figure, the Post era spans March 09, 2023 to September 26, 2023 and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024. The x-axis is truncated at 60 and 5 transplants with a CAS at transplant (excluding blood type points) above 60 were therefore excluded from this figure.

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	720	0	20.01	28.79	29.96	32.00	32.43	52.72
	Post + ABO Mod	1210	0	19.00	28.49	29.67	31.91	32.46	55.13
AB	Post	75	0	20.24	27.95	29.33	30.88	31.33	51.05
	Post + ABO Mod	106	0	23.97	27.84	29.30	30.88	31.16	50.17
B	Post	230	0	20.52	28.50	29.53	31.69	31.79	69.48
	Post + ABO Mod	336	0	21.20	28.25	29.45	31.56	32.81	54.91
O	Post	671	0	15.96	29.23	30.76	33.46	37.12	65.58
	Post + ABO Mod	1551	0	17.85	28.77	30.29	32.90	35.15	81.88
Total	Post	1696	0	15.96	28.82	30.14	32.48	33.72	69.48
	Post + ABO Mod	3203	0	17.85	28.57	29.91	32.32	33.58	81.88

^a In this table, the Post era spans March 09, 2023 to September 26, 2023 and the Post + ABO Mod era spans September 27, 2023 to September 26, 2024.

Pediatrics

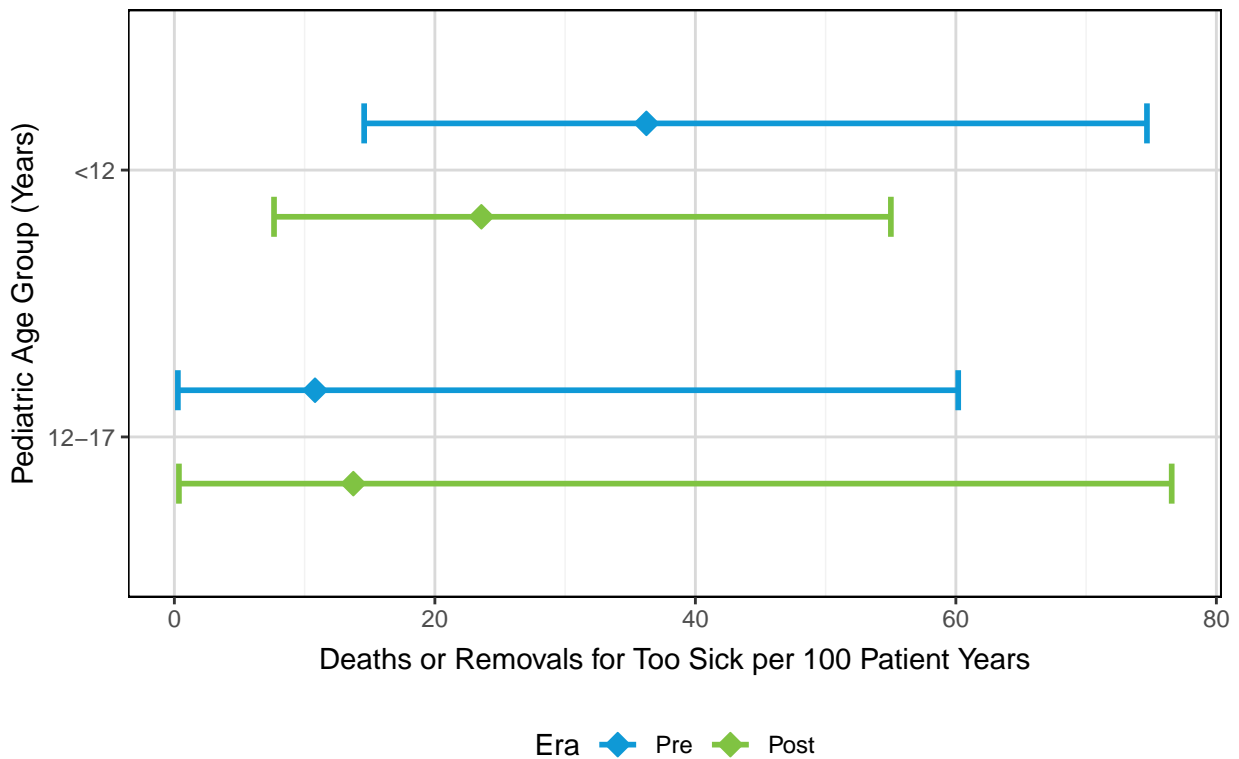
Pediatric candidates are defined as those who are less than 18 years old at the time of listing; this includes individuals who turn 18 years old while on the waiting list. The sample sizes for pediatrics are currently too small to definitively determine implications of the policy change; however, below we describe trends we are observing so far. We will continue to monitor pediatrics in upcoming monitoring reports as more data become available.

To provide the largest possible sample size this section of the report uses data from approximately 18 months pre and post CD implementation. The era dates for the pediatric section are as follows:

- Pre: approximately 18 months before CD implementation (August 18, 2021 - March 08, 2023)
- Post: approximately 18 months after CD implementation (March 09, 2023 - September 26, 2024)

Although sample sizes were small, the number of deaths or removals for too sick per 100 patient years on the waiting list was similar for pediatric candidates in the pre and post policy eras.

Figure 15: Deaths or Removals for Too Sick per 100 Patient Years on the Waiting List by Era and Pediatric Age Group



In this figure, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

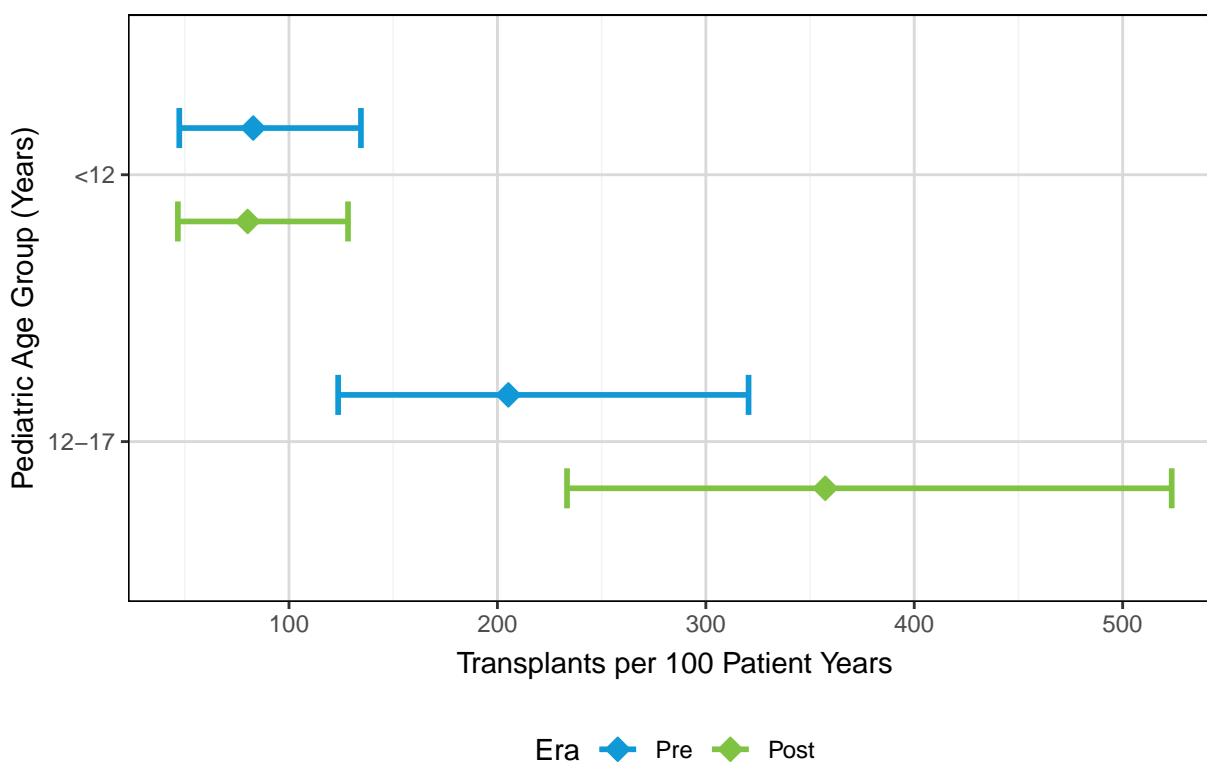
Table 15: Deaths or Removals for Too Sick per 100 Patient Years on the Waiting List by Era and Pediatric Age Group

Pediatric Age Group (Years)	Era	N Patients	Deaths or Removals for Too Sick per 100 Patient Years	95% Confidence Interval
<12	Pre	41	36.24	(14.57, 74.67)
	Post	40	23.57	(7.65, 55.01)
12-17	Pre	33	10.80	(0.27, 60.18)
	Post	34	13.74	(0.35, 76.57)

^a In this table, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

Although sample sizes were small, the number of lung transplants per 100 patient years increased slightly for pediatric candidates between 12-17 years in the post era. The number of transplants per 100 patient years for candidates <12 years remained similar across the policy eras.

Figure 16: Lung Transplants per 100 Patient Years on the Waiting List by Era and Pediatric Age Group



In this figure, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

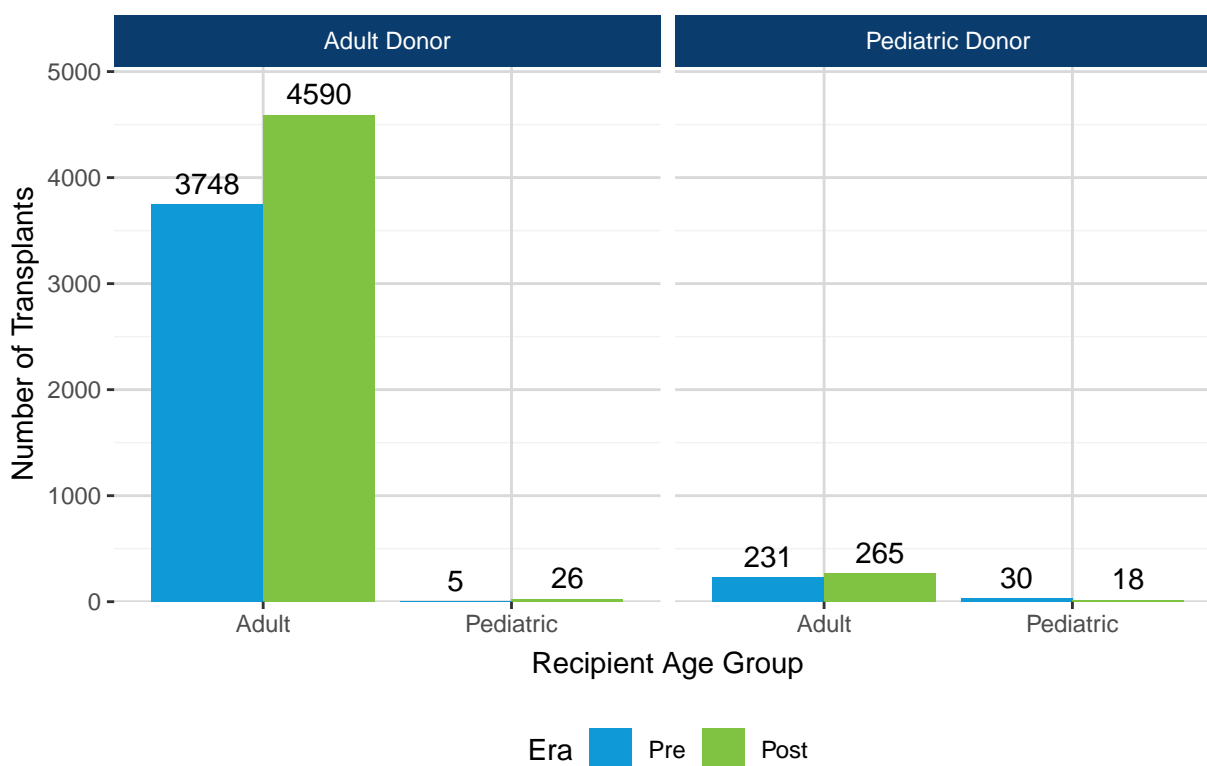
Table 16: Lung Transplants per 100 Patient Years on the Waiting List by Era and Pediatric Age Group

Pediatric Age Group (Years)	Era	N Patients	Transplants per 100 Patient Years	95% Confidence Interval
<12	Pre	41	82.84	(47.35, 134.52)
	Post	40	80.15	(46.69, 128.32)
12-17	Pre	33	205.24	(123.57, 320.50)
	Post	34	357.30	(233.40, 523.53)

^a In this table, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

In the post era, the number of pediatric lungs transplanted to adult recipients increased slightly and the number transplanted to pediatric recipients decreased slightly. In addition, more adult lungs were transplanted to pediatric recipients in the post era compared to the pre era.

Figure 17: Number of Lung Transplants by Era, Recipient Age Group, and Donor Age Group



In this figure, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

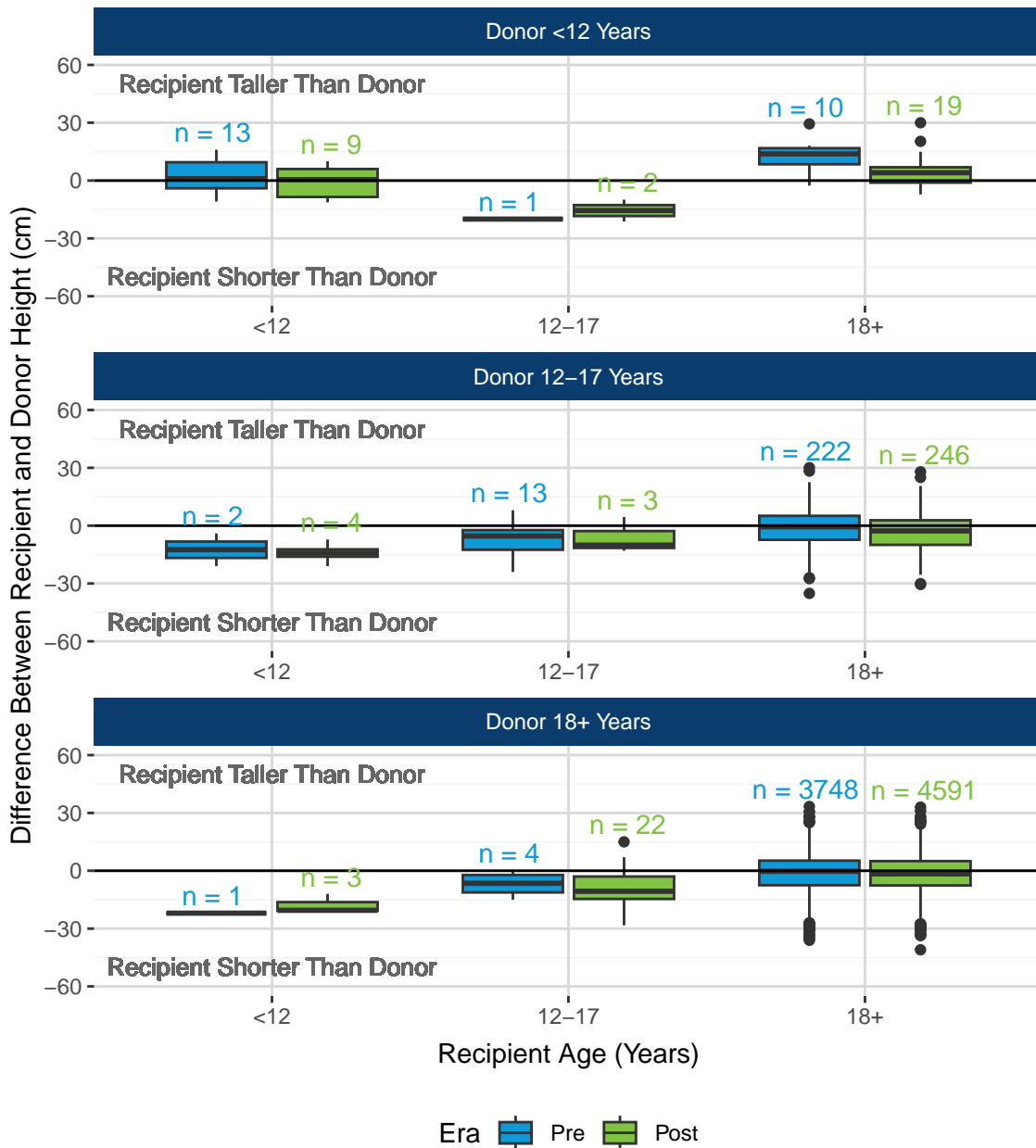
Table 17: Number of Lung Transplants by Era, Recipient Age Group, and Donor Age Group

Era	Recipient Age Group	Adult Donor	Pediatric Donor
Pre	Adult	3748 (99.9%)	231 (88.5%)
	Pediatric	5 (0.1%)	30 (11.5%)
	Total	3753 (100.0%)	261 (100.0%)
Post	Adult	4590 (99.4%)	265 (93.6%)
	Pediatric	26 (0.6%)	18 (6.4%)
	Total	4616 (100.0%)	283 (100.0%)

^a In this table, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

Continuous distribution provides more opportunities for organ sharing between age groups compared to the previous allocation system. The goal of this increased sharing across age groups is that pediatric candidates will have priority for all organs, and while not explicitly outlined in policy, the intent is that short adult candidates will have access to pediatric organs. The following figure and table describe the difference in height between donors and recipients across age groups. Negative height differences mean that the recipient was shorter than the donor and positive height differences mean that the recipient was taller than the donor. In the post policy era there was a smaller height difference between donors <12 years old and adult recipients compared to the pre policy era. In addition, adults who received lungs from 12-17 year old donors were typically a close height match to the donor.

Figure 18: Distribution of the Difference Between Recipient Height and Donor Height by Era, Donor Age Group, and Recipient Age Group



In this figure, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

Table 18: Distribution of Recipient Height, Donor Height, and Recipient-Donor Height Difference by Era, Donor Age Group, and Recipient Age Group

Donor Age (Years)	Recipient Age (Years)	Height Metric	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
<12	<12	Donor Height	Pre	13	0	55.00	76.20	101.00	95.25	114.00	139.00
			Post	9	0	61.00	74.00	114.00	105.44	129.00	140.00
		Recipient Height	Pre	13	0	63.50	67.00	98.20	97.08	117.00	139.00
			Post	9	0	69.00	84.00	112.00	105.19	124.50	133.00
		Height Difference	Pre	13	0	-10.90	-4.00	1.00	1.83	9.50	16.00
			Post	9	0	-11.30	-8.50	0.50	-0.26	6.00	10.00
	12-17	Donor Height	Pre	1	0	165.00	165.00	165.00	165.00	165.00	165.00
			Post	2	0	140.00	140.56	141.12	141.12	141.68	142.24
		Recipient Height	Pre	1	0	145.01	145.01	145.01	145.01	145.01	145.01
			Post	2	0	121.00	123.28	125.55	125.55	127.82	130.10
		Height Difference	Pre	1	0	-19.99	-19.99	-19.99	-19.99	-19.99	-19.99
			Post	2	0	-21.24	-18.41	-15.57	-15.57	-12.74	-9.90
18+	Donor Height	Pre	10	0	123.00	135.00	137.50	141.69	149.15	165.00	
		Post	19	0	127.00	142.00	150.00	148.64	153.47	165.00	
	Recipient Height	Pre	10	0	142.24	148.55	152.40	154.15	160.67	165.10	
		Post	19	0	140.00	149.88	152.40	153.59	157.24	170.18	
	Height Difference	Pre	10	0	-2.60	8.45	13.85	12.46	16.80	29.40	
		Post	19	0	-7.20	-1.07	4.05	4.95	6.90	30.00	

(Continued)

Donor Age (Years)	Recipient Age (Years)	Height Metric	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
12-17	<12	Donor Height	Pre	2	0	157.00	159.00	161.00	161.00	163.00	165.00
			Post	4	0	139.00	147.53	155.18	152.84	160.50	162.00
		Recipient Height	Pre	2	0	144.00	146.25	148.50	148.50	150.75	153.00
			Post	4	0	124.50	136.88	142.10	138.68	143.90	146.00
		Height Difference	Pre	2	0	-21.00	-16.75	-12.50	-12.50	-8.25	-4.00
			Post	4	0	-21.00	-16.12	-14.25	-14.17	-12.29	-7.17
	12-17	Donor Height	Pre	13	0	142.00	168.00	170.00	169.88	175.00	183.00
			Post	3	0	155.00	157.50	160.00	160.00	162.50	165.00
		Recipient Height	Pre	13	0	132.08	157.48	165.10	162.23	167.64	183.20
			Post	3	0	142.00	148.45	154.90	153.80	159.70	164.49
		Height Difference	Pre	13	0	-24.00	-12.52	-5.36	-7.65	-2.30	8.00
			Post	3	0	-13.00	-11.55	-10.10	-6.20	-2.80	4.49
18+	Donor Height	Pre	222	0	140.00	163.87	172.00	170.34	178.00	191.00	
		Post	246	0	145.50	165.00	170.18	171.16	178.00	195.00	
	Recipient Height	Pre	222	0	139.70	161.76	170.18	169.11	177.60	195.00	
		Post	246	0	139.70	162.56	167.64	168.02	175.26	198.10	
	Height Difference	Pre	222	0	-35.14	-7.33	-0.60	-1.23	5.09	30.10	
		Post	246	0	-30.52	-9.96	-2.74	-3.13	2.80	27.94	

(Continued)

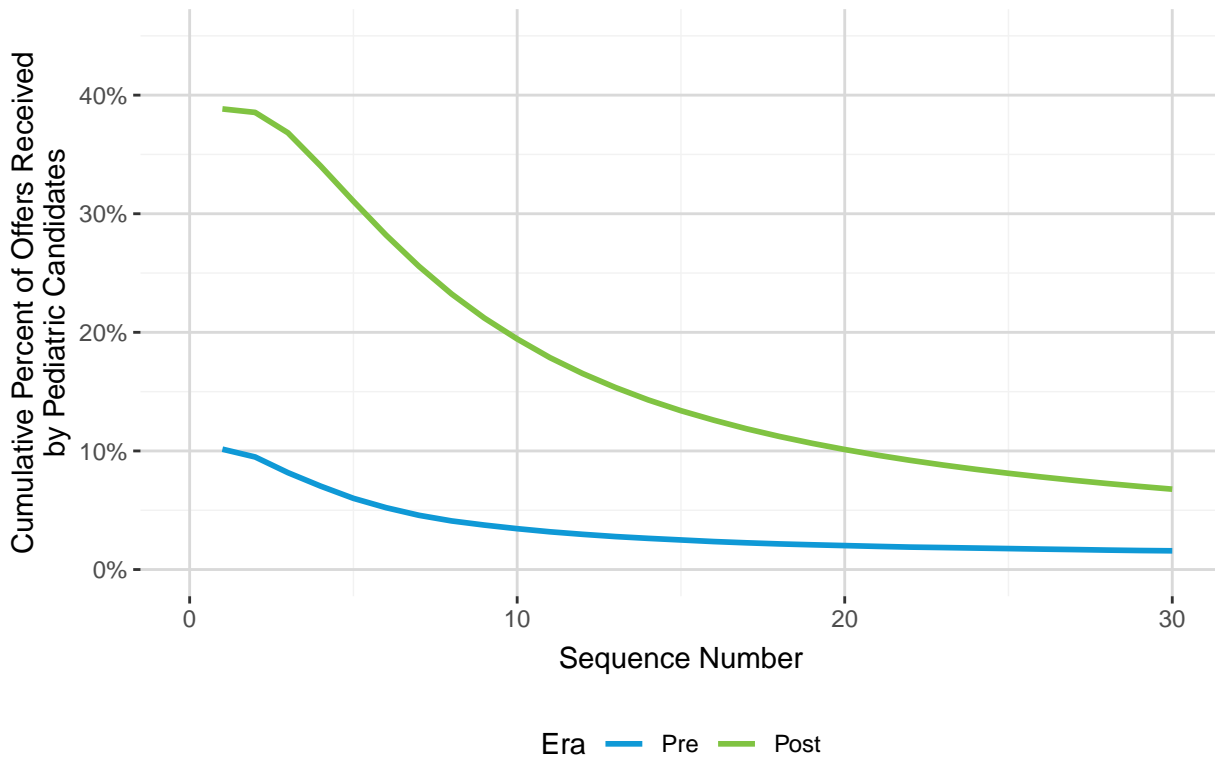
Donor Age (Years)	Recipient Age (Years)	Height Metric	Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max	
18+	<12	Donor Height	Pre	1	0	163.00	163.00	163.00	163.00	163.00	163.00	
			Post	3	0	155.00	155.50	156.00	157.01	158.01	160.02	
		Recipient Height	Pre	1	0	141.00	141.00	141.00	141.00	141.00	141.00	141.00
			Post	3	0	134.00	136.75	139.50	139.17	141.75	144.00	
		Height Difference	Pre	1	0	-22.00	-22.00	-22.00	-22.00	-22.00	-22.00	
			Post	3	0	-21.00	-20.76	-20.52	-17.84	-16.26	-12.00	
	12-17	Donor Height	Pre	4	0	163.00	168.25	175.00	173.25	180.00	180.00	
			Post	22	0	150.00	165.00	168.00	169.58	174.50	193.04	
		Recipient Height	Pre	4	0	153.00	162.00	166.00	166.32	170.32	180.30	
			Post	22	0	127.00	152.12	161.31	160.44	167.48	180.34	
		Height Difference	Pre	4	0	-15.00	-11.25	-6.50	-6.92	-2.17	0.30	
			Post	22	0	-28.30	-14.62	-10.65	-9.15	-2.98	15.00	
18+	Donor Height	Pre	3748	0	127.00	165.00	170.18	171.11	178.00	206.00		
		Post	4591	0	132.00	164.00	171.00	171.08	178.00	201.00		
	Recipient Height	Pre	3748	0	124.46	162.56	170.18	170.16	177.80	203.20		
		Post	4591	0	134.62	162.56	170.18	169.62	177.80	203.20		
	Height Difference	Pre	3748	0	-36.06	-7.51	-0.28	-0.95	5.26	33.34		
		Post	4591	0	-41.00	-7.62	-1.60	-1.47	5.00	32.99		

^a In this table, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

^b Negative height differences mean that the recipient was shorter than the donor and positive height differences mean that the recipient was taller than the donor.

The following figure and table describe how pediatric candidates were ranked on the match run in the pre and post policy eras by depicting the cumulative percent of offers received by pediatric candidates at the top of the match run (from sequence numbers 1 to 30). Match runs were only included in this analysis if at least one pediatric candidate appeared on the match. This is different from analyses included in previous monitoring reports where all lung match runs were included. In the post era, pediatric candidates had greater access to transplants and received the first offer on a match run 39% of the time, compared to the pre era where they received the first offer on a match run only 10% of the time.

Figure 19: Cumulative Percent of Offers Received by Pediatric Candidates by Era and Sequence Number



In this figure, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

Table 19: Cumulative Percent of Offers Received by Pediatric Candidates by Era and Sequence Number

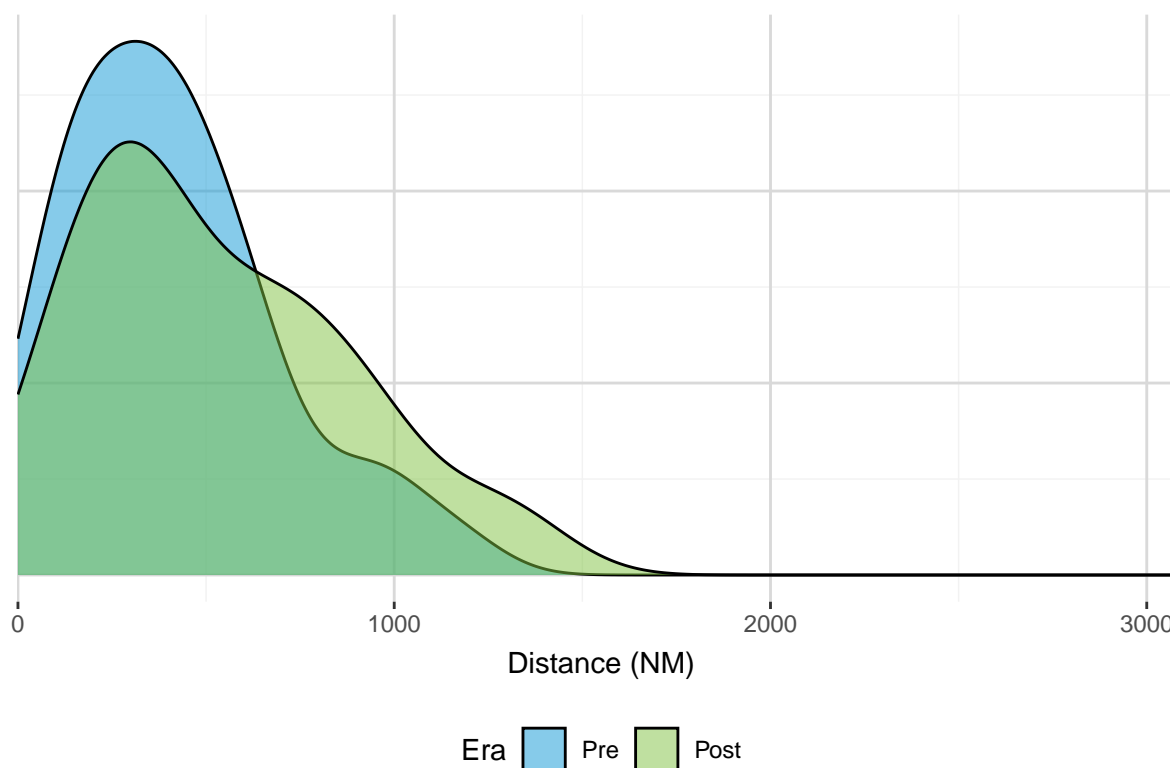
Sequence Number	Pre	Post
1	10.149%	38.838%
2	9.492%	38.545%
3	8.170%	36.826%
4	7.033%	34.025%
5	6.005%	31.057%
6	5.215%	28.192%
7	4.574%	25.569%
8	4.097%	23.231%
9	3.750%	21.202%
10	3.445%	19.444%
11	3.183%	17.867%
12	2.968%	16.525%
13	2.781%	15.349%
14	2.629%	14.303%
15	2.495%	13.392%
16	2.359%	12.598%
17	2.254%	11.869%
18	2.161%	11.225%
19	2.088%	10.645%
20	2.019%	10.120%
21	1.952%	9.643%
22	1.892%	9.209%
23	1.853%	8.813%
24	1.811%	8.450%
25	1.768%	8.116%
26	1.724%	7.807%
27	1.685%	7.521%
28	1.640%	7.256%
29	1.604%	7.009%
30	1.579%	6.778%

^a In this table, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

^b Cumulative percent of offers received by pediatric candidates are only listed through match run sequence number 30 to highlight differences in pediatric offers at the top of the match run in the pre and post eras.

In the post policy era, median distance from the donor hospital to transplant program increased slightly for pediatric recipients from 383 NM to 428 NM, though sample sizes were small.

Figure 20: Distribution of Distance (in Nautical Miles) from Donor Hospital to Transplant Program for Pediatric Recipients by Era



In this figure, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

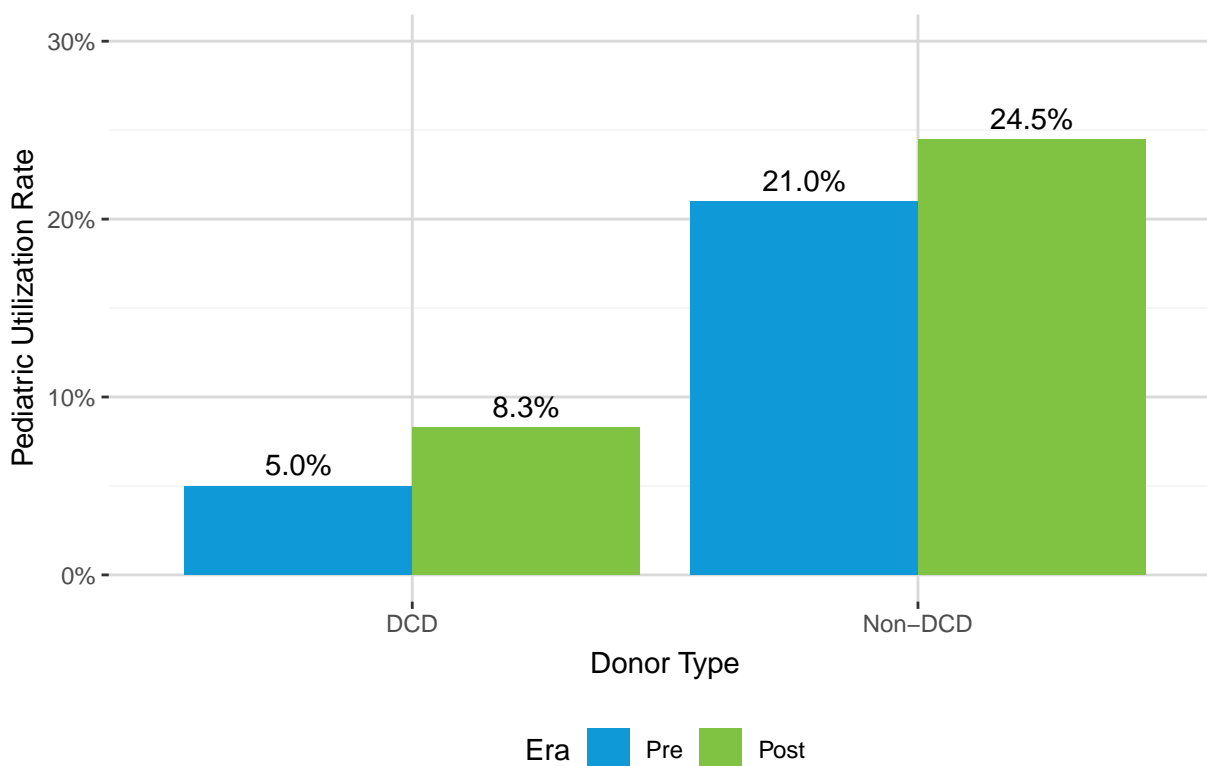
Table 20: Distribution of Distance (in Nautical Miles) from Donor Hospital to Transplant Program for Pediatric Recipients by Era

Era	N	N Missing	Min	25th Percentile	Median	Mean	75th Percentile	Max
Pre	35	0	22	200.00	383	413.11	567.50	1169
Post	44	0	3	264.25	428	527.89	745.25	1384

^a In this table, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

The pediatric lung utilization rate increased slightly for both DCD and non-DCD pediatric donors. The pediatric utilization rate is defined as the percent of pediatric lungs that are transplanted based on all possible lungs from every deceased pediatric donor with at least one organ recovered for the purpose of transplant; this definition assumes that each donor has two possible lungs for donation.

Figure 21: Pediatric Lung Donor Utilization Rates by Era and Donor Type



In this figure, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

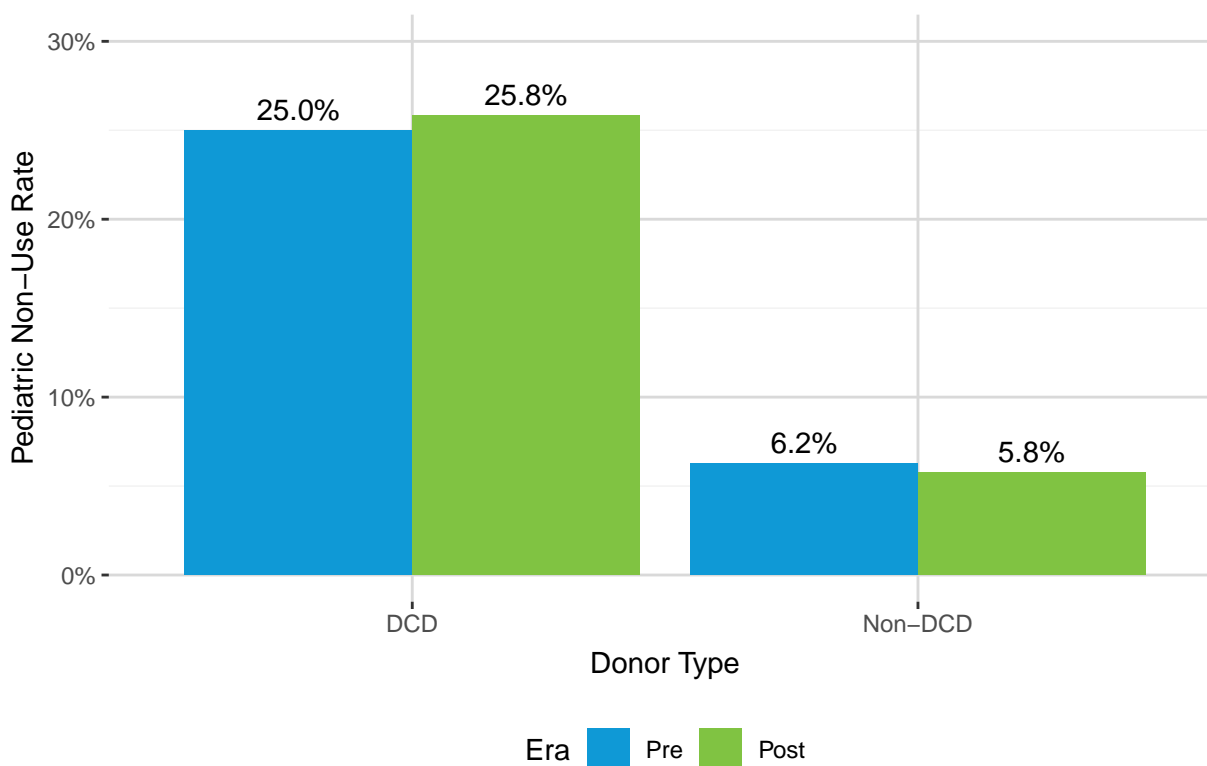
Table 21: Pediatric Lung Donor Utilization Rates by Era and Donor Type

DCD Status	Era	N Donors	N Lungs Transplanted	Pediatric Utilization Rate
DCD	Pre	360	36	5.0%
	Post	398	66	8.3%
Non-DCD	Pre	1108	465	21.0%
	Post	1000	490	24.5%
All Pediatric Donors	Pre	1468	501	17.1%
	Post	1398	556	19.9%

^a In this table, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

The pediatric lung non-use rate increased slightly for DCD donors and decreased slightly for non-DCD donors in the post era. The pediatric non-use rate is defined as the number of pediatric lungs recovered for the purpose of transplant but not transplanted out of all pediatric lungs recovered for transplant.

Figure 22: Pediatric Lung Donor Non-Use Rates by Era and Donor Type



In this figure, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

Table 22: Pediatric Lung Donor Non-Use Rates by Era and Donor Type

DCD Status	Era	N Lungs Recovered	N Lungs Transplanted	Pediatric Non-Use Rate
DCD	Pre	48	36	25.0%
	Post	89	66	25.8%
Non-DCD	Pre	496	465	6.2%
	Post	520	490	5.8%
All Pediatric Donors	Pre	544	501	7.9%
	Post	609	556	8.7%

^a In this table, the Pre era spans August 18, 2021 to March 08, 2023 and the Post era spans March 09, 2023 to September 26, 2024.

Prior Living Donors

This section summarizes the status of prior living donors listed for a lung transplant. Information on prior living donors was not collected before lung CD was implemented; thus, this section only contains data on these candidates in the post policy era (from March 09, 2023 to September 26, 2024).

In the first 18-months after the implementation of lung CD less than 10 prior living donors were listed for a lung transplant and all of these candidates were transplanted. Because of the small number of patients and to protect patient privacy, we cannot provide any additional information about these individuals. We will continue to monitor the prior living donor population and will include more information when it is available.

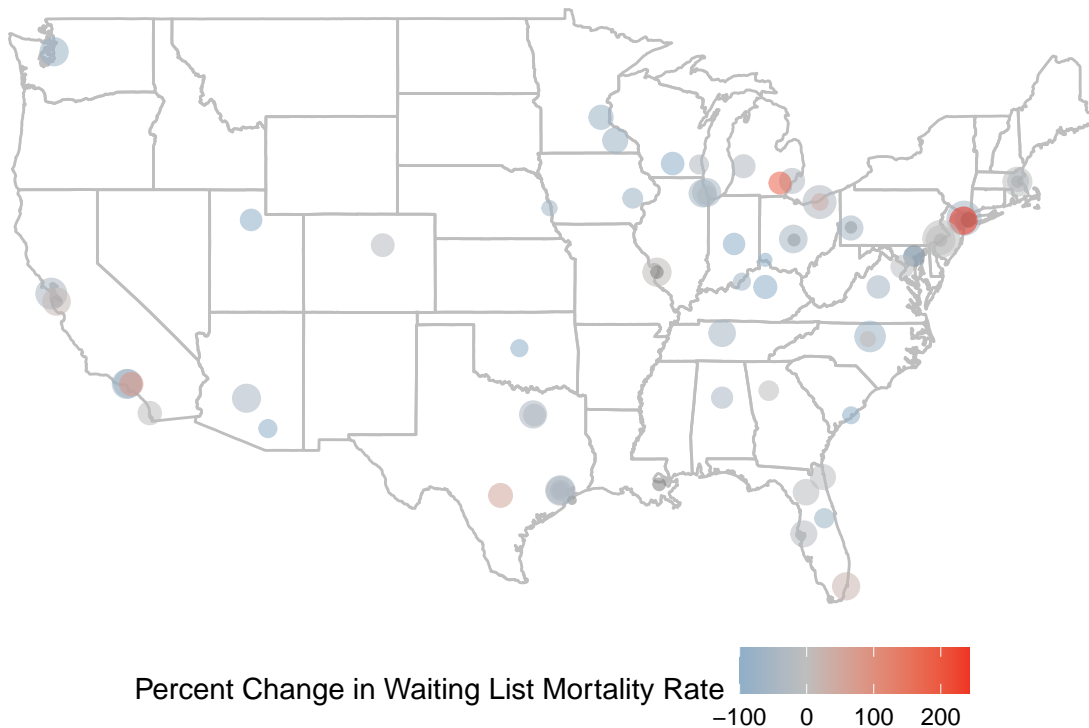
Center Geography & Size

This section visually examines geographic trends in lung allocation by displaying pre/post CD trends on maps of the United States. All analyses in this section are displayed in the following eras:

- Pre: approximately 18 months before CD implementation (August 18, 2021 - March 08, 2023)
- Post: approximately 18 months after CD implementation (March 09, 2023 - September 26, 2024)

This figure displays each center's percent change in lung waiting list mortality rate from the pre policy era to the post policy era. Each point represents an active lung transplant center and the size of the point represents the relative number of lung candidates listed at each center during the pre policy era. Overall, there were no noticeable trends in waiting list mortality rates based on center size or geography.

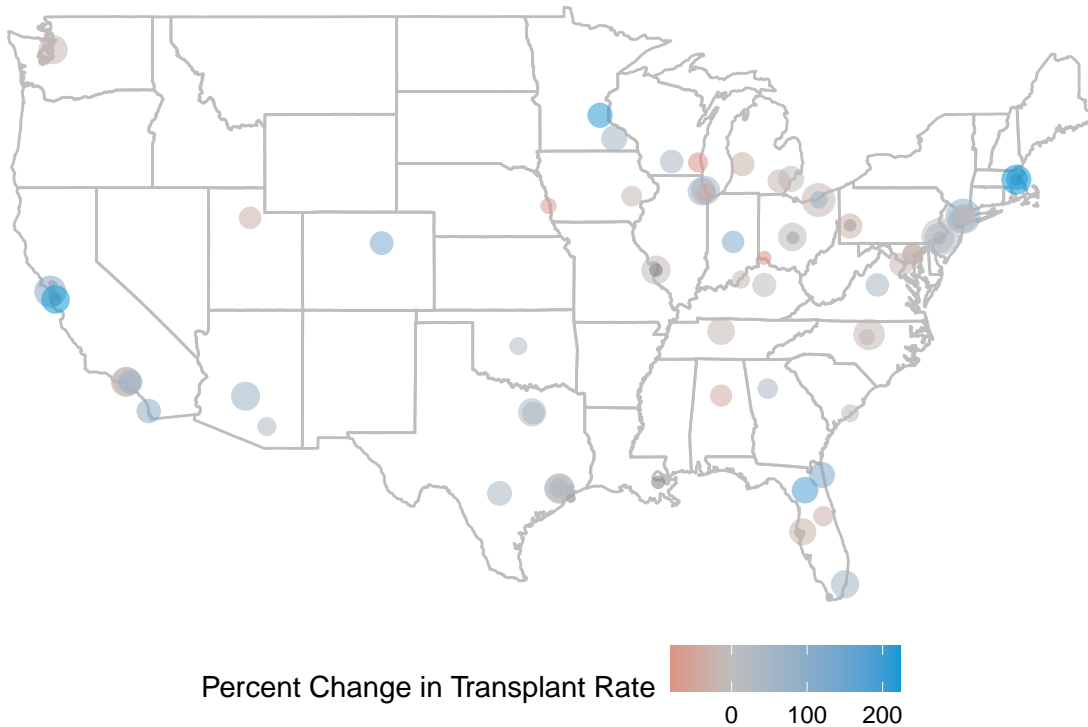
Figure 23: Percent Change in Waiting List Mortality Rate from the Pre Policy Era to the Post Policy Era by Center Size and Location



For this analysis, the Pre era is defined from August 18, 2021 to March 08, 2023 and the Post era is defined from March 09, 2023 to September 26, 2024. The size of each point represents the relative number of lung candidates listed at each center during the pre policy era.

This figure displays transplant center's percent change in lung transplant rate from the pre policy era to the post policy era. Each point represents an active lung transplant center and the size of the point represents the relative number of lung candidates listed at each center during the pre policy era. Overall, there were no noticeable trends in the percent change in transplant rates based on center size or geography.

Figure 24: Percent Change in Transplant Rate from the Pre Policy Era to the Post Policy Era by Center Size and Location



For this analysis, the Pre era is defined from August 18, 2021 to March 08, 2023 and the Post era is defined from March 09, 2023 to September 26, 2024. The size of each point represents the relative number of lung candidates listed at each center during the pre policy era.

This figure displays each center's percent change in lung transplant rate from the pre policy era to the post policy era. In addition, the centers are grouped based on their directional changes in waiting list mortality rate and transplant rate from the pre policy era to the post policy era. On each map, the size of the points represent the relative number of lung candidates listed at each center during the pre policy era. Most centers experienced either an increase in their transplant rate, decrease in their waiting list mortality rate, or both from the pre policy era to the post policy era. However, there were four centers across the East Coast and Midwest that experienced both an increase in their waiting list mortality rate and decrease in their transplant rate, though their percent decrease in transplant rate was relatively small.

Figure 25: Percent Change in Transplant Rate from the Pre Policy Era to the Post Policy Era by Center Size, Location, and Directional Changes in Transplant Rate and Waiting List Mortality Rate



For this analysis, the Pre era is defined from August 18, 2021 to March 08, 2023 and the Post era is defined from March 09, 2023 to September 26, 2024. The size of each point represents the relative number of lung candidates listed at each center during the pre policy era.

Post-Transplant Patient Survival

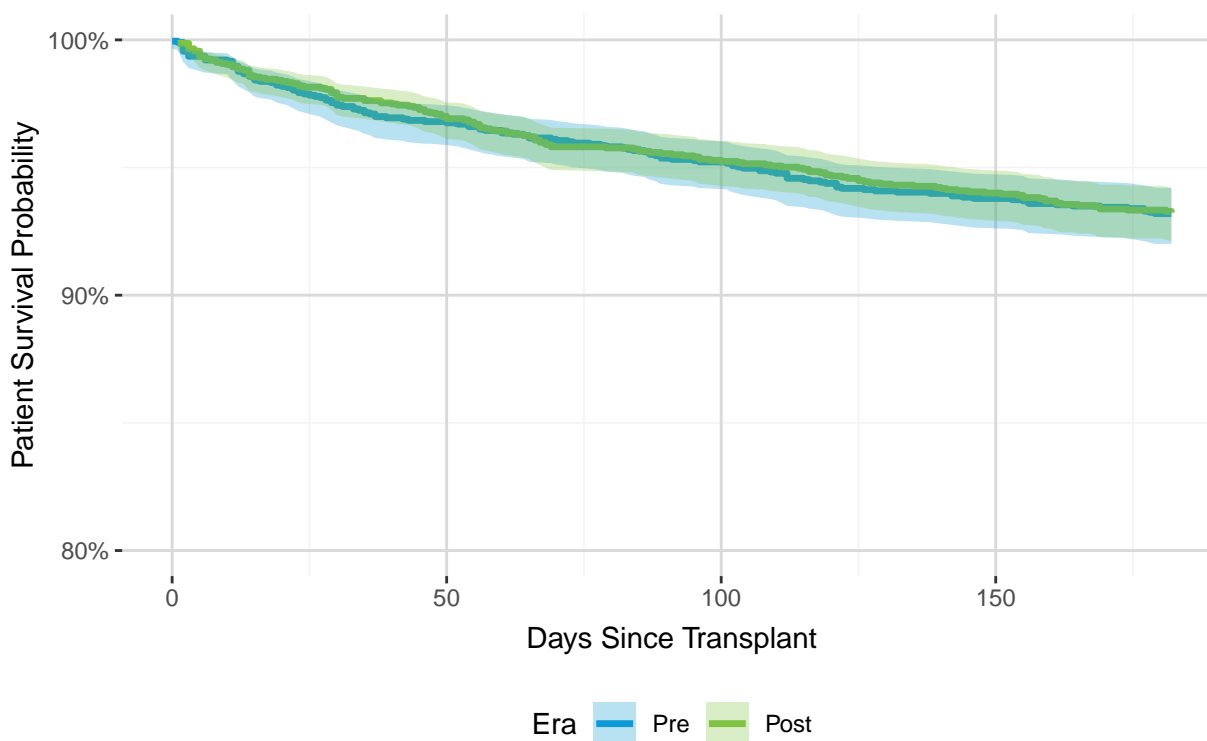
This section evaluates six-month post-transplant survival for candidates that were transplanted over the course of 9 months before and after lung CD was implemented. The cohort for survival analyses was restricted to transplant recipients with at least 6 months of follow-up time after applying lags to account for time delays in reporting per typical OPTN conventions. Specifically, the cohorts are defined as those transplanted in the following eras:

- Pre: 9 months before CD implementation (June 09, 2022 - March 08, 2023)
- Post: 9 months after CD implementation (March 09, 2023 - December 08, 2023)

Note that these analyses do not distinguish between those translated before or after the blood type modification in September 2023. Future monitoring can evaluate differences in post-transplant survival relative to this policy change once more data accrue.

There was no change in the probability of patient survival at six months post-transplant after CD implementation (93% vs 93%).

Figure 26: Six-Month Post-Transplant Patient Survival by Era



In this figure, the Pre era includes transplant recipients from June 09, 2022 to March 08, 2023 and the Post era includes transplant recipients from March 09, 2023 to December 08, 2023.

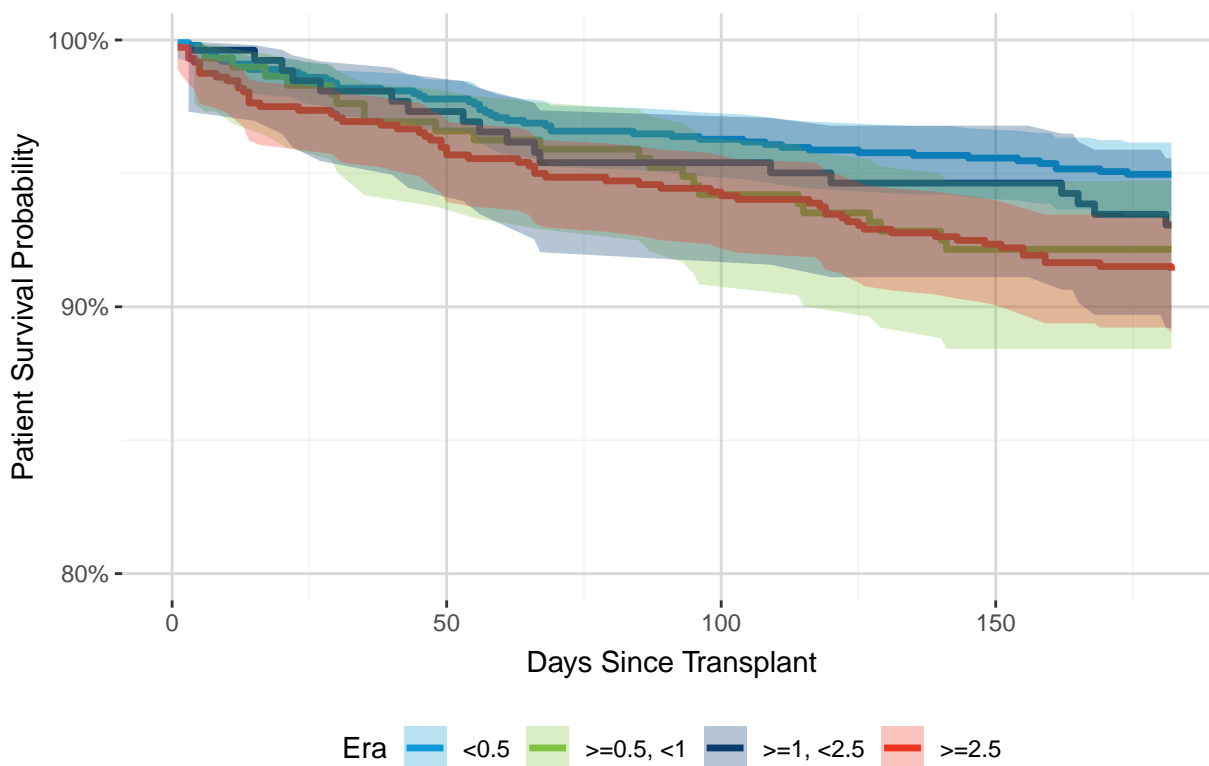
Table 23: Six-Month Post-Transplant Patient Survival by Era

Era	N Transplants	N Deaths	N at Risk	Estimate	95% Confidence Interval
Pre	2032	138	1886	93.2%	(92.0%, 94.2%)
Post	2273	153	1927	93.2%	(92.1%, 94.2%)

^a In this table, the Pre era includes transplant recipients from June 09, 2022 to March 08, 2023 and the Post era includes transplant recipients from March 09, 2023 to December 08, 2023.

Medical urgency points were not available for candidates transplanted before the implementation of lung CD. As a result, the following figure and table contain information from the post policy cohort only. In the post policy era, patient six-month post-transplant survival varied slightly by medical urgency points; candidates with lower medical urgency points (less medically urgent) at the time of transplant had a higher probability of survival after six-months compared to candidates with higher medical urgency points (more medically urgent).

Figure 27: Six-Month Post-Transplant Patient Survival by Medical Urgency Points at Transplant in the Post Policy Era



This figure includes transplant recipients from the Post policy era (March 09, 2023 to December 08, 2023).

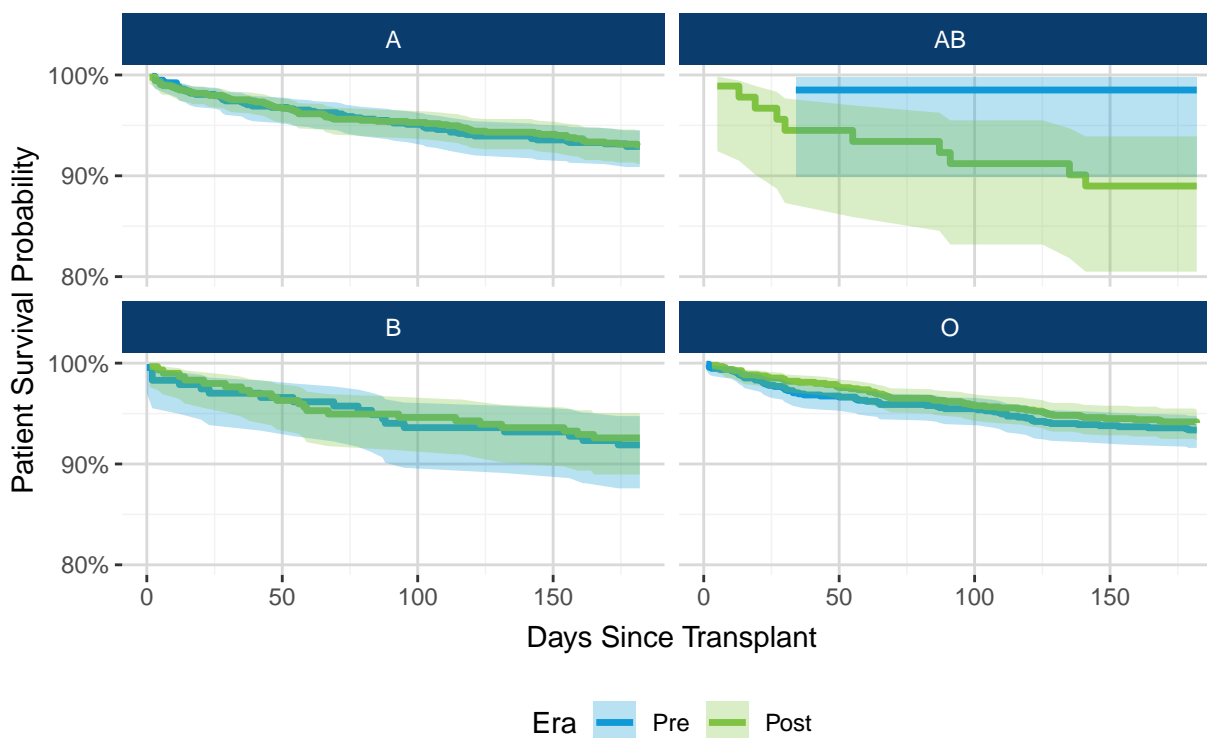
Table 24: Six-Month Post-Transplant Patient Survival by Medical Urgency Points at Transplant in the Post Policy Era

Medical Urgency Points	N Transplants	N Deaths	N at Risk	Estimate	95% Confidence Interval
<0.5	997	50	859	95.0%	(93.4%, 96.2%)
>=0.5, <1	295	23	251	92.2%	(88.4%, 94.7%)
>=1, <2.5	261	18	229	93.1%	(89.2%, 95.6%)
>=2.5	720	62	588	91.4%	(89.0%, 93.2%)

^a This table includes transplant recipients from the Post policy era (March 09, 2023 to December 08, 2023).

Six-month post-transplant survival remained consistent for recipients with blood types A, B, and O after CD was implemented. For blood type AB, sample sizes were small and in the pre policy era one patient death within six months of transplant was reported. This single death in the pre era resulted in a straight-line survival curve for blood type AB. Overall, no statistically significant differences in six-month post-transplant survival were observed across blood types or policy eras. However, it is important to note that the post policy era includes individuals who were transplanted both before and after the blood type modification was implemented in September 2023. Once more data accrue we can further stratify the post policy era to account for this additional policy change.

Figure 28: Six-Month Post-Transplant Patient Survival by Era and Recipient Blood Type



In this figure, the Pre era includes transplant recipients from June 09, 2022 to March 08, 2023 and the Post era includes transplant recipients from March 09, 2023 to December 08, 2023.

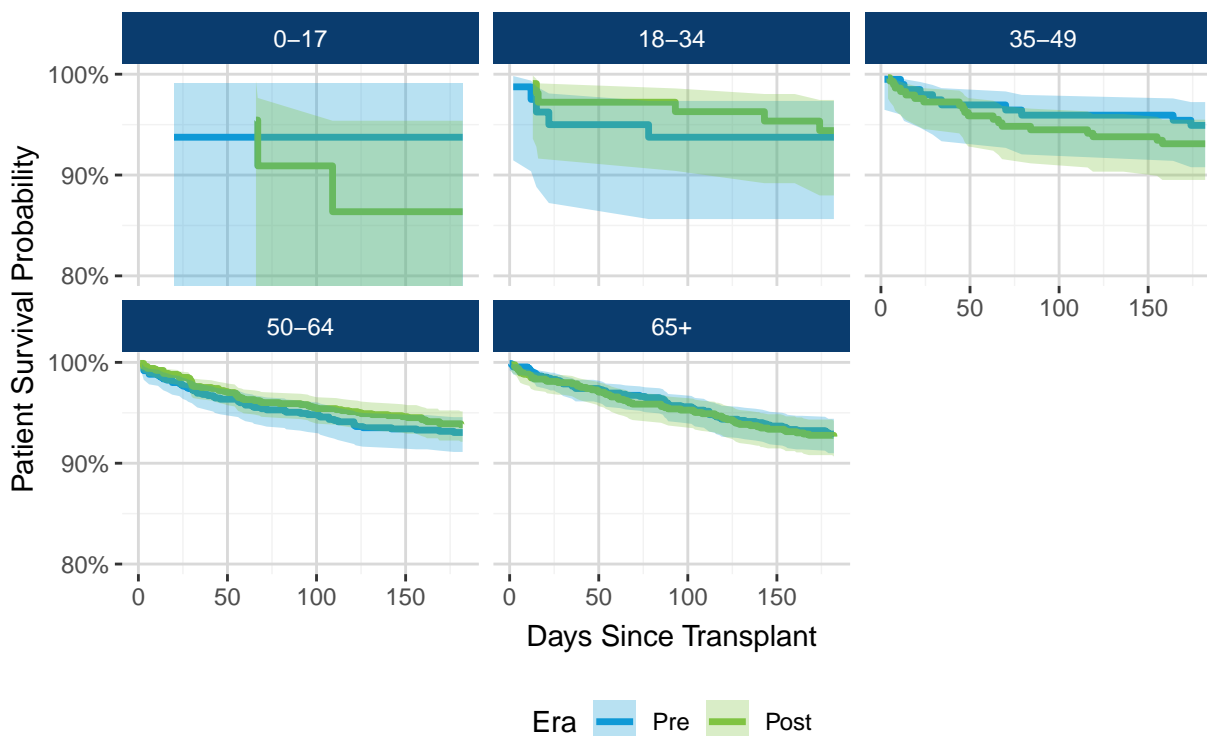
Table 25: Six-Month Post-Transplant Patient Survival by Era and Recipient Blood Type

Blood type	Era	N Transplants	N Deaths	N at Risk	Estimate	95% Confidence Interval
A	Pre	779	55	720	92.9%	(90.9%, 94.5%)
	Post	936	65	803	93.0%	(91.2%, 94.5%)
AB	Pre	67	1	66	98.5%	(89.9%, 99.8%)
	Post	91	10	74	89.0%	(80.5%, 93.9%)
B	Pre	235	19	214	91.9%	(87.6%, 94.8%)
	Post	297	22	253	92.6%	(89.0%, 95.1%)
O	Pre	951	63	886	93.4%	(91.6%, 94.8%)
	Post	949	56	797	94.1%	(92.3%, 95.4%)

^a In this table, the Pre era includes transplant recipients from June 09, 2022 to March 08, 2023 and the Post era includes transplant recipients from March 09, 2023 to December 08, 2023.

Overall, no statistically significant differences in six-month post-transplant survival were observed across age categories or policy eras. However, slight decreases in the survival estimates were observed for recipients aged 0-17 years and 35-49 years in the post policy era. For pediatric recipients, the sample sizes were very small and one patient death within six months of transplant was reported in the pre policy era. This single death in the pre era resulted in a straight-line survival curve for pediatric recipients.

Figure 29: Six-Month Post-Transplant Patient Survival by Era and Recipient Age at Transplant



In this figure, the Pre era includes transplant recipients from June 09, 2022 to March 08, 2023 and the Post era includes transplant recipients from March 09, 2023 to December 08, 2023.

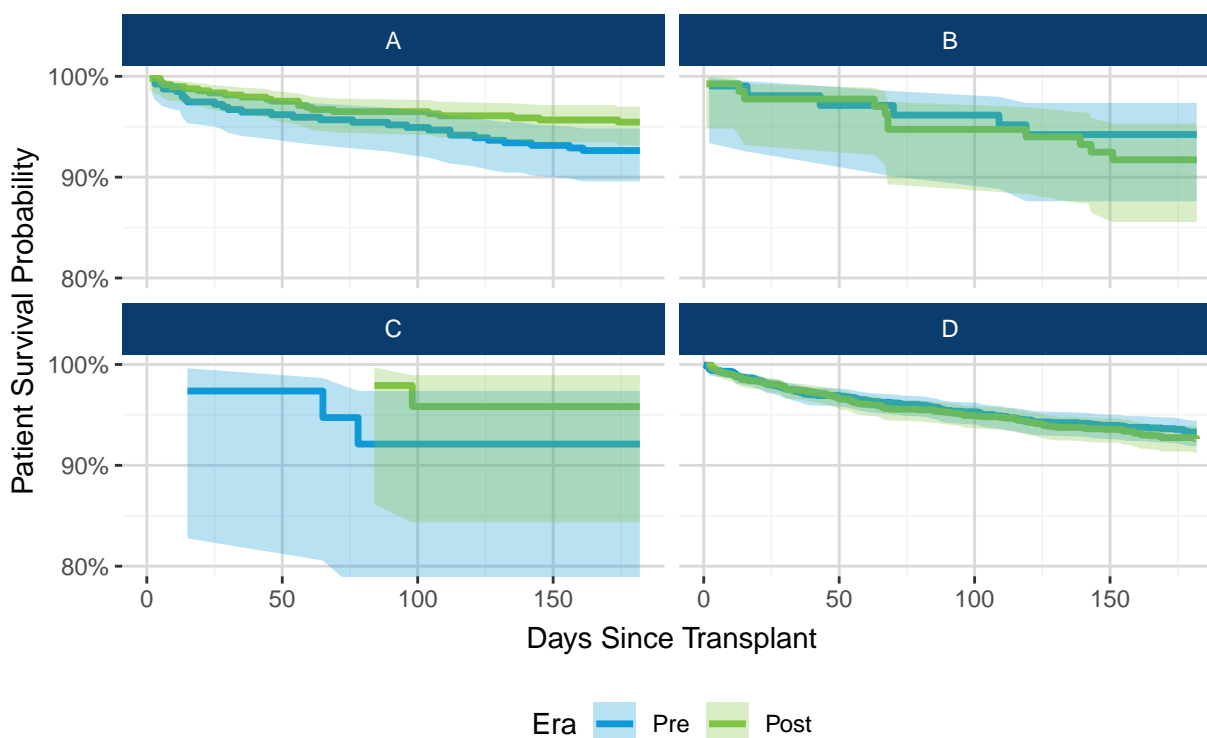
Table 26: Six-Month Post-Transplant Patient Survival by Era and Recipient Age at Transplant

Age (years)	Era	N Transplants	N Deaths	N at Risk	Estimate	95% Confidence Interval
0-17	Pre	16	1	15	93.8%	(63.2%, 99.1%)
	Post	22	3	16	86.4%	(63.4%, 95.4%)
18-34	Pre	80	5	75	93.8%	(85.6%, 97.3%)
	Post	108	6	94	94.4%	(88.0%, 97.4%)
35-49	Pre	198	10	187	94.9%	(90.8%, 97.2%)
	Post	291	20	243	93.1%	(89.5%, 95.5%)
50-64	Pre	849	59	788	93.0%	(91.1%, 94.6%)
	Post	1005	62	863	93.8%	(92.1%, 95.1%)
65+	Pre	889	63	821	92.9%	(91.0%, 94.4%)
	Post	847	62	711	92.6%	(90.7%, 94.2%)

^a In this table, the Pre era includes transplant recipients from June 09, 2022 to March 08, 2023 and the Post era includes transplant recipients from March 09, 2023 to December 08, 2023.

There were no statistically significant differences in six-month post-transplant survival across diagnosis groups and era. However, slight increases in survival were observed for recipients in diagnosis groups A and C in the post policy era, and slight decreases in survival were observed for recipients in diagnosis groups B and D in the post policy era.

Figure 30: Six-Month Post-Transplant Patient Survival by Era and Diagnosis Group



In this figure, the Pre era includes transplant recipients from June 09, 2022 to March 08, 2023 and the Post era includes transplant recipients from March 09, 2023 to December 08, 2023.

Table 27: Six-Month Post-Transplant Patient Survival by Era and Diagnosis Group

Diagnosis group	Era	N Transplants	N Deaths	N at Risk	Estimate	95% Confidence Interval
A	Pre	395	29	364	92.6%	(89.6%, 94.8%)
	Post	488	22	429	95.5%	(93.2%, 97.0%)
B	Pre	104	6	98	94.2%	(87.6%, 97.4%)
	Post	134	11	111	91.7%	(85.6%, 95.3%)
C	Pre	38	3	35	92.1%	(77.5%, 97.4%)
	Post	48	2	43	95.8%	(84.4%, 98.9%)
D	Pre	1495	100	1389	93.3%	(91.9%, 94.5%)
	Post	1603	118	1344	92.6%	(91.2%, 93.8%)

^a In this table, the Pre era includes transplant recipients from June 09, 2022 to March 08, 2023 and the Post era includes transplant recipients from March 09, 2023 to December 08, 2023.