Final Report

OPTN Kidney Transplantation Committee | Descriptive Data Request

Establish Minimum Kidney Donor Criteria to Require Biopsy Two-Year Monitoring Report

DHHS Contract No. 250-2019-00001C
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Kidney Transplantation Committee
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Contents

Executive Summary

This report presents data describing the US organ transplantation system before and after the introduction of a policy establishing minimum criteria for kidney biopsy for deceased donors recovered for transplantation. Overall, there has been an 18.7% increase in the number of donors recovered in the post-policy era as compared to the pre-policy era. There was a slight increase in the percentage of donors who had at least one kidney biopsied, increasing from 64.01% to 65.81% in the post-policy era. Non-use rates increased 5.31% from the pre- to post-policy era for biopsied donors. There was a 3.87% increase in in non-use overall.

Overall, there was a 7.29% increase in the proportion of donors that met the minimum criteria for biopsy in the post-policy era as compared to the pre-policy era. 96.82% of donors that met the minimum criteria for biopsy were biopsied in the post-policy era. There were slight increases in donors aged 50+, and KDPI >35% being biopsied after the implementation of the policy.

Background/Purpose

On September 6, 2022 the Establish Minimum Kidney Donor Criteria to Require Biopsy policy went into effect. This proposal aimed to standardize biopsy practice by establishing minimum donor criteria for when procurement kidney biopsies must be performed by an Organ Procurement Organization (OPO).

OPOs must make a reasonable effort to ensure that a procurement kidney biopsy is performed for all deceased donors meeting any of the following criteria, excluding donors less than 18 years old:

- Anuria, or a urine output of less than 100ml in 24 hours during the most recent hospital admission or in the course of donor management
- Donor has received hemodialysis or other renal replacement therapy during most recent hospital admission or in the course of donor management
- History of diabetes, including hemoglobin A1c (HbA1c) of 6.5 or greater during donor evaluation and management
- KDPI greater than 85 percent
- Donor age 60 years or older
- Donor age 50-59, and meets at least two of the following criteria:
  - History of hypertension
  - Manner of death: Cerebrovascular Accident (CVA)
  - Terminal creatinine greater than or equal to 1.5 mg/dL

Strategic Plan Goal or Committee Project Addressed

- Increase the number of transplants
- Promote efficient management of the OPTN

Committee Request

The policy will be monitored 6, 12, and 24 months post-implementation. The following metrics, and any subsequently requested by the Committee, will be evaluated as data becomes available. Appropriate lags will be applied, per typical OPTN conventions, to account for time delay in institutions reporting data to the OPTN and compared to an appropriate pre-policy cohort to assess performance before and after implementation of this policy.

Counts and percents of deceased kidney donors, as well as utilization and non-use rates for deceased kidney donors overall and stratified by the following will be provided:

- Minimum criteria for biopsy
- Biopsy status
- KDPI
- Donor age

- Recovering OPO

At the October 11, 2023 OPTN Kidney Committee in-person meeting, while receiving a presentation of the 6-month monitoring report, the Committee requested to see delayed graft function, as well as graft survival for future implementations of the monitoring report. These added metrics can be found in the appendix section.

Data and Methods

Data Sources:

Donor data were submitted via the OPTN Donor Data and Matching System and on the Deceased Donor Registration (DDR). Recipient and transplant data were submitted on the Transplant Recipient Registration (TRR).

All results are based on OPTN data as of January 10, 2025. Data are subject to change based on future data submission or correction.

Cohort:

All adult(18+) deceased kidney donors recovered in the United States between September 05, 2020 and September 05, 2024 were included in this analysis. All kidney registrations that were transplanted with organs from adult deceased kidney donors recovered between September 05, 2020 and September 05, 2024 were included in this analysis.

Policy eras were defined as the following, so each era had the same amount of days:

- Pre-policy: September 05, 2020 to September 05, 2022
- Post-policy: September 06, 2022 to September 05, 2024

Methods:

Minimum criteria for biopsy were defined as if any of the following four criteria were met:

- History of diabetes
- KDPI greater than 85 percent
- Donor age 60 years or older
- Donor age 50-59, and meets at least two of the following criteria:
  - History of hypertension
  - Manner of death: Cerebrovascular Accident (CVA)
  - Terminal creatinine greater than or equal to 1.5 mg/dL

The two following criteria are data that are not currently collected for all deceased donors and therefore cannot be used to determine if minimum criteria for biopsy were met.

- Anuria, or a urine output of less than 100ml in 24 hours during the most recent hospital admission or in the course of donor management
- Donor has received hemodialysis or other renal replacement therapy during most recent hospital admission or in the course of donor management

The analysis presented in the report is the best estimate of which donors meet minimum criteria based on the available data, but it is likely this report underestimates the true proportion of donors that meet minimum criteria for biopsy requirements.

Since the above established minimum criteria for biopsy is at a donor level, and not an organ level, metrics dealing with the count and percentage of biopsies will be at the donor level, with a donor being classified as a biopsied donor if at least one organ from the donor was biopsied.

The KDPI donor reference population consisted of all deceased kidney donors recovered for transplantation in 2023. The KDPI being utilized in this analysis is the HCV and Race-neutral KDPI implemented on October 31, 2024 and therefore may not reflect th KDPI at the time of the match.

Non-use rates were defined as the number of deceased donor kidneys recovered for the purpose of transplantation, but not transplanted, divided by the total number of deceased donor kidneys recovered for transplant.

Utilization rate was defined as the number of kidneys transplanted divided by the total number of available kidneys. This was restricted to donors with at least one organ recovered for transplant, and all donors were assumed to have two transplantable kidneys. This assumption may lead to the number of kidneys able to be transplanted to be greater than the actual number of kidneys recovered in the cohort, since not all donors have both kidneys recovered.

Delayed graft function (DGF) is defined as whether a kidney recipient required dialysis within the first week after transplantation.

Post-transplant death-censored graft survival was calculated using the Kaplan-Meier survival estimate. Due to insufficient follow-up and concerns about informative censoring, this report only looks at survival for deceased donor kidney transplants through September 05, 2023. Survival estimates were not calculated for any groupings where there was less than or equal to 10 recipients at risk. Multiorgan transplants were excluded from survival analysis.

Results

Biopsy Status

Table 1 shows the count and percentage of deceased kidney donors recovered by whether or not a donor had at least one kidney biopsied. Overall, the percentage of donors having at least one kidney biopsied stayed consistent between the two eras, with 64.01% in the pre-policy era, and 65.81% in the post-policy era.

Table 1: Count and Percentage of Adult Deceased Kidney Donors Recovered in United States by Policy Era and Biopsy Status

	Biopsy Status		
Era	**Biopsy**	**No biopsy**	**Total**
Pre	15,904 (64.01%)	8,942 (35.99%)	24,846 (100.00%)
Post	19,409 (65.81%)	10,084 (34.19%)	29,493 (100.00%)

Table 2 shows the non-use rates for all deceased kidney donors recovered in the defined eras. There was a slight decrease in the non-use rate in the post-policy era from 6.57% to 6.14% for donors that were not biopsied. For donors that were biopsied there was an increase in the non-use rate from 36.38% in the pre-policy era to 41.69% in the post-policy era.

Table 2: Non-use Rates for Adult Deceased Kidney Donors Recovered in United States by Policy Era and Biopsy Status

Biopsy Status	Era	Kidneys Recovered for Transplant but Not Transplanted	Kidneys Recovered	Non-use Rate (%)
Biopsy	Pre	11,514	31,646	36.38
	Post	16,088	38,592	41.69
No biopsy	Pre	1,169	17,804	6.57
	Post	1,234	20,083	6.14
Total	Pre	12,683	49,450	25.65
	Post	17,322	58,675	29.52

Table 3 shows the utilization rates for all deceased donors recovered in the defined eras. There was a slight decrease in utilization rate in the post-policy era from 81.34% to 79.77% for donors that were not biopsied. For donors that were biopsied there was a decrease in the utilization rate from 63.24% in the pre-policy era to 57.94% in the post-policy era. This metric was restricted to donors with at least one organ recovered for transplant, and all donors were assumed to have two transplantable kidneys. This assumption may lead to the number of kidneys able to be transplanted to be greater than the actual number of kidneys recovered in the cohort, since not all donors have both kidneys recovered.

Table 3: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era and Biopsy Status

Biopsy Status	Era	Kidneys Transplanted	Kidneys Available	Utilization Rate (%)
Biopsy	Pre	20,132	31,832	63.24
	Post	22,504	38,840	57.94
No biopsy	Pre	16,635	20,450	81.34
	Post	18,849	23,628	79.77
Total	Pre	36,767	52,282	70.32
	Post	41,353	62,468	66.20

Minimum Criteria For Biopsy

Table 4 and **Figure 1** show the count and percentage of deceased kidney donors recovered by whether the minimum criteria for biopsy was met by policy era. There was an increase in the percentage of donors meeting the minimum criteria for biopsy from 31.77% in the pre-policy era to 39.06% in the post-policy era. Although there was no minimum criteria for biopsy established before the implementation of this policy, donors in the pre-policy era met the minimum crieria if they would have met the criteria in the post-policy era.

Figure 1: Count and Percentage of Deceased Kidney Donors Recovered in United States by Minimum Criteria for Biopsy and Policy Era

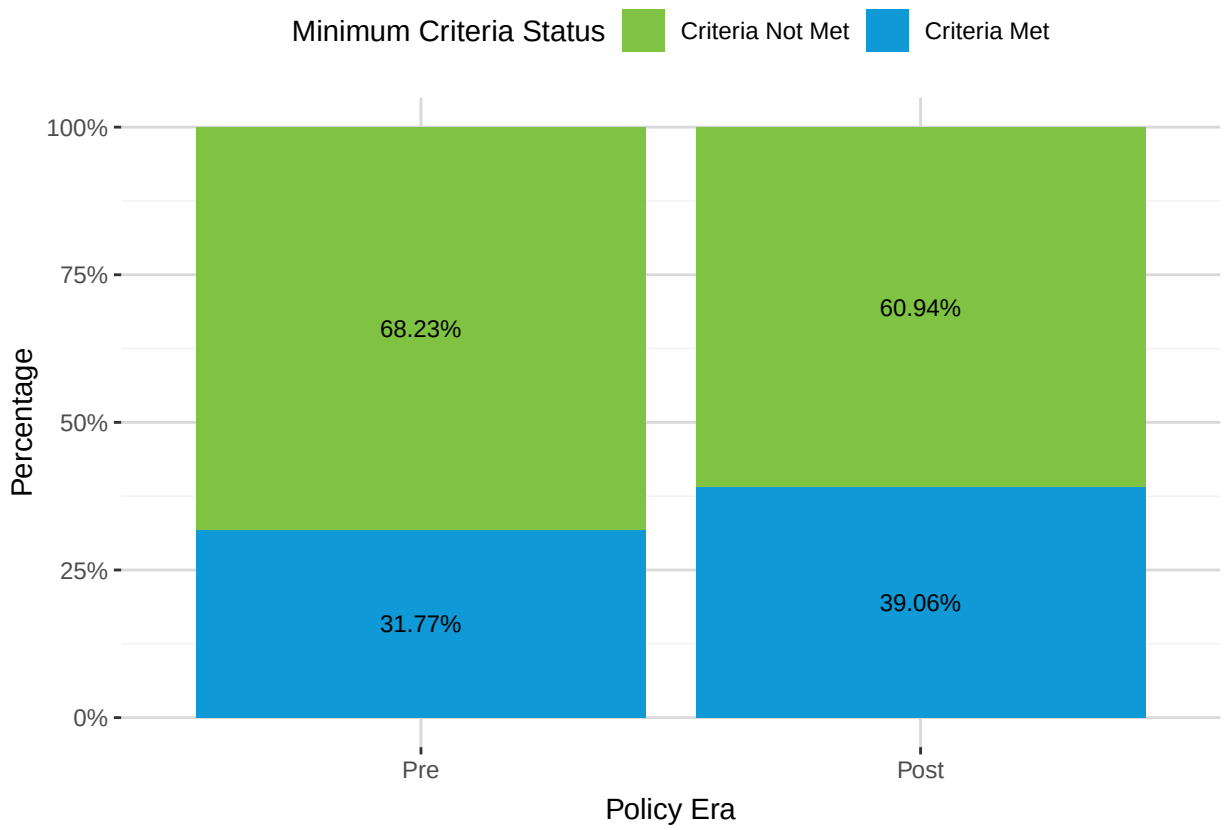


Table 4: Count and Percentage of Deceased Kidney Donors Recovered in United States by Minimum Criteria for Biopsy and Policy Era

Policy Era	Criteria Met	Criteria Not Met	Total
Pre	7,893 (31.77%)	16,953 (68.23%)	24,846 (100.00%)
Post	11,521 (39.06%)	17,972 (60.94%)	29,493 (100.00%)

Table 5 and **Figure 2** show the count and percentage of deceased kidney donors recovered by whether or not one kidney was biopsied as well as if the donor met the minimum criteria to be biopsied. The percentage of kidney donors who did not meet the the criteria and were biopsied decreased to 45.93% in the post-policy era from 50.99% in the pre-policy era. For donors that did meet the minimum criteria for biopsy, the percentage of donors being biopsied increased from 91.97% in the pre-policy era, to 96.82% in the post-policy era. The overall percentage of donors that were biopsied increased slightly from 64.01% in the pre-policy era to 65.81% in the post-policy era

Figure 2: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

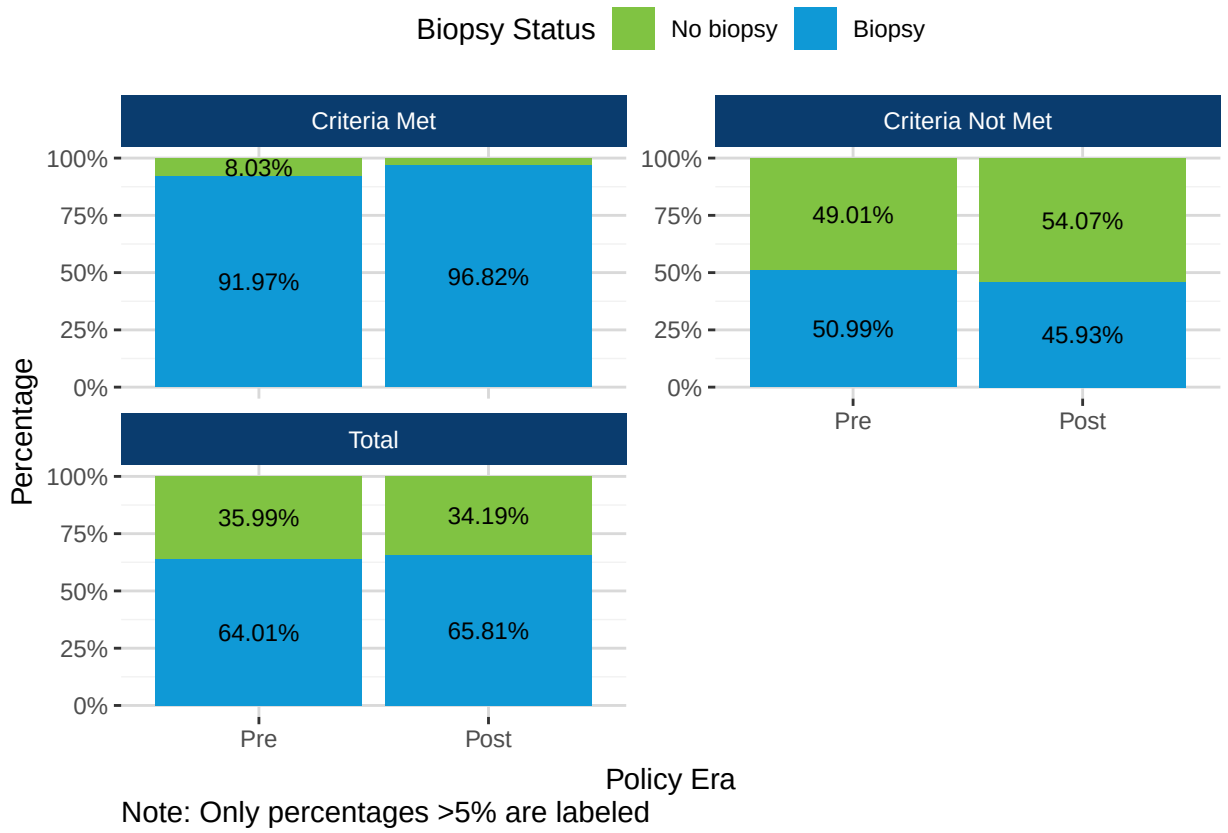


Table 5: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

	Pre-Policy			Post-Policy		
Meets Minumum Criteria	**Biopsied**	**Not Biopsied**	**Total**	**Biopsied**	**Not Biopsied**	**Total**
Yes	7259 (91.97%)	634 (8.03%)	7893 (100%)	11155 (96.82%)	366 (3.18%)	11521 (100%)
No	8645 (50.99%)	8308 (49.01%)	16953 (100%)	8254 (45.93%)	9718 (54.07%)	17972 (100%)
Total	15904 (64.01%)	8942 (35.99%)	24846 (100%)	19409 (65.81%)	10084 (34.19%)	29493 (100%)

Table 6 and **Figure 3** show the non-use rates for all deceased kidney donors recovered by policy era, biopsy status and if the minimum criteria for biopsy were met. For kidney donors that met the minimum criteria for biopsy, and were biopsied, there was little change in the non-use rate between policy eras, with the non-use rate of 53.67% in the pre-policy era and 55.18% in the post-policy era. Overall, for donors that did meet the minimum criteria for biopsy, there was an increase in non-use rate from 52.16% in the pre-policy era to 54.97% in the post-policy era.

Figure 3: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

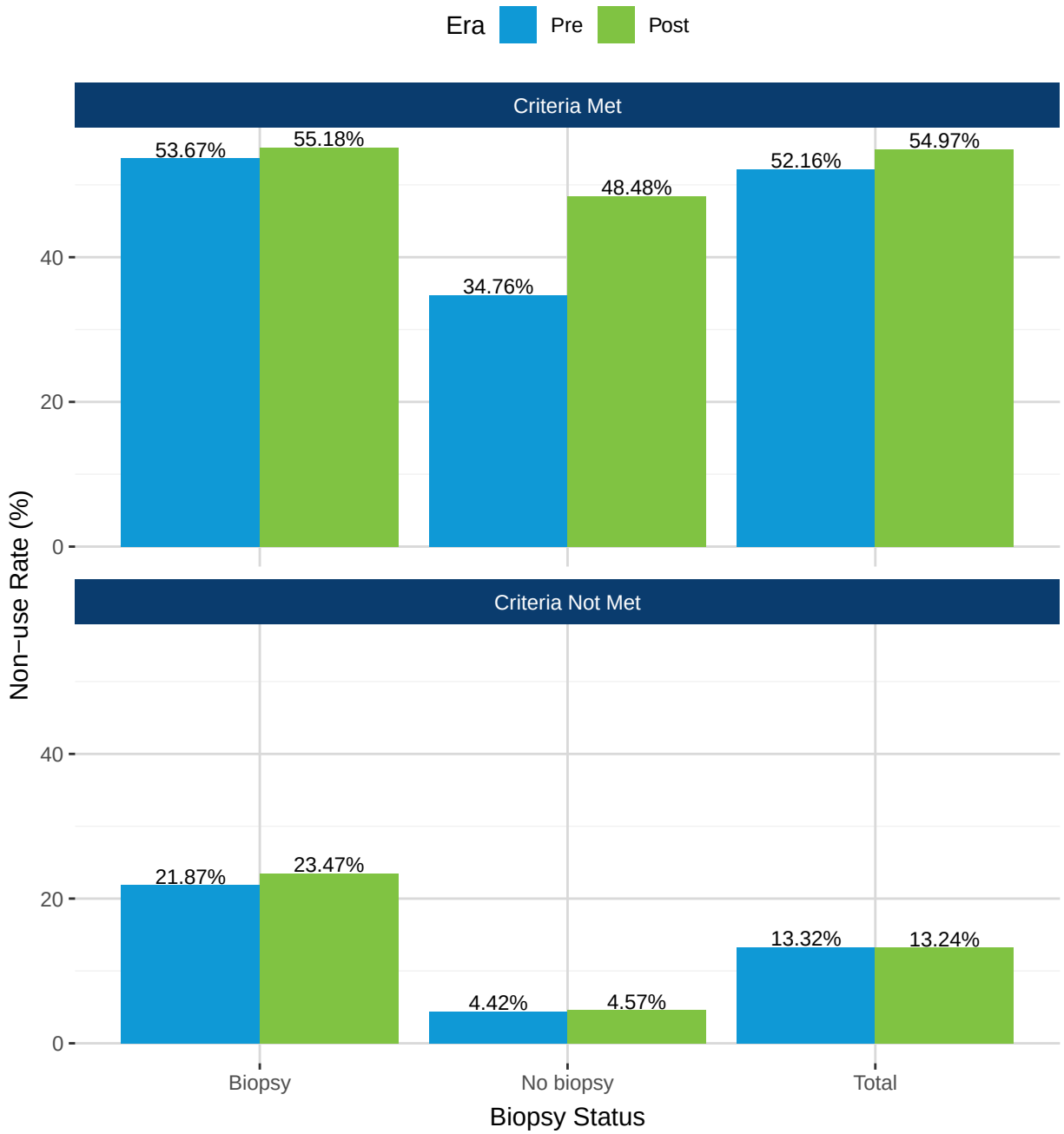


Table 6: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

Meets Minimum Criteria	Biopsy Status	Era	Kidneys Recovered for Transplant but Not Transplanted	Kidneys Recovered	Non-use Rate (%)
Yes	Biopsy	Pre	7,751	14,441	53.67
		Post	12,233	22,170	55.18
	No biopsy	Pre	438	1,260	34.76
		Post	350	722	48.48
	Total	Pre	8,189	15,701	52.16
		Post	12,583	22,892	54.97
No	Biopsy	Pre	3,763	17,205	21.87
		Post	3,855	16,422	23.47
	No biopsy	Pre	731	16,544	4.42
		Post	884	19,361	4.57
	Total	Pre	4,494	33,749	13.32
		Post	4,739	35,783	13.24

Table 7 and **Figure 4** show the utilization rates for all deceased donors recovered by policy era, biopsy status and if the minimum criteria for biopsy were met. For kidney donors that met the minimum criteria for biopsy and were biopsied, there was little change in utilization rate from 46.03% in the pre-policy era to 44.51% in the post-policy era. There was little to no change in utilization rate for donors who did not meet minimum criteria for biopsy and were not biopsied .

Figure 4: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

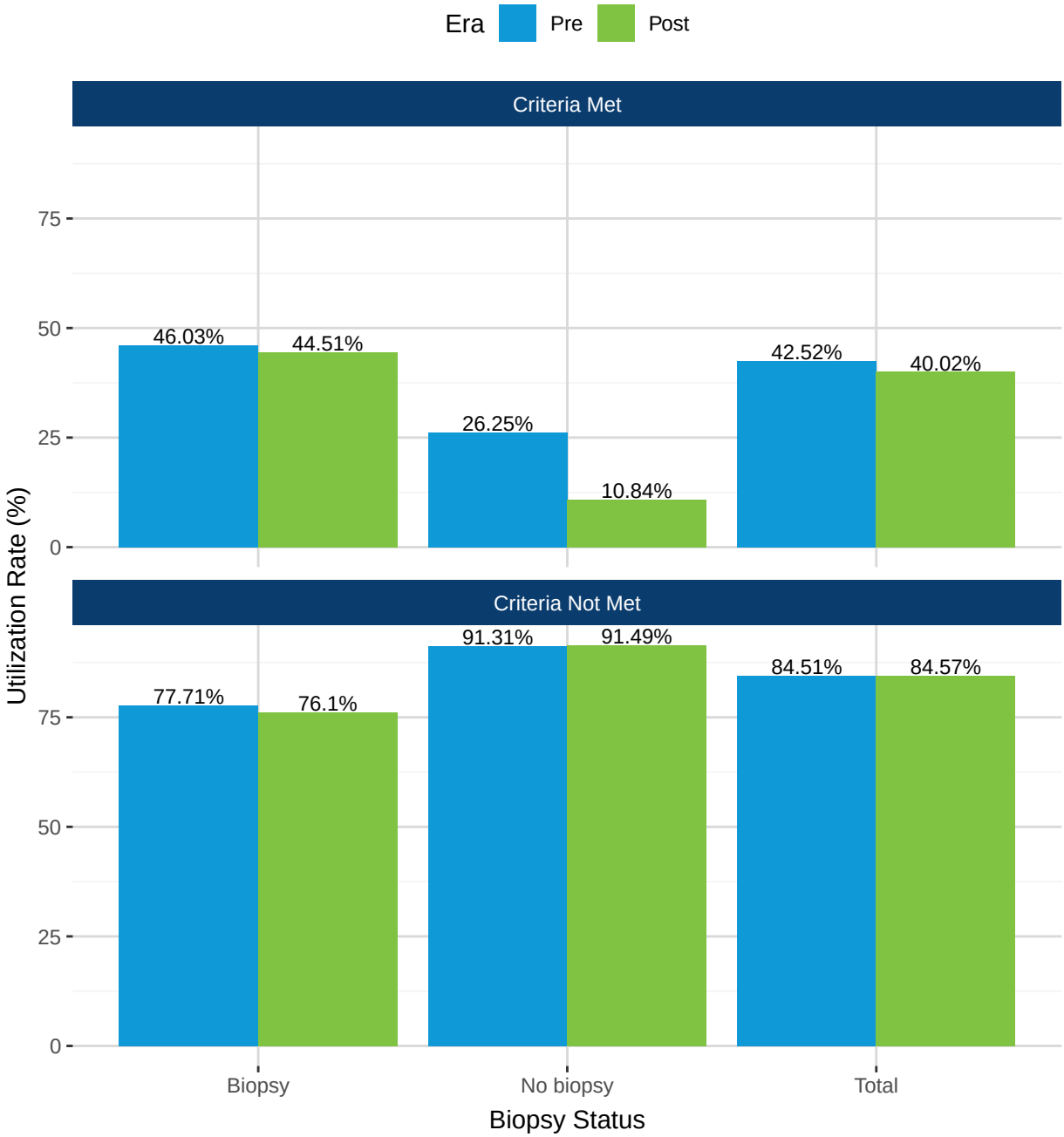


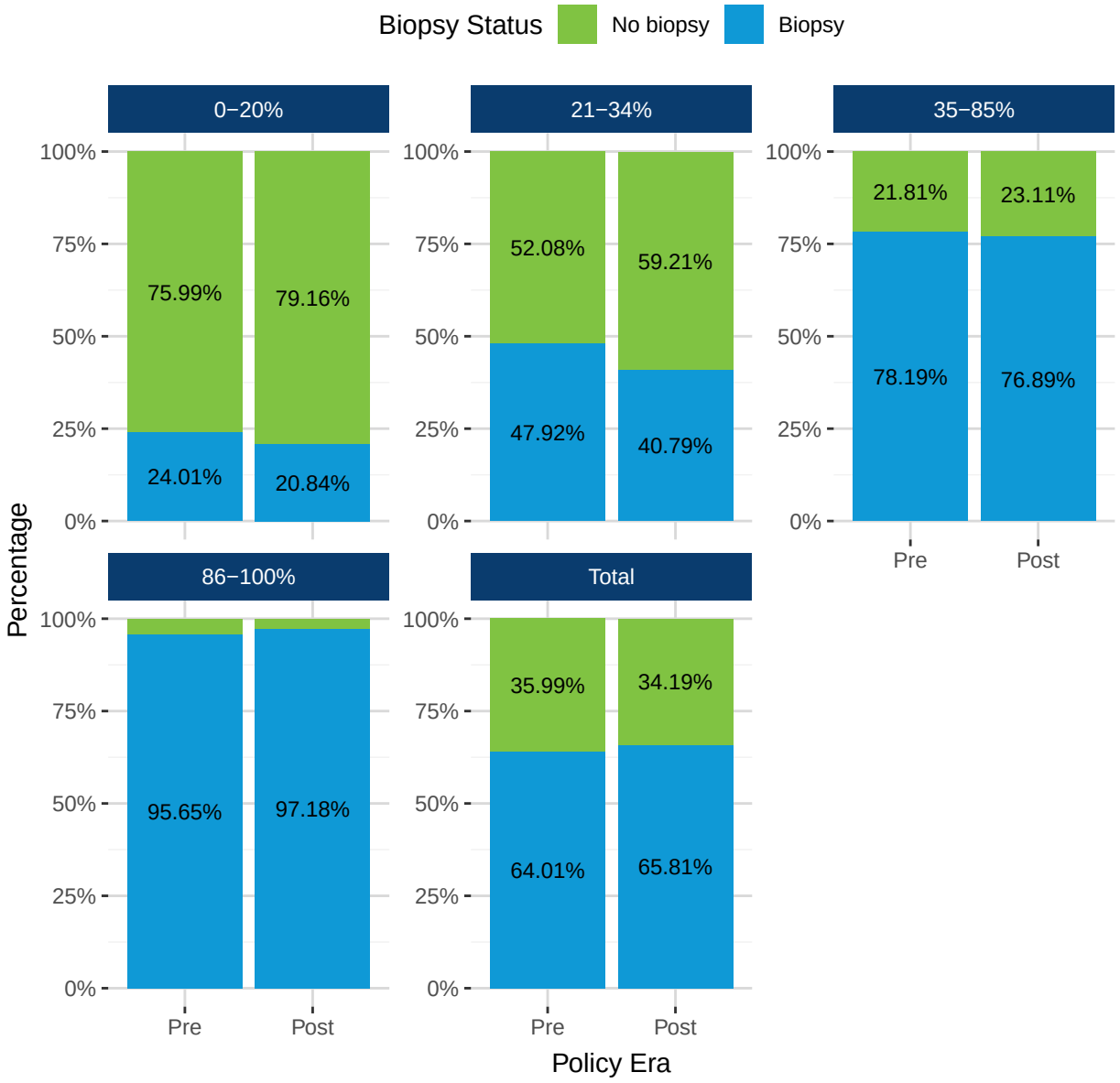
Table 7: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

Meets Minimum Criteria	Biopsy Status	Era	Kidneys Transplanted	Kidneys Available	Utilization Rate (%)
Yes	Biopsy	Pre	6,690	14,534	46.03
		Post	9,937	22,326	44.51
	No biopsy	Pre	822	3,132	26.25
		Post	372	3,432	10.84
	Total	Pre	7,512	17,666	42.52
		Post	10,309	25,758	40.02
No	Biopsy	Pre	13,442	17,298	77.71
		Post	12,567	16,514	76.10
	No biopsy	Pre	15,813	17,318	91.31
		Post	18,477	20,196	91.49
	Total	Pre	29,255	34,616	84.51
		Post	31,044	36,710	84.57

KDPI

Table 8 and **Figure 5** show the count and percentage of deceased kidney donors recovered in each policy era by whether or not a biopsy was performed as well as by donor KDPI. The percentage of donors being biopsied decreased for all KDPI groups except for 86-100% KDPI donors, as 95.65% were biopsied in the pre-policy era and this increased to 97.18% in the post-policy era. Although all donors with a KDPI greater than 85% meet the minimum criteria for biopsy, 2.82% of KDPI 86-100% donors in the post-policy era were not biopsied.

Figure 5: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI



Note: Only percentages >5% are labeled

Table 8: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

	Pre-Policy			Post-Policy		
Donor KDPI Group	**Biopsied**	**Not Biopsied**	**Total**	**Biopsied**	**Not Biopsied**	**Total**
0-20%	1297 (24.01%)	4106 (75.99%)	5403 (100%)	1081 (20.84%)	4106 (79.16%)	5187 (100%)
21-34%	1776 (47.92%)	1930 (52.08%)	3706 (100%)	1572 (40.79%)	2282 (59.21%)	3854 (100%)
35-85%	9949 (78.19%)	2775 (21.81%)	12724 (100%)	11822 (76.89%)	3553 (23.11%)	15375 (100%)
86-100%	2882 (95.65%)	131 (4.35%)	3013 (100%)	4934 (97.18%)	143 (2.82%)	5077 (100%)
Total	15904 (64.01%)	8942 (35.99%)	24846 (100%)	19409 (65.81%)	10084 (34.19%)	29493 (100%)

Table 9 and **Figure 6** show the non-use rates for all deceased kidney donors recovered by policy era, biopsy status and donor KDPI. For donors that were biopsied, the non-use rate increased for 35-85% group but was similar or decreased for the other KDPI groups.

Figure 6: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

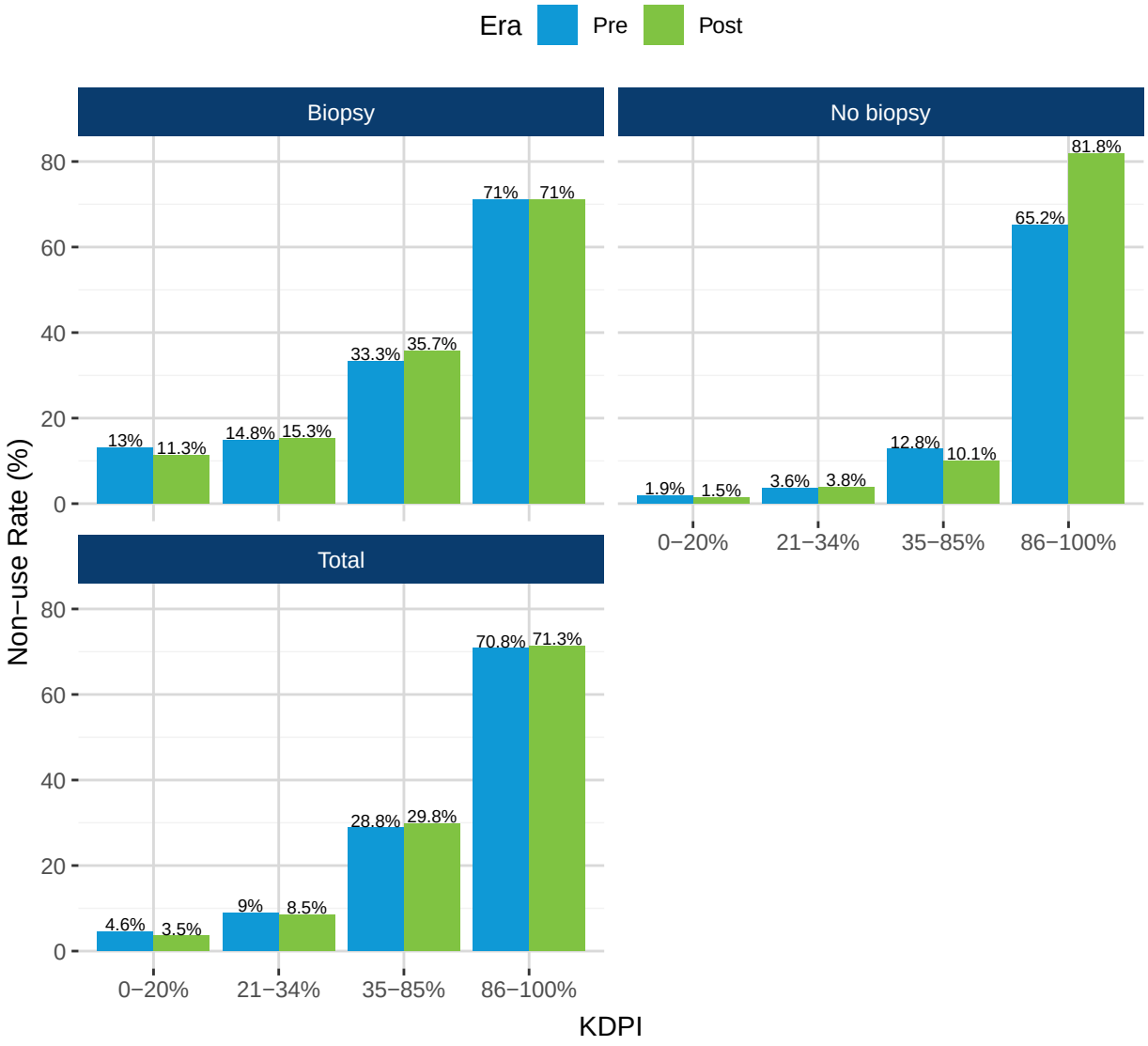


Table 9: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

Biopsy Status	KDPI	Era	Kidneys Recovered for Transplant but Not Transplanted	Kidneys Recovered	Non-use Rate (%)
Biopsy	0-20%	Pre	336	2,584	13.00
		Post	244	2,150	11.35
	21-34%	Pre	522	3,536	14.76
		Post	479	3,126	15.32
	35-85%	Pre	6,584	19,793	33.26
		Post	8,405	23,516	35.74
	86-100%	Pre	4,072	5,733	71.03
		Post	6,960	9,800	71.02
No biopsy	0-20%	Pre	155	8,175	1.90
		Post	121	8,190	1.48
	21-34%	Pre	140	3,847	3.64
		Post	171	4,549	3.76
	35-85%	Pre	705	5,523	12.76
		Post	712	7,063	10.08
	86-100%	Pre	169	259	65.25
		Post	230	281	81.85
Total	0-20%	Pre	491	10,759	4.56
		Post	365	10,340	3.53
	21-34%	Pre	662	7,383	8.97
		Post	650	7,675	8.47
	35-85%	Pre	7,289	25,316	28.79
		Post	9,117	30,579	29.81
	86-100%	Pre	4,241	5,992	70.78
		Post	7,190	10,081	71.32

Table 10 and **Figure 7** show utilization rates for all deceased donors recovered by policy era, biopsy status and donor KDPI. For donors that were biopsied, utilization decreased for the 35-85% group but was similar or increased for the other KDPI groups.

Figure 7: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

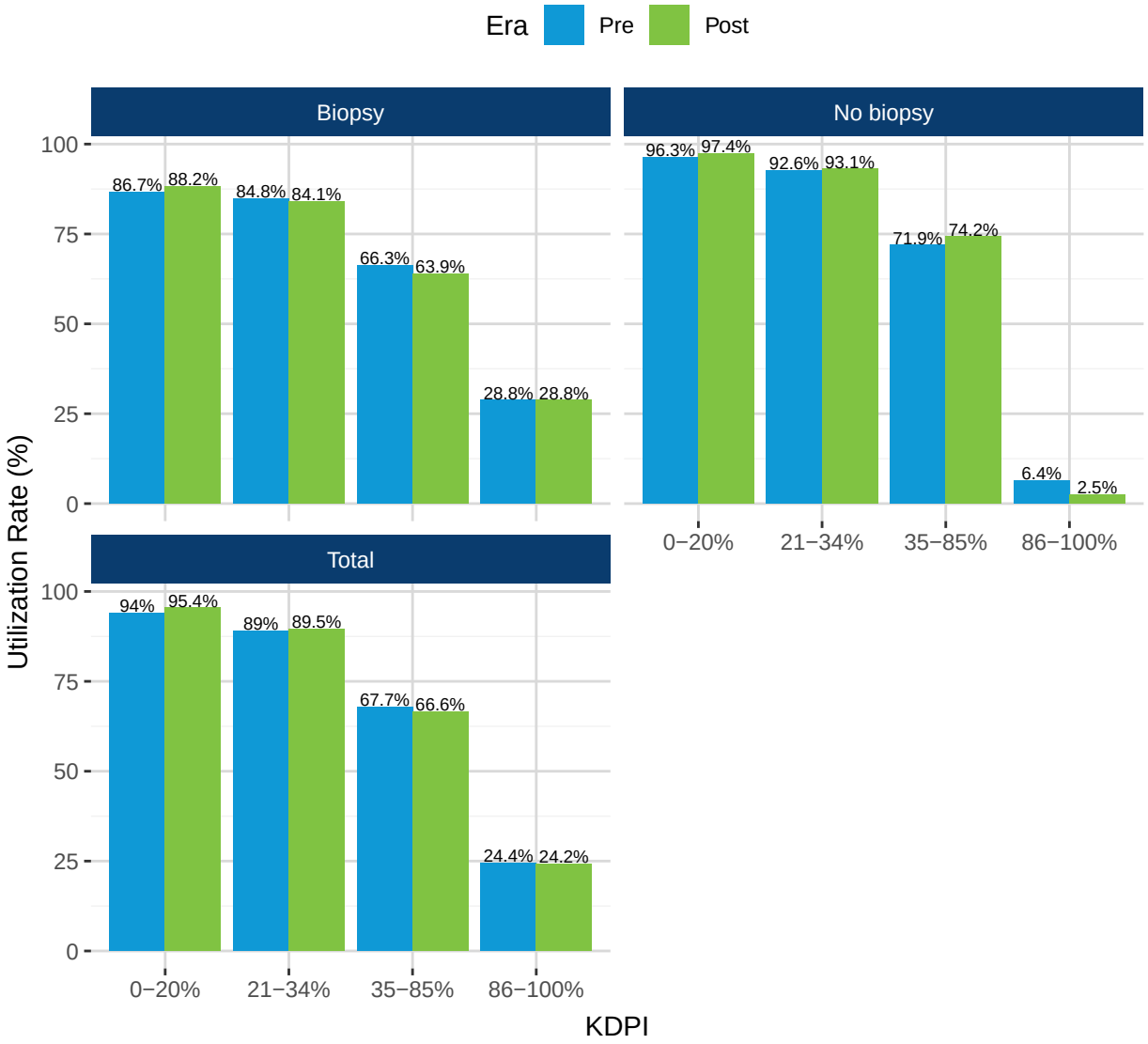


Table 10: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

Biopsy Status	KDPI	Era	Kidneys Transplanted	Kidneys Available	Utilization Rate (%)
Biopsy	0-20%	Pre	2,248	2,594	86.66
		Post	1,906	2,162	88.16
	21-34%	Pre	3,014	3,554	84.81
		Post	2,647	3,146	84.14
	35-85%	Pre	13,209	19,910	66.34
		Post	15,111	23,654	63.88
	86-100%	Pre	1,661	5,774	28.77
		Post	2,840	9,878	28.75
No biopsy	0-20%	Pre	8,020	8,332	96.26
		Post	8,069	8,288	97.36
	21-34%	Pre	3,707	4,002	92.63
		Post	4,378	4,704	93.07
	35-85%	Pre	4,818	6,702	71.89
		Post	6,351	8,554	74.25
	86-100%	Pre	90	1,414	6.36
		Post	51	2,082	2.45
Total	0-20%	Pre	10,268	10,926	93.98
		Post	9,975	10,450	95.45
	21-34%	Pre	6,721	7,556	88.95
		Post	7,025	7,850	89.49
	35-85%	Pre	18,027	26,612	67.74
		Post	21,462	32,208	66.64
	86-100%	Pre	1,751	7,188	24.36
		Post	2,891	11,960	24.17

Donor Age

Table 11 and **Figure 8** show the count and percentage of deceased kidney donors recovered in each policy era by whether or not a biopsy was performed as well as by donor age at time of recovery. Donors over the age of 60 years old meet the minimum criteria for biopsy, as well as donors aged 50-59 who have two of the following criteria; history of hypertension, manner of death was CVA, terminal creatinine greater or equal to 1.5 mg/dL. Notably, donors from all age groups except for 60+, were less likely to have a biopsy performed, with the largest decrease being seen in the 35-49 age group with the percentage of donors being biopsied decreasing from 60.48% in the pre-policy era to 55.9% in the post-policy era. Although all donors over the age of 60 meet minimum criteria for biopsy, 2.25% of donors 60 years old or older were not biopsied in the post-policy era.

Figure 8: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

Note: Only percentages >5% are labeled

Table 11: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

	Pre-Policy			Post-Policy		
Donor Age Group	**Biopsied**	**Not Biopsied**	**Total**	**Biopsied**	**Not Biopsied**	**Total**
18-34	2429 (34.42%)	4628 (65.58%)	7057 (100%)	2247 (31.99%)	4776 (68.01%)	7023 (100%)
35-49	4845 (60.48%)	3166 (39.52%)	8011 (100%)	5061 (55.9%)	3993 (44.1%)	9054 (100%)
50-59	4971 (84.28%)	927 (15.72%)	5898 (100%)	5901 (83.43%)	1172 (16.57%)	7073 (100%)
60+	3659 (94.3%)	221 (5.7%)	3880 (100%)	6200 (97.75%)	143 (2.25%)	6343 (100%)
Total	15904 (64.01%)	8942 (35.99%)	24846 (100%)	19409 (65.81%)	10084 (34.19%)	29493 (100%)

Table 12 and **Figure 9** show the non-use rates for all deceased kidney donors recovered by policy era, biopsy status and donor age at time of recovery. For donors that were biopsied, there was an increase in non-use rates for all donor age groups.

Figure 9: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

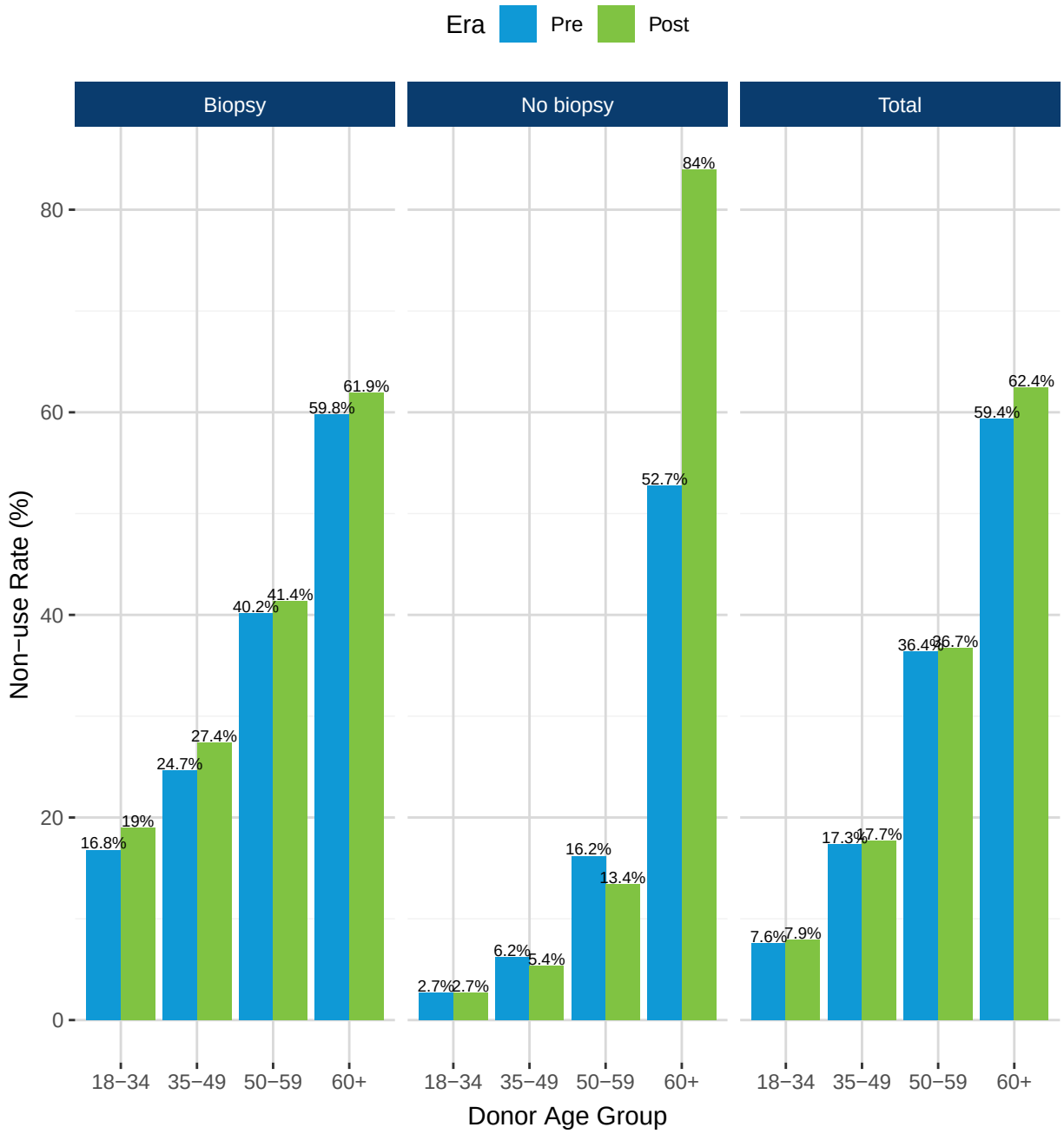


Table 12: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

Biopsy Status	Age Group	Era	Kidneys Recovered for Transplant but Not Transplanted	Kidneys Recovered	Non-use Rate (%)
Biopsy	18-34	Pre	812	4,833	16.80
		Post	848	4,473	18.96
	35-49	Pre	2,378	9,644	24.66
		Post	2,755	10,060	27.39
	50-59	Pre	3,971	9,887	40.16
		Post	4,855	11,741	41.35
	60+	Pre	4,353	7,282	59.78
		Post	7,630	12,318	61.94
No biopsy	18-34	Pre	249	9,204	2.71
		Post	257	9,521	2.70
	35-49	Pre	391	6,322	6.18
		Post	428	7,950	5.38
	50-59	Pre	298	1,840	16.20
		Post	313	2,331	13.43
	60+	Pre	231	438	52.74
		Post	236	281	83.99
Total	18-34	Pre	1,061	14,037	7.56
		Post	1,105	13,994	7.90
	35-49	Pre	2,769	15,966	17.34
		Post	3,183	18,010	17.67
	50-59	Pre	4,269	11,727	36.40
		Post	5,168	14,072	36.73
	60+	Pre	4,584	7,720	59.38
		Post	7,866	12,599	62.43

Table 13 and **Figure 10** show the utilization rates for all deceased donors recovered by policy era, biopsy status and donor age at time of recovery. For donors that were biopsied, there was a decrease in utilization rates for all donor age groups. For donors that were not biopsied, there was a decrease in utilization in the 60+ age group, with relatively little change in the others, except for the 50-59 age group, which increased from 63.09% to 65.22%

Figure 10: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

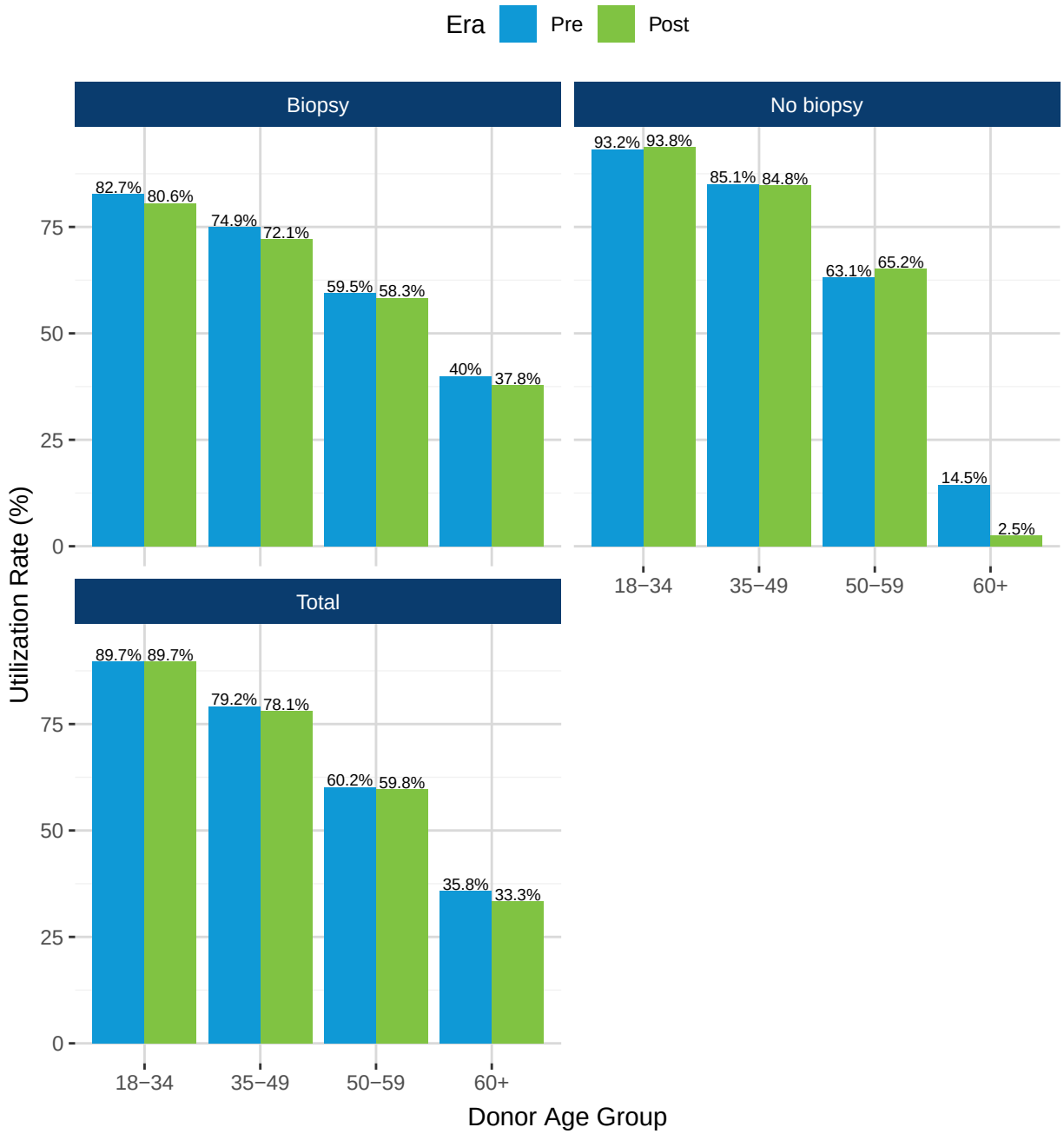


Table 13: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

Biopsy Status	Age Group	Era	Kidneys Transplanted	Kidneys Available	Utilization Rate (%)
Biopsy	18-34	Pre	4,021	4,862	82.70
		Post	3,625	4,498	80.59
	35-49	Pre	7,266	9,700	74.91
		Post	7,305	10,128	72.13
	50-59	Pre	5,916	9,942	59.51
		Post	6,886	11,804	58.34
	60+	Pre	2,929	7,328	39.97
		Post	4,688	12,410	37.78
No biopsy	18-34	Pre	8,955	9,604	93.24
		Post	9,264	9,872	93.84
	35-49	Pre	5,931	6,970	85.09
		Post	7,522	8,866	84.84
	50-59	Pre	1,542	2,444	63.09
		Post	2,018	3,094	65.22
	60+	Pre	207	1,432	14.46
		Post	45	1,796	2.51
Total	18-34	Pre	12,976	14,466	89.70
		Post	12,889	14,370	89.69
	35-49	Pre	13,197	16,670	79.17
		Post	14,827	18,994	78.06
	50-59	Pre	7,458	12,386	60.21
		Post	8,904	14,898	59.77
	60+	Pre	3,136	8,760	35.80
		Post	4,733	14,206	33.32

Recovering OPO

Figure 11 shows frequency of biopsy of deceased kidney donors recovered in each policy era by recovering OPO. In the post-policy era, 31 of the 56 OPOs biopsied donors more frequently than what was seen in the pre-policy era. This analysis is unadjusted, and does not take into account changing OPOs practices, such as the increased recovery of more medically complex donors over time.

Figure 11: Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Recovering OPO

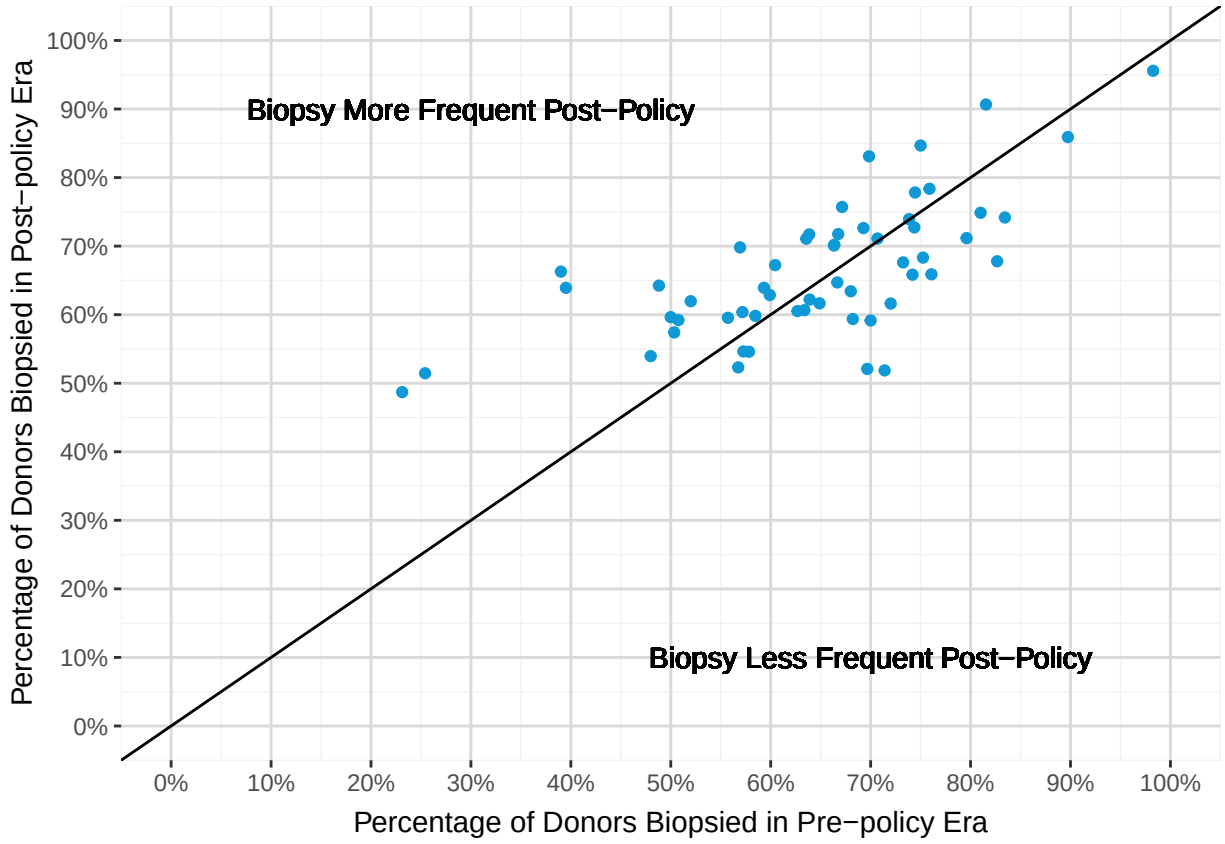


Table 14 shows the count and percentage of deceased kidney donors recovered in each policy era by whether or not a biopsy was performed as well as by recovering OPO.

Table 14: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Recovering OPO

	Pre-Policy			Post-Policy		
Recovering OPO	Biopsied	Not Biopsied	Total	Biopsied	Not Biopsied	Total
493 (48.81%)	1	517 (51.19%)	1010 (100%)	855 (64.24%)	476 (35.76%)	1331 (100%)
732 (60.45%)	2	479 (39.55%)	1211 (100%)	831 (67.23%)	405 (32.77%)	1236 (100%)
464 (56.93%)	3	351 (43.07%)	815 (100%)	754 (69.81%)	326 (30.19%)	1080 (100%)
514 (63.85%)	4	291 (36.15%)	805 (100%)	730 (71.71%)	288 (28.29%)	1018 (100%)
558 (79.6%)	5	143 (20.4%)	701 (100%)	696 (71.17%)	282 (28.83%)	978 (100%)
485 (63.9%)	6	274 (36.1%)	759 (100%)	594 (62.2%)	361 (37.8%)	955 (100%)
493 (59.33%)	7	338 (40.67%)	831 (100%)	606 (63.92%)	342 (36.08%)	948 (100%)
377 (52%)	8	348 (48%)	725 (100%)	549 (61.96%)	337 (38.04%)	886 (100%)
535 (69.66%)	9	233 (30.34%)	768 (100%)	461 (52.09%)	424 (47.91%)	885 (100%)
389 (69.84%)	10	168 (30.16%)	557 (100%)	698 (83.1%)	142 (16.9%)	840 (100%)
391 (56.75%)	11	298 (43.25%)	689 (100%)	430 (52.31%)	392 (47.69%)	822 (100%)
513 (68.22%)	12	239 (31.78%)	752 (100%)	466 (59.36%)	319 (40.64%)	785 (100%)
415 (69.28%)	13	184 (30.72%)	599 (100%)	560 (72.63%)	211 (27.37%)	771 (100%)
434 (74.44%)	14	149 (25.56%)	583 (100%)	600 (77.82%)	171 (22.18%)	771 (100%)
392 (75.24%)	15	129 (24.76%)	521 (100%)	453 (68.33%)	210 (31.67%)	663 (100%)
490 (76.09%)	16	154 (23.91%)	644 (100%)	423 (65.89%)	219 (34.11%)	642 (100%)
427 (71.4%)	17	171 (28.6%)	598 (100%)	333 (51.87%)	309 (48.13%)	642 (100%)
129 (23.12%)	18	429 (76.88%)	558 (100%)	302 (48.71%)	318 (51.29%)	620 (100%)
249 (66.76%)	19	124 (33.24%)	373 (100%)	404 (71.76%)	159 (28.24%)	563 (100%)
337 (72.01%)	20	131 (27.99%)	468 (100%)	342 (61.62%)	213 (38.38%)	555 (100%)
301 (63.37%)	21	174 (36.63%)	475 (100%)	333 (60.66%)	216 (39.34%)	549 (100%)
229 (57.83%)	22	167 (42.17%)	396 (100%)	291 (54.6%)	242 (45.4%)	533 (100%)
370 (68.01%)	23	174 (31.99%)	544 (100%)	338 (63.41%)	195 (36.59%)	533 (100%)
219 (50.34%)	24	216 (49.66%)	435 (100%)	306 (57.41%)	227 (42.59%)	533 (100%)
232 (50.77%)	25	225 (49.23%)	457 (100%)	302 (59.22%)	208 (40.78%)	510 (100%)
263 (57.17%)	26	197 (42.83%)	460 (100%)	297 (60.37%)	195 (39.63%)	492 (100%)
239 (63.56%)	27	137 (36.44%)	376 (100%)	349 (71.08%)	142 (28.92%)	491 (100%)
255 (64.89%)	28	138 (35.11%)	393 (100%)	299 (61.65%)	186 (38.35%)	485 (100%)
256 (57.27%)	29	191 (42.73%)	447 (100%)	265 (54.64%)	220 (45.36%)	485 (100%)
349 (81.54%)	30	79 (18.46%)	428 (100%)	437 (90.66%)	45 (9.34%)	482 (100%)
286 (82.66%)	31	60 (17.34%)	346 (100%)	322 (67.79%)	153 (32.21%)	475 (100%)
293 (73.25%)	32	107 (26.75%)	400 (100%)	305 (67.63%)	146 (32.37%)	451 (100%)
266 (59.91%)	33	178 (40.09%)	444 (100%)	281 (62.86%)	166 (37.14%)	447 (100%)
203 (47.99%)	34	220 (52.01%)	423 (100%)	239 (53.95%)	204 (46.05%)	443 (100%)
280 (89.74%)	35	32 (10.26%)	312 (100%)	323 (85.9%)	53 (14.1%)	376 (100%)
273 (81.01%)	36	64 (18.99%)	337 (100%)	271 (74.86%)	91 (25.14%)	362 (100%)
176 (58.47%)	37	125 (41.53%)	301 (100%)	213 (59.83%)	143 (40.17%)	356 (100%)
197 (66.33%)	38	100 (33.67%)	297 (100%)	239 (70.09%)	102 (29.91%)	341 (100%)
341 (98.27%)	39	6 (1.73%)	347 (100%)	324 (95.58%)	15 (4.42%)	339 (100%)
144 (50%)	40	144 (50%)	288 (100%)	198 (59.64%)	134 (40.36%)	332 (100%)

(continued)

Recovering OPO	Biopsied	Not Biopsied	Total	Biopsied	Not Biopsied	Total
141 (67.14%)	41	69 (32.86%)	210 (100%)	240 (75.71%)	77 (24.29%)	317 (100%)
173 (62.68%)	42	103 (37.32%)	276 (100%)	187 (60.52%)	122 (39.48%)	309 (100%)
193 (70.7%)	43	80 (29.3%)	273 (100%)	219 (71.1%)	89 (28.9%)	308 (100%)
238 (74.38%)	44	82 (25.62%)	320 (100%)	208 (72.73%)	78 (27.27%)	286 (100%)
129 (75%)	45	43 (25%)	172 (100%)	210 (84.68%)	38 (15.32%)	248 (100%)
192 (75.89%)	46	61 (24.11%)	253 (100%)	192 (78.37%)	53 (21.63%)	245 (100%)
46 (25.41%)	47	135 (74.59%)	181 (100%)	124 (51.45%)	117 (48.55%)	241 (100%)
126 (70%)	48	54 (30%)	180 (100%)	139 (59.15%)	96 (40.85%)	235 (100%)
112 (55.72%)	49	89 (44.28%)	201 (100%)	131 (59.55%)	89 (40.45%)	220 (100%)
64 (39.51%)	50	98 (60.49%)	162 (100%)	124 (63.92%)	70 (36.08%)	194 (100%)
96 (73.85%)	51	34 (26.15%)	130 (100%)	139 (73.94%)	49 (26.06%)	188 (100%)
55 (39.01%)	52	86 (60.99%)	141 (100%)	114 (66.28%)	58 (33.72%)	172 (100%)
136 (83.44%)	53	27 (16.56%)	163 (100%)	112 (74.17%)	39 (25.83%)	151 (100%)
75 (66.37%)	54	38 (33.63%)	113 (100%)	106 (70.2%)	45 (29.8%)	151 (100%)
69 (74.19%)	55	24 (25.81%)	93 (100%)	79 (65.83%)	41 (34.17%)	120 (100%)
70 (66.67%)	56	35 (33.33%)	105 (100%)	66 (64.71%)	36 (35.29%)	102 (100%)

Figure 12 shows the unadjusted non-use rates for all deceased kidney donors recovered by policy era and recovering OPO, for donors that were biopsied. The non-use rates for donors who were biopsied, increased in 43 of the 56 recovering OPOs.

Figure 12: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO, for Biopsied Donors

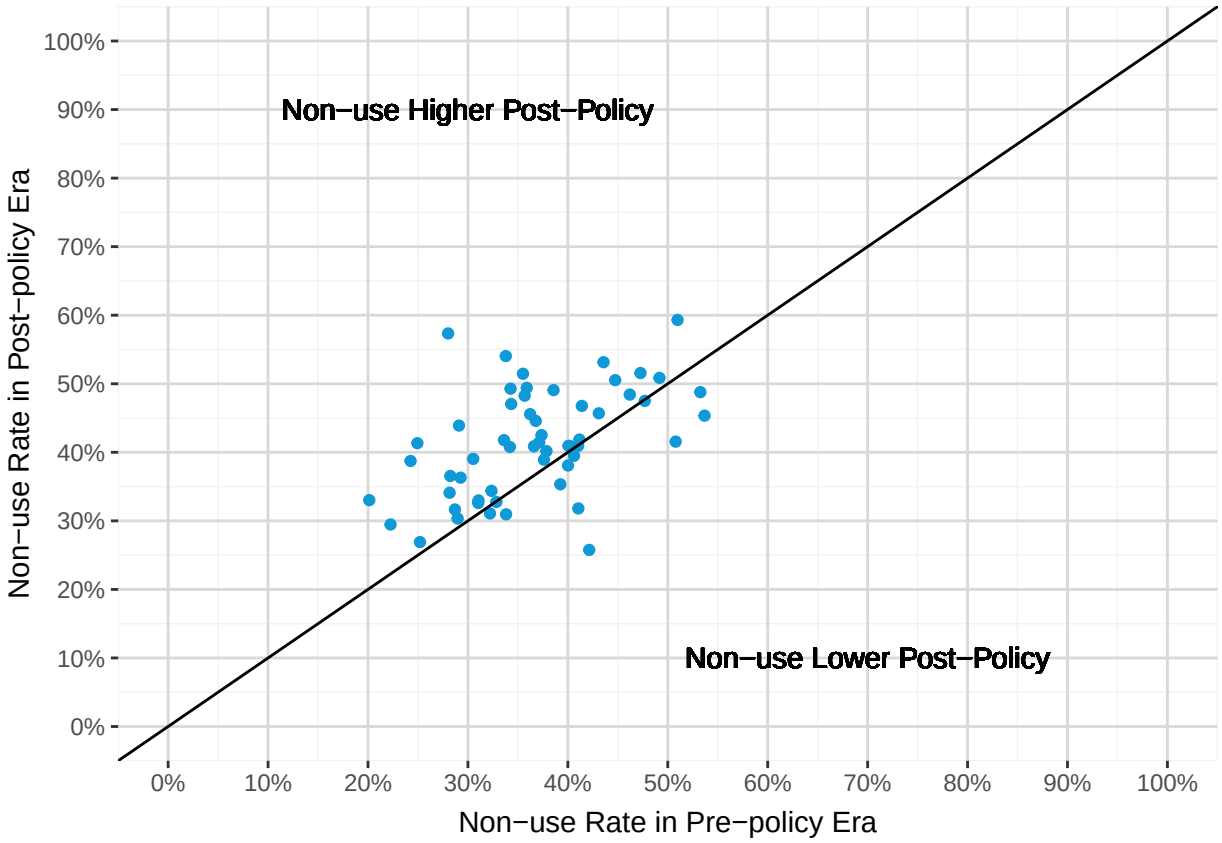
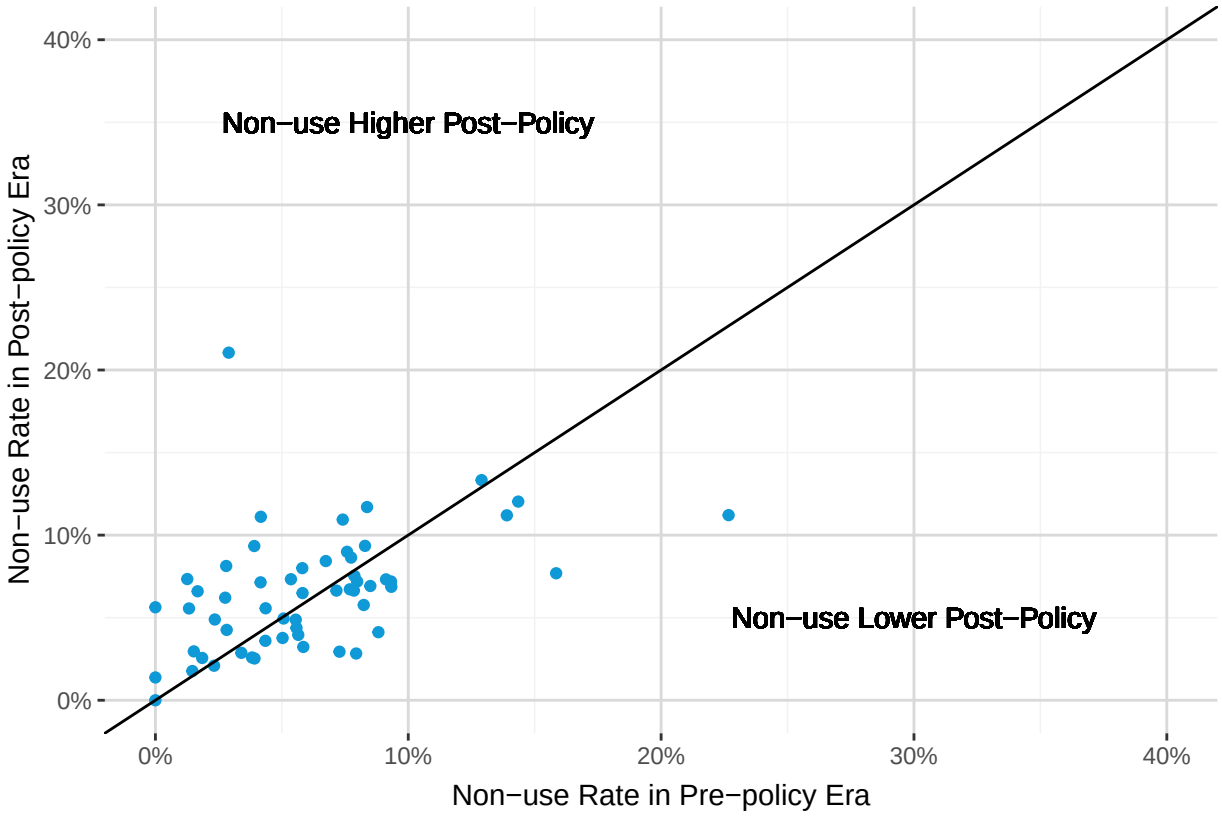


Figure 13 shows the unadjusted non-use rates for all deceased kidney donors recovered by policy era and recovering OPO, for donors that were not biopsied. For donors who were not biopsied a total of 27 recovering OPOs saw an increase in non-use rate.

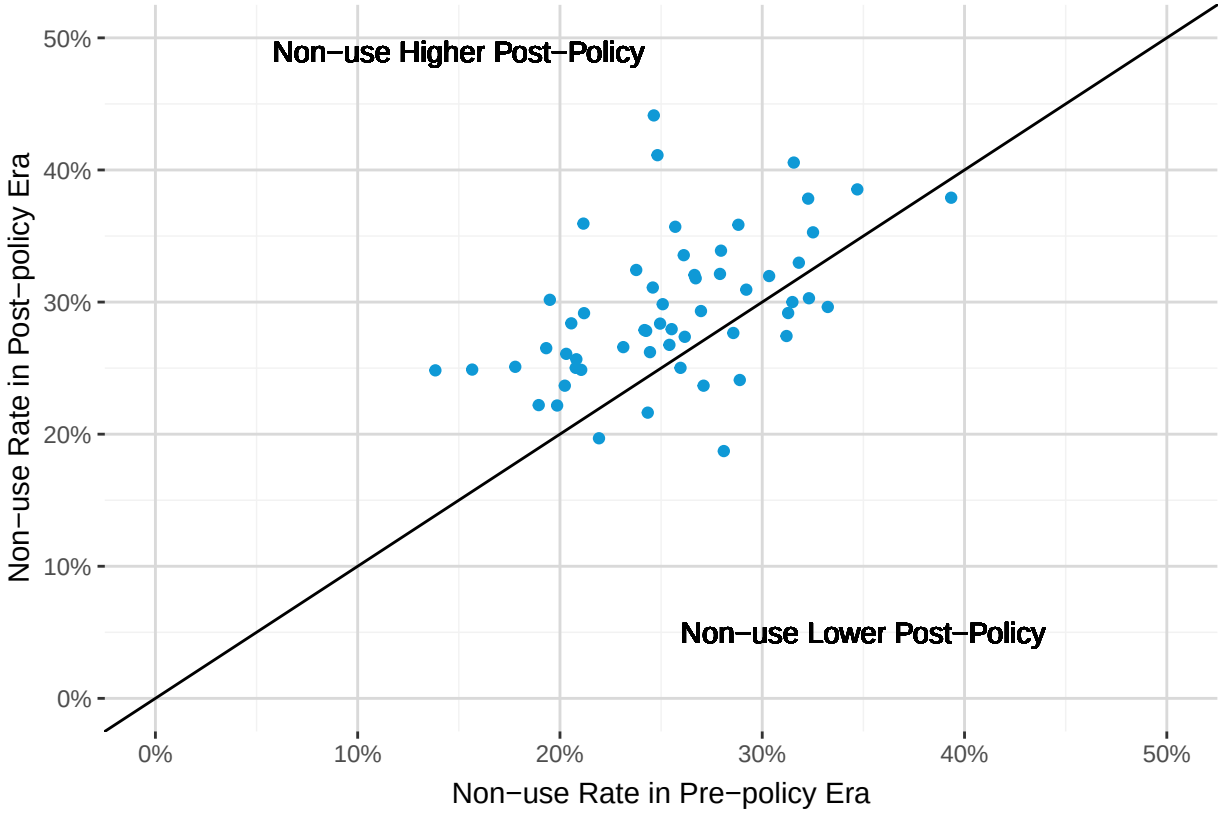
Figure 13: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO, for No Biopsy Donors



Note: The axes for this plot end at 40%

Figure 14 shows the unadjusted non-use rates for all deceased kidney donors recovered by policy era and recovering OPO. A total of 43 recovering OPOs saw an increase in non-use rate overall.

Figure 14: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO



Note: The axes for this plot end at 50%

Figure 15 shows the utilization rates for all deceased donors recovered by policy era and recovering OPO, for donors who were biopsied. The utilization rates for donors who were biopsied, decreased in 44 of the 56 recovering OPOs.

Figure 15: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era and Recovering OPO, for Biopsied Donors

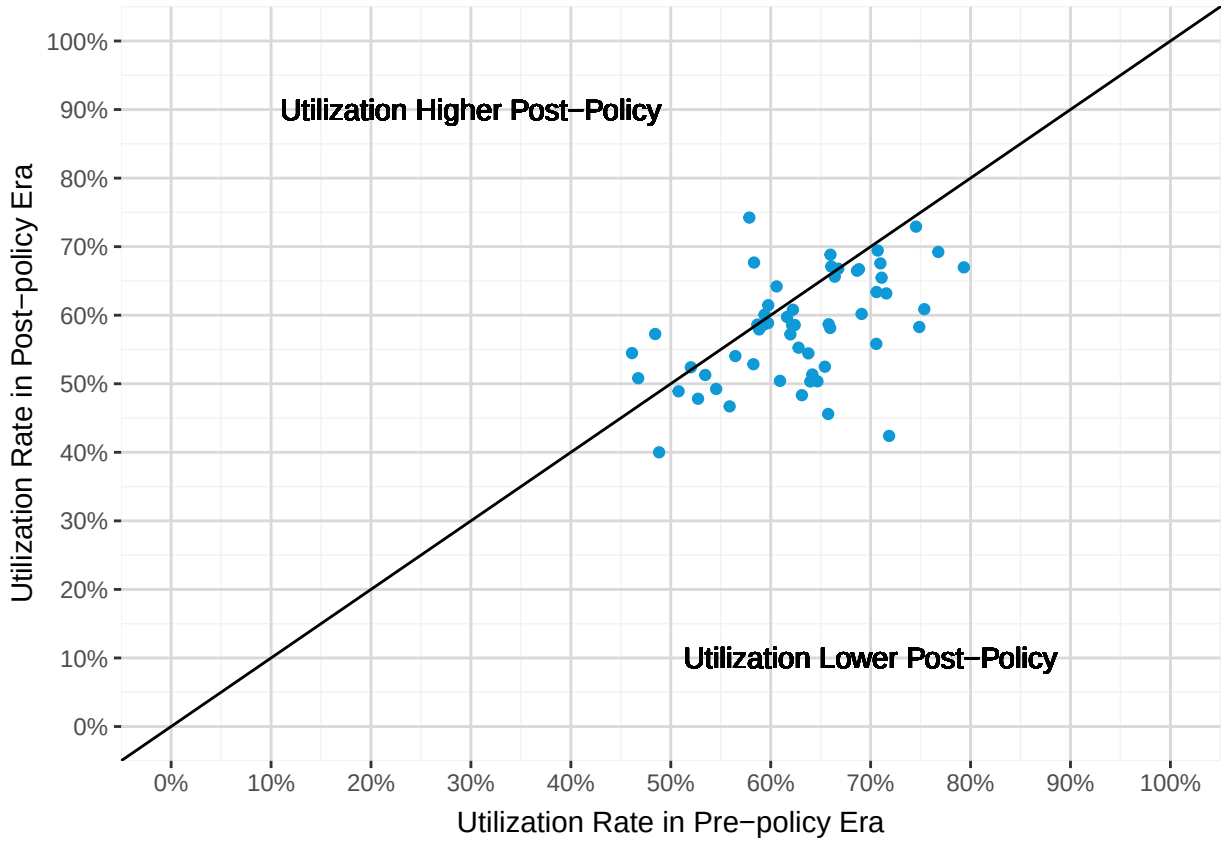
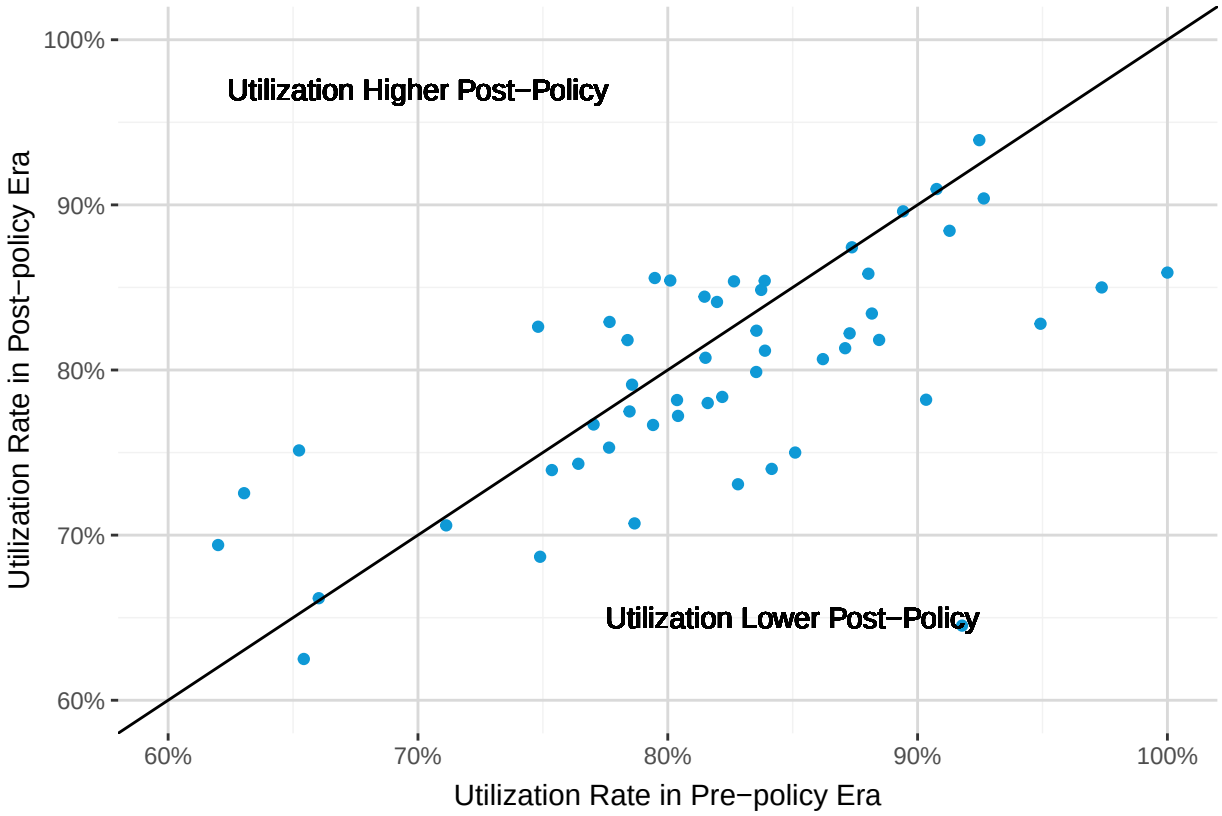


Figure 16 shows the utilization rates for all deceased donors recovered by policy era and recovering OPO, for donors who were not biopsied. For donors who were not biopsied a total of 35 recovering OPOs saw a decrease in utilization rate.

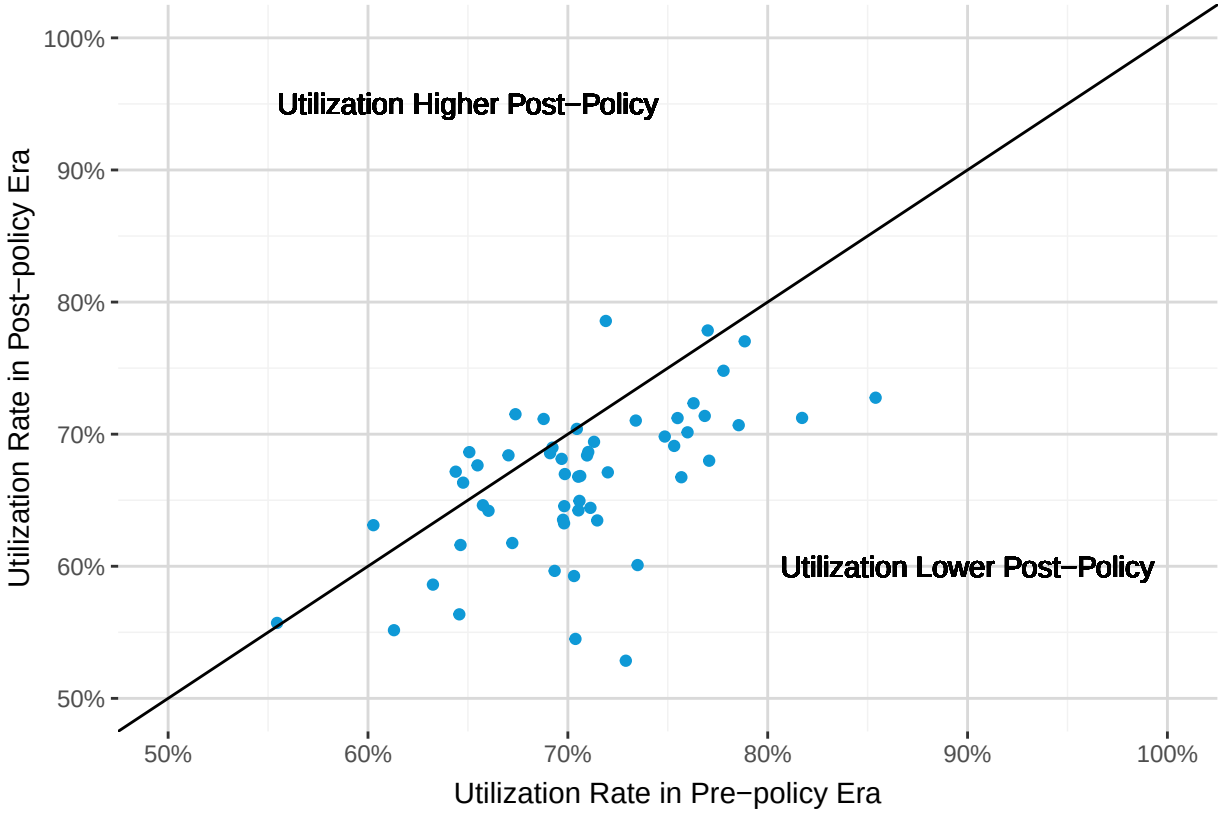
Figure 16: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era and Recovering OPO, for No Biopsy Donors



Note: The axes for this plot start at 60%

Figure 17 shows the utilization rates for all deceased donors recovered by policy era and recovering OPO. A total of 44 recovering OPOs saw a decrease in utilization rate overall.

Figure 17: Utilization Rates for Adult Deceased Donors Recovered in United States by Policy Era and Recovering OPO



Note: The axes for this plot start at 50%

Conclusion

Overall, in the post-policy era there was an increase in the number of adult deceased kidney donors recovered to 29,493 compared to 24,846 donors in the pre-policy era. There was a slight increase in the non-use rate overall, increasing to 29.52% in the post-policy era, from 25.65% in the pre-policy era. The percentage of donors being biopsied stayed similar between the pre- and post-policy era, at 64.01% and 65.81% respectively. Biopsies for donors who met the minimum criteria for biopsy increased from 91.97% in the pre-policy era to 96.82% in the post-policy era. There also was a decrease in the percentage of donors who did not meet the minimum criteria for biopsy and were biopsied, from 50.99% in the pre-policy era to 45.93% in the post-policy era. For donors who met the minimum criteria for biopsy and also were biopsied, non-use rates stayed relatively the same, going from 53.67% to 55.18% between the two eras. For donors who met the minimum criteria and were not biopsied there was an increase in non-use rate in the post-policy era, going from 34.76% to 48.48%. For donors who did not meet the minimum criteria for biopsy and still were biopsied their non-use rates increased from 21.87% to 23.47% across the policy era. Little to no change was seen in the non-use rates for donors who did not meet the minimum criteria for biopsy and were not biopsied, from 4.42% to 4.57%. It is important to note that this analysis is an unadjusted analysis, and therefore does not take into account changes in characteristics of donors procured between the two policy periods.

From the analysis presented it can be seen that there has not been a substantial increase in the percentage of donors being biopsied after the policy change. The percentage of donors being biopsied overall has stayed similar between the two policy eras, although there were small shifts in the types of donors that are being biopsied. It does appear that although non-use rates seem to be increasing overall, there have been shifts in the type of donors being recovered as well as being biopsied, suggesting there is not sufficient evidence to point to biopsying alone as the driver of increasing non-use rates.

Appendix

Biopsy Status

Table A1 and **Figure A1** show the percentage of transplants by delayed graft function and donor biopsy status. Overall, there was little change in delayed graft function percentages, with slight increases being seen for organs coming from donors that were biopsied, increasing from 39.09% in the pre-policy era to 40.84% in the post-policy era.

Figure A1: Count and Percentage of Transplants by Delayed Graft Function Status and Donor Biopsy Status

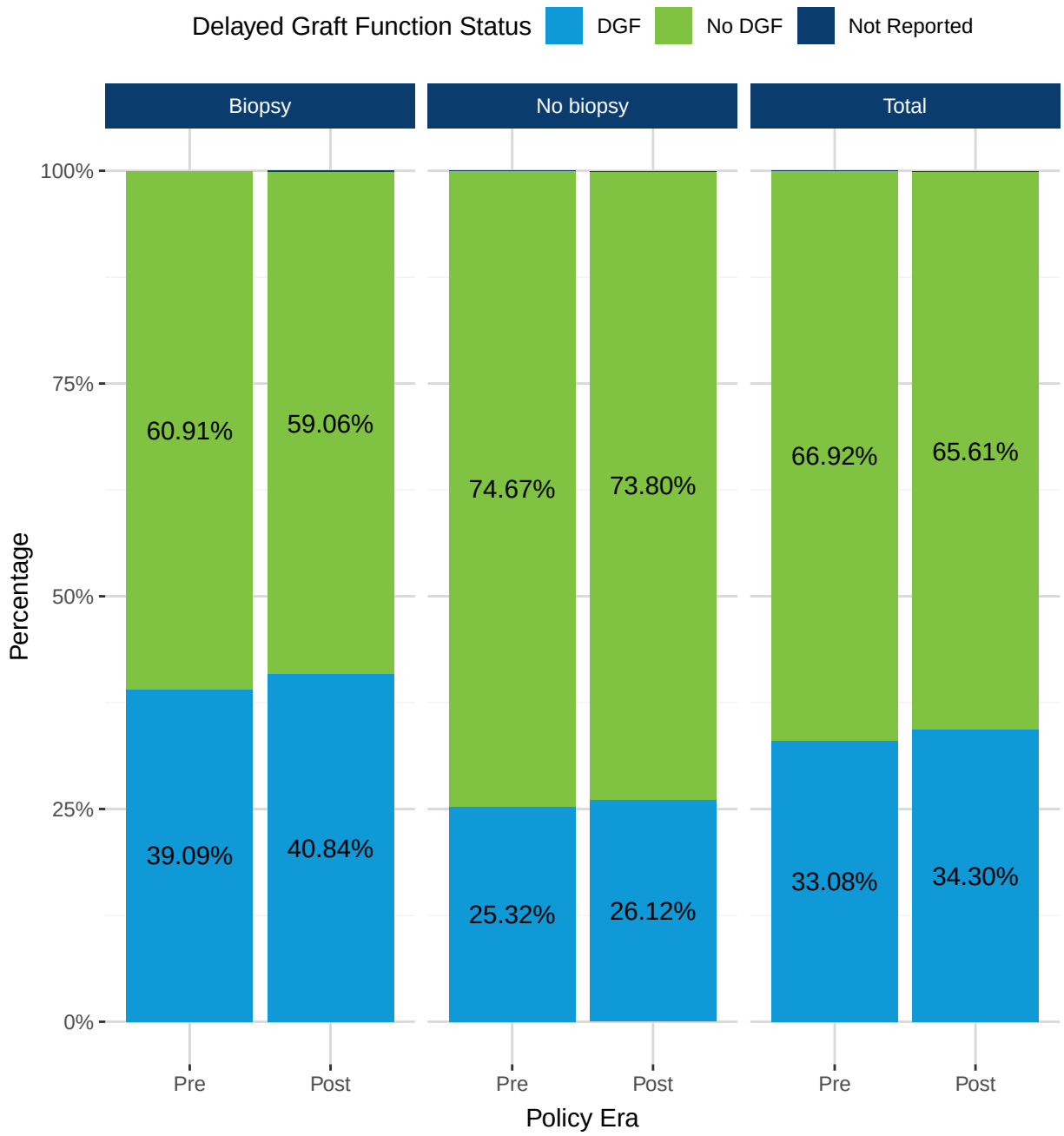


Table A1: Percentage of Transplants by Delayed Graft Function Status and Donor Biopsy Status

Biopsy Status	Era	DGF	No DGF	Not Reported	Total
Biopsy	Pre	7,740 (39.09%)	12,060 (60.91%)	0 (0.00%)	19,800 (100.00%)
	Post	9,023 (40.84%)	13,050 (59.06%)	23 (0.10%)	22,096 (100.00%)
No biopsy	Pre	3,888 (25.32%)	11,466 (74.67%)	1 (0.01%)	15,355 (100.00%)
	Post	4,612 (26.12%)	13,030 (73.80%)	14 (0.08%)	17,656 (100.00%)
Total	Pre	11,628 (33.08%)	23,526 (66.92%)	1 (0.00%)	35,155 (100.00%)
	Post	13,635 (34.30%)	26,080 (65.61%)	37 (0.09%)	39,752 (100.00%)

Figure A2 and **Table A2** show one year unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 05, 2020 to September 05, 2023 by donor biopsy status. One year graft survival improved for both reciepients of biopsied kidneys and kidneys that were not biopsied.

Figure A2: One Year Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 05, 2020 - September 05, 2023 by Donor Biopsy Status

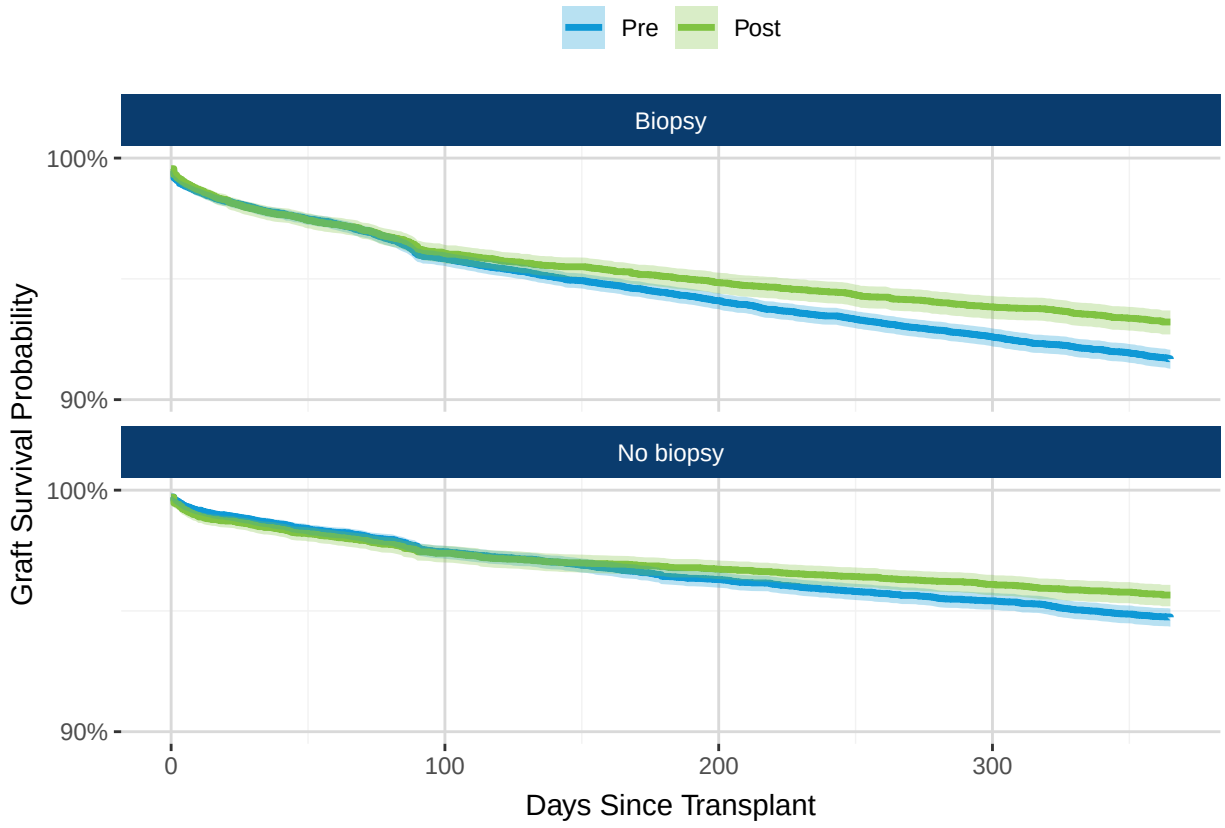


Table A2: One Year Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 05, 2020 - September 05, 2023 by Donor Biopsy Status

Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
Biopsy	Pre	19225	1596	17406	91.7	(91.3, 92.1)
	Post	10041	672	6173	93.2	(92.7, 93.7)
No biopsy	Pre	13739	721	12847	94.7	(94.4, 95.1)
	Post	8299	354	5165	95.7	(95.2, 96.1)

Minimum Criteria for Biopsy

Table A3 and **Figure A3** show the percentage of transplants by delayed graft function status and donor biopsy status and minimum criteria for biopsy. Overall, there was little change in percentage of delayed graft function except for organs from donors who were not biopsied but did meet the minimum criteria for biopsy, decreasing from 36.36% to 31.89% in the post-policy era.

Figure A3: Count and Percentage of Transplants by Delayed Graft Function Status, Donor Biopsy Status and Minimum Criteria for Biopsy

Table A3: Percentage of Transplants by Delayed Graft Function Status, Donor Biopsy Status and Minimum Criteria for Biopsy

Meets Minimum Criteria	Biopsy Status	Era	DGF	No DGF	Not Reported	Total
Criteria Met	Biopsy	Pre	2,518 (38.55%)	4,014 (61.45%)	0 (0.00%)	6,532 (100.00%)
		Post	3,777 (38.95%)	5,910 (60.95%)	9 (0.09%)	9,696 (100.00%)
	No biopsy	Pre	296 (36.36%)	518 (63.64%)	0 (0.00%)	814 (100.00%)
		Post	118 (31.89%)	252 (68.11%)	0 (0.00%)	370 (100.00%)
Criteria Not Met	Biopsy	Pre	5,222 (39.36%)	8,046 (60.64%)	0 (0.00%)	13,268 (100.00%)
		Post	5,246 (42.31%)	7,140 (57.58%)	14 (0.11%)	12,400 (100.00%)
	No biopsy	Pre	3,592 (24.70%)	10,948 (75.29%)	1 (0.01%)	14,541 (100.00%)
		Post	4,494 (26.00%)	12,778 (73.92%)	14 (0.08%)	17,286 (100.00%)

Figure A4 and **Table A4** show one year unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 05, 2020 to September 05, 2023 by donor biopsy status and minimum criteria for biopsy. Graft survival improved for recipients of biopsied kidneys, irrespective of whether the minimum criteria for biopsy was met.

Figure A4: One Year Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 05, 2020 - September 05, 2023 by Donor Biopsy Status and Minimum Criteria for Biopsy

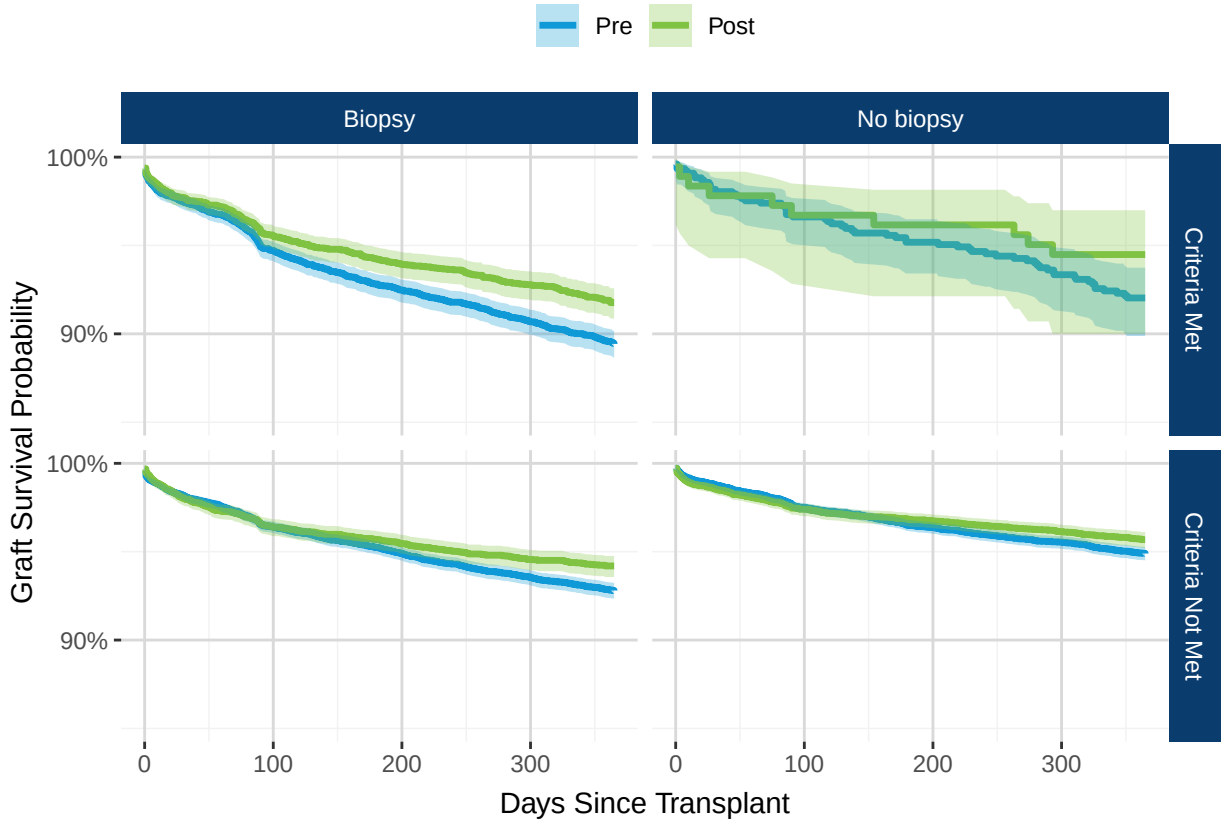


Table A4: One Year Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 05, 2020 - September 05, 2023 by Donor Biopsy Status and Minimum Criteria for Biopsy

Meets Minimum Criteria	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
Criteria Met	Biopsy	Pre	6400	675	5658	89.4	(88.7, 90.2)
		Post	4053	328	2453	91.8	(90.9, 92.6)
	No biopsy	Pre	769	61	692	92	(89.9, 93.7)
		Post	183	10	104	94.5	(90.0, 97.0)
Criteria Not Met	Biopsy	Pre	12825	921	11748	92.8	(92.3, 93.2)
		Post	5988	344	3720	94.2	(93.6, 94.8)
	No biopsy	Pre	12970	660	12155	94.9	(94.5, 95.3)
		Post	8116	344	5061	95.7	(95.2, 96.1)

KDPI

Table A5 and **Figure A5** show the percentage of transplants by delayed graft function, donor biopsy status and donor KDPI group. Overall, there was little change in rates of delayed graft function except for two subsets of recipient organs. Organs from donors who were biopsied and had a KDPI of 0-20% saw DGF increase from 32.31% to 37.19% in the post-policy era. An increase in DGF was also seen for organs from donors who were biopsied and had a KDPI of 21-35%, from 37.26% to 41.52% in the post-policy era. There was a decrease in rate of DGF for organs coming from donors who were not biopsied and had a KDPI of 21-34%, with DGF decreasing from 27.24% to 26.06% in the post-policy era.

Figure A5: Count and Percentage of Transplants by Delayed Graft Function status, Donor Biopsy Status and Donor KDPI Group

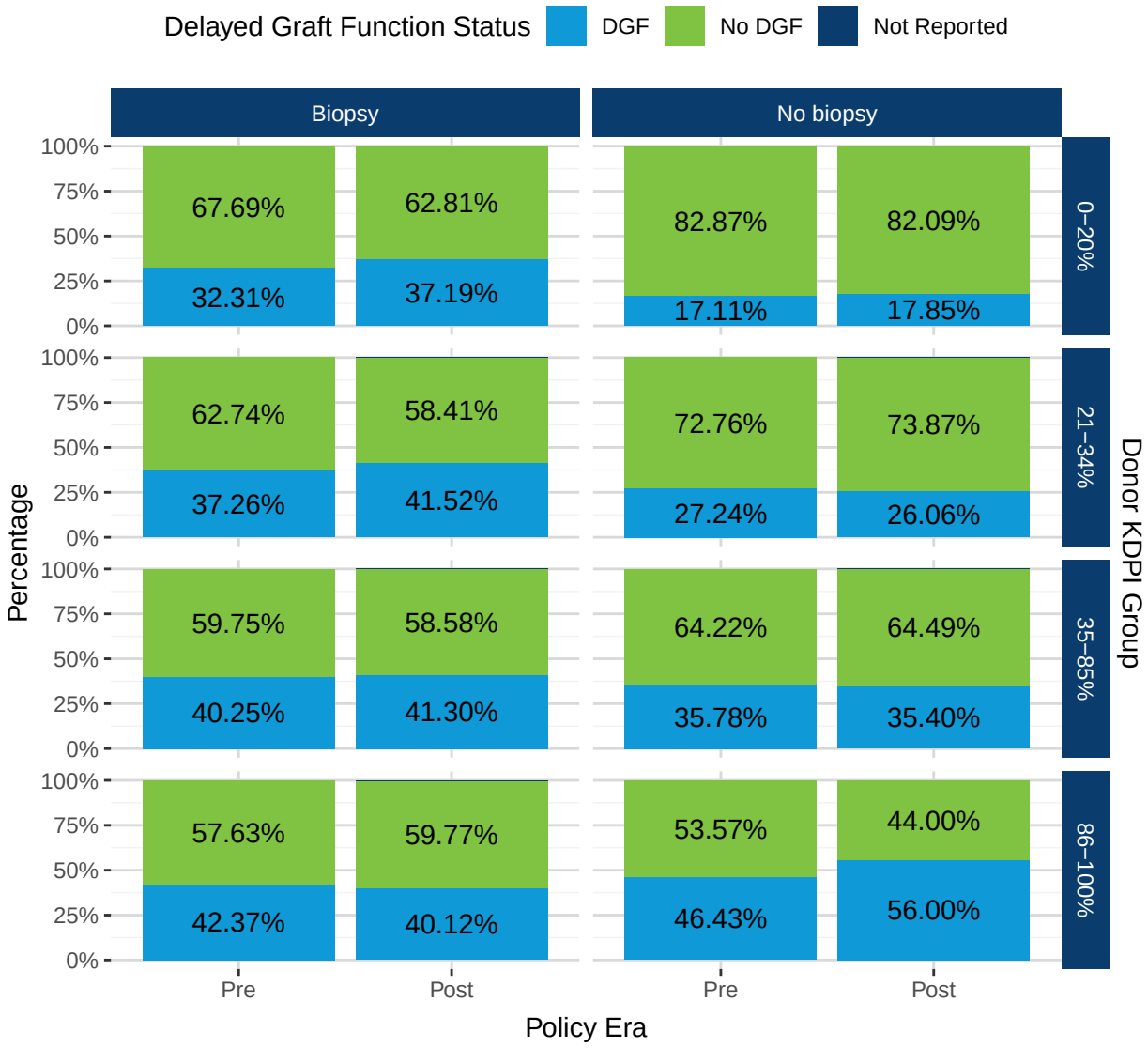
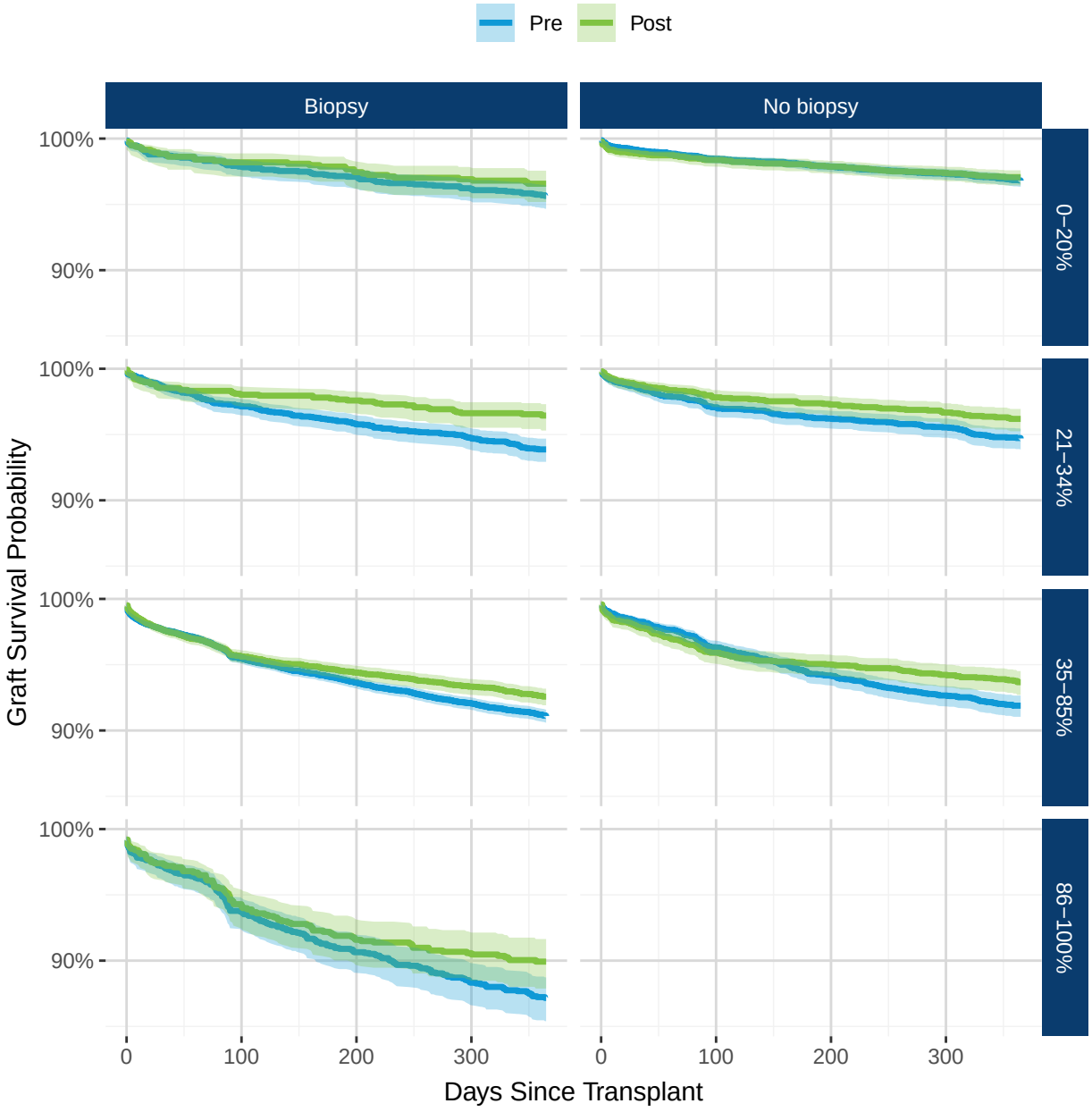


Table A5: Percentage of Transplants by Delayed Graft Function, Donor Biopsy Status and Donor KDPI Group

Biopsy Status	KDPI	Era	DGF	No DGF	Not Reported	Total
Biopsy	0-20%	Pre	708 (32.31%)	1,483 (67.69%)	0 (0.00%)	2,191 (100.00%)
		Post	691 (37.19%)	1,167 (62.81%)	0 (0.00%)	1,858 (100.00%)
	21-34%	Pre	1,107 (37.26%)	1,864 (62.74%)	0 (0.00%)	2,971 (100.00%)
		Post	1,084 (41.52%)	1,525 (58.41%)	2 (0.08%)	2,611 (100.00%)
	35-85%	Pre	5,256 (40.25%)	7,803 (59.75%)	0 (0.00%)	13,059 (100.00%)
		Post	6,158 (41.30%)	8,734 (58.58%)	18 (0.12%)	14,910 (100.00%)
	86-100%	Pre	669 (42.37%)	910 (57.63%)	0 (0.00%)	1,579 (100.00%)
		Post	1,090 (40.12%)	1,624 (59.77%)	3 (0.11%)	2,717 (100.00%)
No biopsy	0-20%	Pre	1,206 (17.11%)	5,841 (82.87%)	1 (0.01%)	7,048 (100.00%)
		Post	1,279 (17.85%)	5,882 (82.09%)	4 (0.06%)	7,165 (100.00%)
	21-34%	Pre	954 (27.24%)	2,548 (72.76%)	0 (0.00%)	3,502 (100.00%)
		Post	1,092 (26.06%)	3,095 (73.87%)	3 (0.07%)	4,190 (100.00%)
	35-85%	Pre	1,689 (35.78%)	3,032 (64.22%)	0 (0.00%)	4,721 (100.00%)
		Post	2,213 (35.40%)	4,031 (64.49%)	7 (0.11%)	6,251 (100.00%)
	86-100%	Pre	39 (46.43%)	45 (53.57%)	0 (0.00%)	84 (100.00%)
		Post	28 (56.00%)	22 (44.00%)	0 (0.00%)	50 (100.00%)

Figure A6 and **Table A6** show one year unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 05, 2020 to September 05, 2023 by donor biopsy status and donor KDPI group. Graft survival increased for recipients who received kidneys from biopsied donors with a KDPI between 21-85%.

Figure A6: One Year Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 05, 2020 - September 05, 2023 by Donor Biopsy Status and Donor KDPI Group



Note: The survival curves for the KDPI 86−100% and No biopsy group are not plotted due to the there being less than or equal to 10 recipients at risk

Table A6: One Year Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 05, 2020 - September 05, 2023 by Donor Biopsy Status and Donor KDPI Group

Biopsy Status	KDPI	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
Biopsy	0-20%	Pre	2069	90	1952	95.6	(94.7, 96.4)
		Post	943	32	620	96.6	(95.2, 97.6)
	21-34%	Pre	2862	175	2647	93.9	(92.9, 94.7)
		Post	1369	48	838	96.4	(95.3, 97.3)
	35-85%	Pre	12733	1131	11462	91.1	(90.6, 91.6)
		Post	6729	492	4113	92.6	(91.9, 93.2)
	86-100%	Pre	1561	200	1345	87.2	(85.4, 88.7)
		Post	1000	100	602	89.9	(87.9, 91.6)
No biopsy	0-20%	Pre	6091	194	5826	96.8	(96.3, 97.2)
		Post	3393	98	2155	97.1	(96.4, 97.6)
	21-34%	Pre	3145	166	2933	94.7	(93.9, 95.4)
		Post	2037	76	1286	96.2	(95.2, 96.9)
	35-85%	Pre	4421	358	4010	91.9	(91.0, 92.7)
		Post	2845	177	1715	93.7	(92.7, 94.5)
	86-100%	Pre	82	3	78	96.3	(89.0, 98.8)
		Post	24	3	9	–	–

Donor Age Group

Table A7 and **Figure A7** show the percentage of transplants by delayed graft function status, donor biopsy status and donor age group. There was an increase in DGF for organs that came from donors that were biopsied and between the ages of 18-34 and 35-49, both of these groups saw an approximately 2% increase in rate of DGF. There was little change in the rate of DGF for organs that came from donors that were biopsied and age 50+.

Figure A7: Count and Percentage of Transplants by Delayed Graft Function Status, Donor Biopsy Status and Donor Age Group

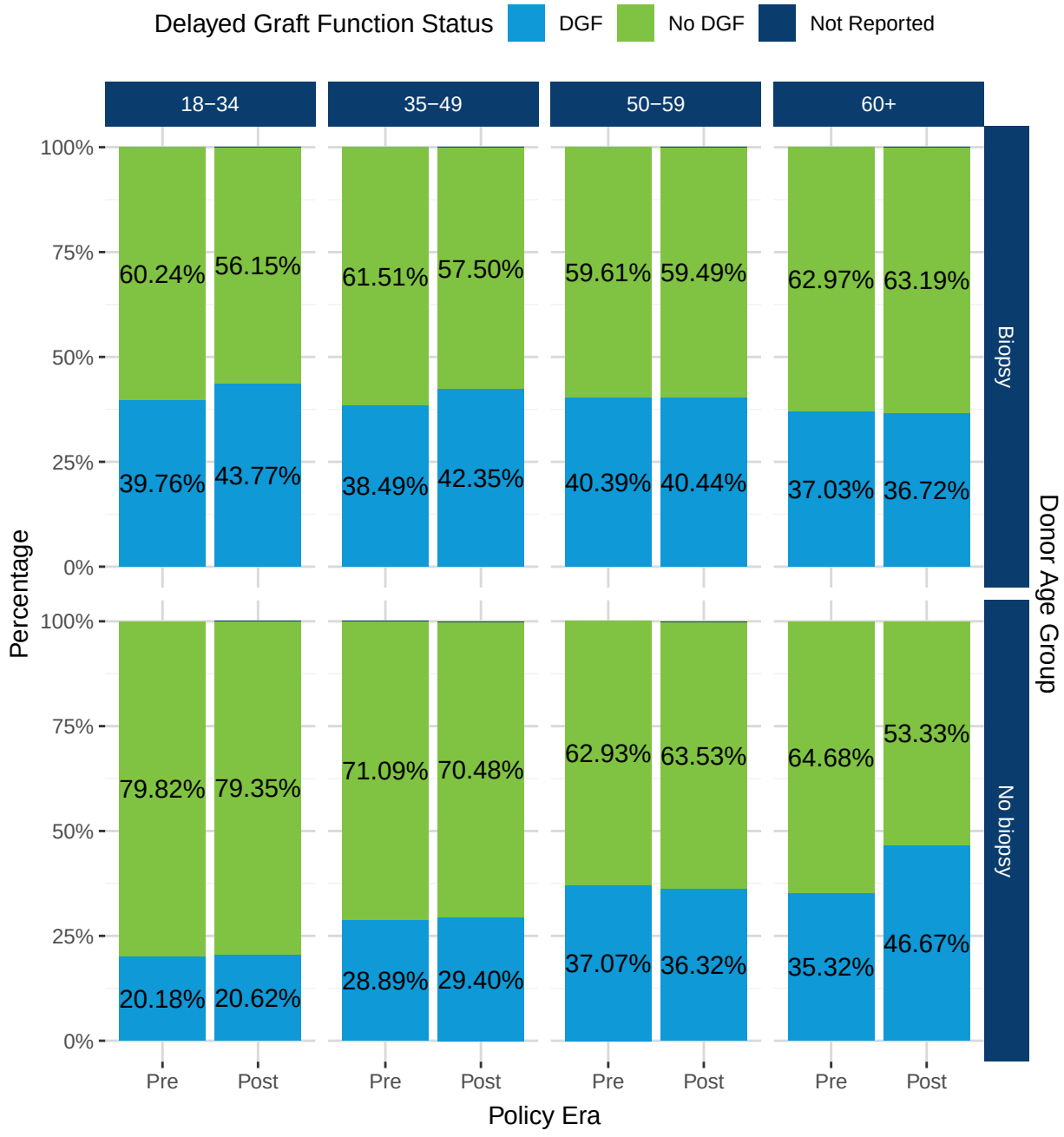
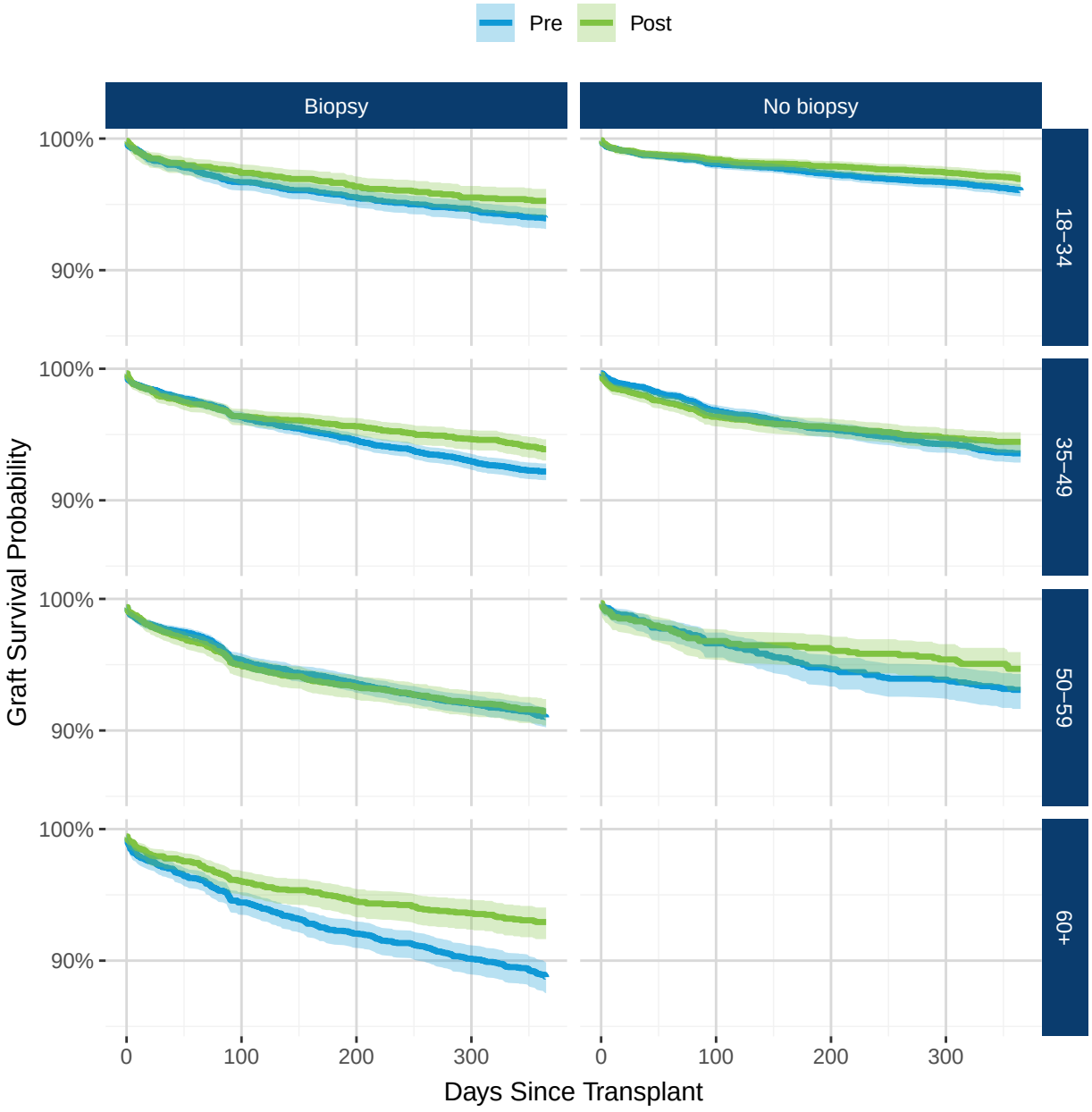


Table A7: Percentage of Transplants by Delayed Graft Function Status, Donor Biopsy Status and Donor Age Group

Biopsy Status	Donor Age Group	Era	DGF	No DGF	Not Reported	Total
Biopsy	18-34	Pre	1,560 (39.76%)	2,364 (60.24%)	0 (0.00%)	3,924 (100.00%)
		Post	1,556 (43.77%)	1,996 (56.15%)	3 (0.08%)	3,555 (100.00%)
	35-49	Pre	2,773 (38.49%)	4,432 (61.51%)	0 (0.00%)	7,205 (100.00%)
		Post	3,058 (42.35%)	4,152 (57.50%)	11 (0.15%)	7,221 (100.00%)
	50-59	Pre	2,359 (40.39%)	3,482 (59.61%)	0 (0.00%)	5,841 (100.00%)
		Post	2,744 (40.44%)	4,037 (59.49%)	5 (0.07%)	6,786 (100.00%)
	60+	Pre	1,048 (37.03%)	1,782 (62.97%)	0 (0.00%)	2,830 (100.00%)
		Post	1,665 (36.72%)	2,865 (63.19%)	4 (0.09%)	4,534 (100.00%)
No biopsy	18-34	Pre	1,590 (20.18%)	6,290 (79.82%)	0 (0.00%)	7,880 (100.00%)
		Post	1,705 (20.62%)	6,561 (79.35%)	2 (0.02%)	8,268 (100.00%)
	35-49	Pre	1,658 (28.89%)	4,080 (71.09%)	1 (0.02%)	5,739 (100.00%)
		Post	2,156 (29.40%)	5,168 (70.48%)	9 (0.12%)	7,333 (100.00%)
	50-59	Pre	569 (37.07%)	966 (62.93%)	0 (0.00%)	1,535 (100.00%)
		Post	730 (36.32%)	1,277 (63.53%)	3 (0.15%)	2,010 (100.00%)
	60+	Pre	71 (35.32%)	130 (64.68%)	0 (0.00%)	201 (100.00%)
		Post	21 (46.67%)	24 (53.33%)	0 (0.00%)	45 (100.00%)

Figure A8 and **Table A8** show one year unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 05, 2020 to September 05, 2023 by donor biopsy status and donor age group. Graft survival increased for organs that were received from donors who were biopsied and aged 35-49 or 60+.

Figure A8: One Year Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 05, 2020 - September 05, 2023 by Donor Biopsy Status and Donor Age Group



Note: The survival curves for the 60+ donor age group and No biopsy group are not plotted due to the there being less than or equal to 10 recipients at risk

Table A8: One Year Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 05, 2020 - September 05, 2023 by Donor Biopsy Status and Donor Age Group

Biopsy Status	Age Group	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
Biopsy	18-34	Pre	3768	228	3495	93.9	(93.1, 94.7)
		Post	1727	81	1089	95.3	(94.1, 96.2)
	35-49	Pre	6971	543	6332	92.2	(91.5, 92.8)
		Post	3482	209	2152	93.9	(93.0, 94.6)
	50-59	Pre	5691	511	5119	91	(90.2, 91.7)
		Post	3042	257	1830	91.4	(90.4, 92.4)
	60+	Pre	2795	314	2460	88.8	(87.5, 89.9)
		Post	1790	125	1102	92.9	(91.6, 94.0)
No biopsy	18-34	Pre	6918	271	6555	96.1	(95.6, 96.5)
		Post	3953	118	2525	96.9	(96.3, 97.4)
	35-49	Pre	5208	334	4819	93.6	(92.9, 94.2)
		Post	3386	186	2057	94.4	(93.6, 95.2)
	50-59	Pre	1421	98	1304	93.1	(91.6, 94.3)
		Post	940	49	572	94.7	(93.0, 96.0)
	60+	Pre	192	18	169	90.6	(85.4, 94.0)
		Post	20	1	11	95	(69.5, 99.3)

Recovering OPO

Figure A9 shows the percentage of transplants with delayed graft function by donor biopsy status and recovering OPO for donors who were biopsied. For donors who were biopsied a total of 31 OPOs saw an increase in percentage of DGF in the post-policy era.

Figure A9: Percentage of Transplants with Delayed Graft Function by Recovering OPO for Biopsied Donors

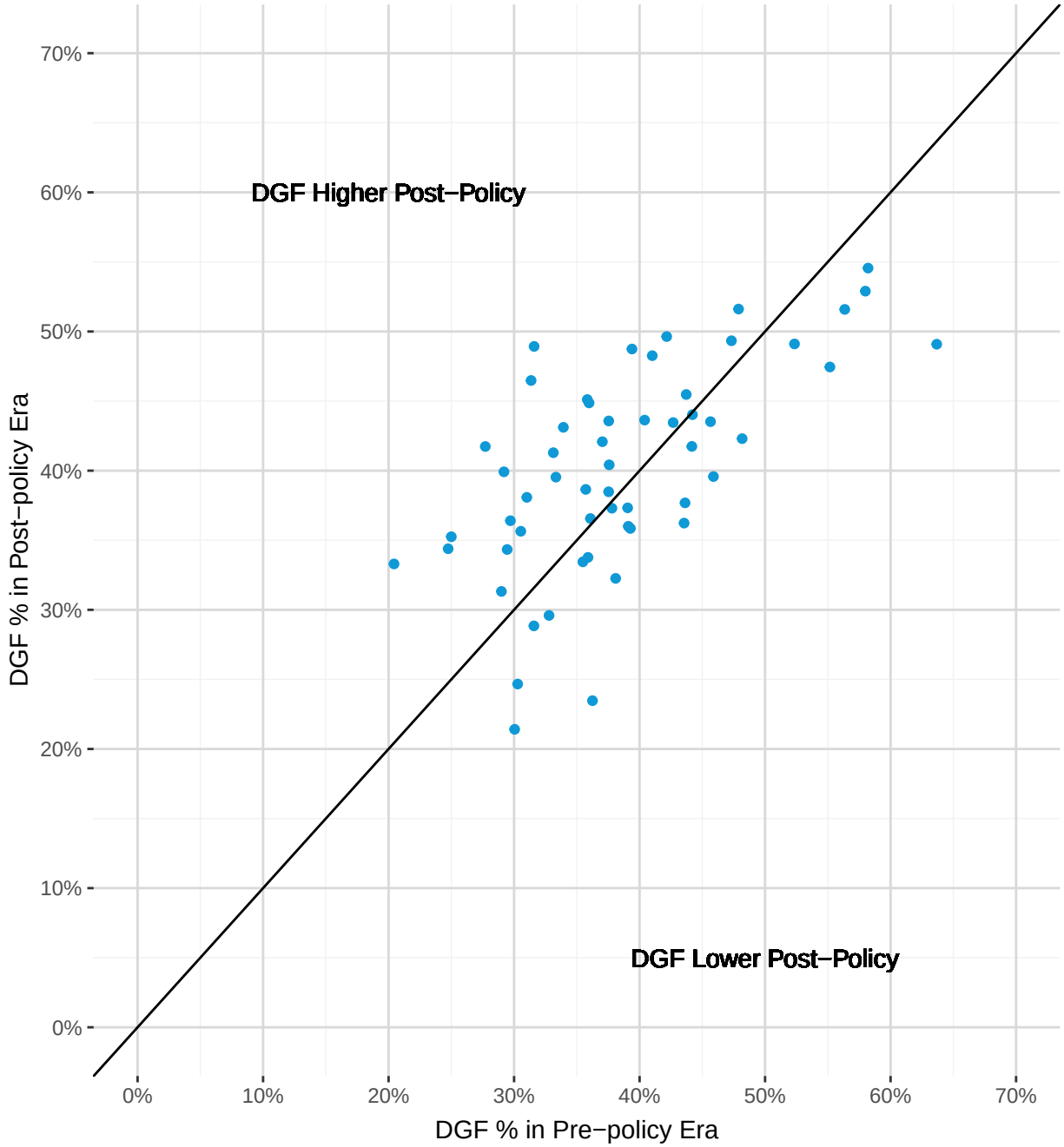


Figure A10 shows the percentage of transplants with delayed graft function by donor biopsy status and recovering OPO for donors who were not biopsied. For donors who were not biopsied a total of 32 OPOs saw an increase in percentage of DGF in the post-policy era.

Figure A10:Percentage of Transplants with Delayed Graft Function by Recovering OPO for Non-biopsied Donors

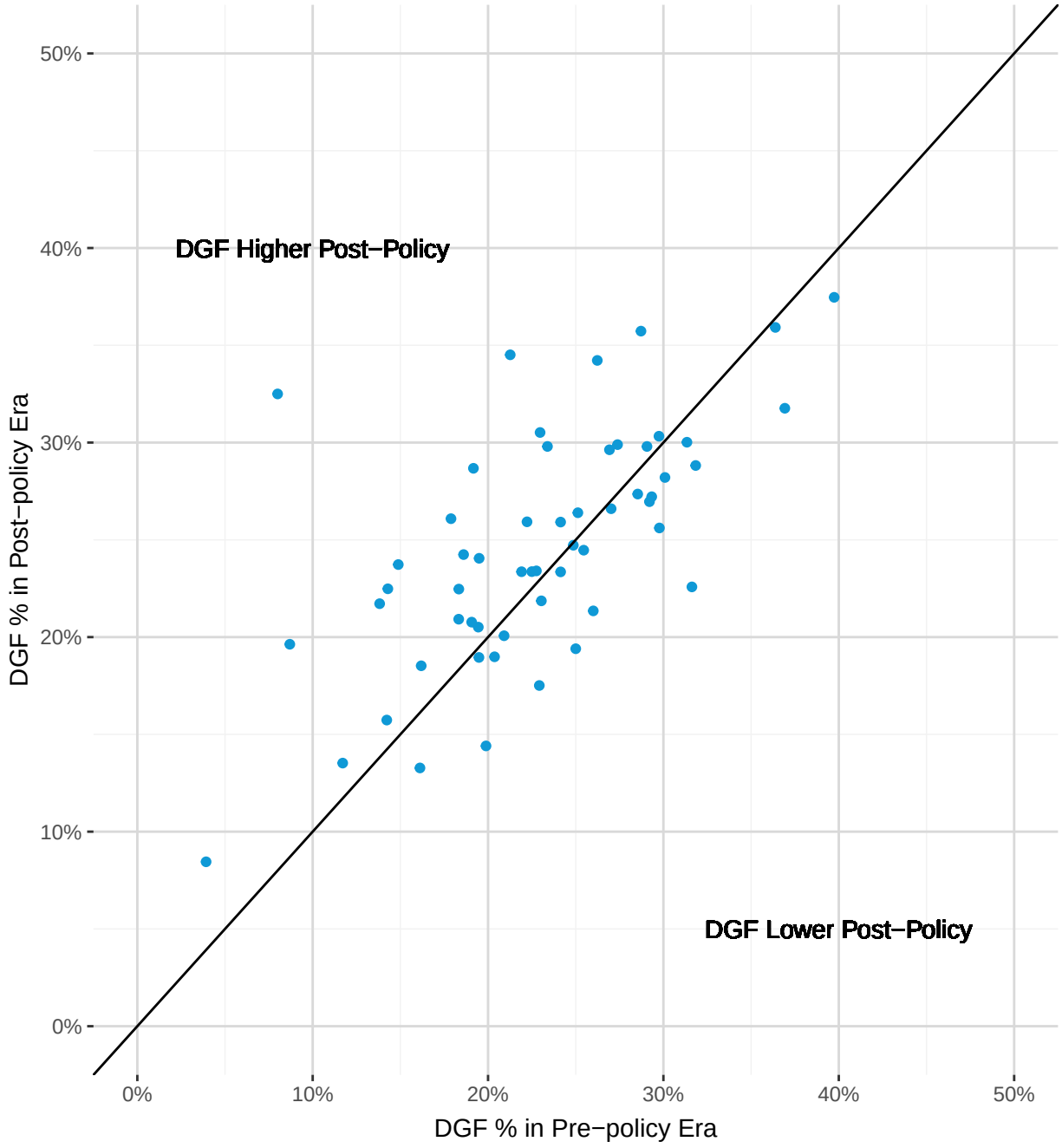


Figure A11 shows the percentage of transplants with delayed graft function by recovering OPO. Overall, a total of 33 OPOs saw an increase in percentage of DGF in the post-policy era.

Figure A11: Percentage of Transplants with Delayed Graft Function by Recovering OPO

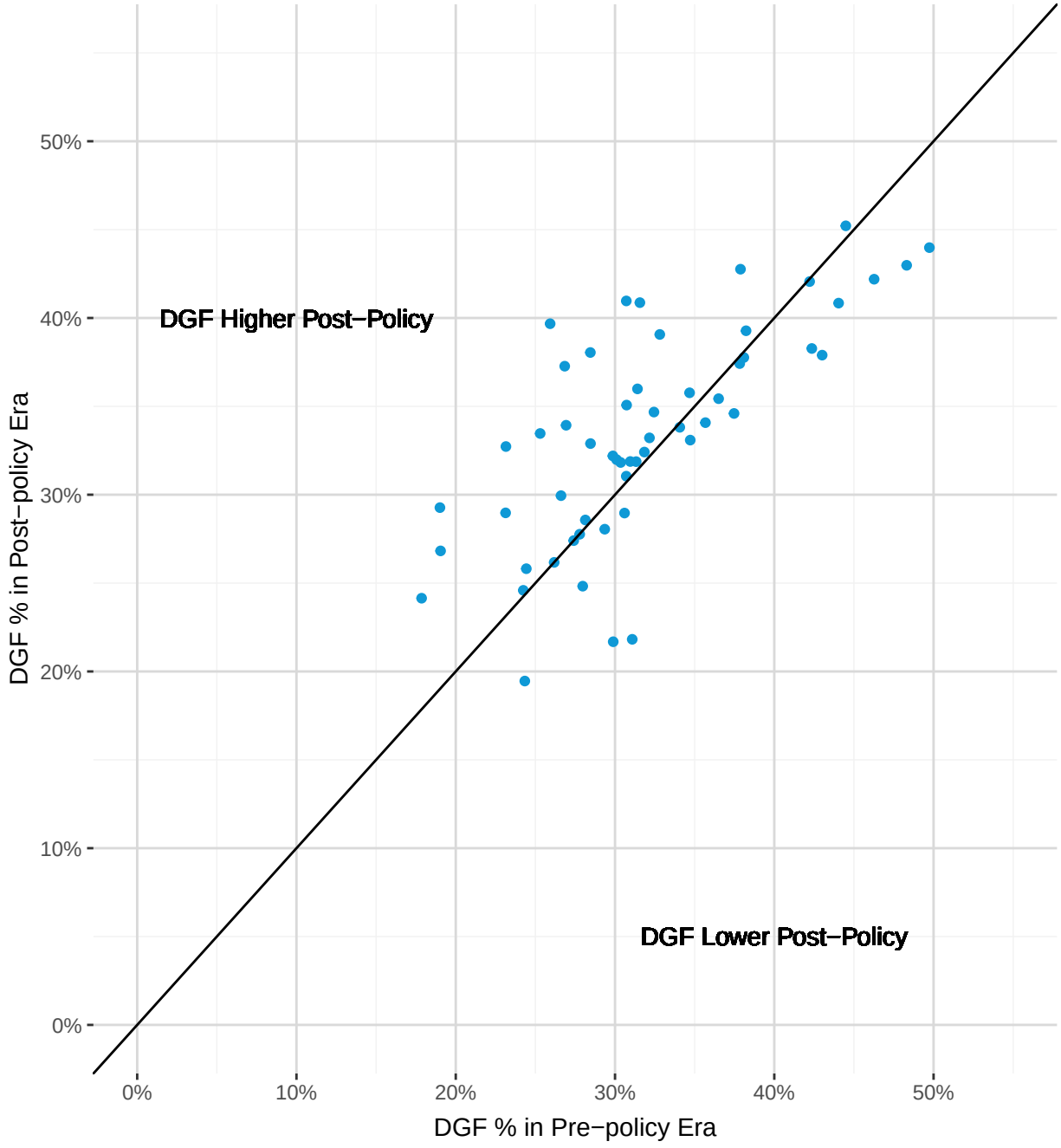


Table A9 shows one year unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 05, 2020 to September 05, 2023 by donor biopsy status and recovering OPO.

Table A9: One Year Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 05, 2020 - September 05, 2023 by Donor Biopsy Status and Recovering OPO

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
1	Biopsy	Pre	156	14	141	91	(85.3, 94.6)
		Post	58	3	35	94.7	(84.4, 98.2)
	No biopsy	Pre	82	6	76	92.7	(84.4, 96.6)
		Post	77	5	48	93.5	(85.1, 97.2)
2	Biopsy	Pre	102	8	94	92.2	(84.9, 96.0)
		Post	74	1	50	98.6	(90.8, 99.8)
	No biopsy	Pre	42	1	41	97.6	(84.3, 99.7)
		Post	21	0	15	100	–
3	Biopsy	Pre	861	86	765	90	(87.8, 91.8)
		Post	534	42	328	92.1	(89.5, 94.1)
	No biopsy	Pre	785	50	715	93.6	(91.7, 95.1)
		Post	373	19	221	94.8	(92.0, 96.7)
4	Biopsy	Pre	55	4	51	92.7	(81.8, 97.2)
		Post	48	4	25	91.7	(79.3, 96.8)
	No biopsy	Pre	102	6	96	94.1	(87.4, 97.3)
		Post	32	2	13	93.8	(77.3, 98.4)
5	Biopsy	Pre	297	29	264	90.2	(86.2, 93.1)
		Post	122	5	74	95.6	(89.7, 98.2)
	No biopsy	Pre	289	16	268	94.4	(91.1, 96.6)
		Post	139	2	82	98.5	(94.0, 99.6)
6	Biopsy	Pre	344	20	317	94.2	(91.1, 96.2)
		Post	157	18	110	88.4	(82.3, 92.5)
	No biopsy	Pre	205	5	200	97.6	(94.2, 99.0)
		Post	139	5	107	96.4	(91.6, 98.5)
7	Biopsy	Pre	443	40	398	91	(87.9, 93.3)
		Post	247	14	164	94.3	(90.6, 96.6)
	No biopsy	Pre	101	7	94	93.1	(86.0, 96.6)
		Post	29	1	20	96.6	(77.9, 99.5)
8	Biopsy	Pre	62	7	55	88.7	(77.8, 94.5)
		Post	49	2	27	95.8	(84.2, 98.9)
	No biopsy	Pre	162	11	148	93.2	(88.0, 96.1)
		Post	58	3	35	94.6	(84.1, 98.2)
		Pre	593	59	529	90	(87.3, 92.2)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
9	Biopsy	Post	273	21	171	92.2	(88.3, 94.9)
	No biopsy	Pre	351	16	327	95.4	(92.6, 97.2)
		Post	245	9	157	96.1	(92.6, 97.9)
10	Biopsy	Pre	453	53	392	88.2	(84.9, 90.9)
		Post	224	20	120	91	(86.4, 94.1)
	No biopsy	Pre	285	20	258	92.9	(89.2, 95.4)
		Post	216	10	134	95.3	(91.5, 97.5)
11	Biopsy	Pre	465	33	425	92.9	(90.1, 94.9)
		Post	200	12	118	94	(89.6, 96.5)
	No biopsy	Pre	214	7	201	96.7	(93.3, 98.4)
		Post	172	7	95	95.9	(91.6, 98.0)
12	Biopsy	Pre	393	27	361	93.1	(90.1, 95.2)
		Post	131	7	52	94.5	(88.9, 97.4)
	No biopsy	Pre	76	1	74	98.7	(91.0, 99.8)
		Post	132	6	62	95.4	(90.0, 97.9)
13	Biopsy	Pre	205	18	184	91.2	(86.4, 94.4)
		Post	94	3	66	96.8	(90.4, 99.0)
	No biopsy	Pre	154	9	144	94.2	(89.1, 96.9)
		Post	85	4	54	95.3	(87.8, 98.2)
14	Biopsy	Pre	402	40	356	90	(86.7, 92.6)
		Post	194	18	115	90.4	(85.2, 93.9)
	No biopsy	Pre	475	27	437	94.3	(91.8, 96.0)
		Post	372	13	247	96.5	(94.0, 97.9)
15	Biopsy	Pre	318	24	292	92.4	(88.9, 94.9)
		Post	222	15	140	93.2	(88.9, 95.8)
	No biopsy	Pre	239	12	224	95	(91.3, 97.1)
		Post	113	5	72	95.6	(89.7, 98.1)
16	Biopsy	Pre	272	29	243	89.3	(85.0, 92.5)
		Post	149	16	106	89.1	(82.9, 93.2)
	No biopsy	Pre	235	14	217	94	(90.1, 96.4)
		Post	169	11	98	93.4	(88.4, 96.3)
17	Biopsy	Pre	248	24	224	90.3	(85.9, 93.4)
		Post	117	11	61	90.6	(83.6, 94.7)
	No biopsy	Pre	94	5	88	94.7	(87.7, 97.8)
		Post	54	1	25	98.1	(87.1, 99.7)
	Biopsy	Pre	406	17	385	95.8	(93.3, 97.4)
		Post	204	6	143	97	(93.5, 98.7)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
18	No biopsy	Pre	6	0	6	–	–
		Post	12	0	9	–	–
19	Biopsy	Pre	512	47	457	90.8	(88.0, 93.0)
		Post	359	23	217	93.5	(90.4, 95.7)
	No biopsy	Pre	801	31	764	96.1	(94.5, 97.3)
		Post	413	29	272	92.9	(90.0, 95.0)
20	Biopsy	Pre	163	22	139	86.5	(80.2, 90.9)
		Post	108	5	61	95.4	(89.2, 98.0)
	No biopsy	Pre	226	14	212	93.8	(89.8, 96.3)
		Post	97	3	57	96.9	(90.7, 99.0)
21	Biopsy	Pre	409	24	381	94.1	(91.4, 96.0)
		Post	213	18	132	91.5	(86.8, 94.5)
	No biopsy	Pre	42	1	41	97.6	(84.3, 99.7)
		Post	46	1	35	97.8	(85.6, 99.7)
22	Biopsy	Pre	171	7	163	95.9	(91.6, 98.0)
		Post	76	5	54	93.3	(84.5, 97.1)
	No biopsy	Pre	49	2	47	95.9	(84.7, 99.0)
		Post	27	1	23	96.3	(76.5, 99.5)
23	Biopsy	Pre	80	9	70	88.7	(79.4, 94.0)
		Post	43	1	27	97.2	(81.9, 99.6)
	No biopsy	Pre	64	1	63	98.4	(89.4, 99.8)
		Post	33	1	20	97	(80.4, 99.6)
24	Biopsy	Pre	498	33	458	93.4	(90.8, 95.2)
		Post	293	17	163	94.2	(90.8, 96.3)
	No biopsy	Pre	448	13	429	97.1	(95.0, 98.3)
		Post	267	10	142	96.1	(92.9, 97.9)
25	Biopsy	Pre	42	4	37	90.4	(76.4, 96.3)
		Post	60	4	30	93.3	(83.2, 97.4)
	No biopsy	Pre	211	10	199	95.3	(91.4, 97.4)
		Post	100	3	57	97	(91.0, 99.0)
26	Biopsy	Pre	623	62	557	90	(87.4, 92.1)
		Post	437	30	270	93	(90.2, 95.1)
	No biopsy	Pre	565	34	523	94	(91.6, 95.6)
		Post	263	14	153	94.6	(91.1, 96.8)
	Biopsy	Pre	240	23	208	90.3	(85.8, 93.5)
		Post	80	5	52	93.7	(85.6, 97.3)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
27	No biopsy	Pre	294	20	272	93.2	(89.7, 95.6)
		Post	172	7	117	95.6	(90.9, 97.9)
28	Biopsy	Pre	289	20	265	93.1	(89.4, 95.5)
		Post	147	16	96	88.3	(81.6, 92.7)
	No biopsy	Pre	312	21	288	93.3	(89.8, 95.6)
		Post	165	10	100	93.4	(88.1, 96.4)
29	Biopsy	Pre	366	25	335	93.1	(90.0, 95.3)
		Post	176	7	108	96	(91.8, 98.1)
	No biopsy	Pre	275	11	261	96	(92.9, 97.8)
		Post	168	5	100	97	(92.9, 98.7)
30	Biopsy	Pre	559	50	504	91	(88.3, 93.1)
		Post	238	17	143	92.6	(88.4, 95.4)
	No biopsy	Pre	251	10	240	96	(92.7, 97.8)
		Post	188	9	111	95.1	(90.8, 97.4)
31	Biopsy	Pre	685	55	623	92	(89.7, 93.8)
		Post	241	19	137	91.7	(87.3, 94.7)
	No biopsy	Pre	362	23	333	93.6	(90.6, 95.7)
		Post	341	20	208	94	(90.9, 96.1)
32	Biopsy	Pre	752	58	680	92.3	(90.1, 94.0)
		Post	380	28	241	92.6	(89.4, 94.8)
	No biopsy	Pre	210	7	197	96.7	(93.1, 98.4)
		Post	215	10	142	95.3	(91.5, 97.5)
33	Biopsy	Pre	176	9	166	94.9	(90.4, 97.3)
		Post	108	4	54	96.3	(90.4, 98.6)
	No biopsy	Pre	115	1	113	99.1	(93.9, 99.9)
		Post	60	8	34	85.6	(73.1, 92.6)
34	Biopsy	Pre	457	42	408	90.8	(87.7, 93.1)
		Post	190	14	142	92.6	(87.8, 95.6)
	No biopsy	Pre	255	11	236	95.7	(92.3, 97.6)
		Post	146	4	100	97.3	(92.8, 99.0)
35	Biopsy	Pre	566	56	505	90.1	(87.3, 92.3)
		Post	254	17	153	93.2	(89.3, 95.7)
	No biopsy	Pre	182	19	161	89.5	(84.1, 93.2)
		Post	184	10	112	94.5	(90.0, 97.0)
	Biopsy	Pre	502	27	469	94.6	(92.2, 96.3)
		Post	168	7	97	95.8	(91.4, 98.0)
		Pre	235	5	225	97.9	(94.9, 99.1)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
36	No biopsy	Post	241	11	131	95.3	(91.6, 97.4)
37	Biopsy	Pre	260	17	238	93.5	(89.7, 95.9)
		Post	120	4	75	96.7	(91.4, 98.7)
	No biopsy	Pre	95	1	91	98.9	(92.8, 99.9)
		Post	52	3	33	94.2	(83.2, 98.1)
38	Biopsy	Pre	158	11	144	93	(87.8, 96.1)
		Post	112	12	65	89.3	(81.9, 93.8)
	No biopsy	Pre	65	1	62	98.4	(89.4, 99.8)
		Post	27	1	21	96.2	(75.7, 99.4)
39	Biopsy	Pre	85	7	76	91.8	(83.5, 96.0)
		Post	49	5	27	89.6	(76.8, 95.5)
	No biopsy	Pre	38	5	32	86.8	(71.2, 94.3)
		Post	23	0	12	100	–
40	Biopsy	Pre	535	41	490	92.3	(89.7, 94.3)
		Post	384	21	223	94.5	(91.7, 96.4)
	No biopsy	Pre	245	12	230	95.1	(91.5, 97.2)
		Post	108	4	65	96.2	(90.2, 98.6)
41	Biopsy	Pre	282	33	245	88.3	(83.9, 91.5)
		Post	197	7	116	96.4	(92.6, 98.3)
	No biopsy	Pre	177	7	169	96	(91.9, 98.1)
		Post	134	7	80	94.7	(89.3, 97.5)
42	Biopsy	Pre	191	13	178	93.2	(88.6, 96.0)
		Post	118	5	82	95.8	(90.1, 98.2)
	No biopsy	Pre	198	9	189	95.5	(91.4, 97.6)
		Post	124	4	70	96.8	(91.6, 98.8)
43	Biopsy	Pre	498	33	458	93.3	(90.8, 95.2)
		Post	272	21	210	92.2	(88.4, 94.9)
	No biopsy	Pre	569	27	539	95.2	(93.1, 96.7)
		Post	317	5	226	98.4	(96.2, 99.3)
44	Biopsy	Pre	285	30	252	89.4	(85.2, 92.5)
		Post	134	11	72	91.5	(85.2, 95.2)
	No biopsy	Pre	345	22	320	93.6	(90.4, 95.7)
		Post	154	11	94	92.8	(87.3, 95.9)
	Biopsy	Pre	141	11	129	92.2	(86.3, 95.6)
		Post	125	6	67	95.2	(89.5, 97.8)
		Pre	650	59	585	90.9	(88.4, 92.9)

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OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
45	No biopsy	Post	259	6	146	97.7	(94.9, 99.0)
46	Biopsy	Pre	571	43	517	92.4	(89.9, 94.3)
		Post	253	17	148	93.2	(89.3, 95.7)
	No biopsy	Pre	417	29	381	93	(90.1, 95.1)
		Post	323	11	216	96.5	(93.8, 98.1)
47	Biopsy	Pre	115	4	109	96.5	(91.0, 98.7)
		Post	53	3	31	94.3	(83.4, 98.1)
	No biopsy	Pre	65	5	59	92.2	(82.2, 96.7)
		Post	38	0	24	100	–
48	Biopsy	Pre	207	27	175	86.9	(81.5, 90.8)
		Post	146	12	75	91.7	(85.8, 95.2)
	No biopsy	Pre	355	29	326	91.8	(88.5, 94.2)
		Post	183	10	111	94.5	(90.0, 97.0)
49	Biopsy	Pre	578	55	522	90.5	(87.8, 92.6)
		Post	315	24	198	92.3	(88.8, 94.8)
	No biopsy	Pre	504	26	475	94.8	(92.5, 96.4)
		Post	291	10	188	96.5	(93.7, 98.1)
50	Biopsy	Pre	327	35	289	89.3	(85.4, 92.2)
		Post	162	11	104	93	(87.7, 96.1)
	No biopsy	Pre	152	2	150	98.7	(94.8, 99.7)
		Post	99	4	76	95.9	(89.5, 98.4)
51	Biopsy	Pre	277	21	254	92.4	(88.6, 95.0)
		Post	76	3	47	95.8	(87.5, 98.6)
	No biopsy	Pre	313	13	298	95.8	(93.0, 97.6)
		Post	168	9	103	94.6	(89.9, 97.1)
52	Biopsy	Pre	610	28	578	95.4	(93.4, 96.8)
		Post	392	19	269	95.1	(92.4, 96.9)
	No biopsy	Pre	239	5	232	97.9	(95.0, 99.1)
		Post	148	4	94	97.3	(93.0, 99.0)
53	Biopsy	Pre	247	18	227	92.7	(88.6, 95.3)
		Post	112	10	83	91	(83.9, 95.1)
	No biopsy	Pre	136	3	130	97.8	(93.3, 99.3)
		Post	84	1	65	98.8	(91.8, 99.8)
54	Biopsy	Pre	264	21	241	92	(88.0, 94.7)
		Post	123	8	74	93.5	(87.4, 96.7)
	No biopsy	Pre	147	9	136	93.9	(88.6, 96.8)
		Post	81	2	57	97.5	(90.4, 99.4)

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OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
55	Biopsy	Pre	282	32	247	88.6	(84.3, 91.8)
		Post	136	16	67	88.1	(81.4, 92.6)
	No biopsy	Pre	104	4	100	96.2	(90.1, 98.5)
		Post	51	1	29	98	(86.9, 99.7)
56	Biopsy	Pre	147	11	136	92.5	(86.9, 95.8)
		Post	94	2	58	97.8	(91.7, 99.5)
	No biopsy	Pre	131	6	125	95.4	(90.1, 97.9)
		Post	71	2	47	97.2	(89.2, 99.3)