

Establish Minimum Kidney Donor Criteria to Require Biopsy Six Month Monitoring Report

DHHS Contract No. 250-2019-00001C

Date Completed: October 11, 2023

Prepared for:

Kidney Transplantation Committee
Committee Meeting

Date of Meeting: October 11, 2023

By:

Thomas Dolan, MS
UNOS Research Department

Contents

Background/Purpose	3
Strategic Plan Goal or Committee Project Addressed	3
Committee Request	3
Data and Methods	3
Results	5
Biopsy Status	5
Table 1: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era and Biopsy Status	5
Table 2: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Biopsy Status	5
Table 3: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Biopsy Status	6
Minimum Criteria For Biopsy	7
Figure 1: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy	7
Table 4: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy	7
Figure 2: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy	8
Table 5: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy	9
Figure 3: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy	10
Table 6: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy	11
KDPI	12

Figure 4: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI	12
Table 7: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI	13
Figure 5: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI	14
Table 8: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI	15
Figure 6: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI	16
Table 9: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI	17
Donor Age	18
Figure 7: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age	18
Table 10: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age	19
Figure 8: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age	20
Table 11: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age	21
Figure 9: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age	22
Table 12: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age	23
Recovering OPO	24
Figure 10: Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Recovering OPO	24
Table 13: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Recovering OPO	25
Figure 11: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO, for Biopsied Donors	27
Figure 12: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO, for No Biopsy Donors	28
Figure 13: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO	29
Figure 14: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO, for Biopsied Donors	30
Figure 15: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO, for No Biopsy Donors	31
Figure 16: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO	32
Conclusion	33

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 become 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, percents, utilization and non-use rates for deceased kidney donors overall and by:

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

Data and Methods

Data Sources:

Donor data were submitted via the OPTN Donor Data and Matching System and on the Deceased Donor Registration (DDR)

All results are based on OPTN data as of September 15, 2023. Data are subject to change based on future data submission or correction.

Cohort:

All adult deceased kidney donors recovered in the United States between March 09, 2022 and March 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: March 09, 2022 to September 05, 2022
- Post-policy: September 06, 2022 to March 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.

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 transplant, but not transplanted, divided by the total number of kidneys recovered for transplant.

Utilization rates were defined as the number of kidneys transplanted divided by the total number of kidneys that could of potentially been transplanted. All donors were assumed to have two kidneys that were able to be transplanted. 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.

Results

Biopsy Status

Table 1 shows the count and percentage of deceased kidney donors recovered by whether or not a biopsy was performed. Overall, the percentage of kidneys being biopsied stayed consistent between the two eras, with 62.59% in the pre-policy era, and 63.94% in the post-policy era.

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

Era	Biopsy Status		Total
	Biopsy	No biopsy	
Pre	4,086 (62.59%)	2,442 (37.41%)	6,528 (100.00%)
Post	4,431 (63.94%)	2,499 (36.06%)	6,930 (100.00%)

Table 2 shows the non-use rates for all deceased donor kidneys recovered in the defined eras. There was a slight decrease in non-use rate in the post-policy era from 6.69% to 5.95% for kidneys that were not biopsied. For kidneys that were biopsied there was an increase in the non-use rate from 38.3% in the pre-policy era to 43.15% 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	3,112	8,126	38.30
	Post	3,798	8,802	43.15
No biopsy	Pre	325	4,860	6.69
	Post	296	4,977	5.95
Total	Pre	3,437	12,986	26.47
	Post	4,094	13,779	29.71

Table 3 shows the utilization rates for all deceased donor kidneys recovered in the defined eras. There was a slight increase in utilization rate in the post-policy era from 92.85% to 93.66% for kidneys that were not biopsied. For kidneys that were biopsied there was an decrease in the utilization rate from 61.36% in the pre-policy era to 56.47% in the post-policy era. The amount of available kidneys for utilization rates may be different than the amount of kidneys actually recovered, due to the fact that not every deceased donor has both kidneys recovered.

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

Biopsy Status	Era	Transplanted	Kidneys Available	Utilization Rate (%)
Biopsy	Pre	5,014	8,172	61.36
	Post	5,004	8,862	56.47
No biopsy	Pre	4,535	4,884	92.85
	Post	4,681	4,998	93.66
Total	Pre	9,549	13,056	73.14
	Post	9,685	13,860	69.88

Minimum Criteria For Biopsy

Table 4 and Figure 1 show the count and percentage of deceased kidney donors recovered by whether or not a biopsy was performed as well as if the donor met the minimum criteria to be biopsied. The percentage of kidneys being biopsied when they did not meet the minimum criteria decreased to 45.53% in the post-policy era from 48.81% in the pre-policy era. For donors that did meet the minimum criteria the percentage of donors being biopsied increased, from 91.31% in the pre-policy era, to 96.79% 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



Note: Only percentages >5% are labeled

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

Meets Minimum Criteria	Pre-Policy			Post-Policy		
	Biopsied	Not Biopsied	Total	Biopsied	Not Biopsied	Total
Yes	1933 (91.31%)	184 (8.69%)	2117 (100%)	2409 (96.79%)	80 (3.21%)	2489 (100%)
No	2153 (48.81%)	2258 (51.19%)	4411 (100%)	2022 (45.53%)	2419 (54.47%)	4441 (100%)
Total	4086 (62.59%)	2442 (37.41%)	6528 (100%)	4431 (63.94%)	2499 (36.06%)	6930 (100%)

Table 5 and Figure 2 show the non-use rates for all deceased donor kidneys recovered by policy era, biopsy status and if minimum criteria for biopsy were met. For kidney donors that met the minimum criteria for biopsy, and were biopsied, there was an increase in non-use rate from 56.23% in the pre-policy era to 57.91% in the post-policy era. There was a slight increase in non-use rates for donors who did not meet minimum criteria for biopsy and were biopsied (4.36% to 4.79%)

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

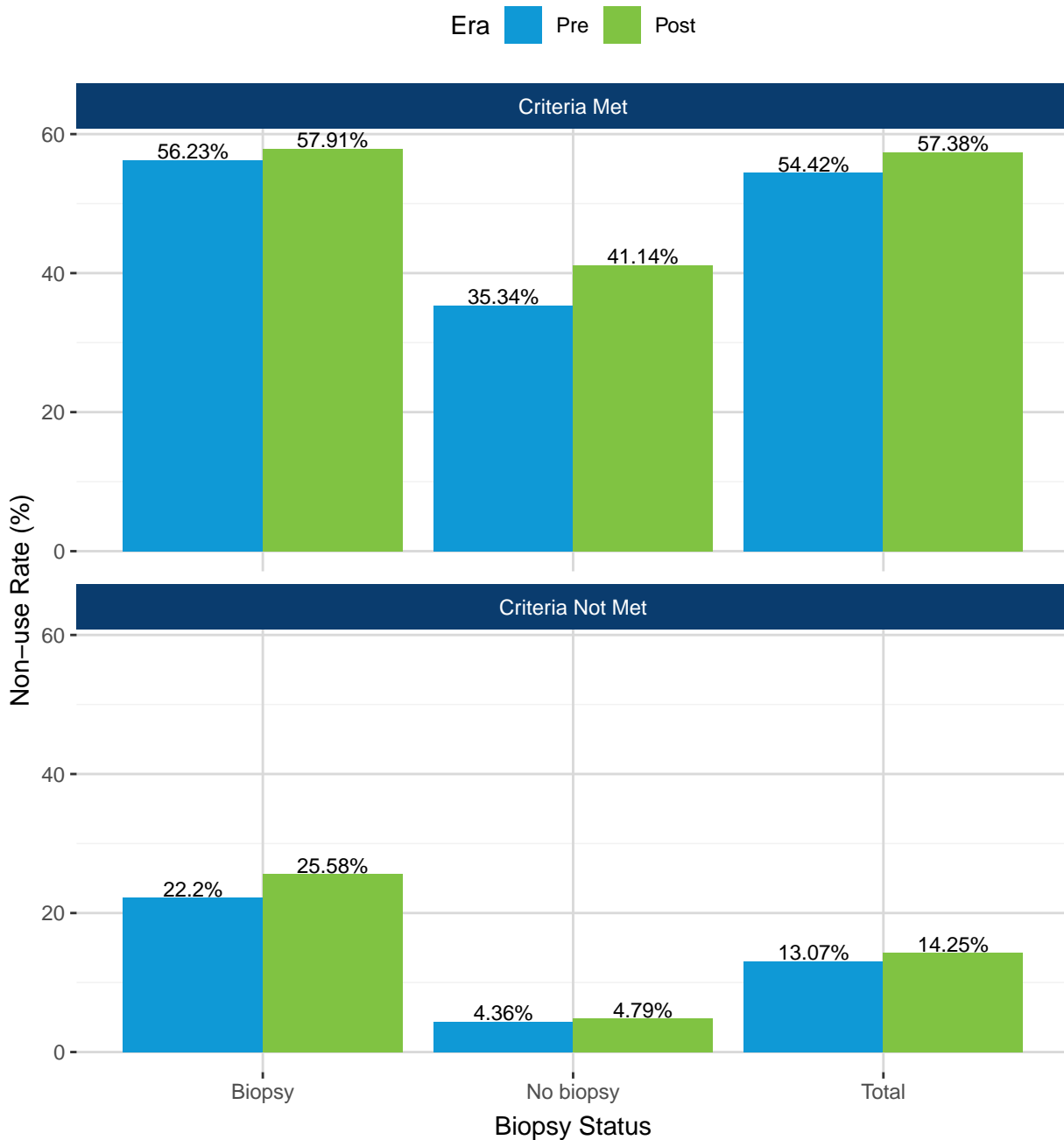


Table 5: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

Meets Minimum Criteria	Biopsy Status	Era	Kidneys Recovered for Transplant but Not Transplanted	Kidneys Recovered	Non-use Rate (%)	
Yes	Biopsy	Pre	2,161	3,843	56.23	
		Post	2,770	4,783	57.91	
	No biopsy	Pre	129	365	35.34	
		Post	65	158	41.14	
	Total	Pre	2,290	4,208	54.42	
		Post	2,835	4,941	57.38	
	No	Biopsy	Pre	951	4,283	22.20
			Post	1,028	4,019	25.58
No biopsy		Pre	196	4,495	4.36	
		Post	231	4,819	4.79	
Total		Pre	1,147	8,778	13.07	
		Post	1,259	8,838	14.25	

Table 6 and Figure 3 show the utilization rates for all deceased donor kidneys recovered by policy era, biopsy status and if minimum criteria for biopsy were met. For kidney donors that met the minimum criteria for biopsy, and were being biopsied, there was a decrease in utilization rate from 43.51% in the pre-policy era to 41.78% in the post-policy era. There was a slight decrease in utilization rate for donors who did not meet minimum criteria for biopsy and were not biopsied (95.19% to 94.83% respectively).

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

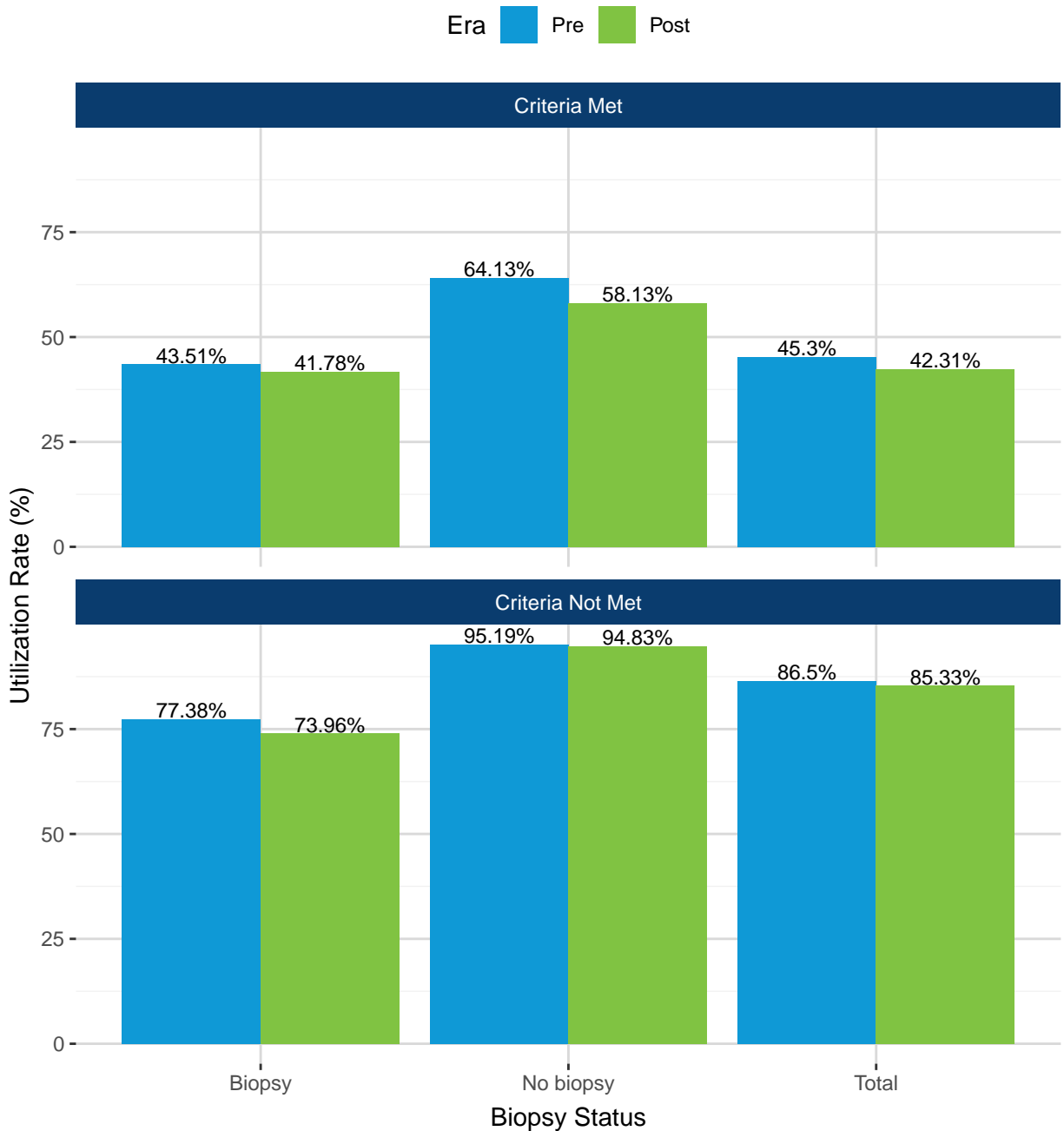


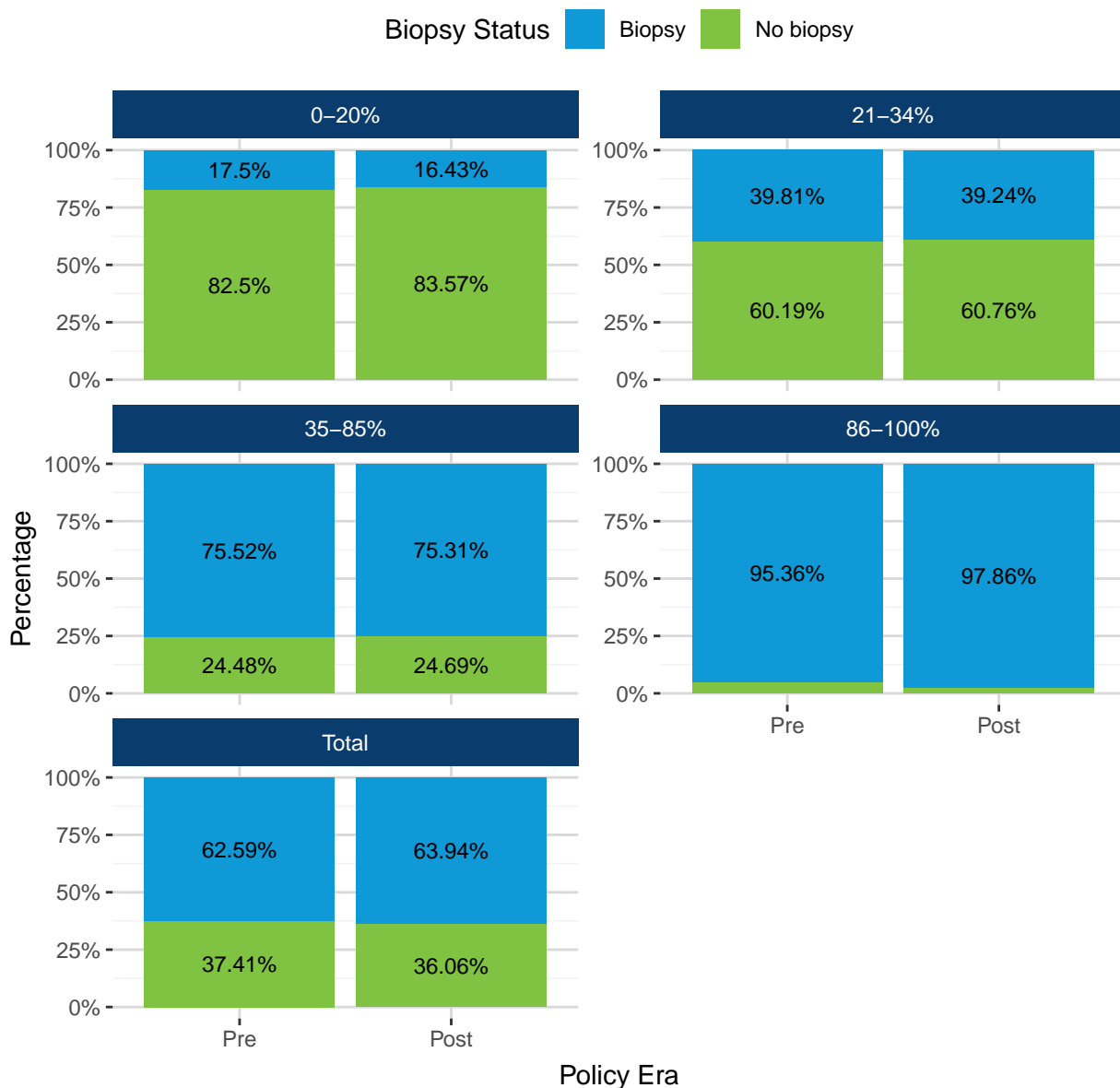
Table 6: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

Meets Minimum Criteria	Biopsy Status	Era	Transplanted	Kidneys Available	Utilization Rate (%)
Yes	Biopsy	Pre	1,682	3,866	43.51
		Post	2,013	4,818	41.78
	No biopsy	Pre	236	368	64.13
		Post	93	160	58.13
	Total	Pre	1,918	4,234	45.30
		Post	2,106	4,978	42.31
No	Biopsy	Pre	3,332	4,306	77.38
		Post	2,991	4,044	73.96
	No biopsy	Pre	4,299	4,516	95.19
		Post	4,588	4,838	94.83
	Total	Pre	7,631	8,822	86.50
		Post	7,579	8,882	85.33

KDPI

Table 7 and Figure 4 show the count and percentage of deceased kidney donors recovered by whether or not a biopsy was performed as well as by donor KDPI. The percentage of kidneys being biopsied was similar between the two eras, with the biggest change in 86-100% KDPI donors, as 95.36% were biopsied in the pre-policy era and this increased to 97.86% in the post-policy era. Although all kidneys with a KDPI greater than 85% meet the minimum criteria for biopsy, 2.14% 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

Donor KDPI Group	Pre-Policy			Post-Policy		
	Biopsied	Not Biopsied	Total	Biopsied	Not Biopsied	Total
0-20%	211 (17.5%)	995 (82.5%)	1206 (100%)	201 (16.43%)	1022 (83.57%)	1223 (100%)
21-34%	385 (39.81%)	582 (60.19%)	967 (100%)	372 (39.24%)	576 (60.76%)	948 (100%)
35-85%	2524 (75.52%)	818 (24.48%)	3342 (100%)	2669 (75.31%)	875 (24.69%)	3544 (100%)
86-100%	966 (95.36%)	47 (4.64%)	1013 (100%)	1189 (97.86%)	26 (2.14%)	1215 (100%)
Total	4086 (62.59%)	2442 (37.41%)	6528 (100%)	4431 (63.94%)	2499 (36.06%)	6930 (100%)

Table 8 and Figure 5 show the non-use rates for all deceased donor kidneys recovered by policy era, biopsy status and donor KDPI. For kidneys that were biopsied, there was an increase in non-use rates for all KDPI groups, except for the 21-34% group, which decreased from 16.36% to 14.81%

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

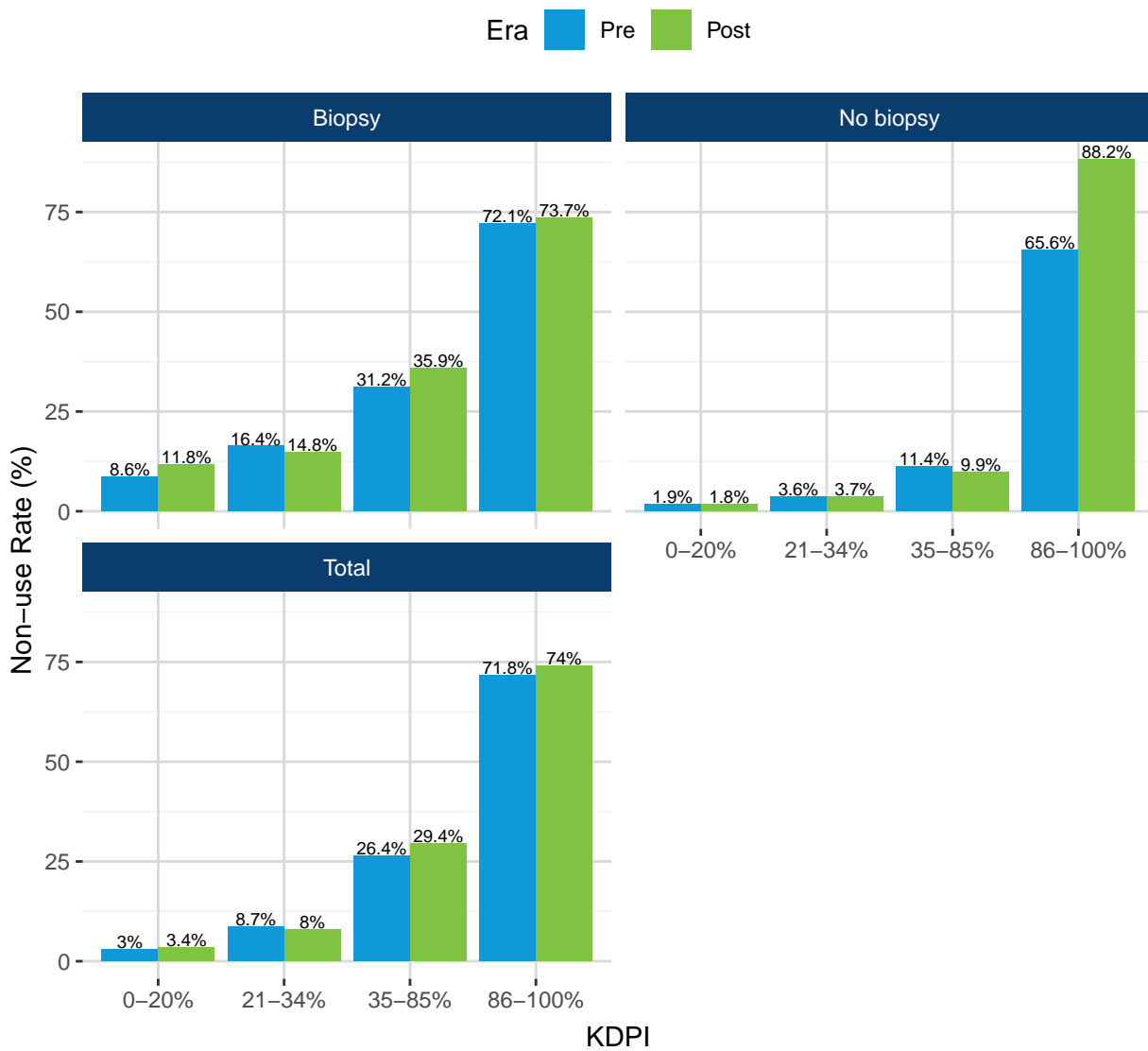


Table 8: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

Biopsy Status	KDPI	Era	Kidneys Recovered for Transplant but Not Transplanted	Kidneys Recovered	Non-use Rate (%)	
Biopsy	0-20%	Pre	36	421	8.55	
		Post	47	400	11.75	
	21-34%	Pre	125	764	16.36	
		Post	109	736	14.81	
	35-85%	Pre	1,567	5,021	31.21	
		Post	1,902	5,304	35.86	
	86-100%	Pre	1,384	1,920	72.08	
		Post	1,740	2,362	73.67	
	No biopsy	0-20%	Pre	37	1,980	1.87
			Post	37	2,040	1.81
		21-34%	Pre	42	1,160	3.62
			Post	42	1,145	3.67
35-85%		Pre	185	1,627	11.37	
		Post	172	1,741	9.88	
86-100%		Pre	61	93	65.59	
		Post	45	51	88.24	
Total		0-20%	Pre	73	2,401	3.04
			Post	84	2,440	3.44
		21-34%	Pre	167	1,924	8.68
			Post	151	1,881	8.03
	35-85%	Pre	1,752	6,648	26.35	
		Post	2,074	7,045	29.44	
	86-100%	Pre	1,445	2,013	71.78	
		Post	1,785	2,413	73.97	

Table 9 and Figure 6 show utilization rates for all deceased donor kidneys recovered by policy era, biopsy status and donor KDPI. For kidneys that were biopsied, there were slight decreases in utilization rates for all KDPI groups, except for the 21-34% group, which increased from 82.99% to 84.27%

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

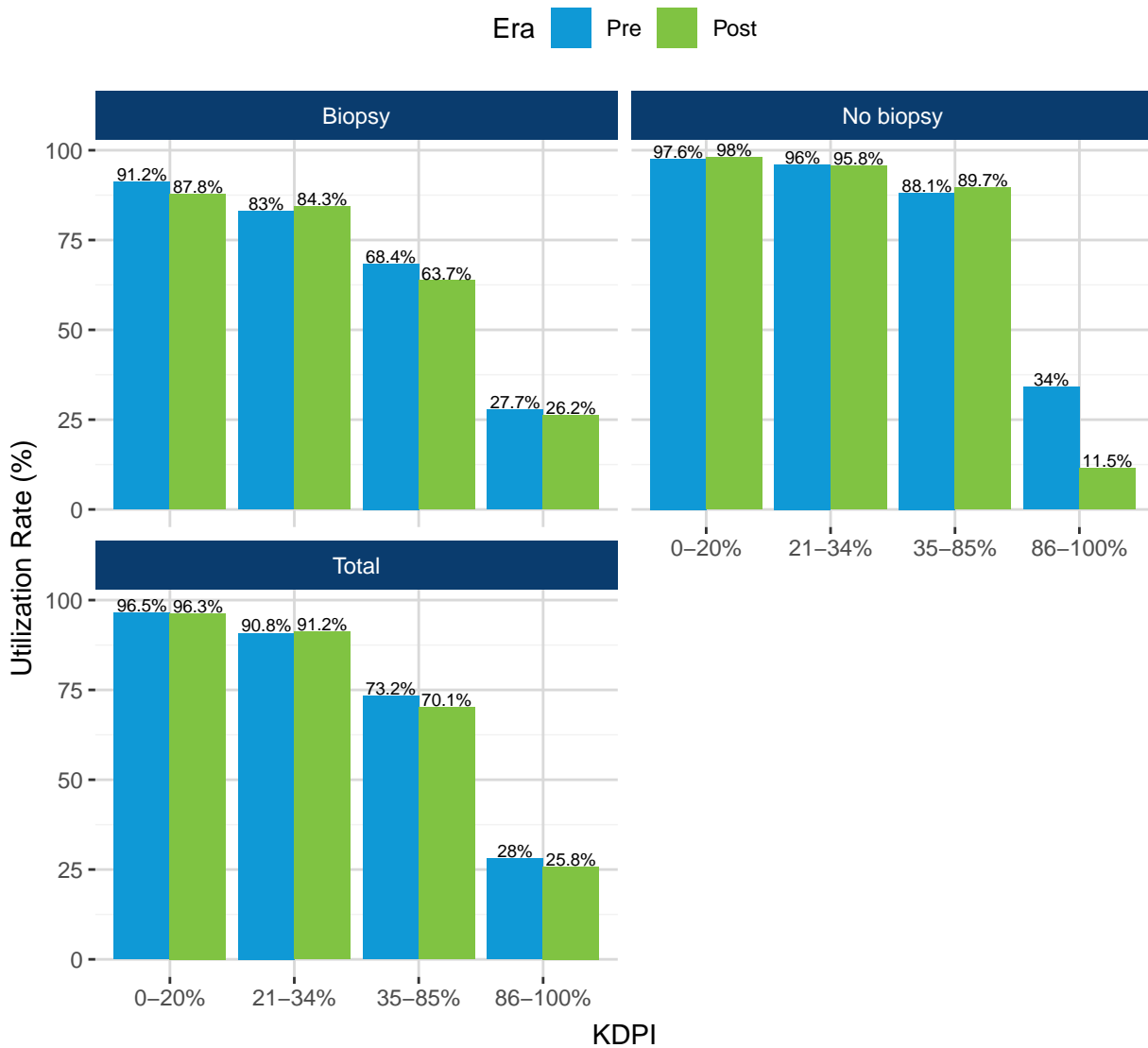


Table 9: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and KDPI

Biopsy Status	KDPI	Era	Transplanted	Kidneys Available	Utilization Rate (%)
	0-20%	Pre	385	422	91.23
		Post	353	402	87.81
	21-34%	Pre	639	770	82.99
		Post	627	744	84.27
Biopsy	35-85%	Pre	3,454	5,048	68.42
		Post	3,402	5,338	63.73
	86-100%	Pre	536	1,932	27.74
		Post	622	2,378	26.16
	0-20%	Pre	1,943	1,990	97.64
		Post	2,003	2,044	97.99
	21-34%	Pre	1,118	1,164	96.05
		Post	1,103	1,152	95.75
No biopsy	35-85%	Pre	1,442	1,636	88.14
		Post	1,569	1,750	89.66
	86-100%	Pre	32	94	34.04
		Post	6	52	11.54
	0-20%	Pre	2,328	2,412	96.52
		Post	2,356	2,446	96.32
	21-34%	Pre	1,757	1,934	90.85
		Post	1,730	1,896	91.24
Total	35-85%	Pre	4,896	6,684	73.25
		Post	4,971	7,088	70.13
	86-100%	Pre	568	2,026	28.04
		Post	628	2,430	25.84

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 and 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 50+, were less likely to have a biopsy performed, with the largest decrease being seen in the 18-34 age group with the percentage of donors being biopsied decreasing from 34.34% in the pre-policy era to 31.31% in the post-policy era. Although all donors over the age of 60 meet minimum criteria for biopsy, 2.11% 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

Donor Age Group	Pre-Policy			Post-Policy		
	Biopsied	Not Biopsied	Total	Biopsied	Not Biopsied	Total
18-34	627 (34.34%)	1199 (65.66%)	1826 (100%)	574 (31.31%)	1259 (68.69%)	1833 (100%)
35-49	1225 (57.76%)	896 (42.24%)	2121 (100%)	1273 (57.39%)	945 (42.61%)	2218 (100%)
50-59	1266 (81.52%)	287 (18.48%)	1553 (100%)	1333 (83.26%)	268 (16.74%)	1601 (100%)
60+	968 (94.16%)	60 (5.84%)	1028 (100%)	1251 (97.89%)	27 (2.11%)	1278 (100%)
Total	4086 (62.59%)	2442 (37.41%)	6528 (100%)	4431 (63.94%)	2499 (36.06%)	6930 (100%)

Table 11 and Figure 8 show the non-use rates for all deceased donor kidneys recovered by policy era, biopsy status and donor age at time of recovery. For kidneys that were biopsied, there was an increase in non-use rates for all donor age groups. The largest change in non-use rates for donors who were biopsied occurred in donors aged 35-49, going from 25.11% to 29.57%

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

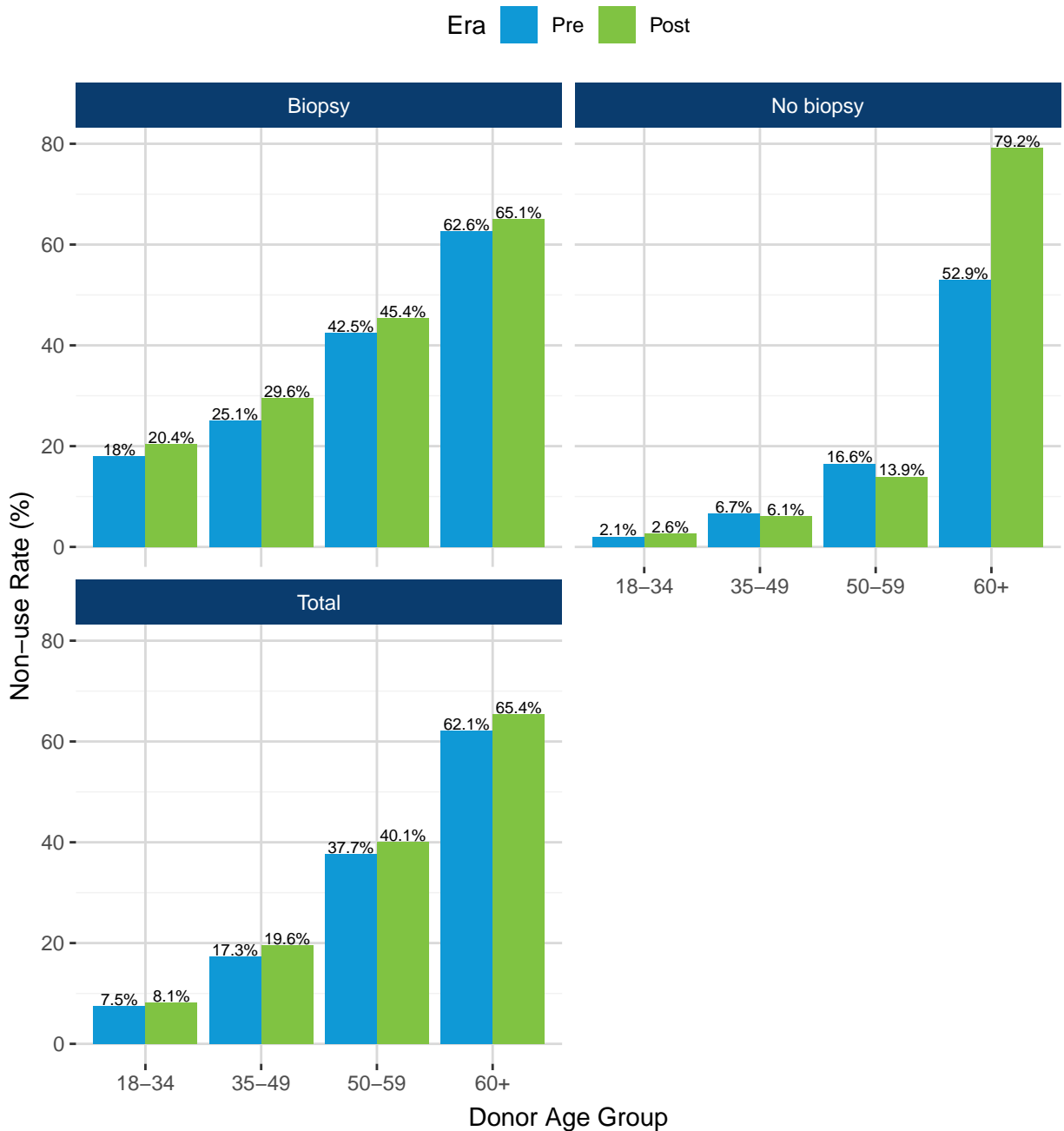


Table 11: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

Biopsy Status	Age Group	Era	Kidneys Recovered for Transplant but Not Transplanted	Kidneys Recovered	Non-use Rate (%)	
Biopsy	18-34	Pre	225	1,249	18.01	
		Post	232	1,139	20.37	
	35-49	Pre	612	2,437	25.11	
		Post	748	2,530	29.57	
	50-59	Pre	1,069	2,515	42.50	
		Post	1,203	2,651	45.38	
	60+	Pre	1,206	1,925	62.65	
		Post	1,615	2,482	65.07	
	No biopsy	18-34	Pre	49	2,384	2.06
			Post	65	2,513	2.59
		35-49	Pre	119	1,789	6.65
			Post	115	1,880	6.12
50-59		Pre	94	568	16.55	
		Post	74	531	13.94	
60+		Pre	63	119	52.94	
		Post	42	53	79.25	
Total		18-34	Pre	274	3,633	7.54
			Post	297	3,652	8.13
		35-49	Pre	731	4,226	17.30
			Post	863	4,410	19.57
	50-59	Pre	1,163	3,083	37.72	
		Post	1,277	3,182	40.13	
	60+	Pre	1,269	2,044	62.08	
		Post	1,657	2,535	65.36	

Table 12 and Figure 9 show the utilization rates for all deceased donor kidneys recovered by policy era, biopsy status and donor age at time of recovery. For kidneys that were biopsied, there was a decrease in utilization rates for all donor age groups. For kidneys 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 82.58% to 85.26%

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

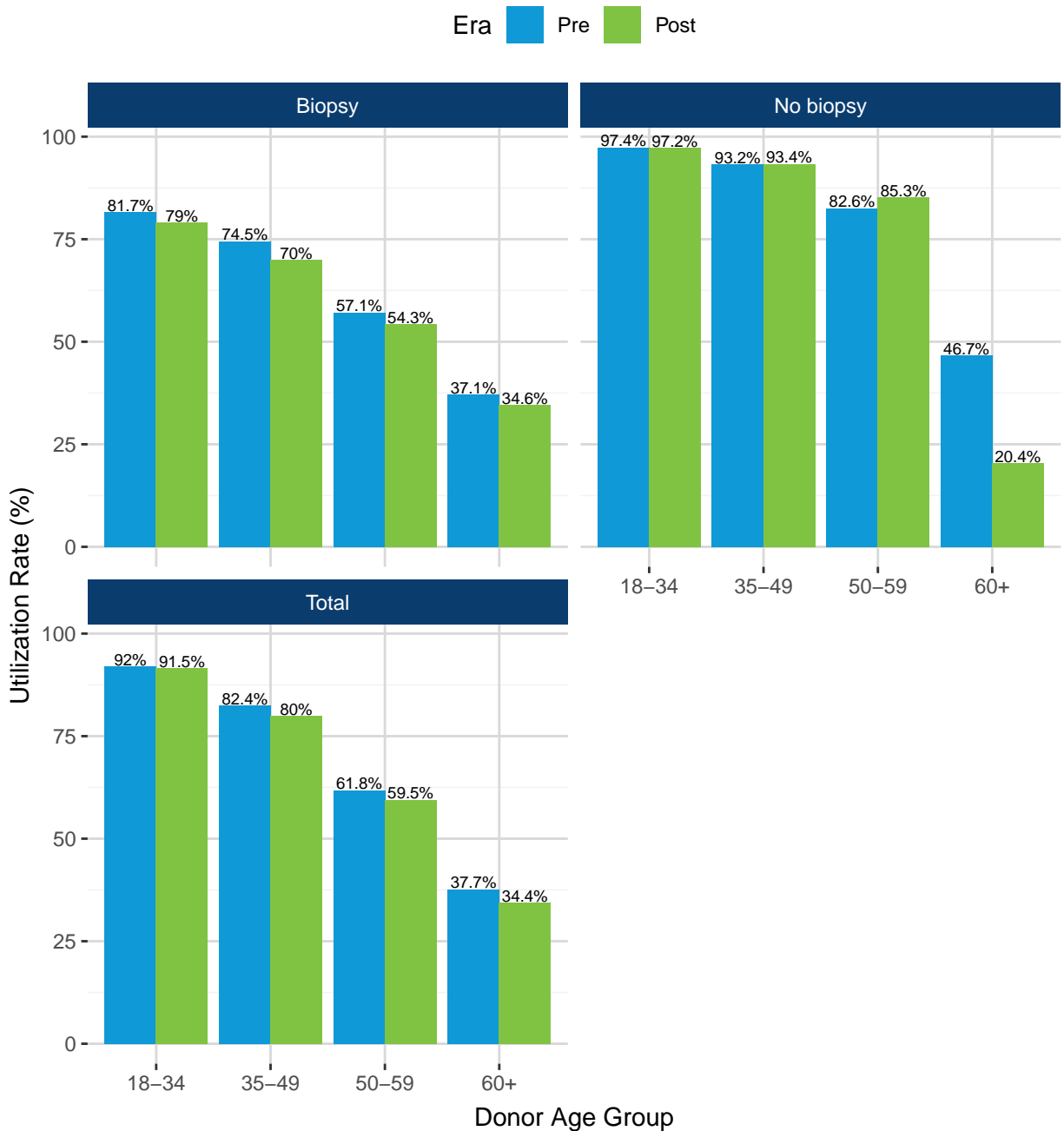


Table 12: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Donor Age

Biopsy Status	Age Group	Era	Transplanted	Kidneys Available	Utilization Rate (%)	
Biopsy	18-34	Pre	1,024	1,254	81.66	
		Post	907	1,148	79.01	
	35-49	Pre	1,825	2,450	74.49	
		Post	1,782	2,546	69.99	
	50-59	Pre	1,446	2,532	57.11	
		Post	1,448	2,666	54.31	
	60+	Pre	719	1,936	37.14	
		Post	867	2,502	34.65	
	No biopsy	18-34	Pre	2,335	2,398	97.37
			Post	2,448	2,518	97.22
		35-49	Pre	1,670	1,792	93.19
			Post	1,765	1,890	93.39
50-59		Pre	474	574	82.58	
		Post	457	536	85.26	
60+		Pre	56	120	46.67	
		Post	11	54	20.37	
Total		18-34	Pre	3,359	3,652	91.98
			Post	3,355	3,666	91.52
		35-49	Pre	3,495	4,242	82.39
			Post	3,547	4,436	79.96
	50-59	Pre	1,920	3,106	61.82	
		Post	1,905	3,202	59.49	
	60+	Pre	775	2,056	37.69	
		Post	878	2,556	34.35	

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, 34 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 donor kidneys over time.

Figure 10: Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Recovering OPO

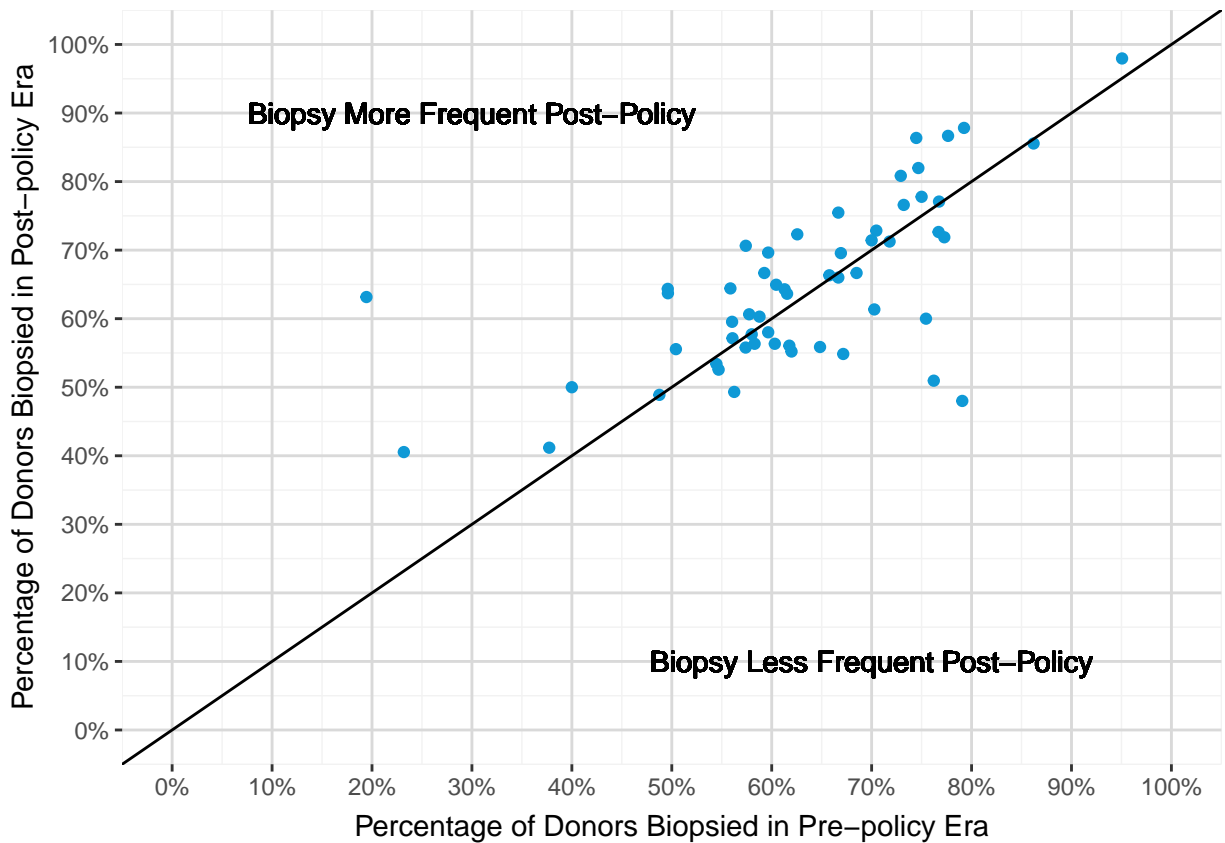


Table 13 shows the count and percentage of deceased kidney donors recovered in each policy era by whether or not a biopsy was performed as well as by recovering OPO.

Table 13: Count and Percentage of Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Recovering OPO

Recovering OPO	Pre-Policy			Post-Policy		
	Biopsied	Not Biopsied	Total	Biopsied	Not Biopsied	Total
1	34 (79.07%)	9 (20.93%)	43 (100%)	24 (48%)	26 (52%)	50 (100%)
2	35 (74.47%)	12 (25.53%)	47 (100%)	38 (86.36%)	6 (13.64%)	44 (100%)
3	188 (60.45%)	123 (39.55%)	311 (100%)	202 (64.95%)	109 (35.05%)	311 (100%)
4	7 (19.44%)	29 (80.56%)	36 (100%)	24 (63.16%)	14 (36.84%)	38 (100%)
5	75 (61.98%)	46 (38.02%)	121 (100%)	53 (55.21%)	43 (44.79%)	96 (100%)
6	66 (57.39%)	49 (42.61%)	115 (100%)	53 (55.79%)	42 (44.21%)	95 (100%)
7	84 (79.25%)	22 (20.75%)	106 (100%)	101 (87.83%)	14 (12.17%)	115 (100%)
8	18 (40%)	27 (60%)	45 (100%)	19 (50%)	19 (50%)	38 (100%)
9	118 (64.84%)	64 (35.16%)	182 (100%)	100 (55.87%)	79 (44.13%)	179 (100%)
10	104 (70.27%)	44 (29.73%)	148 (100%)	100 (61.35%)	63 (38.65%)	163 (100%)
11	77 (58.78%)	54 (41.22%)	131 (100%)	82 (60.29%)	54 (39.71%)	136 (100%)
12	70 (70%)	30 (30%)	100 (100%)	85 (71.43%)	34 (28.57%)	119 (100%)
13	42 (61.76%)	26 (38.24%)	68 (100%)	37 (56.06%)	29 (43.94%)	66 (100%)
14	99 (56.25%)	77 (43.75%)	176 (100%)	108 (49.32%)	111 (50.68%)	219 (100%)
15	68 (66.67%)	34 (33.33%)	102 (100%)	66 (66%)	34 (34%)	100 (100%)
16	58 (58%)	42 (42%)	100 (100%)	71 (57.72%)	52 (42.28%)	123 (100%)
17	36 (66.67%)	18 (33.33%)	54 (100%)	40 (75.47%)	13 (24.53%)	53 (100%)
18	77 (95.06%)	4 (4.94%)	81 (100%)	96 (97.96%)	2 (2.04%)	98 (100%)
19	129 (49.62%)	131 (50.38%)	260 (100%)	237 (63.71%)	135 (36.29%)	372 (100%)
20	35 (54.69%)	29 (45.31%)	64 (100%)	41 (52.56%)	37 (47.44%)	78 (100%)
21	75 (86.21%)	12 (13.79%)	87 (100%)	77 (85.56%)	13 (14.44%)	90 (100%)
22	34 (77.27%)	10 (22.73%)	44 (100%)	23 (71.88%)	9 (28.12%)	32 (100%)
23	19 (61.29%)	12 (38.71%)	31 (100%)	18 (64.29%)	10 (35.71%)	28 (100%)
24	132 (62.56%)	79 (37.44%)	211 (100%)	154 (72.3%)	59 (27.7%)	213 (100%)
25	20 (37.74%)	33 (62.26%)	53 (100%)	21 (41.18%)	30 (58.82%)	51 (100%)
26	119 (55.87%)	94 (44.13%)	213 (100%)	143 (64.41%)	79 (35.59%)	222 (100%)
27	61 (50.41%)	60 (49.59%)	121 (100%)	65 (55.56%)	52 (44.44%)	117 (100%)
28	65 (56.03%)	51 (43.97%)	116 (100%)	78 (59.54%)	53 (40.46%)	131 (100%)
29	62 (49.6%)	63 (50.4%)	125 (100%)	74 (64.35%)	41 (35.65%)	115 (100%)
30	105 (70.47%)	44 (29.53%)	149 (100%)	110 (72.85%)	41 (27.15%)	151 (100%)
31	117 (60.31%)	77 (39.69%)	194 (100%)	120 (56.34%)	93 (43.66%)	213 (100%)
32	158 (76.7%)	48 (23.3%)	206 (100%)	162 (72.65%)	61 (27.35%)	223 (100%)
33	56 (71.79%)	22 (28.21%)	78 (100%)	57 (71.25%)	23 (28.75%)	80 (100%)
34	100 (68.49%)	46 (31.51%)	146 (100%)	82 (66.67%)	41 (33.33%)	123 (100%)
35	87 (66.92%)	43 (33.08%)	130 (100%)	112 (69.57%)	49 (30.43%)	161 (100%)
36	125 (76.22%)	39 (23.78%)	164 (100%)	80 (50.96%)	77 (49.04%)	157 (100%)
37	66 (76.74%)	20 (23.26%)	86 (100%)	74 (77.08%)	22 (22.92%)	96 (100%)
38	41 (73.21%)	15 (26.79%)	56 (100%)	36 (76.6%)	11 (23.4%)	47 (100%)
39	21 (75%)	7 (25%)	28 (100%)	21 (77.78%)	6 (22.22%)	27 (100%)
40	115 (74.68%)	39 (25.32%)	154 (100%)	141 (81.98%)	31 (18.02%)	172 (100%)

(continued)

Recovering OPO	Biopsied	Not Biopsied	Total	Biopsied	Not Biopsied	Total
41	62 (57.41%)	46 (42.59%)	108 (100%)	89 (70.63%)	37 (29.37%)	126 (100%)
42	41 (57.75%)	30 (42.25%)	71 (100%)	57 (60.64%)	37 (39.36%)	94 (100%)
43	109 (58.29%)	78 (41.71%)	187 (100%)	120 (56.34%)	93 (43.66%)	213 (100%)
44	60 (56.07%)	47 (43.93%)	107 (100%)	60 (57.14%)	45 (42.86%)	105 (100%)
45	32 (23.19%)	106 (76.81%)	138 (100%)	60 (40.54%)	88 (59.46%)	148 (100%)
46	137 (67.16%)	67 (32.84%)	204 (100%)	130 (54.85%)	107 (45.15%)	237 (100%)
47	16 (59.26%)	11 (40.74%)	27 (100%)	18 (66.67%)	9 (33.33%)	27 (100%)
48	67 (54.47%)	56 (45.53%)	123 (100%)	71 (53.38%)	62 (46.62%)	133 (100%)
49	136 (59.65%)	92 (40.35%)	228 (100%)	152 (58.02%)	110 (41.98%)	262 (100%)
50	73 (65.77%)	38 (34.23%)	111 (100%)	65 (66.33%)	33 (33.67%)	98 (100%)
51	59 (48.76%)	62 (51.24%)	121 (100%)	44 (48.89%)	46 (51.11%)	90 (100%)
52	105 (72.92%)	39 (27.08%)	144 (100%)	135 (80.84%)	32 (19.16%)	167 (100%)
53	43 (75.44%)	14 (24.56%)	57 (100%)	39 (60%)	26 (40%)	65 (100%)
54	48 (61.54%)	30 (38.46%)	78 (100%)	49 (63.64%)	28 (36.36%)	77 (100%)
55	66 (77.65%)	19 (22.35%)	85 (100%)	78 (86.67%)	12 (13.33%)	90 (100%)
56	34 (59.65%)	23 (40.35%)	57 (100%)	39 (69.64%)	17 (30.36%)	56 (100%)

Figure 11 shows the unadjusted non-use rates for all deceased donor kidneys 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

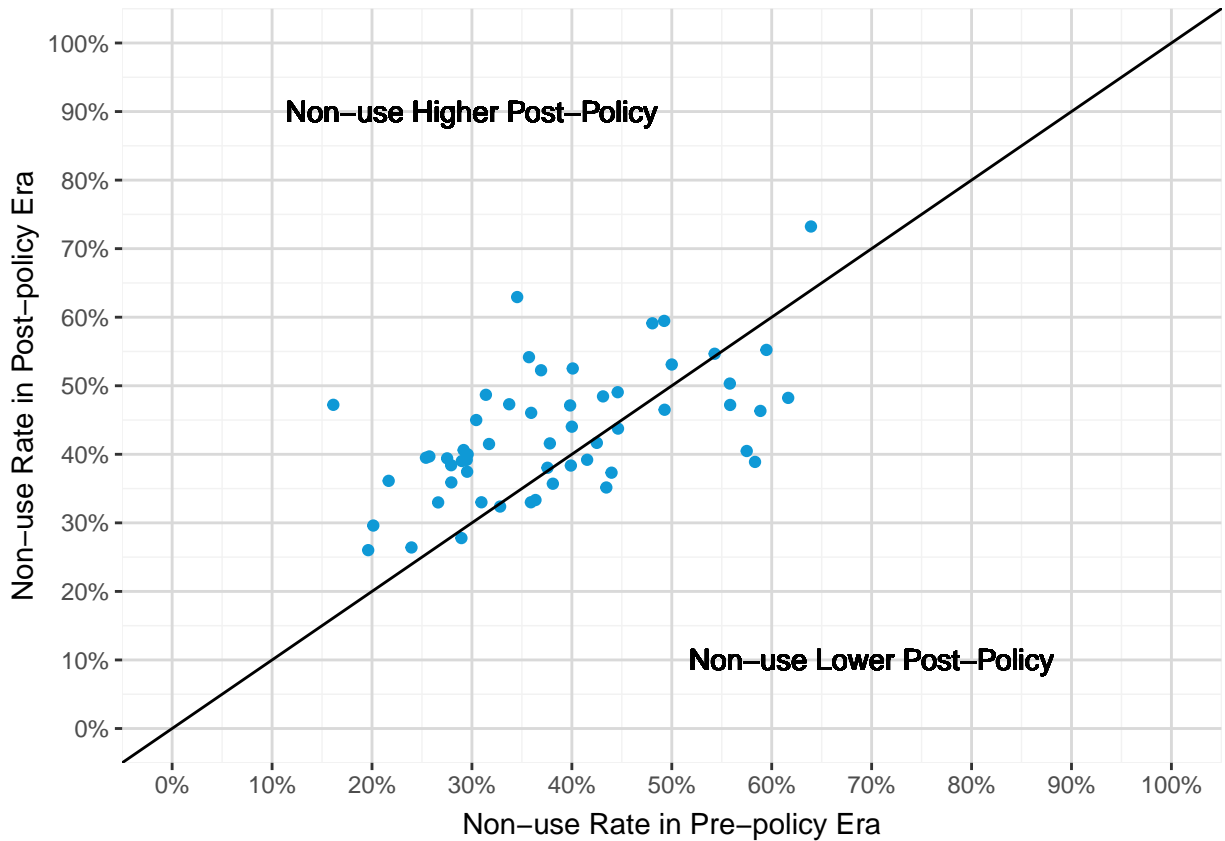


Figure 12 shows the unadjusted non-use rates for all deceased donor kidneys recovered by policy era and recovering OPO, for donors that were not biopsied. For donors who were not biopsied a total of 27 OPOs saw an increase in non-use rate.

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

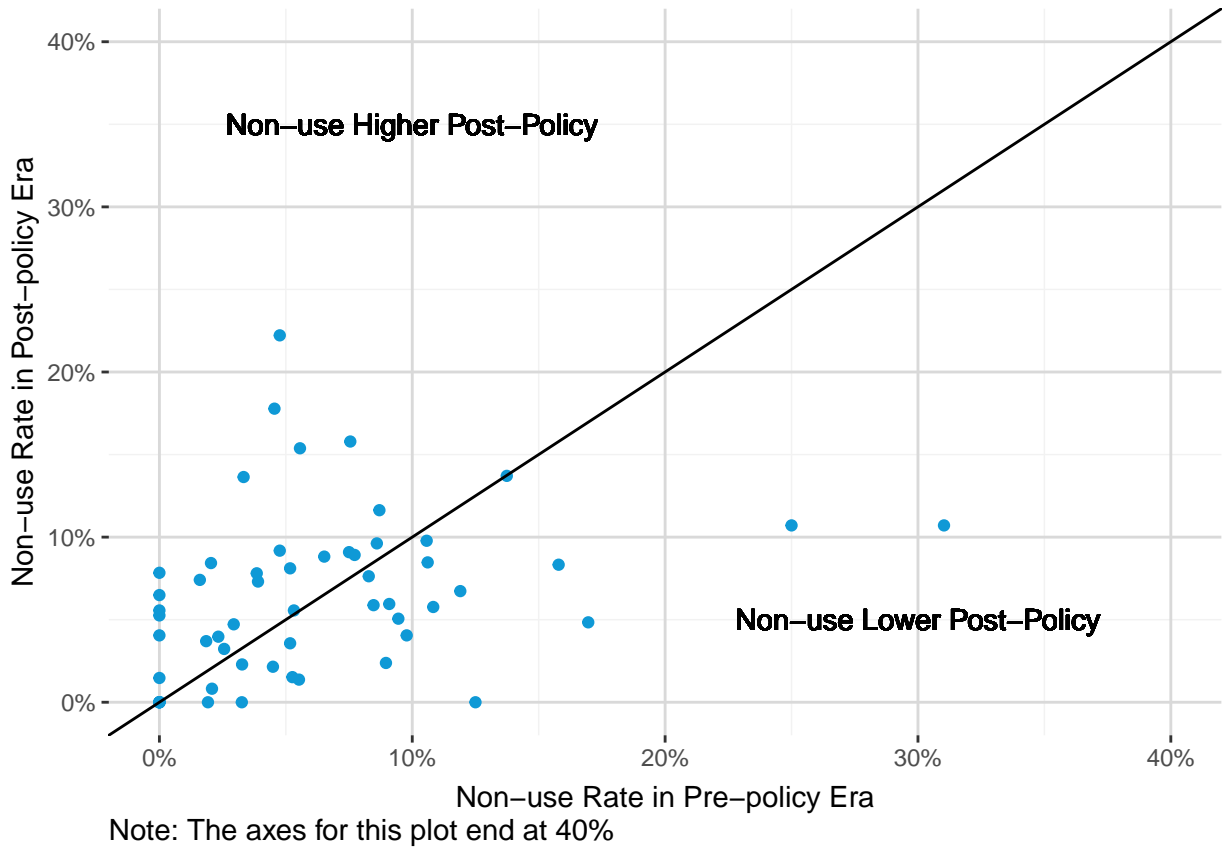


Figure 13 shows the unadjusted non-use rates for all deceased donor kidneys recovered by policy era and recovering OPO. A total of 38 OPOs saw an increase in non-use rate.

Figure 13: Non-use Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO

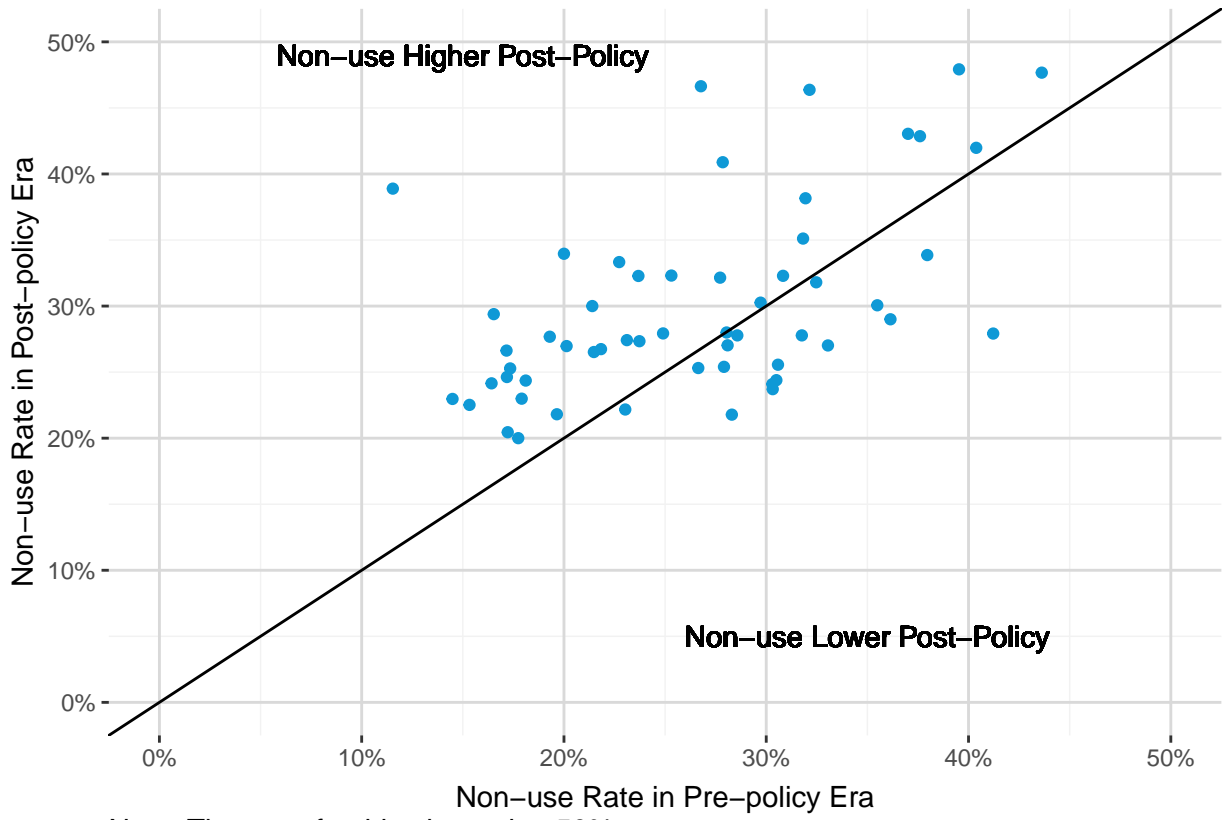


Figure 14 shows the utilization rates for all deceased donor kidneys recovered by policy era and recovering OPO, for donors who were biopsied. The utilization rates for donors who were biopsied, decreased in 36 of the 56 recovering OPOs.

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

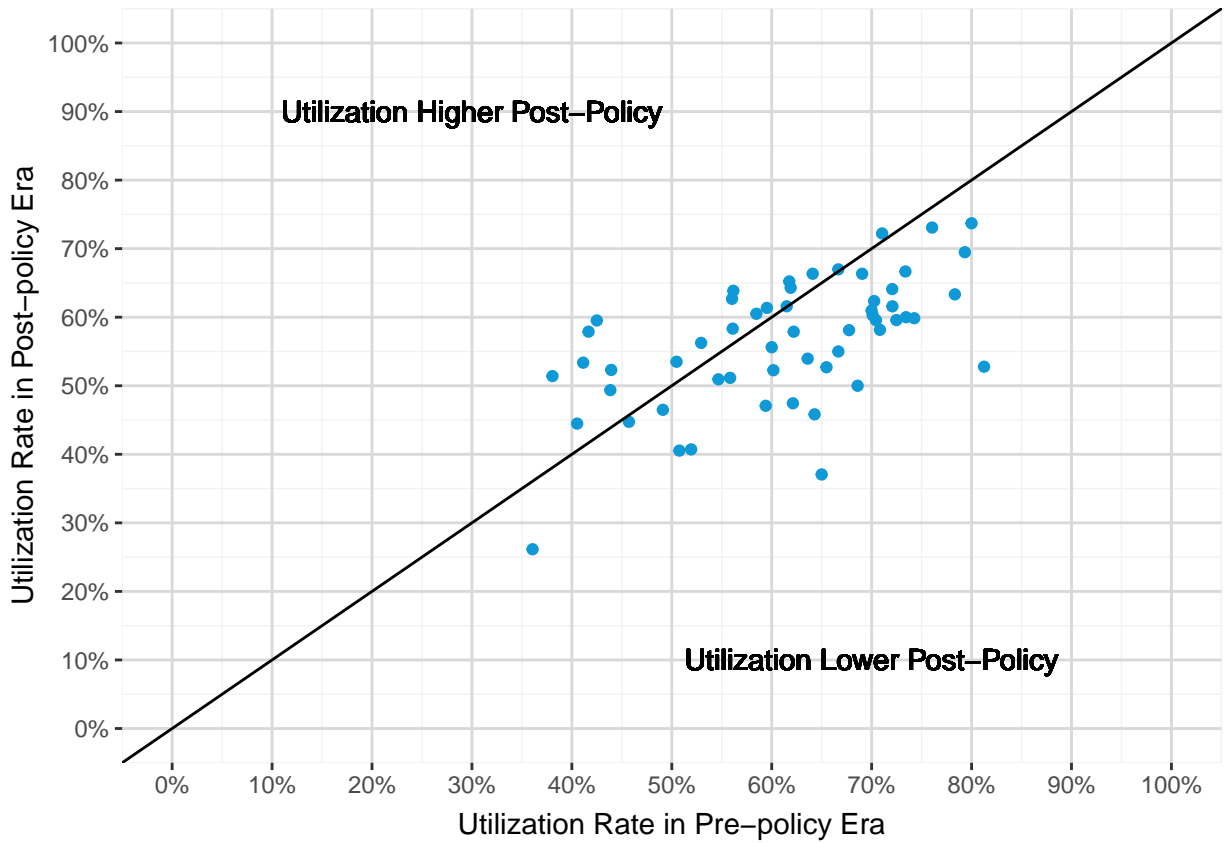
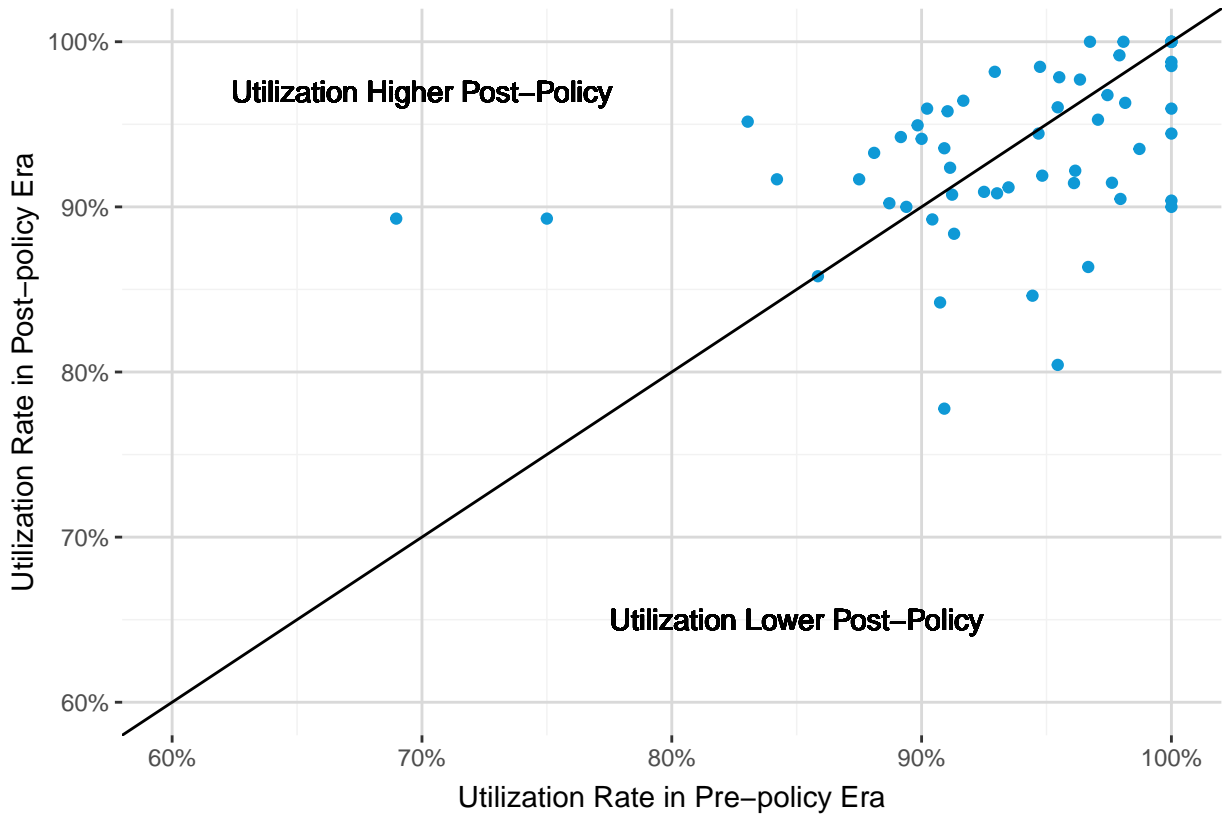


Figure 15 shows the utilization rates for all deceased donor kidneys recovered by policy era and recovering OPO, for donors who were not biopsied. For donors who were not biopsied a total of 28 OPOs saw a decrease in utilization rate.

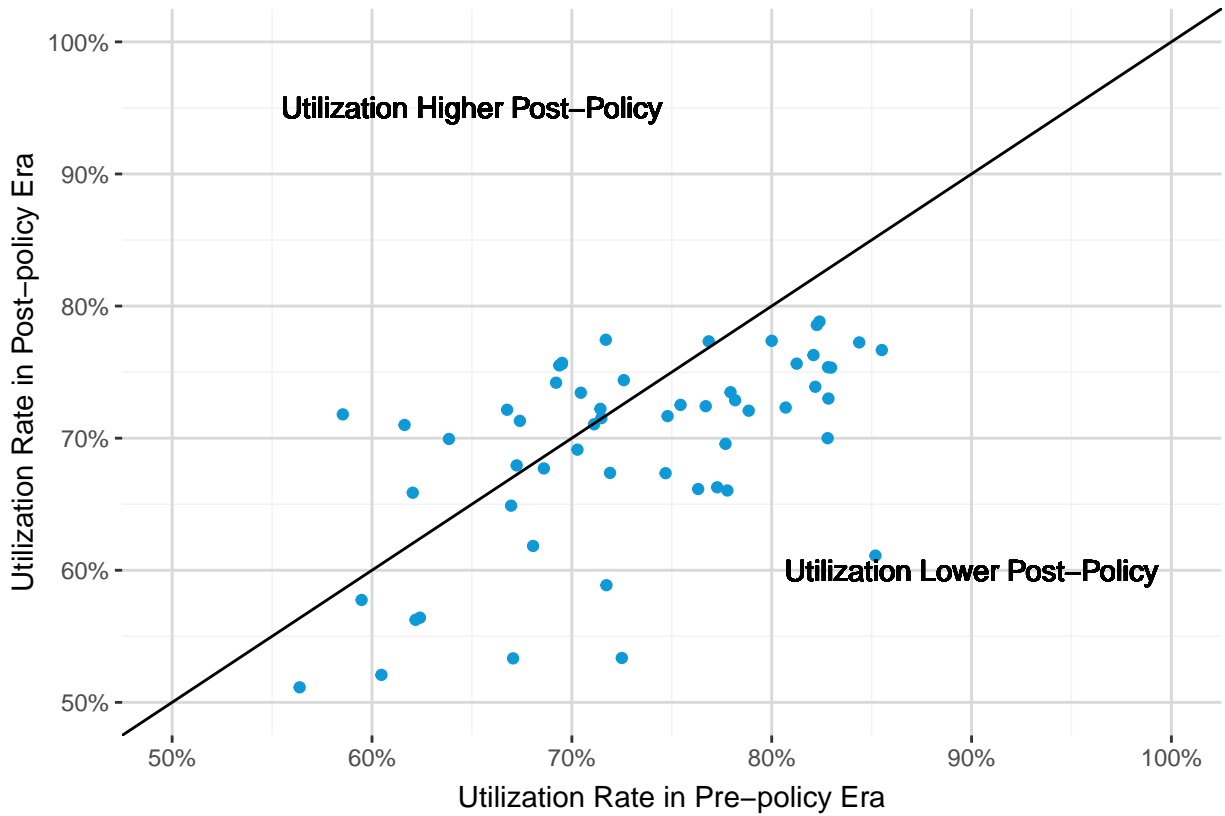
Figure 15: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO, for No Biopsy Donors



Note: The axes for this plot start at 60%

Figure 16 shows the utilization rates for all deceased donor kidneys recovered by policy era and recovering OPO. A total of 39 OPOs saw a decrease in utilization rate.

Figure 16: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era and Recovering OPO



Conclusion

Overall, in the post-policy era there was an increase in the amount of deceased kidney donors recovered to 6,930 compared to 6,528 donors in the pre-policy era. There was an increase in the non-use rate of kidneys overall, increasing to 29.71% in the post-policy era, from 26.47% in the pre. The percentage of donors being biopsied stayed similar between the pre- and post-policy era, with 62.59% and 63.94% respectively. Biopsies for donors who met the minimum criteria for biopsy increased from 91.31% in the pre-policy era to 96.79% 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 48.81% in the pre-policy era to 45.53% in the post. For donors who met minimum criteria for biopsy non-use rates increased for both donors that were biopsied, as well as those that were not biopsied in the post-policy era, increasing from 56.23% to 57.91% and from 35.34% to 41.14% respectively. For donors who did not meet the minimum criteria for biopsy and still were biopsied their non-use rates increased from 22.2% to 25.58% across the policy era. A slight increase was also seen in donors who did not meet criteria and were not biopsied, from 4.36% to 4.79%. 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 appear 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 suggest biopsying alone has increased non-use rates.