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

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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 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

<table>
<thead>
<tr>
<th>Biopsy Status</th>
<th>Era</th>
<th>Biopsy</th>
<th>No biopsy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>4,086</td>
<td>2,442</td>
<td>6,528</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>4,431</td>
<td>2,499</td>
<td>6,930</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Biopsy Status</th>
<th>Era</th>
<th>Kidneys Recovered for Transplant but Not Transplanted</th>
<th>Kidneys Recovered</th>
<th>Non-use Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopsy</td>
<td>Pre</td>
<td>3,112</td>
<td>8,126</td>
<td>38.30</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>3,798</td>
<td>8,802</td>
<td>43.15</td>
</tr>
<tr>
<td>No biopsy</td>
<td>Pre</td>
<td>325</td>
<td>4,860</td>
<td>6.69</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>296</td>
<td>4,977</td>
<td>5.95</td>
</tr>
<tr>
<td>Total</td>
<td>Pre</td>
<td>3,437</td>
<td>12,986</td>
<td>26.47</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>4,094</td>
<td>13,779</td>
<td>29.71</td>
</tr>
</tbody>
</table>
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 increase 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

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

![Biopsy Status Graph]

**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 Criterion for Biopsy**

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

<table>
<thead>
<tr>
<th>Meets Minimum Criteria</th>
<th>Biopsy Status</th>
<th>Era</th>
<th>Kidneys Recovered for Transplant but Not Transplanted</th>
<th>Kidneys Recovered</th>
<th>Non-use Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biopsy</td>
<td>Pre</td>
<td>2,161</td>
<td>3,843</td>
<td>56.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>2,770</td>
<td>4,783</td>
<td>57.91</td>
</tr>
<tr>
<td>Yes</td>
<td>No biopsy</td>
<td>Pre</td>
<td>129</td>
<td>365</td>
<td>35.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>65</td>
<td>158</td>
<td>41.14</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Pre</td>
<td>2,290</td>
<td>4,208</td>
<td>54.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>2,835</td>
<td>4,941</td>
<td>57.38</td>
</tr>
<tr>
<td></td>
<td>Biopsy</td>
<td>Pre</td>
<td>951</td>
<td>4,283</td>
<td>22.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>1,028</td>
<td>4,019</td>
<td>25.58</td>
</tr>
<tr>
<td>No</td>
<td>No biopsy</td>
<td>Pre</td>
<td>196</td>
<td>4,495</td>
<td>4.36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>231</td>
<td>4,819</td>
<td>4.79</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Pre</td>
<td>1,147</td>
<td>8,778</td>
<td>13.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>1,259</td>
<td>8,838</td>
<td>14.25</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Biopsy Status</th>
<th>Era</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria Not Met</td>
<td>Total</td>
<td>95.19%</td>
<td>94.83%</td>
</tr>
<tr>
<td>No biopsy</td>
<td>Total</td>
<td>77.38%</td>
<td>73.96%</td>
</tr>
<tr>
<td>Biopsy</td>
<td>Total</td>
<td>43.51%</td>
<td>41.78%</td>
</tr>
</tbody>
</table>
### Table 6: Utilization Rates for Deceased Kidney Donors Recovered in United States by Policy Era, Biopsy Status and Minimum Criteria for Biopsy

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

<table>
<thead>
<tr>
<th>Donor KDPI Group</th>
<th>Pre-Policy</th>
<th>Post-Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biopsied</td>
<td>Not Biopsied</td>
</tr>
<tr>
<td>0-20%</td>
<td>211 (17.5%)</td>
<td>995 (82.5%)</td>
</tr>
<tr>
<td>21-34%</td>
<td>385 (39.81%)</td>
<td>582 (60.19%)</td>
</tr>
<tr>
<td>35-85%</td>
<td>2524 (75.52%)</td>
<td>818 (24.48%)</td>
</tr>
<tr>
<td>86-100%</td>
<td>966 (95.36%)</td>
<td>47 (4.64%)</td>
</tr>
<tr>
<td>Total</td>
<td>4086 (62.59%)</td>
<td>2442 (37.41%)</td>
</tr>
</tbody>
</table>
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

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

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

![Biopsy Status Graph]

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

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

<table>
<thead>
<tr>
<th>Biopsy Status</th>
<th>Age Group</th>
<th>Era</th>
<th>Kidneys Recovered for Transplant but Not Transplanted</th>
<th>Kidneys Recovered</th>
<th>Non-use Rate (%)</th>
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</thead>
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<tr>
<td></td>
<td></td>
<td>Pre</td>
<td>225</td>
<td>1,249</td>
<td>18.01</td>
</tr>
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<td></td>
<td></td>
<td>Post</td>
<td>232</td>
<td>1,139</td>
<td>20.37</td>
</tr>
<tr>
<td>Pre</td>
<td>18-34</td>
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<tr>
<td></td>
<td></td>
<td>Pre</td>
<td>612</td>
<td>2,437</td>
<td>25.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>748</td>
<td>2,530</td>
<td>29.57</td>
</tr>
<tr>
<td>Post</td>
<td>35-49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>50-59</td>
<td></td>
<td>1,069</td>
<td>2,515</td>
<td>42.50</td>
</tr>
<tr>
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<td></td>
<td>Post</td>
<td>1,203</td>
<td>2,651</td>
<td>45.38</td>
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<tr>
<td>Post</td>
<td>60+</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>18-34</td>
<td></td>
<td>49</td>
<td>2,384</td>
<td>2.06</td>
</tr>
<tr>
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<td></td>
<td>Post</td>
<td>65</td>
<td>2,513</td>
<td>2.59</td>
</tr>
<tr>
<td>Post</td>
<td>35-49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>50-59</td>
<td></td>
<td>94</td>
<td>568</td>
<td>16.55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>74</td>
<td>531</td>
<td>13.94</td>
</tr>
<tr>
<td>Post</td>
<td>60+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>18-34</td>
<td></td>
<td>274</td>
<td>3,633</td>
<td>7.54</td>
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<td></td>
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</tr>
<tr>
<td>Pre</td>
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<tr>
<td>Post</td>
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</tr>
<tr>
<td>Pre</td>
<td>Total</td>
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<td>1,269</td>
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<td></td>
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<td>2,535</td>
<td>65.36</td>
</tr>
<tr>
<td>Post</td>
<td>50-59</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>60+</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Biopsy Status</th>
<th>Age Group</th>
<th>Era</th>
<th>Transplanted</th>
<th>Kidneys Available</th>
<th>Utilization Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18-34</td>
<td>Pre</td>
<td>1,024</td>
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</tr>
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<td>Post</td>
<td>907</td>
<td>1,148</td>
<td>79.01</td>
</tr>
<tr>
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<td>Pre</td>
<td>1,825</td>
<td>2,450</td>
<td>74.49</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>69.99</td>
</tr>
<tr>
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<td>2,532</td>
<td>57.11</td>
</tr>
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<td></td>
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<td>1,448</td>
<td>2,666</td>
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<tr>
<td></td>
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<tr>
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<td>2,398</td>
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<td>1,792</td>
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<td>Pre</td>
<td>474</td>
<td>574</td>
<td>82.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>457</td>
<td>536</td>
<td>85.26</td>
</tr>
<tr>
<td></td>
<td>60+</td>
<td>Pre</td>
<td>56</td>
<td>120</td>
<td>46.67</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>11</td>
<td>54</td>
<td>20.37</td>
</tr>
<tr>
<td></td>
<td>18-34</td>
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<td>3,359</td>
<td>3,652</td>
<td>91.98</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>3,666</td>
<td>91.52</td>
</tr>
<tr>
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<td>4,242</td>
<td>82.39</td>
</tr>
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<td></td>
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<td>79.96</td>
</tr>
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<td>1,920</td>
<td>3,106</td>
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<td>3,202</td>
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<tr>
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<td>60+</td>
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<tr>
<td></td>
<td></td>
<td>Post</td>
<td>878</td>
<td>2,556</td>
<td>34.35</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Recovering OPO</th>
<th>Pre-Policy</th>
<th>Post-Policy</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Biopsied</td>
<td>Not Biopsied</td>
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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**

Note: The axes for this plot end at 40%.
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**

Non-use Higher Post-Policy

Non-use Lower Post-Policy

Note: The axes for this plot end at 50%
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**

Note: The axes for this plot start at 50%
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.