Final Report

OPTN Kidney Transplantation Committee | Descriptive Data Request

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

DHHS Contract No. 250-2019-00001C
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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 September 06, 2024. Data are subject to change based on future data submission or correction.

Cohort:

All adult deceased kidney donors recovered in the United States between September 06, 2021 and September 05, 2023 were included in this analysis. All kidney registrations that were transplanted with organs from donors recovered between September 06, 2021 and September 05, 2023 were included in this analysis.

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

- Pre-policy: September 06, 2021 to September 05, 2022
- Post-policy: September 06, 2022 to September 05, 2023

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 2022.

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 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.

Delayed Graft Function (DGF) is defined as whether a kidney recipient was required to use 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 March 04, 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 63.85% in the pre-policy era, and 63.22% in the post-policy era.

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

	Biopsy Status		
Era	**Biopsy**	**No biopsy**	**Total**
Pre	8,098 (63.85%)	4,584 (36.15%)	12,682 (100.00%)
Post	9,083 (63.22%)	5,285 (36.78%)	14,368 (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 non-use rate in the post-policy era from 7.16% to 6.13% for donors that were not biopsied. For donors that were biopsied there was an increase in the non-use rate from 38.59% in the pre-policy era to 41.88% in the post-policy era.

Table 2: Non-use Rates for 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	6,219	16,115	38.59
	Post	7,565	18,062	41.88
No biopsy	Pre	654	9,128	7.16
	Post	645	10,528	6.13
Total	Pre	6,873	25,243	27.23
	Post	8,210	28,590	28.72

Table 3 shows the utilization rates for all deceased donors recovered in the defined eras. There was a slight increase in utilization rate in the post-policy era from 81.09% to 81.85% for donors that were not biopsied. For donors that were biopsied there was a decrease in the utilization rate from 61.06% in the pre-policy era to 57.76% 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 Deceased Donors Recovered in United States by Policy Era and Biopsy Status

Biopsy Status	Era	Transplanted	Kidneys Available	Utilization Rate (%)
Biopsy	Pre	9,896	16,208	61.06
	Post	10,497	18,174	57.76
No biopsy	Pre	8,474	10,450	81.09
	Post	9,883	12,074	81.85
Total	Pre	18,370	26,658	68.91
	Post	20,380	30,248	67.38

Minimum Criteria For Biopsy

Table 4 and **Figure 1** 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 met the the criteria and were biopsied decreased to 44.78% in the post-policy era from 50.64% in the pre-policy era. For donors that did meet the minimum criteria for biopsy, the percentage of donors being biopsied increased from 91.55% in the pre-policy era, to 96.69% in the post-policy era.

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

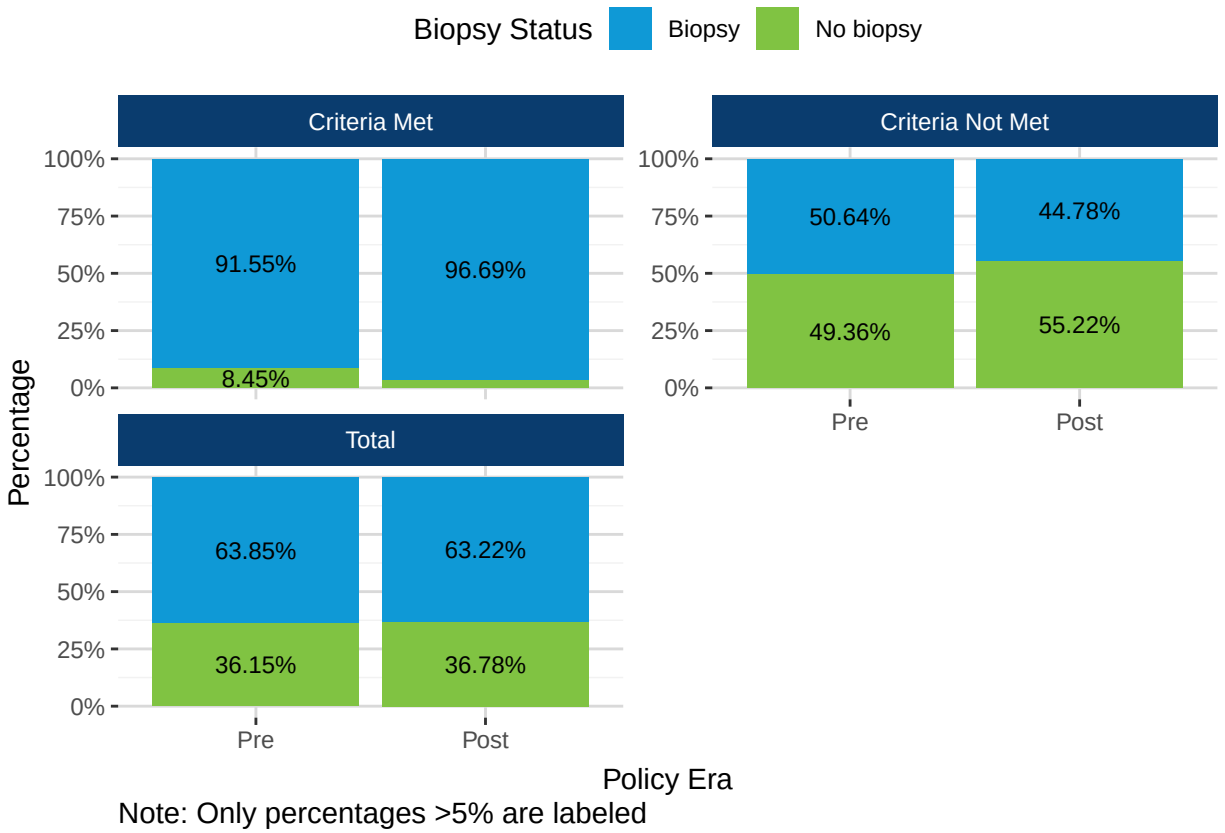


Table 4: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

	Pre-Policy			Post-Policy		
Meets Minumum Criteria	Biopsied	Not Biopsied	Total	Biopsied	Not Biopsied	Total
Yes	3750 (91.55%)	346 (8.45%)	4096 (100%)	4934 (96.69%)	169 (3.31%)	5103 (100%)
No	4348 (50.64%)	4238 (49.36%)	8586 (100%)	4149 (44.78%)	5116 (55.22%)	9265 (100%)
Total	8098 (63.85%)	4584 (36.15%)	12682 (100%)	9083 (63.22%)	5285 (36.78%)	14368 (100%)

Table 5 and **Figure 2** 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 56% in the pre-policy era and 56.16% 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 54.27% in the pre-policy era to 55.77% in the post-policy era.

Figure 2: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

Table 5: 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	4,180	7,464	56.00
		Post	5,512	9,814	56.16
	No biopsy	Pre	244	688	35.47
		Post	148	334	44.31
	Total	Pre	4,424	8,152	54.27
		Post	5,660	10,148	55.77
No	Biopsy	Pre	2,039	8,651	23.57
		Post	2,053	8,248	24.89
	No biopsy	Pre	410	8,440	4.86
		Post	497	10,194	4.88
	Total	Pre	2,449	17,091	14.33
		Post	2,550	18,442	13.83

Table 6 and **Figure 3** 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 43.75% in the pre-policy era to 43.56% 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 3: Utilization Rates for Deceased Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

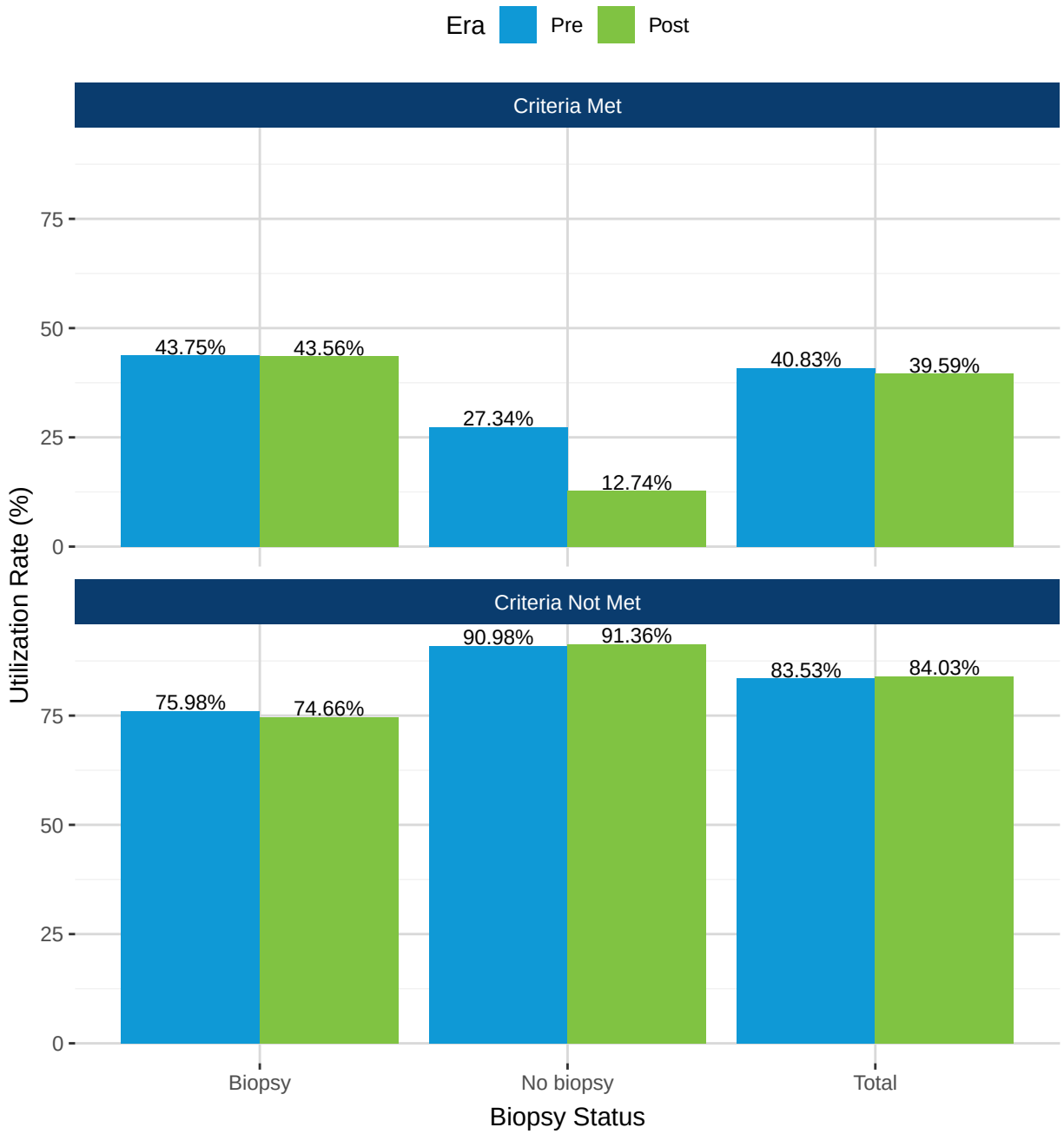


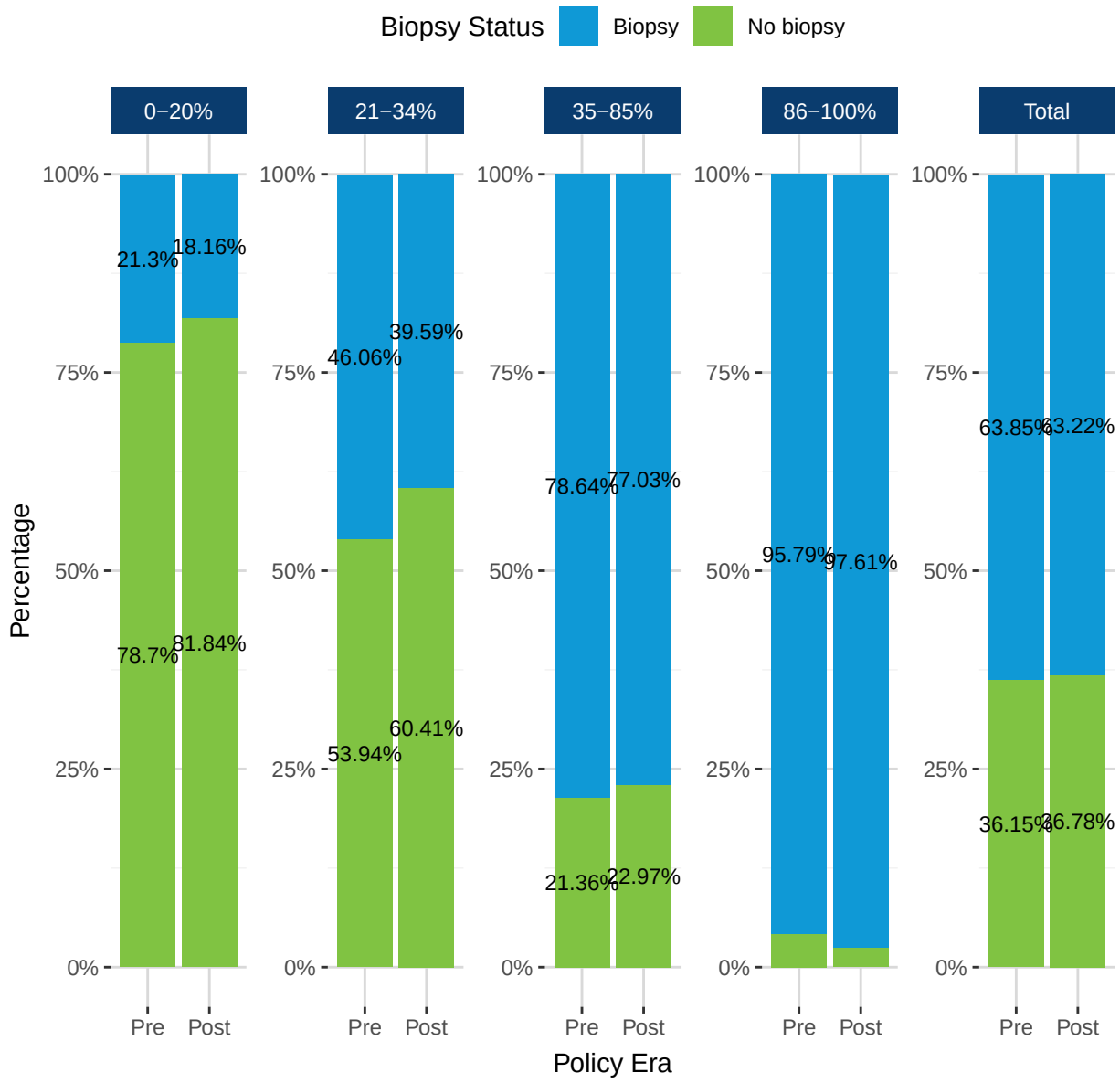
Table 6: Utilization Rates for Deceased Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

Meets Minimum Criteria	Biopsy Status	Era	Transplanted	Kidneys Available	Utilization Rate (%)
Yes	Biopsy	Pre	3,284	7,506	43.75
		Post	4,302	9,876	43.56
	No biopsy	Pre	444	1,624	27.34
		Post	186	1,460	12.74
	Total	Pre	3,728	9,130	40.83
		Post	4,488	11,336	39.59
No	Biopsy	Pre	6,612	8,702	75.98
		Post	6,195	8,298	74.66
	No biopsy	Pre	8,030	8,826	90.98
		Post	9,697	10,614	91.36
	Total	Pre	14,642	17,528	83.53
		Post	15,892	18,912	84.03

KDPI

Table 7 and **Figure 4** 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 95.79% were biopsied in the pre-policy era and this increased to 97.61% in the post-policy era. Although all donors with a KDPI greater than 85% meet the minimum criteria for biopsy, 2.39% of KDPI 86-100% donors in the post-policy era were not biopsied.

Figure 4: 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 7: 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%	560 (21.3%)	2069 (78.7%)	2629 (100%)	512 (18.16%)	2307 (81.84%)	2819 (100%)
21-34%	912 (46.06%)	1068 (53.94%)	1980 (100%)	818 (39.59%)	1248 (60.41%)	2066 (100%)
35-85%	5077 (78.64%)	1379 (21.36%)	6456 (100%)	5628 (77.03%)	1678 (22.97%)	7306 (100%)
86-100%	1549 (95.79%)	68 (4.21%)	1617 (100%)	2125 (97.61%)	52 (2.39%)	2177 (100%)
Total	8098 (63.85%)	4584 (36.15%)	12682 (100%)	9083 (63.22%)	5285 (36.78%)	14368 (100%)

Table 8 and **Figure 5** show the non-use rates for all deceased kidney donors recovered by policy era, biopsy status and donor KDPI. For donors that were biopsied, there was slight increases in non-use rates for all KDPI groups, except for the 21-34% group which stayed relatively the same between the two policy eras.

Figure 5: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

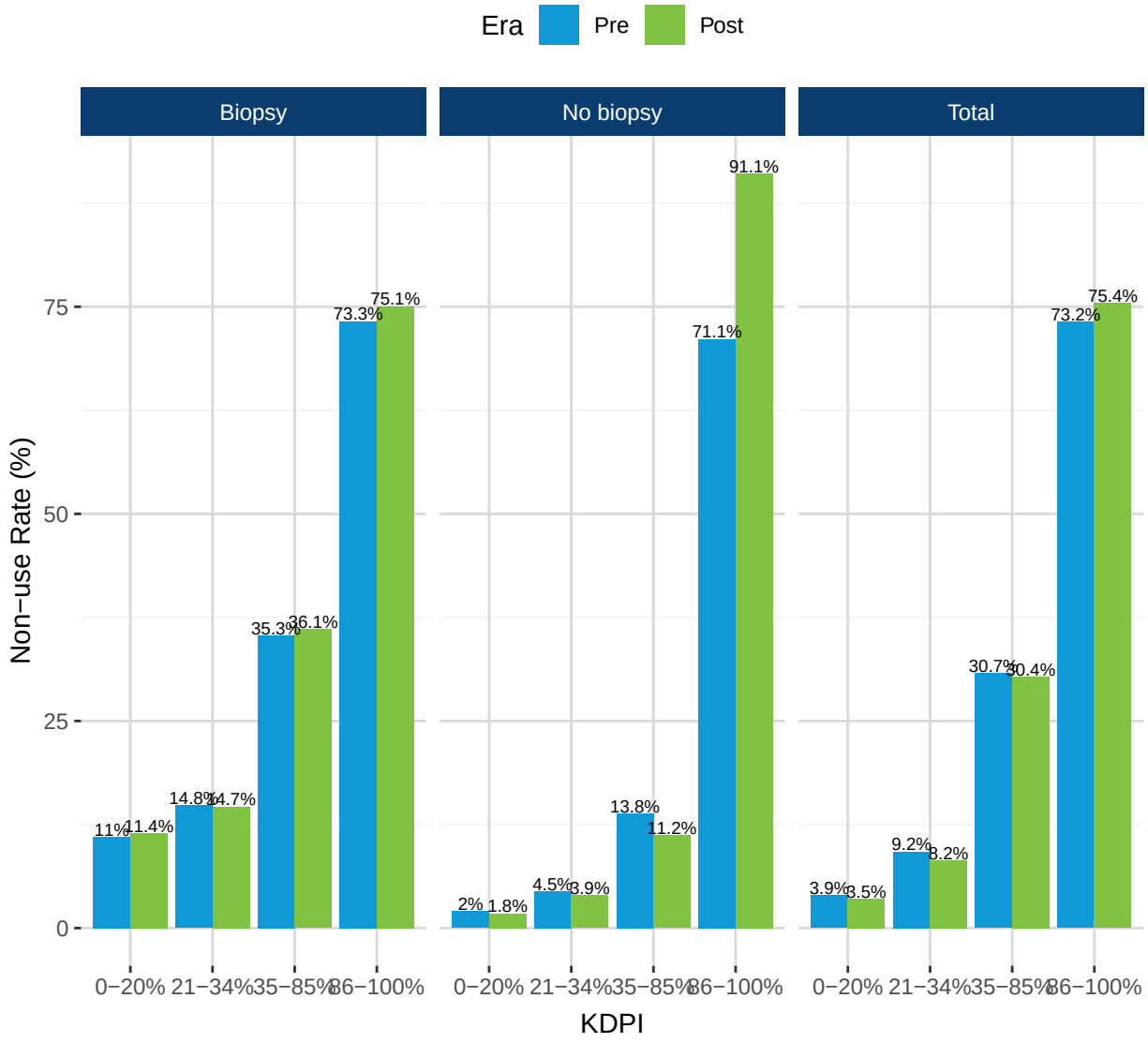


Table 8: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

Biopsy Status	KDPI	Era	Kidneys Recovered for Transplant but Not Transplanted	Kidneys Recovered	Non-use Rate (%)
Biopsy	0-20%	Pre	123	1,115	11.03
		Post	116	1,015	11.43
	21-34%	Pre	269	1,818	14.80
		Post	239	1,629	14.67
	35-85%	Pre	3,567	10,097	35.33
		Post	4,037	11,191	36.07
	86-100%	Pre	2,260	3,085	73.26
		Post	3,173	4,227	75.07
No biopsy	0-20%	Pre	83	4,122	2.01
		Post	81	4,599	1.76
	21-34%	Pre	95	2,126	4.47
		Post	98	2,486	3.94
	35-85%	Pre	380	2,745	13.84
		Post	374	3,342	11.19
	86-100%	Pre	96	135	71.11
		Post	92	101	91.09
Total	0-20%	Pre	206	5,237	3.93
		Post	197	5,614	3.51
	21-34%	Pre	364	3,944	9.23
		Post	337	4,115	8.19
	35-85%	Pre	3,947	12,842	30.74
		Post	4,411	14,533	30.35
	86-100%	Pre	2,356	3,220	73.17
		Post	3,265	4,328	75.44

Table 9 and **Figure 6** show utilization rates for all deceased donors recovered by policy era, biopsy status and donor KDPI. For donors that were biopsied, there were slight decreases in utilization rates for all KDPI groups, except for the 21-34% group, which increased slightly from 84.83% to 84.96%

Figure 6: Utilization Rates for Deceased Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

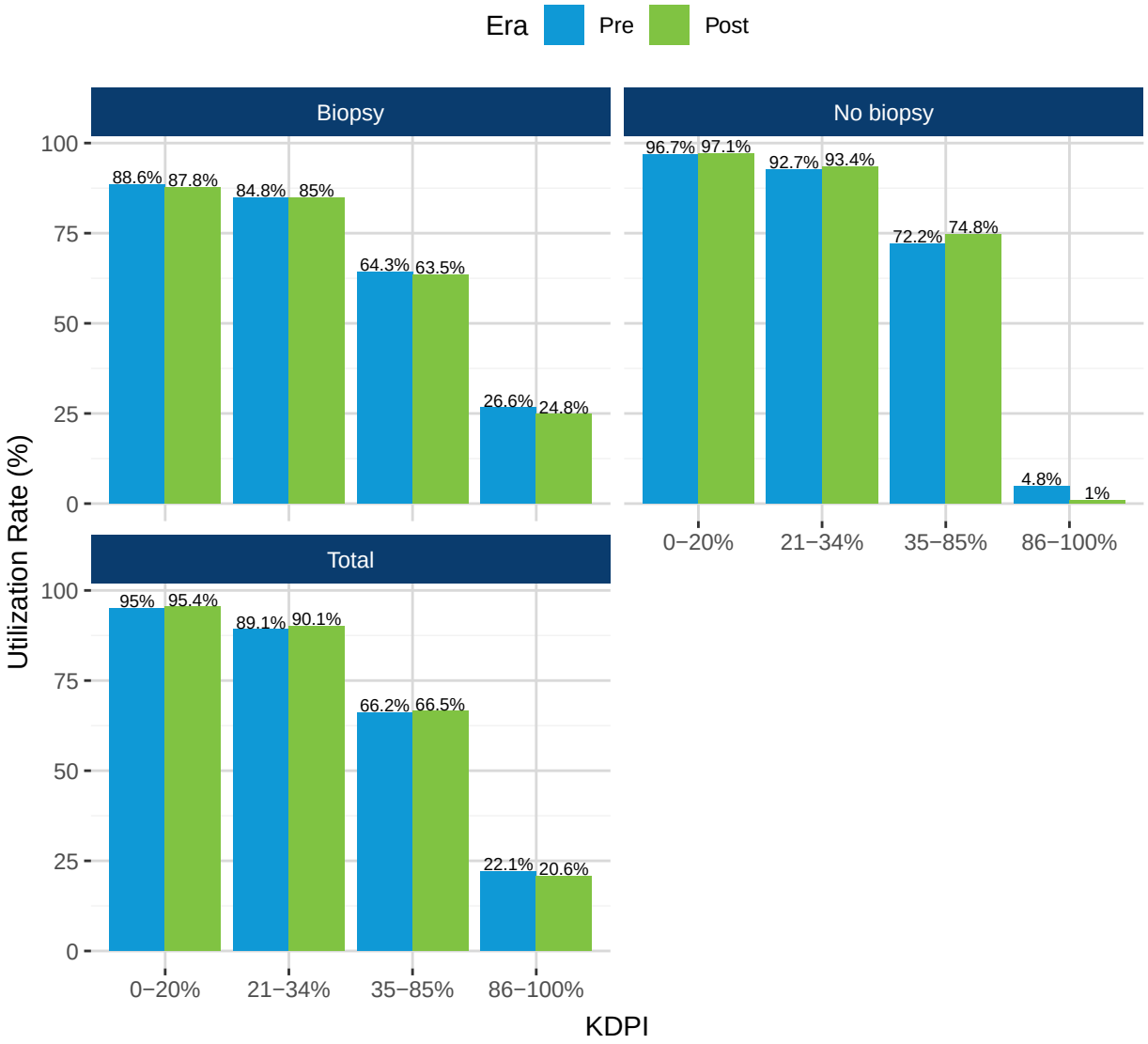


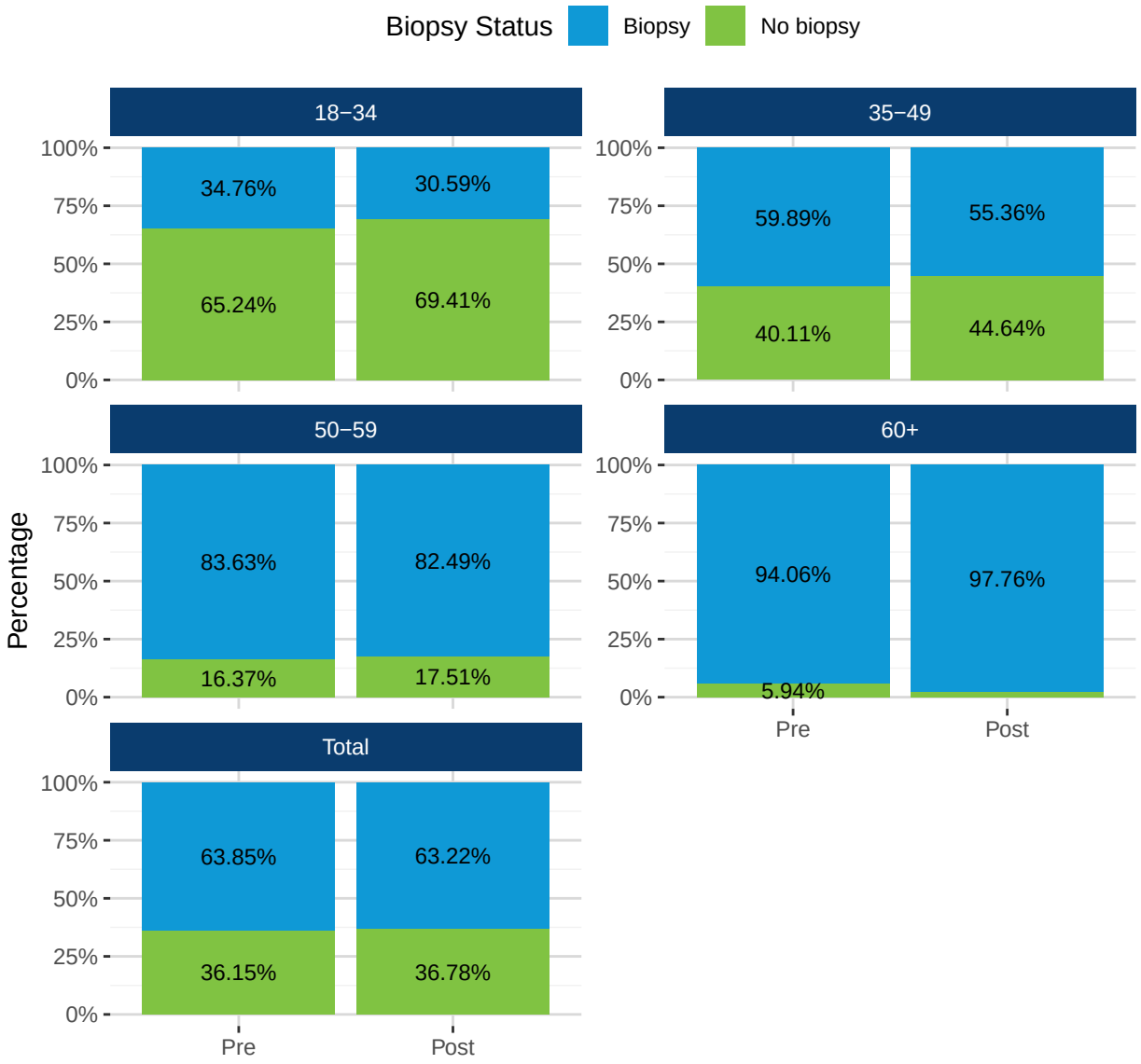
Table 9: Utilization Rates for Deceased Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

Biopsy Status	KDPI	Era	Transplanted	Kidneys Available	Utilization Rate (%)
Biopsy	0-20%	Pre	992	1,120	88.57
		Post	899	1,024	87.79
	21-34%	Pre	1,549	1,826	84.83
		Post	1,390	1,636	84.96
	35-85%	Pre	6,530	10,160	64.27
		Post	7,154	11,258	63.55
	86-100%	Pre	825	3,102	26.60
		Post	1,054	4,256	24.77
No biopsy	0-20%	Pre	4,039	4,176	96.72
		Post	4,518	4,654	97.08
	21-34%	Pre	2,031	2,190	92.74
		Post	2,388	2,556	93.43
	35-85%	Pre	2,365	3,278	72.15
		Post	2,968	3,970	74.76
	86-100%	Pre	39	806	4.84
		Post	9	894	1.01
Total	0-20%	Pre	5,031	5,296	95.00
		Post	5,417	5,678	95.40
	21-34%	Pre	3,580	4,016	89.14
		Post	3,778	4,192	90.12
	35-85%	Pre	8,895	13,438	66.19
		Post	10,122	15,228	66.47
	86-100%	Pre	864	3,908	22.11
		Post	1,063	5,150	20.64

Donor Age

Table 10 and **Figure 7** 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 creatine 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 59.89% in the pre-policy era to 55.36% in the post-policy era. Although all donors over the age of 60 meet minimum criteria for biopsy, 2.24% of donors 60 years old or older were not biopsied.

Figure 7: 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 10: 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	1232 (34.76%)	2312 (65.24%)	3544 (100%)	1141 (30.59%)	2589 (69.41%)	3730 (100%)
35-49	2482 (59.89%)	1662 (40.11%)	4144 (100%)	2534 (55.36%)	2043 (44.64%)	4577 (100%)
50-59	2514 (83.63%)	492 (16.37%)	3006 (100%)	2794 (82.49%)	593 (17.51%)	3387 (100%)
60+	1870 (94.06%)	118 (5.94%)	1988 (100%)	2614 (97.76%)	60 (2.24%)	2674 (100%)
Total	8098 (63.85%)	4584 (36.15%)	12682 (100%)	9083 (63.22%)	5285 (36.78%)	14368 (100%)

Table 11 and **Figure 8** 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 except for the 50-59 age group, which stayed relatively the same between the two policy eras. The largest change in non-use rates for donors who were biopsied occurred in donors aged 60+, going from 60.89% to 63.63%

Figure 8: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

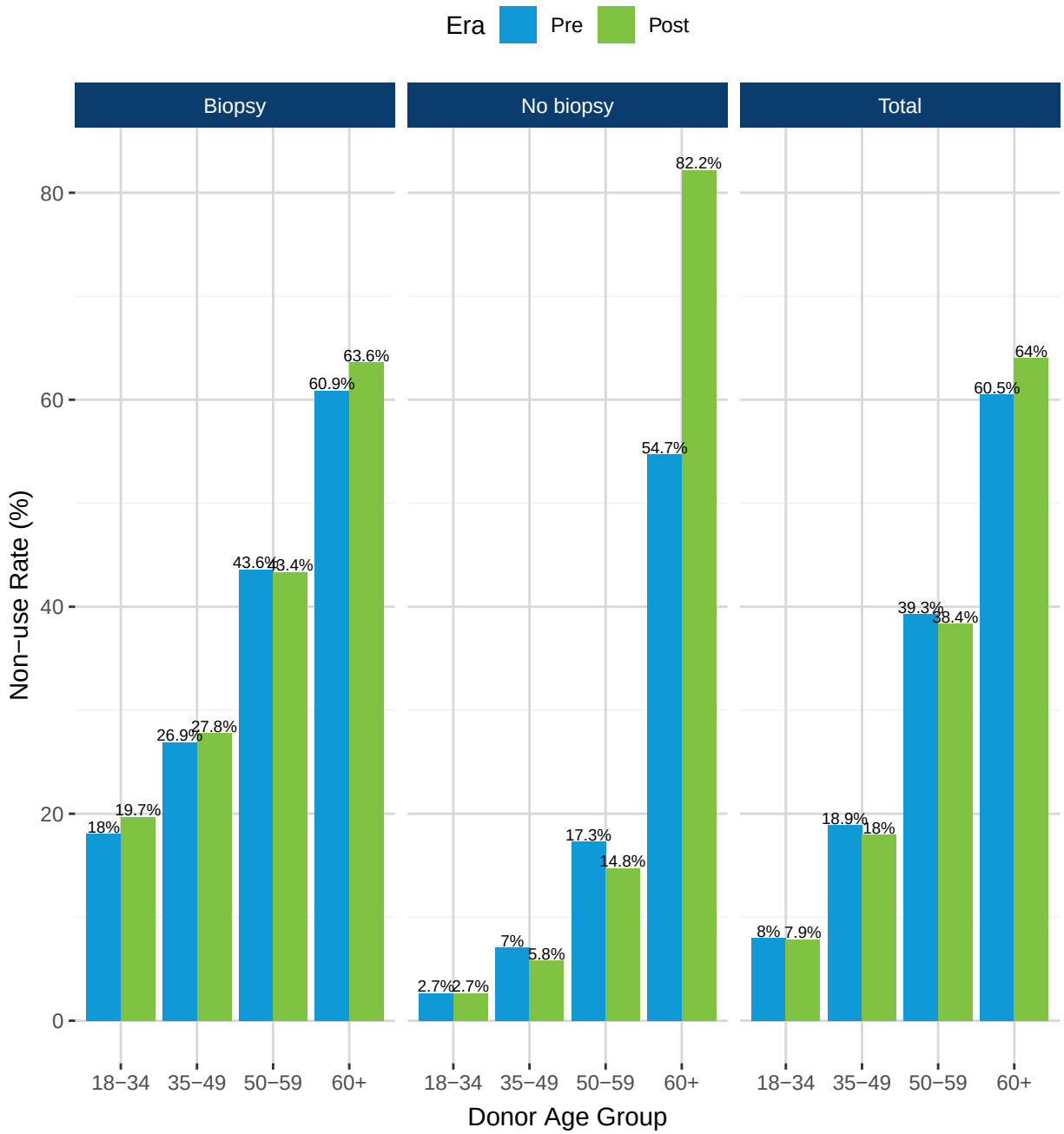


Table 11: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

Biopsy Status	Age Group	Era	Kidneys Recovered for Transplant but Not Transplanted	Kidneys Recovered	Non-use Rate (%)
Biopsy	18-34	Pre	443	2,454	18.05
		Post	447	2,268	19.71
	35-49	Pre	1,330	4,942	26.91
		Post	1,400	5,034	27.81
	50-59	Pre	2,179	4,996	43.61
		Post	2,412	5,564	43.35
	60+	Pre	2,267	3,723	60.89
		Post	3,306	5,196	63.63
No biopsy	18-34	Pre	123	4,600	2.67
		Post	138	5,163	2.67
	35-49	Pre	234	3,319	7.05
		Post	236	4,068	5.80
	50-59	Pre	169	975	17.33
		Post	174	1,179	14.76
	60+	Pre	128	234	54.70
		Post	97	118	82.20
Total	18-34	Pre	566	7,054	8.02
		Post	585	7,431	7.87
	35-49	Pre	1,564	8,261	18.93
		Post	1,636	9,102	17.97
	50-59	Pre	2,348	5,971	39.32
		Post	2,586	6,743	38.35
	60+	Pre	2,395	3,957	60.53
		Post	3,403	5,314	64.04

Table 12 and **Figure 9** 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 except the 50-59 age group. 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 62.58% to 67%

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

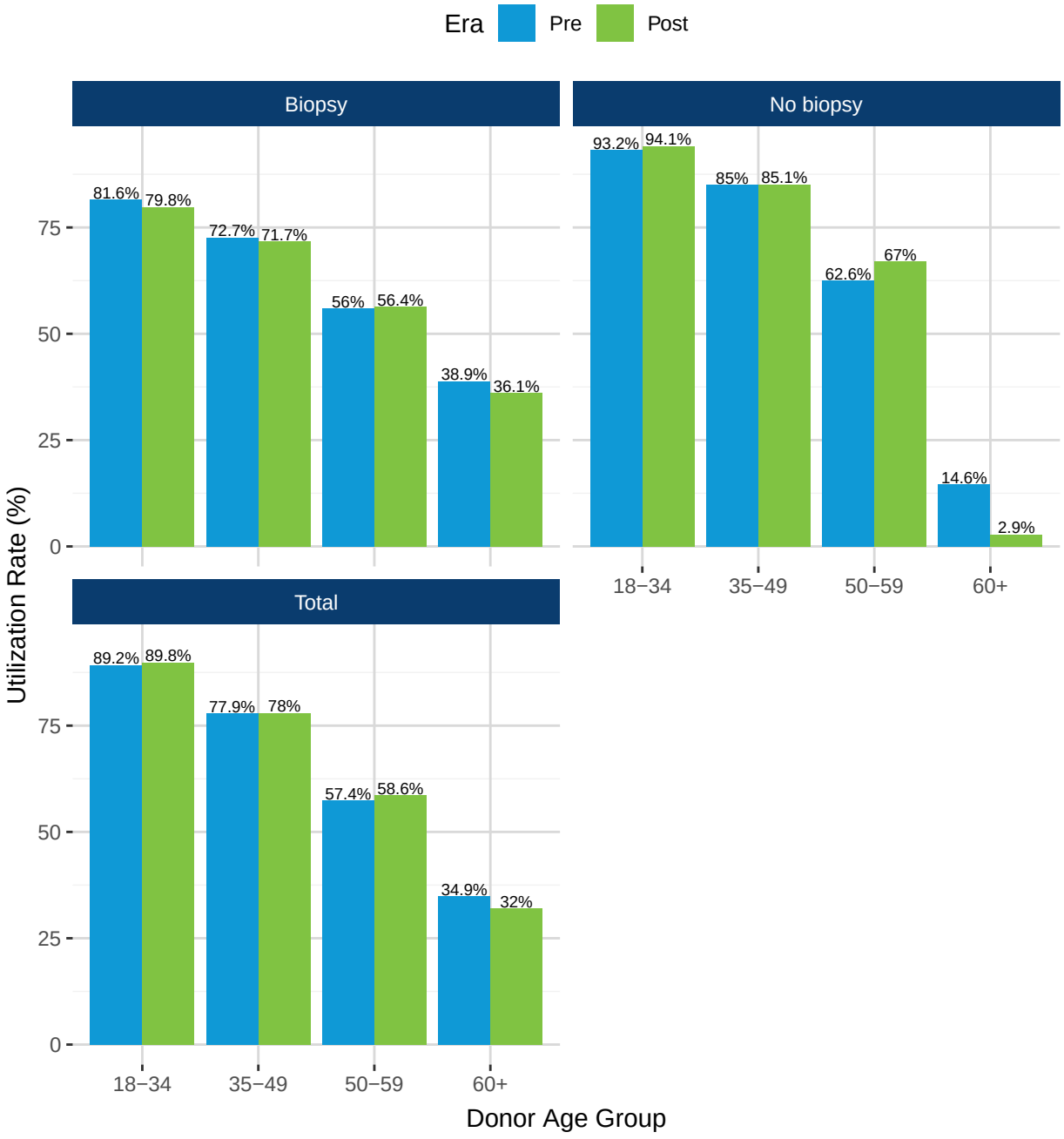


Table 12: Utilization Rates for Deceased Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

Biopsy Status	Age Group	Era	Transplanted	Kidneys Available	Utilization Rate (%)
Biopsy	18-34	Pre	2,011	2,466	81.55
		Post	1,821	2,282	79.80
	35-49	Pre	3,612	4,970	72.68
		Post	3,634	5,070	71.68
	50-59	Pre	2,817	5,028	56.03
		Post	3,152	5,590	56.39
	60+	Pre	1,456	3,744	38.89
		Post	1,890	5,232	36.12
No biopsy	18-34	Pre	4,477	4,804	93.19
		Post	5,025	5,338	94.14
	35-49	Pre	3,085	3,630	84.99
		Post	3,832	4,502	85.12
	50-59	Pre	806	1,288	62.58
		Post	1,005	1,500	67.00
	60+	Pre	106	728	14.56
		Post	21	734	2.86
Total	18-34	Pre	6,488	7,270	89.24
		Post	6,846	7,620	89.84
	35-49	Pre	6,697	8,600	77.87
		Post	7,466	9,572	78.00
	50-59	Pre	3,623	6,316	57.36
		Post	4,157	7,090	58.63
	60+	Pre	1,562	4,472	34.93
		Post	1,911	5,966	32.03

Recovering OPO

Figure 10 shows frequency of biopsy of deceased kidney donors recovered in each policy era by recovering OPO. In the post-policy era, 23 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 10: Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Recovering OPO

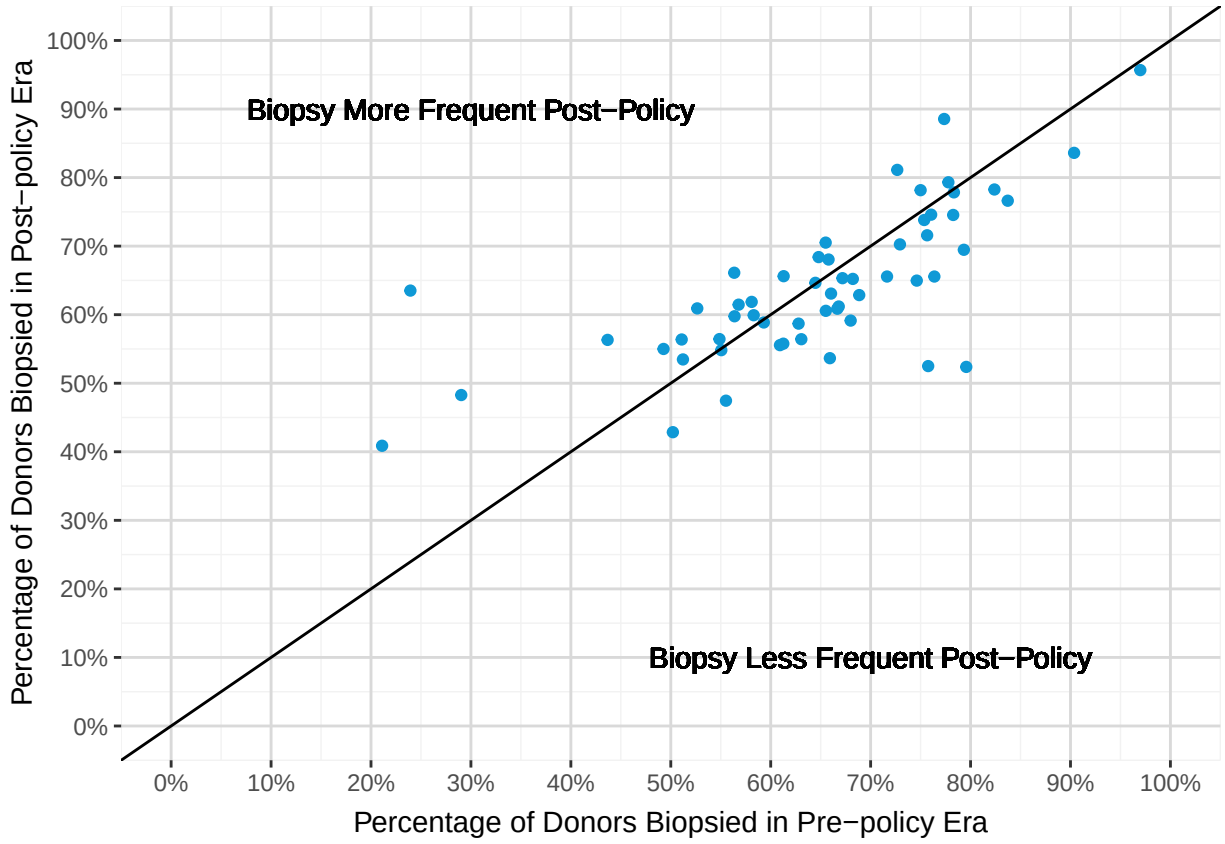


Table 13 shows the count and percentage of deceased kidney donors recovered in each policy era by whether or not a biopsy was performed as well as by recovering OPO.

Table 13: 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
1	74 (79.57%)	19 (20.43%)	93 (100%)	55 (52.38%)	50 (47.62%)	105 (100%)
2	57 (75%)	19 (25%)	76 (100%)	68 (78.16%)	19 (21.84%)	87 (100%)
3	369 (61.3%)	233 (38.7%)	602 (100%)	416 (65.62%)	218 (34.38%)	634 (100%)
4	17 (23.94%)	54 (76.06%)	71 (100%)	47 (63.51%)	27 (36.49%)	74 (100%)
5	136 (61.26%)	86 (38.74%)	222 (100%)	116 (55.77%)	92 (44.23%)	208 (100%)
6	135 (62.79%)	80 (37.21%)	215 (100%)	135 (58.7%)	95 (41.3%)	230 (100%)
7	164 (77.36%)	48 (22.64%)	212 (100%)	201 (88.55%)	26 (11.45%)	227 (100%)
8	38 (43.68%)	49 (56.32%)	87 (100%)	49 (56.32%)	38 (43.68%)	87 (100%)
9	255 (68%)	120 (32%)	375 (100%)	233 (59.14%)	161 (40.86%)	394 (100%)
10	199 (68.86%)	90 (31.14%)	289 (100%)	220 (62.86%)	130 (37.14%)	350 (100%)
11	157 (66.81%)	78 (33.19%)	235 (100%)	164 (61.19%)	104 (38.81%)	268 (100%)
12	142 (79.33%)	37 (20.67%)	179 (100%)	182 (69.47%)	80 (30.53%)	262 (100%)
13	95 (65.52%)	50 (34.48%)	145 (100%)	86 (60.56%)	56 (39.44%)	142 (100%)
14	196 (55.52%)	157 (44.48%)	353 (100%)	205 (47.45%)	227 (52.55%)	432 (100%)
15	131 (65.5%)	69 (34.5%)	200 (100%)	165 (70.51%)	69 (29.49%)	234 (100%)
16	107 (54.87%)	88 (45.13%)	195 (100%)	149 (56.44%)	115 (43.56%)	264 (100%)
17	104 (75.36%)	34 (24.64%)	138 (100%)	93 (73.81%)	33 (26.19%)	126 (100%)
18	161 (96.99%)	5 (3.01%)	166 (100%)	177 (95.68%)	8 (4.32%)	185 (100%)
19	278 (52.65%)	250 (47.35%)	528 (100%)	413 (60.91%)	265 (39.09%)	678 (100%)
20	86 (59.31%)	59 (40.69%)	145 (100%)	93 (58.86%)	65 (41.14%)	158 (100%)
21	150 (90.36%)	16 (9.64%)	166 (100%)	153 (83.61%)	30 (16.39%)	183 (100%)
22	72 (83.72%)	14 (16.28%)	86 (100%)	59 (76.62%)	18 (23.38%)	77 (100%)
23	36 (66.67%)	18 (33.33%)	54 (100%)	28 (60.87%)	18 (39.13%)	46 (100%)
24	274 (64.47%)	151 (35.53%)	425 (100%)	320 (64.65%)	175 (35.35%)	495 (100%)
25	27 (29.03%)	66 (70.97%)	93 (100%)	56 (48.28%)	60 (51.72%)	116 (100%)
26	244 (56.35%)	189 (43.65%)	433 (100%)	320 (66.12%)	164 (33.88%)	484 (100%)
27	117 (51.09%)	112 (48.91%)	229 (100%)	137 (56.38%)	106 (43.62%)	243 (100%)
28	137 (58.3%)	98 (41.7%)	235 (100%)	148 (59.92%)	99 (40.08%)	247 (100%)
29	137 (56.38%)	106 (43.62%)	243 (100%)	156 (59.77%)	105 (40.23%)	261 (100%)
30	244 (74.62%)	83 (25.38%)	327 (100%)	204 (64.97%)	110 (35.03%)	314 (100%)
31	236 (65.92%)	122 (34.08%)	358 (100%)	235 (53.65%)	203 (46.35%)	438 (100%)
32	289 (75.65%)	93 (24.35%)	382 (100%)	335 (71.58%)	133 (28.42%)	468 (100%)
33	97 (72.93%)	36 (27.07%)	133 (100%)	111 (70.25%)	47 (29.75%)	158 (100%)
34	174 (67.18%)	85 (32.82%)	259 (100%)	162 (65.32%)	86 (34.68%)	248 (100%)
35	176 (68.22%)	82 (31.78%)	258 (100%)	225 (65.22%)	120 (34.78%)	345 (100%)
36	225 (75.76%)	72 (24.24%)	297 (100%)	168 (52.5%)	152 (47.5%)	320 (100%)
37	141 (78.33%)	39 (21.67%)	180 (100%)	137 (77.84%)	39 (22.16%)	176 (100%)
38	77 (77.78%)	22 (22.22%)	99 (100%)	92 (79.31%)	24 (20.69%)	116 (100%)
39	36 (78.26%)	10 (21.74%)	46 (100%)	41 (74.55%)	14 (25.45%)	55 (100%)
40	210 (72.66%)	79 (27.34%)	289 (100%)	318 (81.12%)	74 (18.88%)	392 (100%)

(continued)

Recovering OPO	Biopsied	Not Biopsied	Total	Biopsied	Not Biopsied	Total
41	127 (64.8%)	69 (35.2%)	196 (100%)	184 (68.4%)	85 (31.6%)	269 (100%)
42	92 (60.93%)	59 (39.07%)	151 (100%)	100 (55.56%)	80 (44.44%)	180 (100%)
43	196 (55.06%)	160 (44.94%)	356 (100%)	233 (54.82%)	192 (45.18%)	425 (100%)
44	102 (49.28%)	105 (50.72%)	207 (100%)	121 (55%)	99 (45%)	220 (100%)
45	57 (21.11%)	213 (78.89%)	270 (100%)	121 (40.88%)	175 (59.12%)	296 (100%)
46	251 (63.07%)	147 (36.93%)	398 (100%)	268 (56.42%)	207 (43.58%)	475 (100%)
47	35 (66.04%)	18 (33.96%)	53 (100%)	41 (63.08%)	24 (36.92%)	65 (100%)
48	126 (51.22%)	120 (48.78%)	246 (100%)	131 (53.47%)	114 (46.53%)	245 (100%)
49	230 (56.79%)	175 (43.21%)	405 (100%)	303 (61.46%)	190 (38.54%)	493 (100%)
50	144 (71.64%)	57 (28.36%)	201 (100%)	139 (65.57%)	73 (34.43%)	212 (100%)
51	119 (50.21%)	118 (49.79%)	237 (100%)	84 (42.86%)	112 (57.14%)	196 (100%)
52	216 (76.06%)	68 (23.94%)	284 (100%)	273 (74.59%)	93 (25.41%)	366 (100%)
53	97 (76.38%)	30 (23.62%)	127 (100%)	99 (65.56%)	52 (34.44%)	151 (100%)
54	100 (65.79%)	52 (34.21%)	152 (100%)	115 (68.05%)	54 (31.95%)	169 (100%)
55	145 (82.39%)	31 (17.61%)	176 (100%)	126 (78.26%)	35 (21.74%)	161 (100%)
56	61 (58.1%)	44 (41.9%)	105 (100%)	73 (61.86%)	45 (38.14%)	118 (100%)

Figure 11 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 37 of the 56 recovering OPOs.

Figure 11: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO, for Biopsied Donors

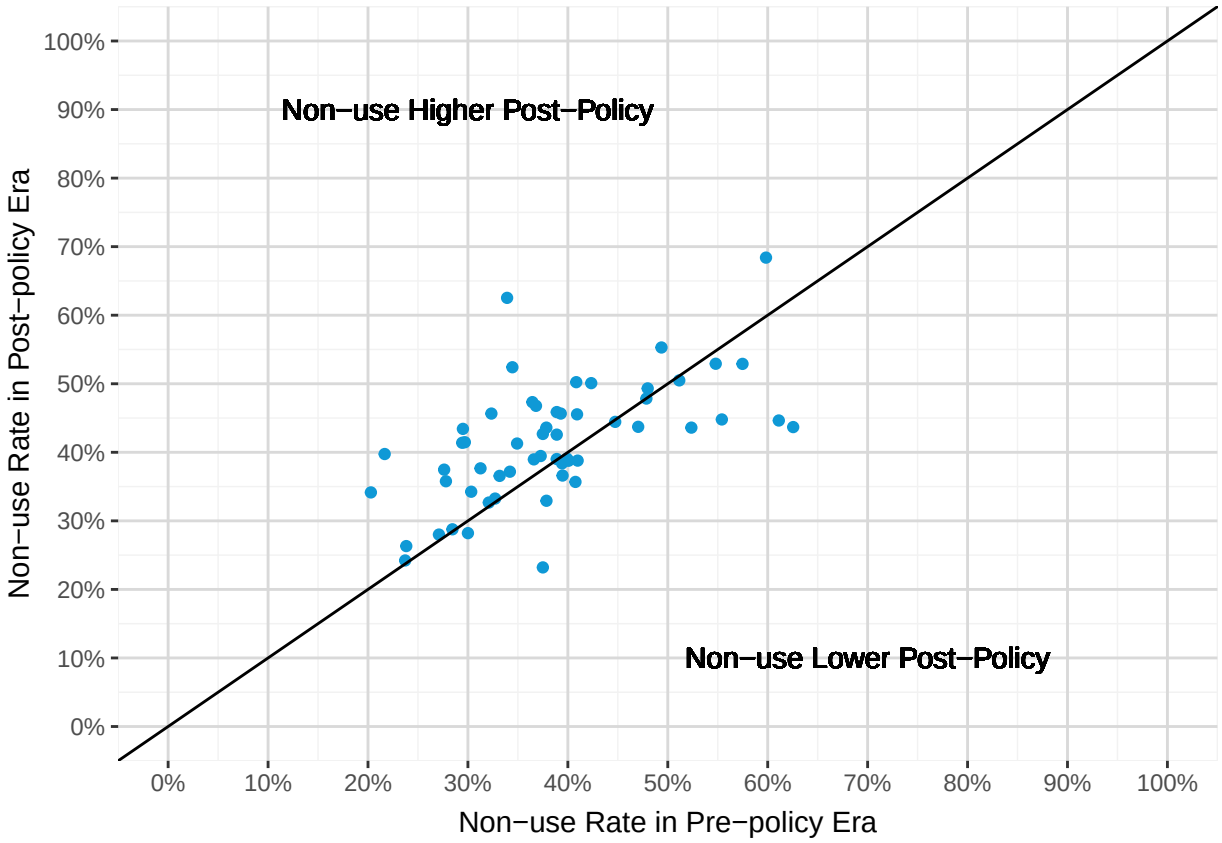
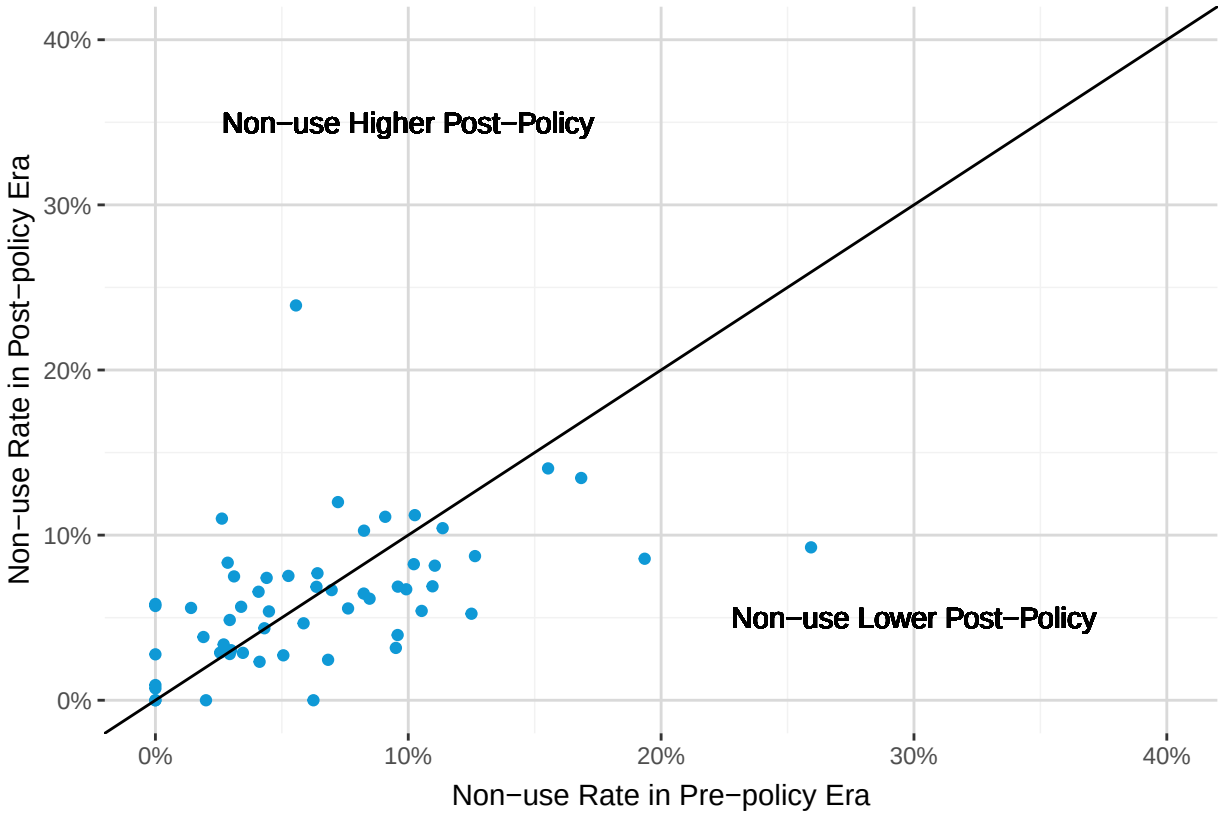


Figure 12 shows the unadjusted non-use rates for all deceased kidney donors recovered by policy era and recovering OPO, for donors that were not biopsied. For donors who were not biopsied a total of 27 recovering OPOs saw an increase in non-use rate.

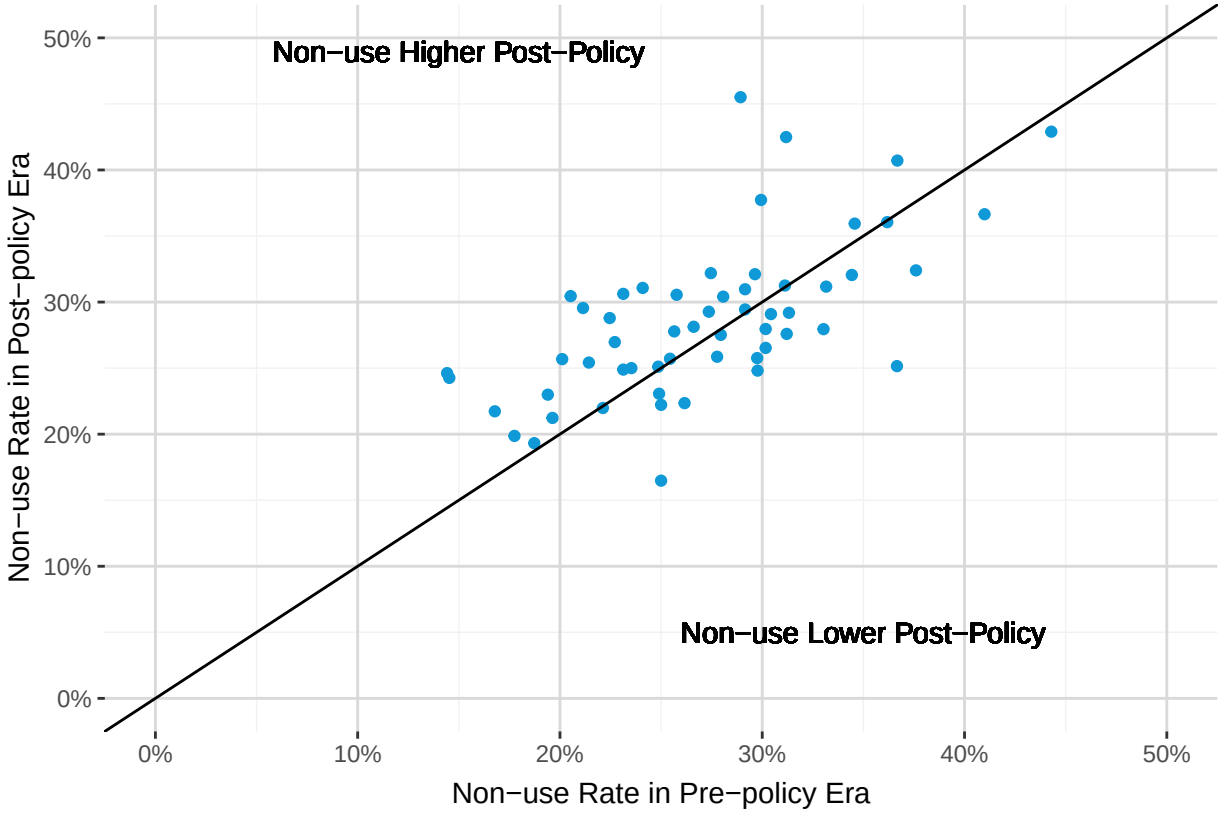
Figure 12: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO, for No Biopsy Donors



Note: The axes for this plot end at 40%

Figure 13 shows the unadjusted non-use rates for all deceased kidney donors recovered by policy era and recovering OPO. A total of 34 recovering OPOs saw an increase in non-use rate overall.

Figure 13: 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 14 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 38 of the 56 recovering OPOs.

Figure 14: Utilization Rates for Deceased Donors Recovered in United States by Policy Era and Recovering OPO, for Biopsied Donors

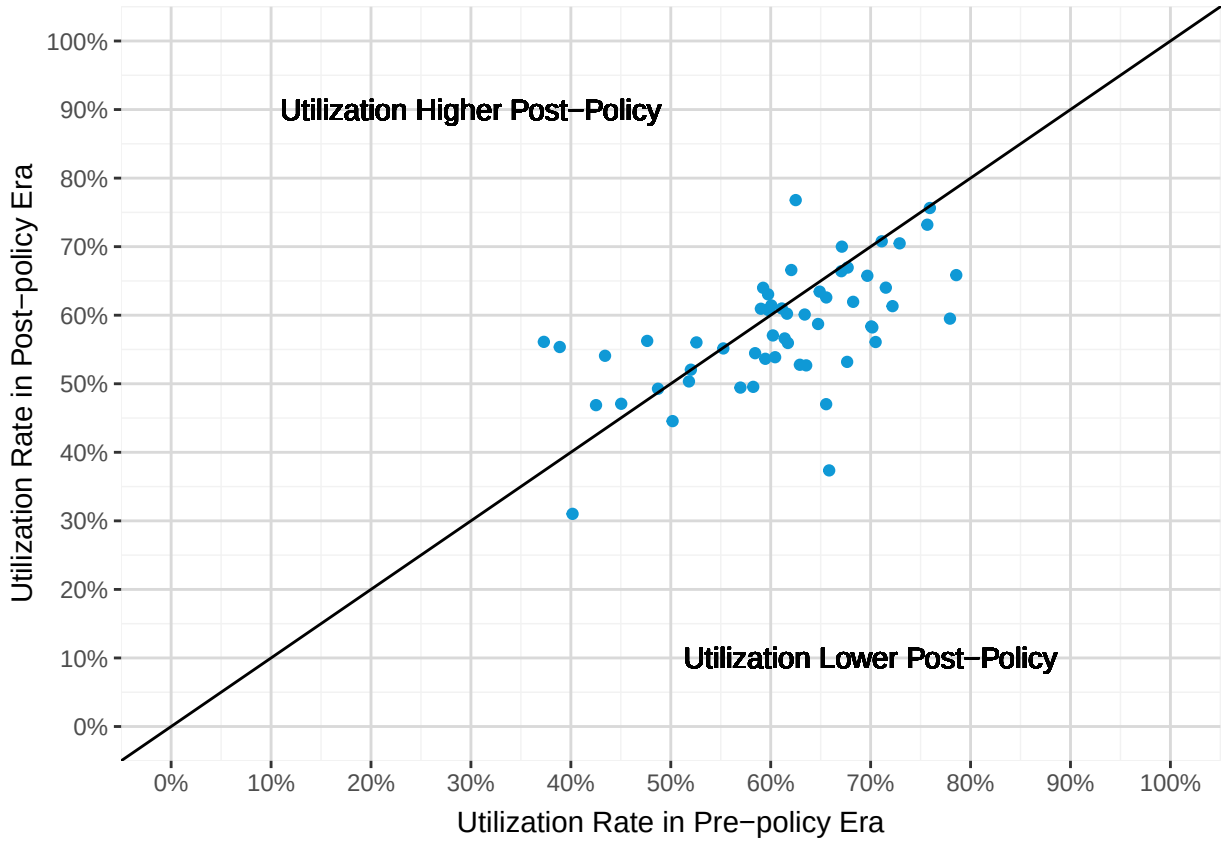
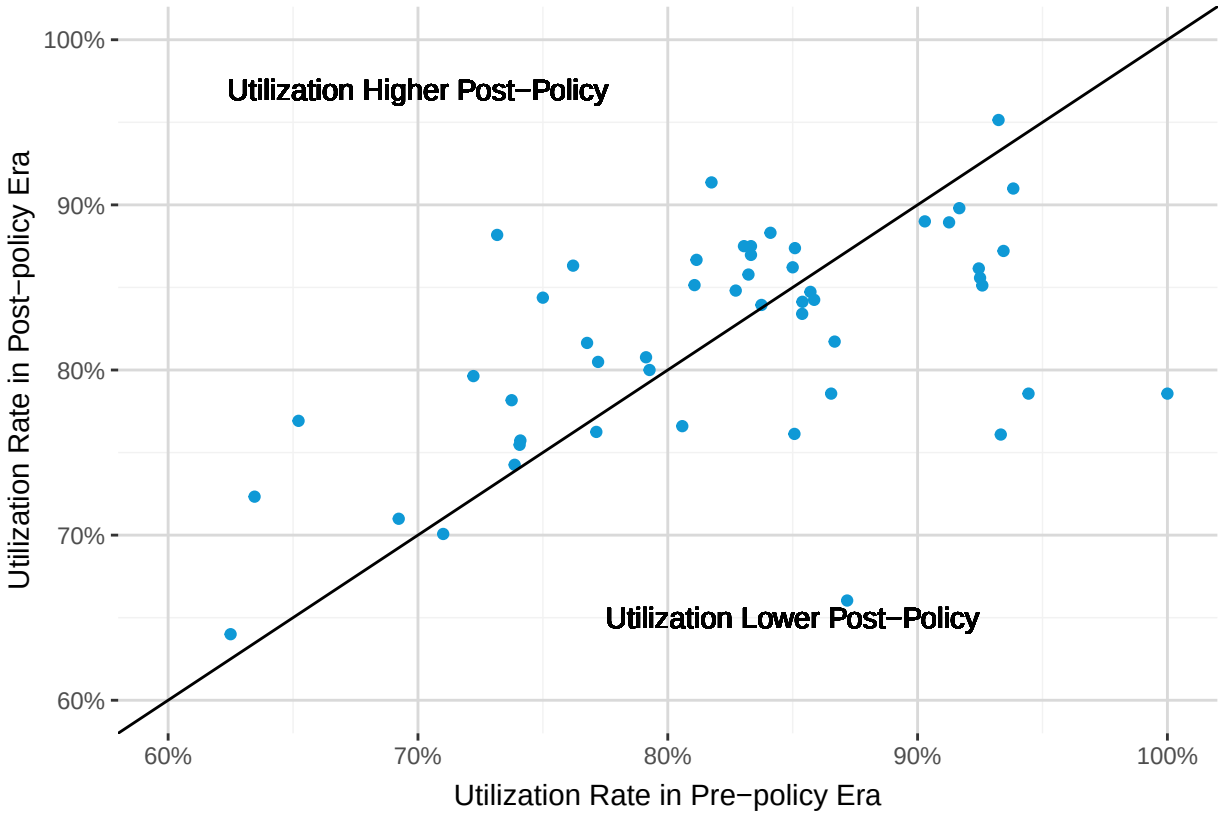


Figure 15 shows the utilization rates for all deceased donors recovered by policy era and recovering OPO, for donors who were not biopsied. For donors who were not biopsied a total of 24 recovering OPOs saw a decrease in utilization rate.

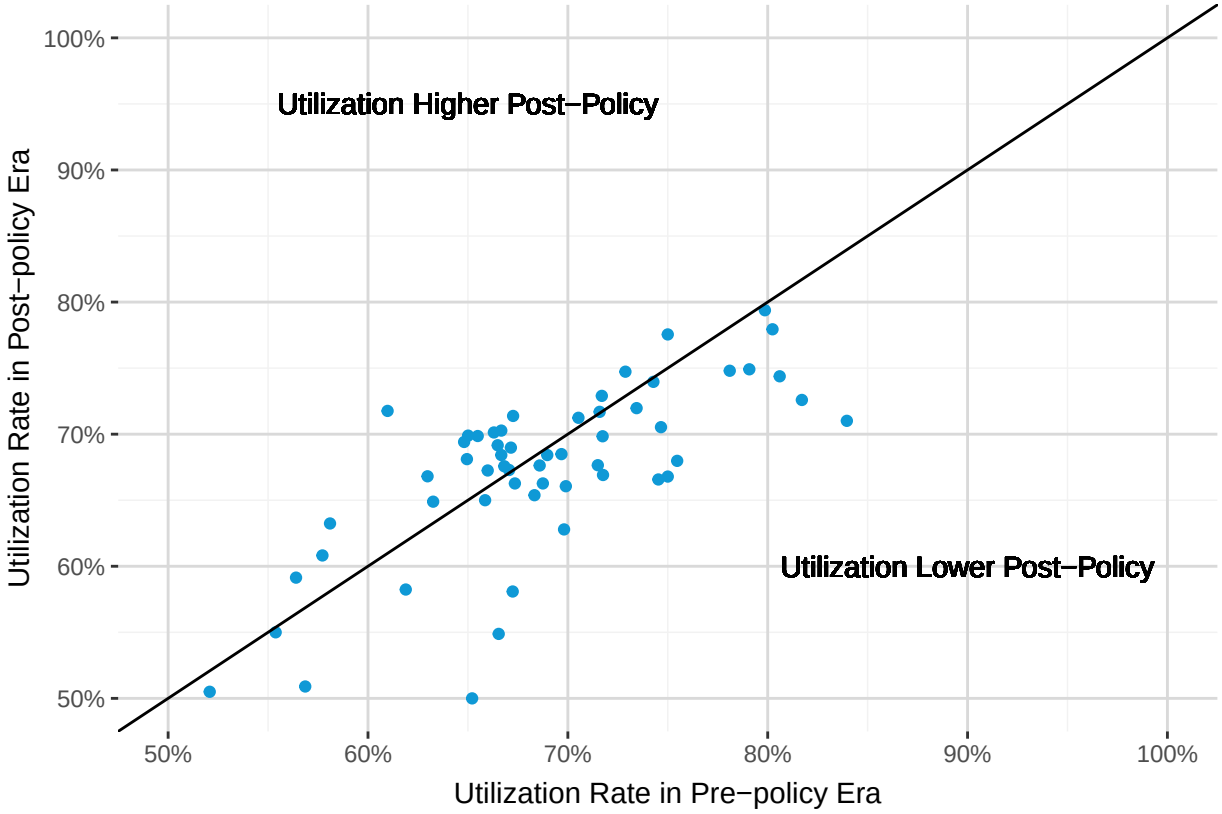
Figure 15: Utilization Rates for Deceased Donors Recovered in United States by Policy Era and Recovering OPO, for No Biopsy Donors



Note: The axes for this plot start at 60%

Figure 16 shows the utilization rates for all deceased donors recovered by policy era and recovering OPO. A total of 32 recovering OPOs saw a decrease in utilization rate overall.

Figure 16: Utilization Rates for 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 14,368 compared to 12,682 donors in the pre-policy era. There was a slight increase in the non-use rate overall, increasing to 28.72% in the post-policy era, from 27.23% in the pre. The percentage of donors being biopsied stayed similar between the pre- and post-policy era, with 63.85% and 63.22% respectively. Biopsies for donors who met the minimum criteria for biopsy increased from 91.55% in the pre-policy era to 96.69% 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 50.64% in the pre-policy era to 44.78% in the post. For donors who met minimum criteria for biopsy and also were biopsied, non-use rates stayed relatively the same, going from 56% to 56.16% 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 35.47% to 44.31%. For donors who did not meet the minimum criteria for biopsy and still were biopsied their non-use rates increased from 23.57% to 24.89% 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 4.86% to 4.88%. 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 to no change in delayed graft function percentages, with slight increases being seen for organs coming from donors that were biopsied, increasing from 40.06% in the pre-policy era to 40.90% in the post-policy era.

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

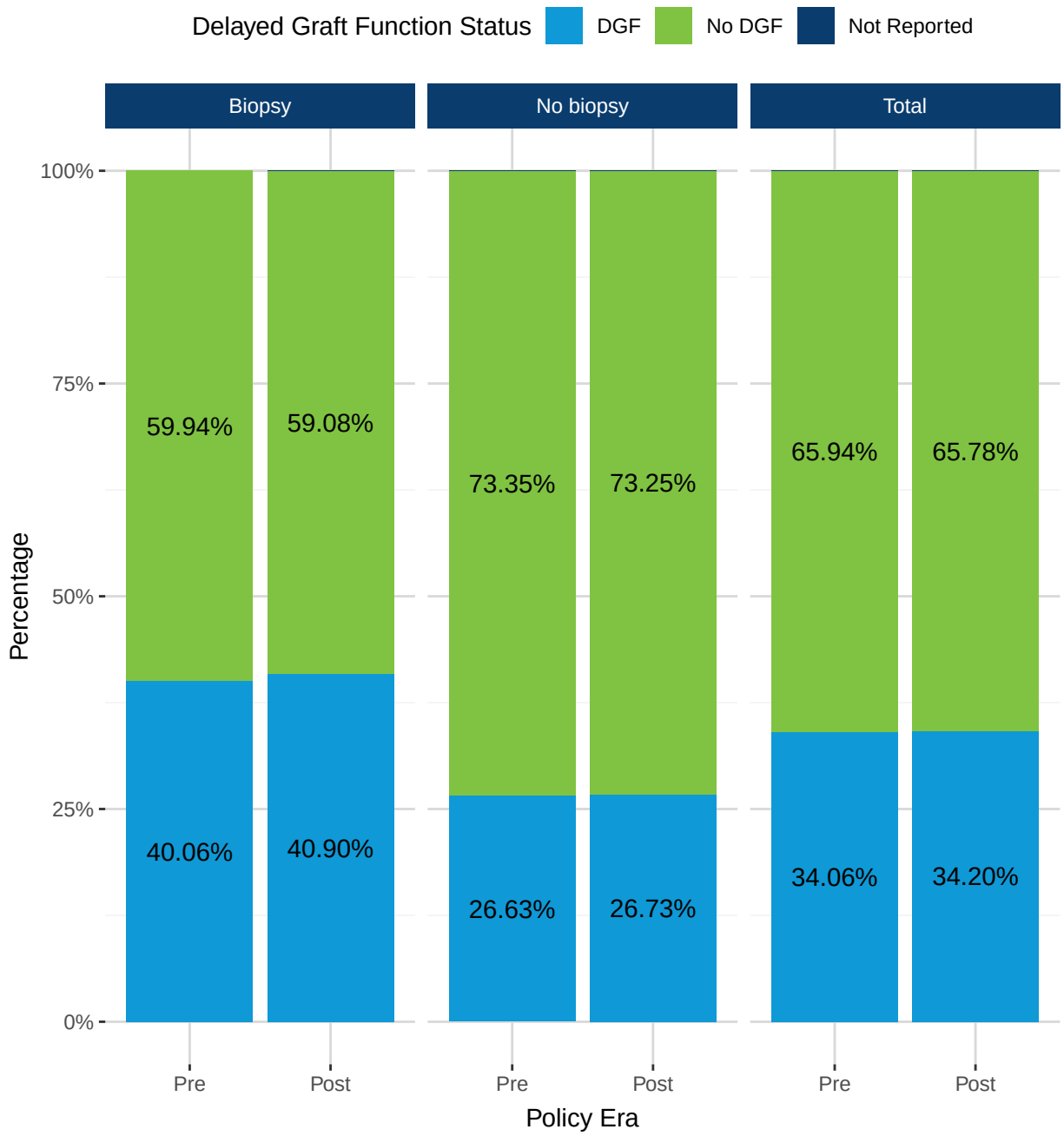


Table A1: Percentage of Transplants by Delayed Graft Function Status and Donor Biopsy Status

Biopsy Status	Era	DGF	No DGF	Not Reported	Total
Biopsy	Pre	3,895 (40.06%)	5,829 (59.94%)	0 (0.00%)	9,724 (100.00%)
	Post	4,218 (40.90%)	6,093 (59.08%)	2 (0.02%)	10,313 (100.00%)
No biopsy	Pre	2,092 (26.63%)	5,762 (73.35%)	1 (0.01%)	7,855 (100.00%)
	Post	2,471 (26.73%)	6,773 (73.25%)	2 (0.02%)	9,246 (100.00%)
Total	Pre	5,987 (34.06%)	11,591 (65.94%)	1 (0.01%)	17,579 (100.00%)
	Post	6,689 (34.20%)	12,866 (65.78%)	4 (0.02%)	19,559 (100.00%)

Figure A2 and **Table A2** show six month unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 06, 2021 to March 04, 2023 by donor biopsy status. Graft survival did not change for transplanted organs coming from biopsied or non biopsied donors after policy implementation.

Figure A2: Six Month Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 06, 2021 - March 04, 2023 by Donor Biopsy Status

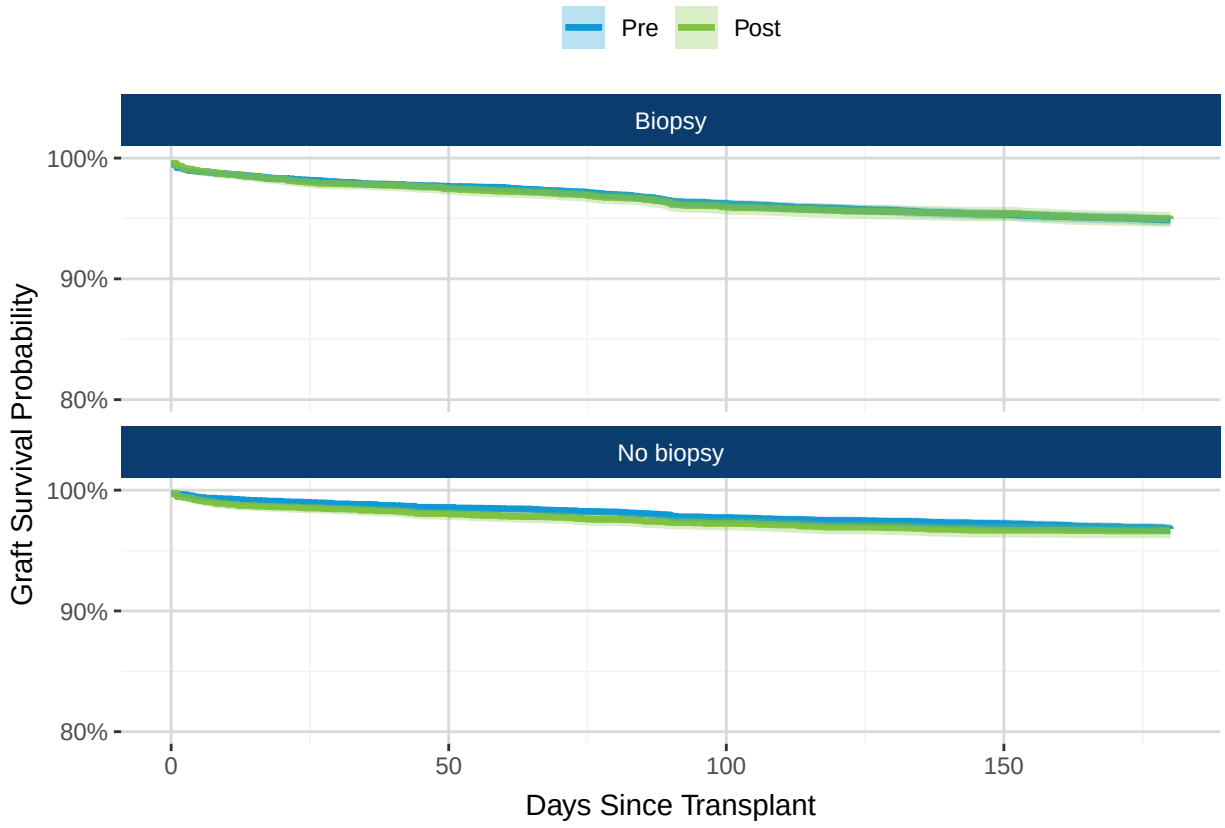


Table A2: Six Month Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 06, 2021 - March 04, 2023 by Donor Biopsy Status

Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
Biopsy	Pre	9434	482	8919	94.9	(94.4, 95.3)
	Post	4766	240	4510	95	(94.3, 95.5)
No biopsy	Pre	7033	225	6776	96.8	(96.4, 97.2)
	Post	3926	132	3772	96.6	(96.0, 97.2)

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 38.95% 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	1,253 (39.05%)	1,956 (60.95%)	0 (0.00%)	3,209 (100.00%)
		Post	1,633 (38.91%)	2,564 (61.09%)	0 (0.00%)	4,197 (100.00%)
	No biopsy	Pre	171 (38.95%)	268 (61.05%)	0 (0.00%)	439 (100.00%)
		Post	59 (31.89%)	126 (68.11%)	0 (0.00%)	185 (100.00%)
Criteria Not Met	Biopsy	Pre	2,642 (40.55%)	3,873 (59.45%)	0 (0.00%)	6,515 (100.00%)
		Post	2,585 (42.27%)	3,529 (57.70%)	2 (0.03%)	6,116 (100.00%)
	No biopsy	Pre	1,921 (25.90%)	5,494 (74.08%)	1 (0.01%)	7,416 (100.00%)
		Post	2,412 (26.62%)	6,647 (73.36%)	2 (0.02%)	9,061 (100.00%)

Figure A4 and **Table A4** show six month unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 06, 2021 to March 04, 2023 by donor biopsy status and minimum criteria for biopsy. Graft survival did not change for any group after policy implementation.

Figure A4: Six Month Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 06, 2021 - March 04, 2023 by Donor Biopsy Status and Minimum Criteria for Biopsy

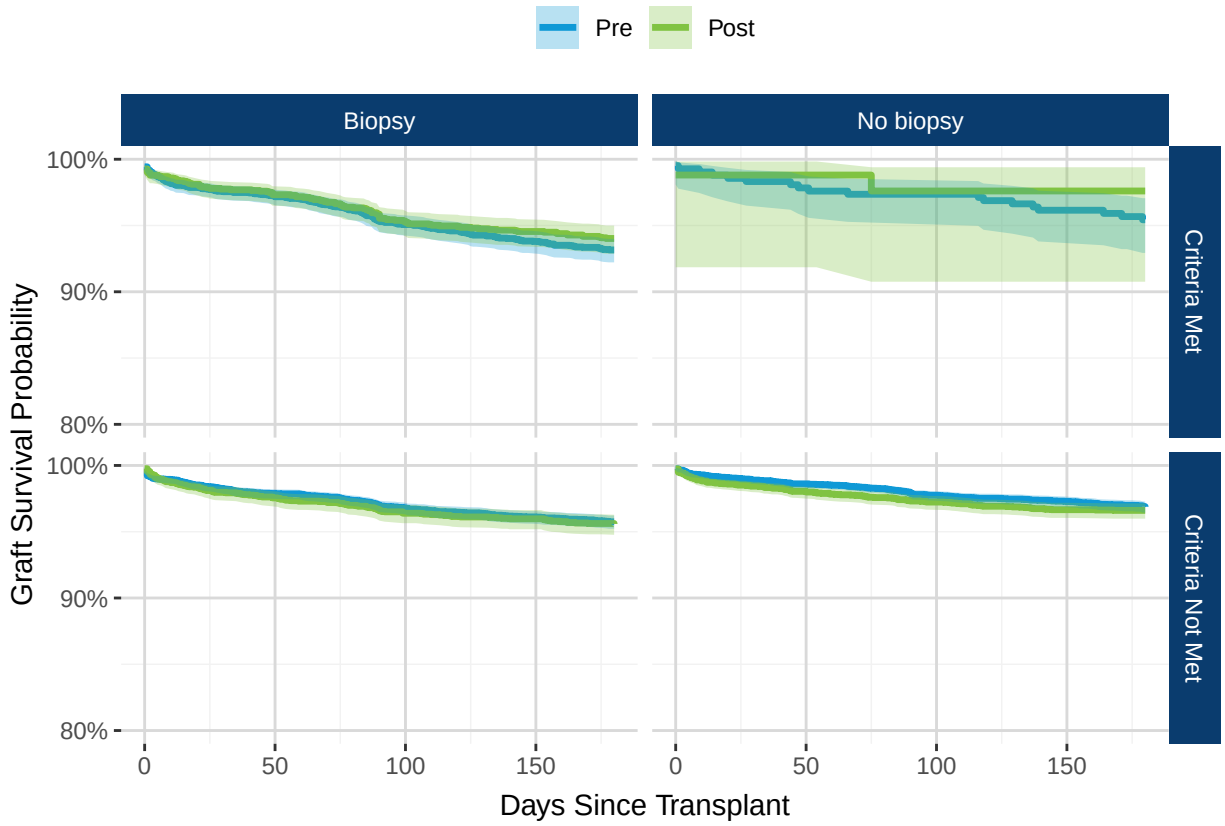


Table A4: Six Month Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 06, 2021 - March 04, 2023 by Donor Biopsy Status and Minimum Criteria for Biopsy

Meets Minimum Criteria	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
Criteria Met	Biopsy	Pre	3145	215	2922	93.2	(92.2, 94.0)
		Post	1908	114	1789	94	(92.9, 95.0)
	No biopsy	Pre	416	19	396	95.4	(92.9, 97.1)
		Post	84	2	81	97.6	(90.8, 99.4)
Criteria Not Met	Biopsy	Pre	6289	267	5997	95.8	(95.2, 96.2)
		Post	2858	126	2721	95.6	(94.8, 96.3)
	No biopsy	Pre	6617	206	6380	96.9	(96.4, 97.3)
		Post	3842	130	3691	96.6	(96.0, 97.1)

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 31.08% to 36.44% 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 40.26% to 43.06% 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 30.46% to 29.73% in the post-policy era.

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

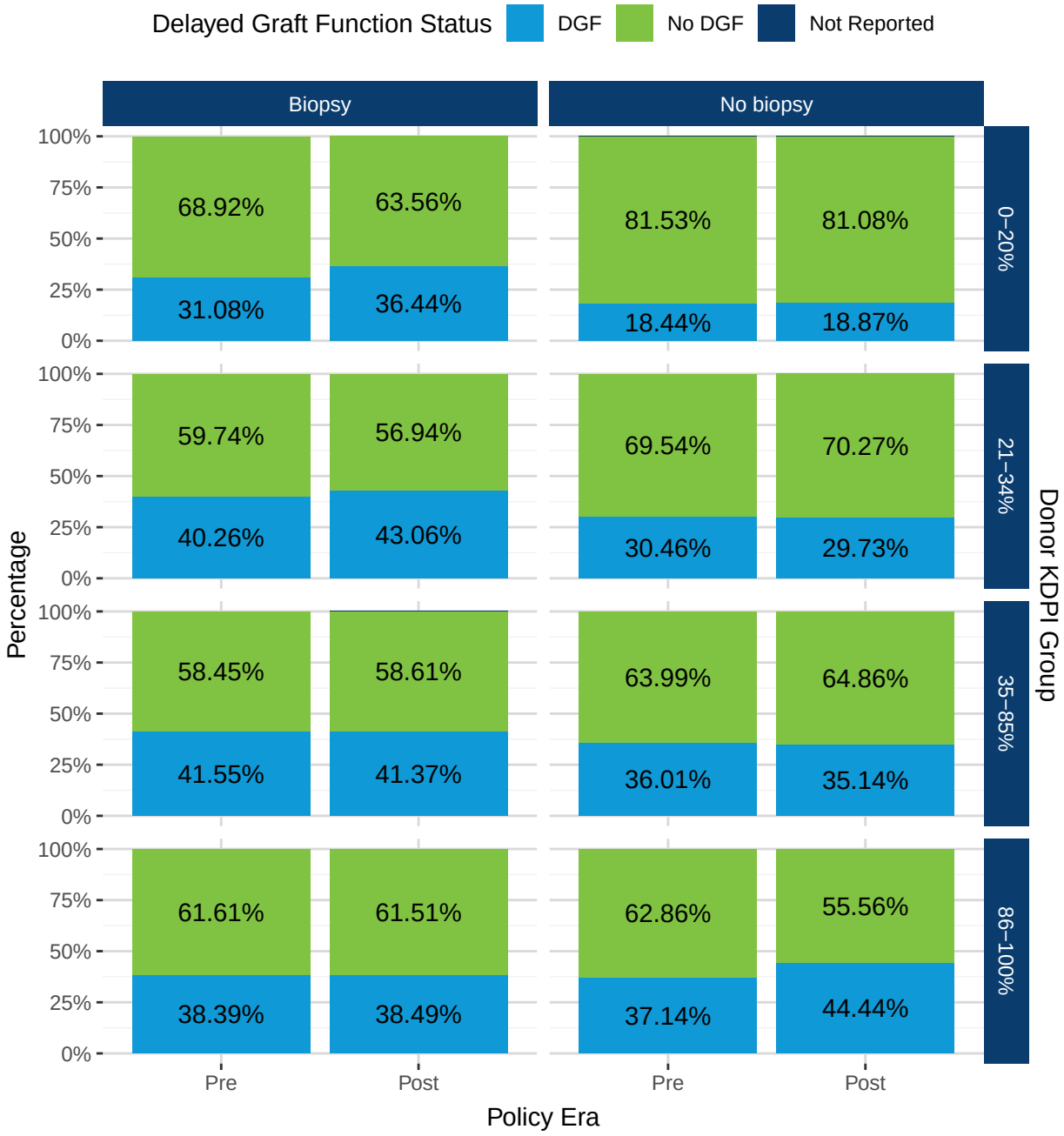
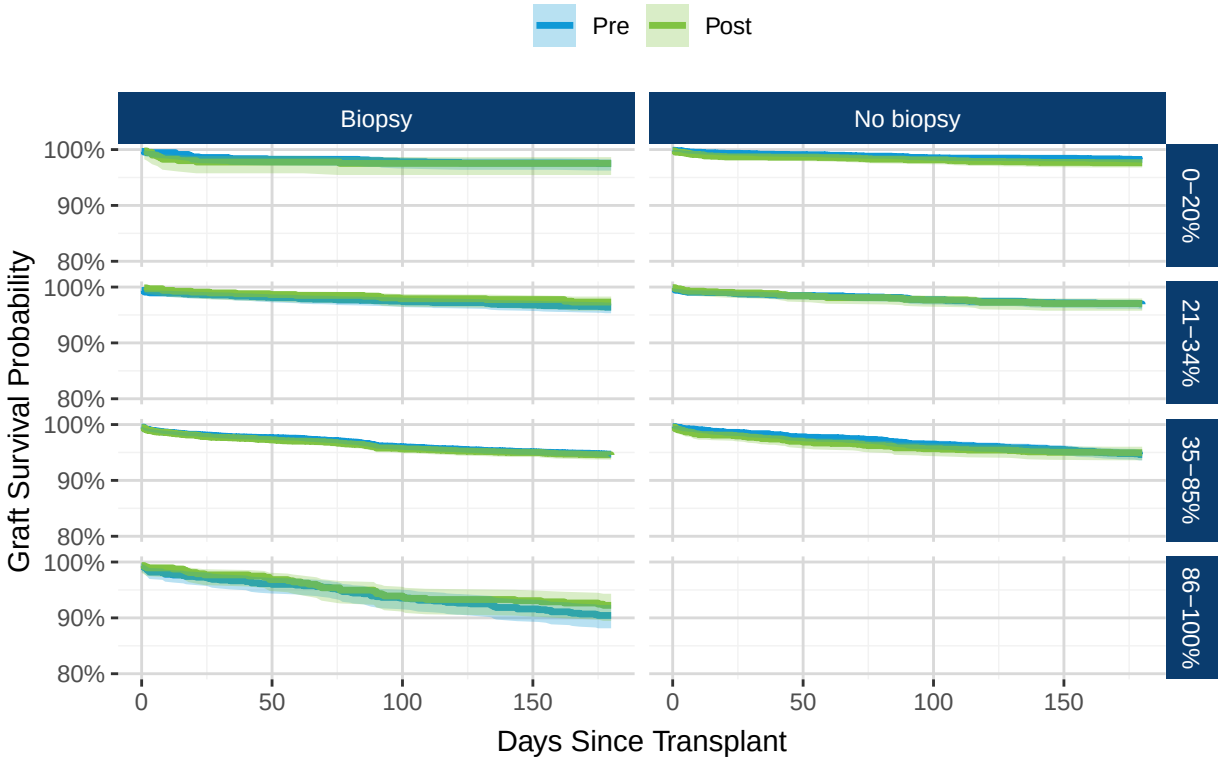


Table A5: Percentage of Transplants by Delayed Graft Function, Donor Biopsy Status and Donor KDPI Group

Biopsy Status	KDPI	Era	DGF	No DGF	Not Reported	Total
Biopsy	0-20%	Pre	299 (31.08%)	663 (68.92%)	0 (0.00%)	962 (100.00%)
		Post	317 (36.44%)	553 (63.56%)	0 (0.00%)	870 (100.00%)
	21-34%	Pre	616 (40.26%)	914 (59.74%)	0 (0.00%)	1,530 (100.00%)
		Post	593 (43.06%)	784 (56.94%)	0 (0.00%)	1,377 (100.00%)
	35-85%	Pre	2,679 (41.55%)	3,769 (58.45%)	0 (0.00%)	6,448 (100.00%)
		Post	2,925 (41.37%)	4,144 (58.61%)	2 (0.03%)	7,071 (100.00%)
	86-100%	Pre	301 (38.39%)	483 (61.61%)	0 (0.00%)	784 (100.00%)
		Post	383 (38.49%)	612 (61.51%)	0 (0.00%)	995 (100.00%)
No biopsy	0-20%	Pre	662 (18.44%)	2,927 (81.53%)	1 (0.03%)	3,590 (100.00%)
		Post	759 (18.87%)	3,262 (81.08%)	2 (0.05%)	4,023 (100.00%)
	21-34%	Pre	583 (30.46%)	1,331 (69.54%)	0 (0.00%)	1,914 (100.00%)
		Post	681 (29.73%)	1,610 (70.27%)	0 (0.00%)	2,291 (100.00%)
	35-85%	Pre	834 (36.01%)	1,482 (63.99%)	0 (0.00%)	2,316 (100.00%)
		Post	1,027 (35.14%)	1,896 (64.86%)	0 (0.00%)	2,923 (100.00%)
	86-100%	Pre	13 (37.14%)	22 (62.86%)	0 (0.00%)	35 (100.00%)
		Post	4 (44.44%)	5 (55.56%)	0 (0.00%)	9 (100.00%)

Figure A6 and **Table A6** show six month unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 06, 2021 to March 04, 2023 by donor biopsy status and donor KDPI group. Graft survival did not change for any group after policy implementation.

Figure A6: Six Month Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 06, 2021 - March 04, 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: Six Month Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 06, 2021 - March 04, 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	915	23	889	97.5	(96.2, 98.3)
		Post	403	10	390	97.5	(95.4, 98.7)
	21-34%	Pre	1472	53	1414	96.4	(95.3, 97.2)
		Post	670	18	652	97.3	(95.8, 98.3)
	35-85%	Pre	6273	332	5917	94.7	(94.1, 95.2)
		Post	3216	175	3028	94.6	(93.7, 95.3)
	86-100%	Pre	774	74	699	90.4	(88.1, 92.3)
		Post	477	37	440	92.2	(89.5, 94.3)
No biopsy	0-20%	Pre	3131	56	3058	98.2	(97.7, 98.6)
		Post	1697	40	1648	97.6	(96.8, 98.3)
	21-34%	Pre	1726	53	1664	96.9	(96.0, 97.6)
		Post	952	28	919	97.1	(95.8, 98.0)
	35-85%	Pre	2141	115	2020	94.6	(93.6, 95.5)
		Post	1273	64	1201	95	(93.6, 96.0)
	86-100%	Pre	35	1	34	97.1	(81.4, 99.6)
		Post	4	0	4	–	–

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 a decrease of approximately 1.5% in rate of DGF in organs coming from donors who were biopsied and aged 60+.

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

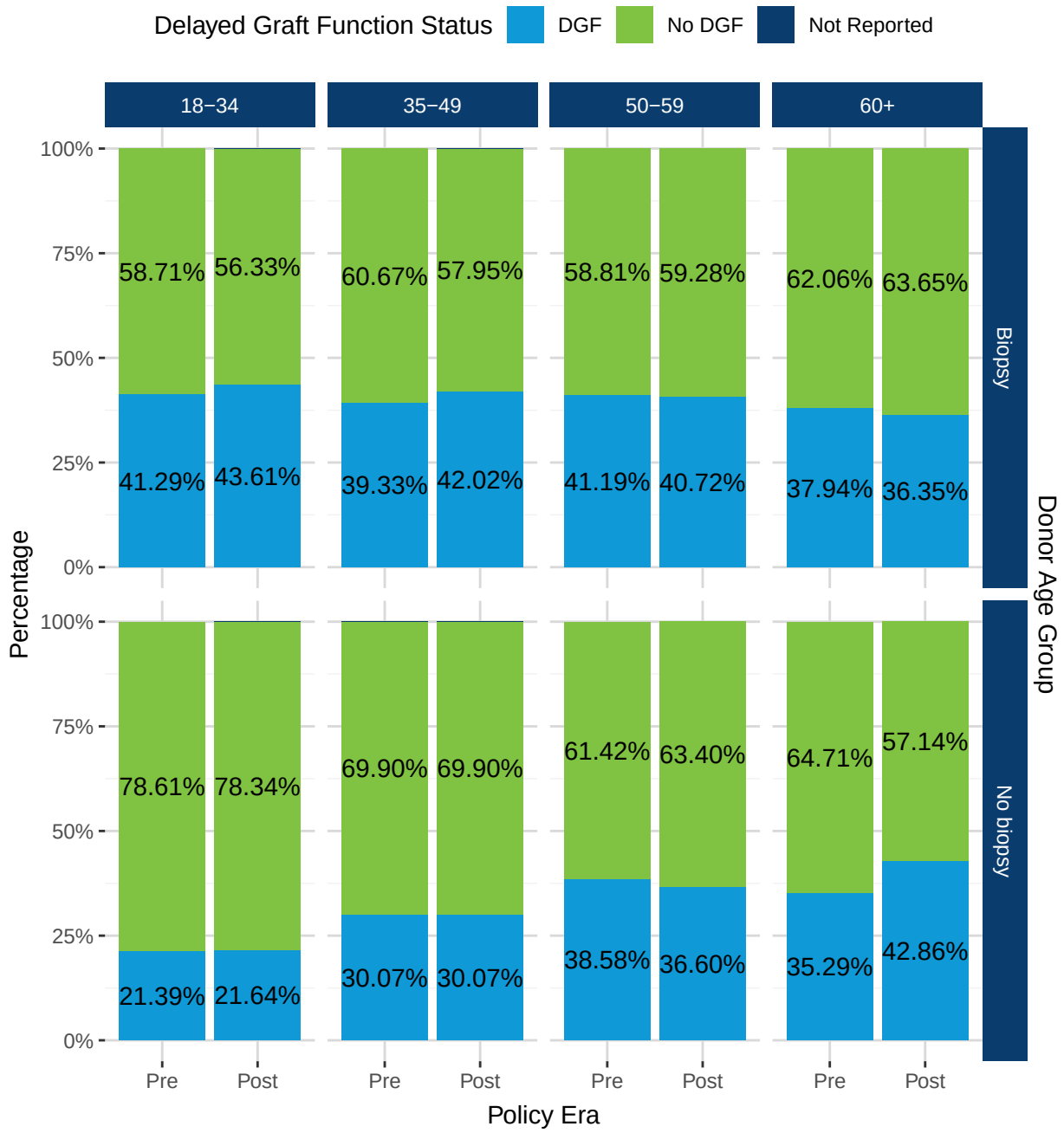
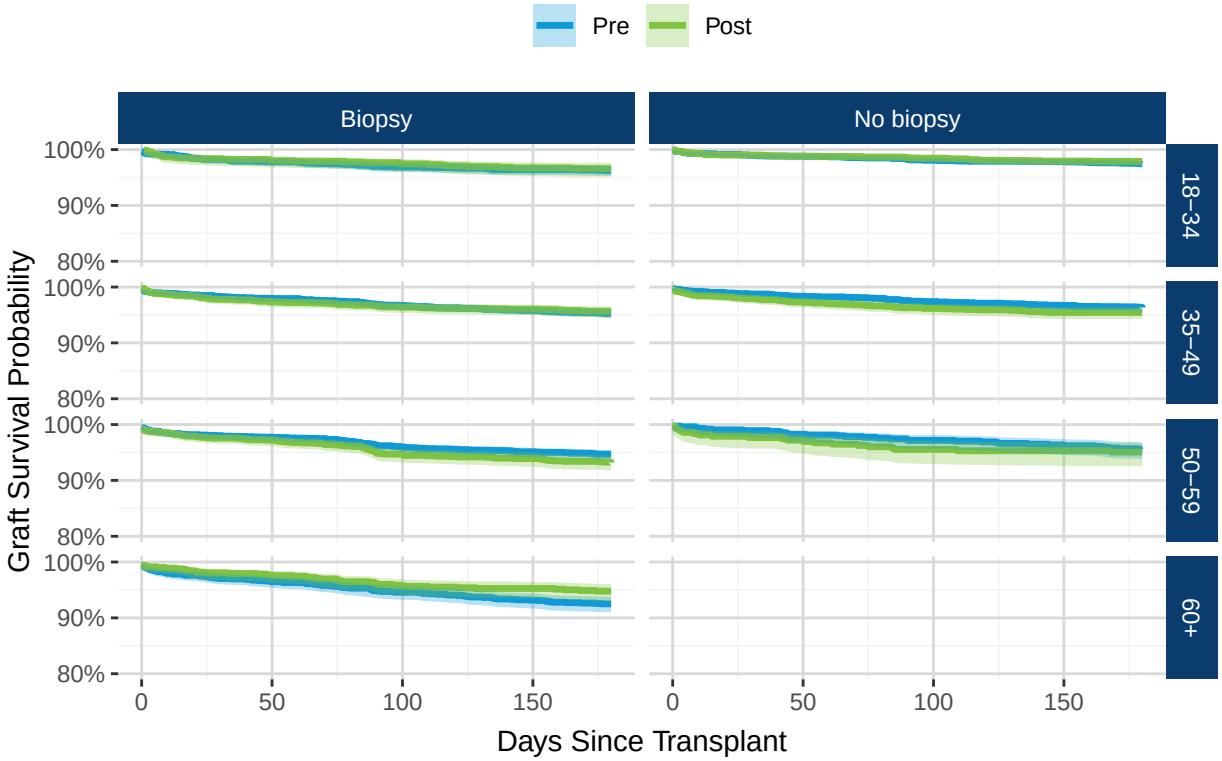


Table A7: Percentage of Transplants by Delayed Graft Function Status, Donor Biopsy Status and Donor Age Group

Biopsy Status	Donor Age Group	Era	DGF	No DGF	Not Reported	Total
Biopsy	18-34	Pre	811 (41.29%)	1,153 (58.71%)	0 (0.00%)	1,964 (100.00%)
		Post	778 (43.61%)	1,005 (56.33%)	1 (0.06%)	1,784 (100.00%)
	35-49	Pre	1,406 (39.33%)	2,169 (60.67%)	0 (0.00%)	3,575 (100.00%)
		Post	1,509 (42.02%)	2,081 (57.95%)	1 (0.03%)	3,591 (100.00%)
	50-59	Pre	1,145 (41.19%)	1,635 (58.81%)	0 (0.00%)	2,780 (100.00%)
		Post	1,268 (40.72%)	1,846 (59.28%)	0 (0.00%)	3,114 (100.00%)
	60+	Pre	533 (37.94%)	872 (62.06%)	0 (0.00%)	1,405 (100.00%)
		Post	663 (36.35%)	1,161 (63.65%)	0 (0.00%)	1,824 (100.00%)
No biopsy	18-34	Pre	847 (21.39%)	3,112 (78.61%)	0 (0.00%)	3,959 (100.00%)
		Post	968 (21.64%)	3,505 (78.34%)	1 (0.02%)	4,474 (100.00%)
	35-49	Pre	900 (30.07%)	2,092 (69.90%)	1 (0.03%)	2,993 (100.00%)
		Post	1,128 (30.07%)	2,622 (69.90%)	1 (0.03%)	3,751 (100.00%)
	50-59	Pre	309 (38.58%)	492 (61.42%)	0 (0.00%)	801 (100.00%)
		Post	366 (36.60%)	634 (63.40%)	0 (0.00%)	1,000 (100.00%)
	60+	Pre	36 (35.29%)	66 (64.71%)	0 (0.00%)	102 (100.00%)
		Post	9 (42.86%)	12 (57.14%)	0 (0.00%)	21 (100.00%)

Figure A8 and **Table A8** show six month unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 06, 2021 to March 04, 2023 by donor biopsy status and donor age group. Graft survival did not change for any group after policy implementation.

Figure A8: Six Month Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 06, 2021 - March 04, 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: Six Month Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 06, 2021 - March 04, 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	1888	71	1814	96.2	(95.3, 97.0)
		Post	856	29	822	96.6	(95.2, 97.6)
	35-49	Pre	3448	163	3269	95.3	(94.5, 95.9)
		Post	1690	73	1608	95.7	(94.6, 96.5)
	50-59	Pre	2708	144	2554	94.7	(93.8, 95.5)
		Post	1396	95	1300	93.2	(91.7, 94.4)
	60+	Pre	1390	104	1282	92.5	(91.0, 93.8)
		Post	824	43	780	94.8	(93.0, 96.1)
No biopsy	18-34	Pre	3459	88	3352	97.5	(96.9, 97.9)
		Post	1944	41	1895	97.9	(97.1, 98.4)
	35-49	Pre	2735	100	2626	96.3	(95.6, 97.0)
		Post	1543	70	1464	95.5	(94.3, 96.4)
	50-59	Pre	740	33	703	95.5	(93.8, 96.8)
		Post	428	21	402	95.1	(92.5, 96.8)
	60+	Pre	99	4	95	96	(89.6, 98.5)
		Post	11	0	11	100	–

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 33 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

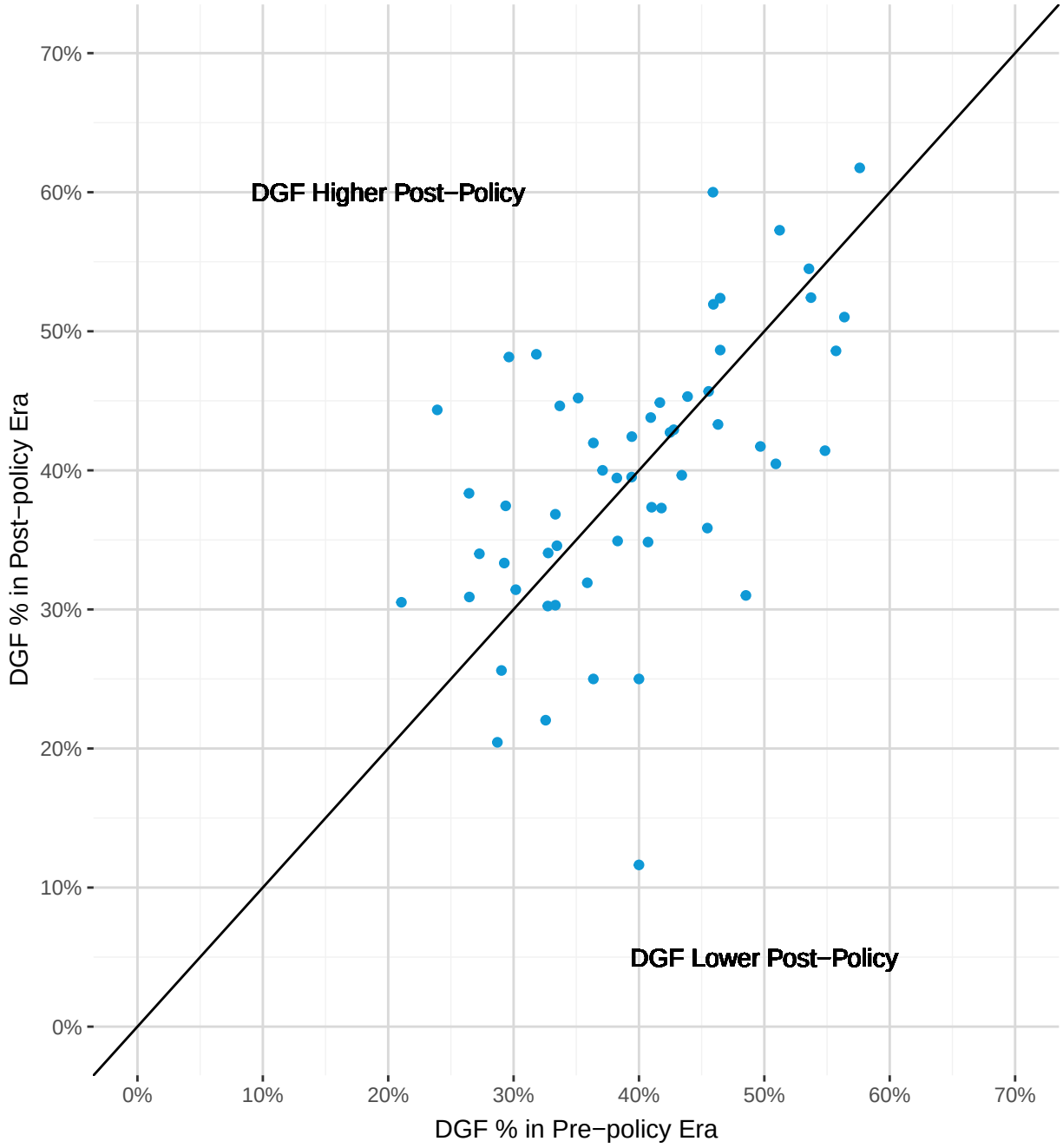


Figure A10 shows the percentage of transplants with delayed graft function by donor biopsy status and recovering OPO for donors who were not biopsied. For donors who were not biopsied a total of 28 OPOs saw an increase in percentage of DGF in the post-policy era.

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

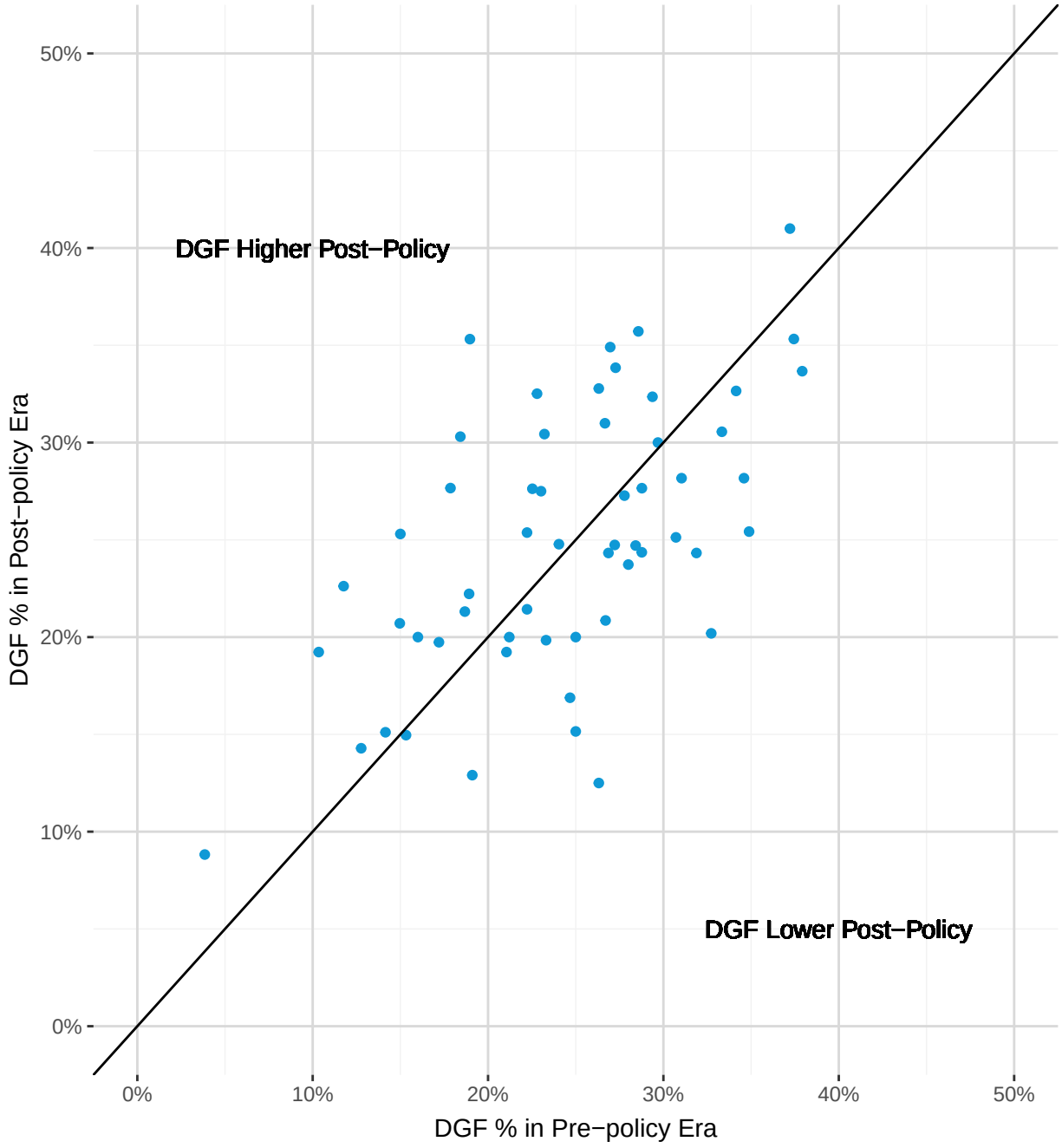


Figure A11 shows the percentage of transplants with delayed graft function by recovering OPO. Overall, a total of 27 OPOs saw an increase in percentage of DGF in the post-policy era.

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

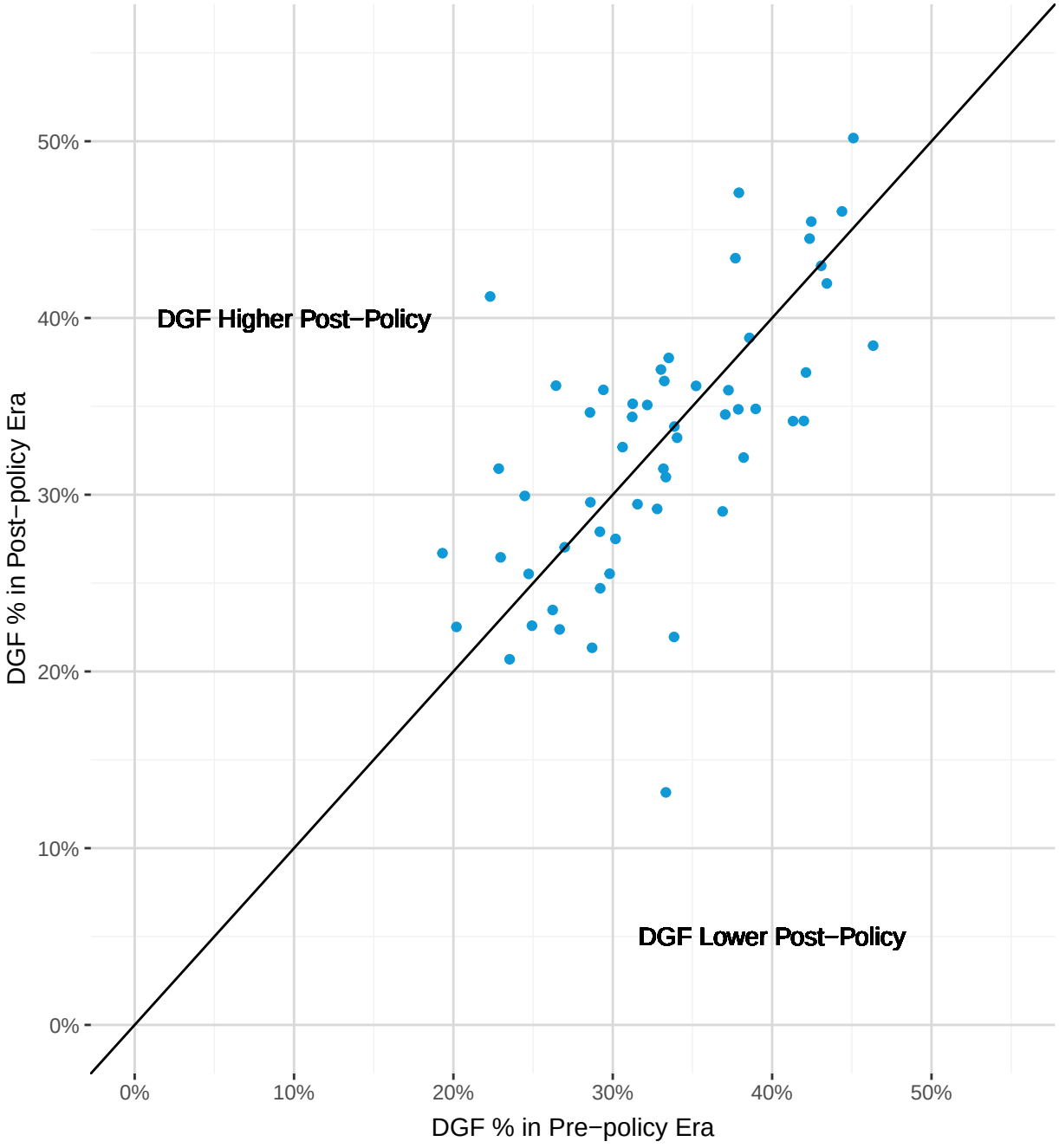


Table A9 shows six month unadjusted Kaplan Meier post-transplant graft survival for deceased donor kidney transplants from September 06, 2021 to March 04, 2023 by donor biopsy status and recovering OPO. Graft survival did not change for any group after policy implementation.

Table A9: Six Month Unadjusted Post-Transplant Graft Survival for Deceased Donor Kidney Transplants September 06, 2021 - March 04, 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	83	2	81	97.6	(90.7, 99.4)
		Post	27	1	26	96.3	(76.5, 99.5)
	No biopsy	Pre	29	3	26	89.7	(71.3, 96.5)
		Post	38	3	35	92.1	(77.5, 97.4)
2	Biopsy	Pre	56	4	52	92.9	(82.1, 97.3)
		Post	32	1	31	96.9	(79.8, 99.6)
	No biopsy	Pre	26	1	25	96.2	(75.7, 99.4)
		Post	6	0	6	–	–
3	Biopsy	Pre	446	17	427	96.2	(93.9, 97.6)
		Post	261	6	253	97.7	(94.9, 99.0)
	No biopsy	Pre	387	17	368	95.6	(93.0, 97.2)
		Post	187	9	175	95.2	(90.9, 97.4)
4	Biopsy	Pre	21	2	19	90.5	(67.0, 97.5)
		Post	22	1	21	95.5	(71.9, 99.3)
	No biopsy	Pre	63	2	61	96.8	(87.9, 99.2)
		Post	18	1	17	94.4	(66.6, 99.2)
5	Biopsy	Pre	136	7	129	94.9	(89.5, 97.5)
		Post	48	2	45	95.8	(84.4, 98.9)
	No biopsy	Pre	132	7	123	94.7	(89.1, 97.4)
		Post	61	1	59	98.4	(88.9, 99.8)
6	Biopsy	Pre	172	4	166	97.7	(93.9, 99.1)
		Post	65	3	62	95.4	(86.4, 98.5)
	No biopsy	Pre	121	0	121	100	–
		Post	60	2	58	96.7	(87.3, 99.2)
7	Biopsy	Pre	206	15	190	92.7	(88.2, 95.5)
		Post	124	4	120	96.8	(91.6, 98.8)
	No biopsy	Pre	62	2	60	96.8	(87.7, 99.2)
		Post	20	1	19	95	(69.5, 99.3)
8	Biopsy	Pre	33	3	30	90.9	(74.4, 97.0)
		Post	19	0	18	100	–
	No biopsy	Pre	83	2	80	97.6	(90.6, 99.4)
		Post	30	1	28	96.7	(78.6, 99.5)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
9	Biopsy	Pre	294	20	273	93.2	(89.7, 95.6)
		Post	110	9	101	91.8	(84.9, 95.7)
	No biopsy	Pre	179	7	169	96.1	(91.9, 98.1)
		Post	113	1	112	99.1	(93.9, 99.9)
10	Biopsy	Pre	202	16	184	92.1	(87.4, 95.1)
		Post	101	5	96	95	(88.5, 97.9)
	No biopsy	Pre	140	6	132	95.7	(90.7, 98.0)
		Post	108	6	101	94.4	(88.1, 97.5)
11	Biopsy	Pre	219	11	207	95	(91.1, 97.2)
		Post	98	3	95	96.9	(90.8, 99.0)
	No biopsy	Pre	132	3	128	97.7	(93.1, 99.3)
		Post	87	3	84	96.6	(89.7, 98.9)
12	Biopsy	Pre	178	6	169	96.6	(92.6, 98.5)
		Post	61	2	59	96.7	(87.5, 99.2)
	No biopsy	Pre	53	1	52	98.1	(87.4, 99.7)
		Post	57	3	54	94.7	(84.6, 98.3)
13	Biopsy	Pre	117	8	109	93.2	(86.8, 96.5)
		Post	38	3	35	92.1	(77.5, 97.4)
	No biopsy	Pre	75	3	72	96	(88.1, 98.7)
		Post	44	3	41	93.2	(80.3, 97.7)
14	Biopsy	Pre	181	13	168	92.8	(88.0, 95.8)
		Post	111	8	103	92.8	(86.1, 96.3)
	No biopsy	Pre	251	6	244	97.6	(94.7, 98.9)
		Post	177	6	169	96.6	(92.6, 98.5)
15	Biopsy	Pre	185	9	176	95.1	(90.9, 97.4)
		Post	74	5	68	93.2	(84.5, 97.1)
	No biopsy	Pre	124	4	120	96.8	(91.6, 98.8)
		Post	54	2	52	96.3	(86.0, 99.1)
16	Biopsy	Pre	124	4	120	96.8	(91.6, 98.8)
		Post	83	6	77	92.8	(84.6, 96.7)
	No biopsy	Pre	123	4	119	96.7	(91.6, 98.8)
		Post	74	4	70	94.6	(86.2, 97.9)
17	Biopsy	Pre	130	9	121	93.1	(87.1, 96.3)
		Post	44	5	39	88.6	(74.8, 95.1)
	No biopsy	Pre	57	1	56	98.2	(88.2, 99.8)
		Post	21	0	20	100	–
		Pre	197	5	191	97.5	(94.0, 98.9)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
18	Biopsy	Post	109	3	105	97.2	(91.7, 99.1)
	No biopsy	Pre	4	0	4	–	–
		Post	3	0	3	–	–
19	Biopsy	Pre	262	23	239	91.2	(87.1, 94.1)
		Post	188	12	176	93.6	(89.0, 96.3)
	No biopsy	Pre	391	4	386	99	(97.3, 99.6)
		Post	221	13	208	94.1	(90.1, 96.5)
20	Biopsy	Pre	102	9	93	91.2	(83.7, 95.3)
		Post	47	2	45	95.7	(84.0, 98.9)
	No biopsy	Pre	95	5	90	94.7	(87.8, 97.8)
		Post	53	1	51	98.1	(87.1, 99.7)
21	Biopsy	Pre	216	4	212	98.1	(95.1, 99.3)
		Post	101	9	93	91.1	(83.6, 95.3)
	No biopsy	Pre	18	0	18	100	–
		Post	19	0	19	100	–
22	Biopsy	Pre	90	4	85	95.6	(88.6, 98.3)
		Post	28	1	27	96.4	(77.2, 99.5)
	No biopsy	Pre	25	1	24	96	(74.8, 99.4)
		Post	16	1	15	93.8	(63.2, 99.1)
23	Biopsy	Pre	45	2	42	95.6	(83.4, 98.9)
		Post	26	0	26	100	–
	No biopsy	Pre	33	0	33	100	–
		Post	18	0	18	100	–
24	Biopsy	Pre	222	7	215	96.8	(93.5, 98.5)
		Post	131	5	126	96.2	(91.1, 98.4)
	No biopsy	Pre	233	7	225	97	(93.8, 98.6)
		Post	101	3	97	97	(91.0, 99.0)
25	Biopsy	Pre	20	0	20	100	–
		Post	25	2	23	92	(71.6, 97.9)
	No biopsy	Pre	104	3	101	97.1	(91.3, 99.1)
		Post	48	2	46	95.8	(84.4, 98.9)
26	Biopsy	Pre	342	19	323	94.4	(91.4, 96.4)
		Post	201	14	186	93	(88.5, 95.8)
	No biopsy	Pre	300	13	283	95.7	(92.6, 97.5)
		Post	124	3	120	97.6	(92.7, 99.2)
		Pre	90	3	87	96.7	(90.0, 98.9)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
27	Biopsy	Post	33	2	31	93.9	(77.9, 98.4)
	No biopsy	Pre	163	8	154	95.1	(90.4, 97.5)
		Post	83	1	80	98.8	(91.8, 99.8)
28	Biopsy	Pre	139	6	132	95.7	(90.6, 98.0)
		Post	73	9	64	87.7	(77.6, 93.4)
	No biopsy	Pre	156	6	149	96.1	(91.6, 98.2)
		Post	84	7	77	91.7	(83.3, 95.9)
29	Biopsy	Pre	159	3	156	98.1	(94.3, 99.4)
		Post	84	3	81	96.4	(89.3, 98.8)
	No biopsy	Pre	174	7	168	96	(91.7, 98.1)
		Post	64	2	62	96.9	(88.1, 99.2)
30	Biopsy	Pre	282	14	267	95	(91.8, 97.0)
		Post	129	5	124	96.1	(90.9, 98.4)
	No biopsy	Pre	130	4	126	96.9	(92.0, 98.8)
		Post	73	5	67	93.1	(84.2, 97.1)
31	Biopsy	Pre	289	11	277	96.2	(93.2, 97.9)
		Post	109	5	102	95.4	(89.3, 98.1)
	No biopsy	Pre	193	6	187	96.9	(93.2, 98.6)
		Post	153	7	145	95.4	(90.6, 97.8)
32	Biopsy	Pre	384	16	363	95.8	(93.3, 97.4)
		Post	196	10	186	94.9	(90.7, 97.2)
	No biopsy	Pre	138	2	135	98.6	(94.3, 99.6)
		Post	105	2	103	98.1	(92.6, 99.5)
33	Biopsy	Pre	111	6	105	94.6	(88.4, 97.5)
		Post	51	2	49	96.1	(85.2, 99.0)
	No biopsy	Pre	60	0	60	100	–
		Post	31	1	30	96.8	(79.2, 99.5)
34	Biopsy	Pre	194	16	178	91.8	(86.9, 94.9)
		Post	99	8	91	91.9	(84.5, 95.9)
	No biopsy	Pre	128	4	124	96.9	(91.9, 98.8)
		Post	69	0	69	100	–
35	Biopsy	Pre	239	13	226	94.6	(90.8, 96.8)
		Post	132	7	124	94.7	(89.2, 97.4)
	No biopsy	Pre	122	12	109	90.1	(83.3, 94.3)
		Post	68	3	65	95.6	(86.9, 98.6)
	Biopsy	Pre	249	15	233	94	(90.2, 96.3)
		Post	85	4	80	95.3	(87.9, 98.2)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
36	No biopsy	Pre	96	1	95	99	(92.8, 99.9)
		Post	119	3	114	97.5	(92.4, 99.2)
37	Biopsy	Pre	115	5	110	95.7	(89.9, 98.2)
		Post	54	2	52	96.3	(86.0, 99.1)
	No biopsy	Pre	57	0	57	100	–
		Post	26	1	25	96.2	(75.7, 99.4)
38	Biopsy	Pre	90	0	90	100	–
		Post	39	3	36	92.3	(78.0, 97.5)
	No biopsy	Pre	31	0	30	100	–
		Post	12	0	12	100	–
39	Biopsy	Pre	42	3	39	92.9	(79.5, 97.6)
		Post	26	0	26	100	–
	No biopsy	Pre	16	1	15	93.8	(63.2, 99.1)
		Post	11	0	11	100	–
40	Biopsy	Pre	276	16	260	94.2	(90.7, 96.4)
		Post	163	9	154	94.5	(89.7, 97.1)
	No biopsy	Pre	109	1	108	99.1	(93.7, 99.9)
		Post	45	1	44	97.8	(85.3, 99.7)
41	Biopsy	Pre	119	9	110	92.4	(86.0, 96.0)
		Post	94	3	90	96.8	(90.4, 99.0)
	No biopsy	Pre	97	1	95	99	(92.9, 99.9)
		Post	62	3	59	95.2	(85.7, 98.4)
42	Biopsy	Pre	98	4	94	95.9	(89.5, 98.4)
		Post	62	1	61	98.4	(89.1, 99.8)
	No biopsy	Pre	95	2	93	97.9	(91.8, 99.5)
		Post	54	1	53	98.1	(87.6, 99.7)
43	Biopsy	Pre	274	14	258	94.9	(91.5, 96.9)
		Post	136	8	128	94.1	(88.6, 97.0)
	No biopsy	Pre	261	6	254	97.7	(94.9, 99.0)
		Post	151	2	148	98.7	(94.8, 99.7)
44	Biopsy	Pre	146	7	139	95.2	(90.2, 97.7)
		Post	73	8	64	88.9	(79.1, 94.3)
	No biopsy	Pre	167	6	160	96.4	(92.2, 98.4)
		Post	72	4	68	94.4	(85.9, 97.9)
	Biopsy	Pre	63	2	61	96.8	(87.9, 99.2)
		Post	69	2	67	97.1	(88.9, 99.3)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
45	No biopsy	Pre	321	15	304	95.3	(92.4, 97.2)
		Post	130	2	128	98.5	(94.0, 99.6)
46	Biopsy	Pre	278	11	263	96	(92.9, 97.8)
		Post	123	7	115	94.3	(88.4, 97.2)
	No biopsy	Pre	227	11	216	95.2	(91.4, 97.3)
		Post	168	3	164	98.2	(94.6, 99.4)
47	Biopsy	Pre	52	1	50	98.1	(87.1, 99.7)
		Post	18	0	18	100	–
	No biopsy	Pre	28	3	24	88.9	(69.4, 96.3)
		Post	11	0	11	100	–
48	Biopsy	Pre	90	8	82	91.1	(83.0, 95.5)
		Post	73	5	67	93.2	(84.3, 97.1)
	No biopsy	Pre	193	11	182	94.3	(89.9, 96.8)
		Post	106	4	101	96.2	(90.3, 98.6)
49	Biopsy	Pre	263	11	252	95.8	(92.6, 97.7)
		Post	156	8	148	94.9	(90.0, 97.4)
	No biopsy	Pre	252	6	244	97.6	(94.7, 98.9)
		Post	171	5	166	97.1	(93.1, 98.8)
50	Biopsy	Pre	152	11	140	92.7	(87.3, 95.9)
		Post	79	1	78	98.7	(91.4, 99.8)
	No biopsy	Pre	78	1	77	98.7	(91.2, 99.8)
		Post	51	2	49	96.1	(85.2, 99.0)
51	Biopsy	Pre	153	10	143	93.5	(88.2, 96.4)
		Post	42	0	41	100	–
	No biopsy	Pre	171	2	169	98.8	(95.4, 99.7)
		Post	71	2	68	97.2	(89.2, 99.3)
52	Biopsy	Pre	307	13	294	95.8	(92.8, 97.5)
		Post	182	5	176	97.2	(93.5, 98.8)
	No biopsy	Pre	107	0	107	100	–
		Post	52	0	52	100	–
53	Biopsy	Pre	120	9	110	92.4	(86.0, 96.0)
		Post	39	3	36	92.3	(78.0, 97.5)
	No biopsy	Pre	50	1	47	98	(86.6, 99.7)
		Post	40	0	40	100	–
	Biopsy	Pre	132	4	128	97	(92.1, 98.9)
		Post	53	3	50	94.3	(83.5, 98.1)
		Pre	71	2	69	97.2	(89.2, 99.3)

(continued)

OPO	Biopsy Status	Era	N Transplants	N Graft Failures	N at Risk	Estimate	95% Confidence Interval
54	No biopsy	Post	41	1	40	97.6	(83.9, 99.7)
55	Biopsy	Pre	171	14	157	91.8	(86.6, 95.1)
		Post	70	5	65	92.9	(83.7, 97.0)
	No biopsy	Pre	36	3	33	91.7	(76.3, 97.2)
		Post	19	0	19	100	–
56	Biopsy	Pre	78	4	74	94.9	(86.9, 98.0)
		Post	50	0	50	100	–
	No biopsy	Pre	66	1	65	98.5	(89.7, 99.8)
		Post	26	1	25	96.2	(75.7, 99.4)