The Effect of State Policies on Organ Donation and Transplantation in the United States

Paula Chatterjee, MD, MPH; Atheendar S. Venkataramani, MD, PhD; Anitha Vijayan, MD; Jason R. Wellen, MD, MBA; Erika G. Martin, PhD, MPH

IMPORTANCE Shortages in transplantable solid organs remain a critical public health challenge in the United States. During the past 2 decades, all states have implemented policies to increase organ supply, although their effectiveness is unknown.

OBJECTIVE To determine the effects on organ donation and transplantation rates of state policies to provide incentives for volunteer donation.

DESIGN, SETTING, AND PARTICIPANTS Using a quasi-experimental design and difference-in-differences regression analyses, we estimated the effect of policies in all 50 states and the District of Columbia on organ donors per capita and the number of transplantations from January 1, 1988, to December 31, 2010. Analyses were also stratified by type of donor (living vs deceased). Data were derived from the United Network for Organ Sharing. All data collection occurred between July 7 and September 27, 2013.

EXPOSURES Policies of interest were the presence of first-person consent laws, donor registries, dedicated revenue streams for donor recruitment activities, population education programs, paid leave for donation, and tax incentives. Information on states’ passage of various policies was obtained from primary legislative and legal sources.

MAIN OUTCOMES AND MEASURES The number of organ donors and transplantations per state, per year, during the study period.

RESULTS From 1988 to 2010, the number of states passing at least 1 donation-related policy increased from 7 (14%) to 50 (100%). First-person consent laws, donor registries, public education, paid leave, and tax incentives had no robust, significant association with either donation rates or number of transplants. The establishment of revenue policies, in which individuals contribute to a protected state fund for donation promotion activities, was associated with a 5.3% increase in the absolute number of transplants (95% CI, 0.57%-10.1%; P = .03). These associations were driven by a 4.9% increase in organ donations (95% CI, 0.97%-8.7%; P = .01) and an 8.0% increase in transplants (95% CI, 3.1%-12.9%; P = .001) from deceased donors as opposed to changes among living donors or transplants from living donors.

CONCLUSIONS AND RELEVANCE Nearly all state-level policies to encourage organ donation have had no observable effect on the rate of organ donation and transplantation in the United States. The one exception was the establishment of revenue policies to promote organ donation, which may have led to small increases in organ donations and transplantations from deceased donors. New policy designs are needed to increase donation rates and curtail the widening gap between organ supply and demand.

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he shortage in transplantable solid organs is a critical public health challenge in the United States. With nearly 124,000 patients requiring an organ transplant and 79,000 patients remaining on active waitlists for organs nationwide,1 more than 6000 patients are expected to die this year owing to organ shortages.2 Despite clinical and systems-based improvements in organ use,3–8 current trends in population aging and the prevalence of chronic diseases with end-stage organ dysfunction are expected to worsen organ shortages.9–11 This persistent gap between supply and demand has drawn the attention of physicians and policymakers, yet barriers to donation and effective organ transplantation remain.

Since the late 1980s, states have enacted numerous policies to increase organ supply. For instance, first-person consent laws that legally register donor intent prior to donation may have increased living donor rates in certain states.12 However, other policies, such as paid leave from employment for activities associated with donation or tax benefits for donors equal to the amount associated with an act of donation, have not increased organ supply.3,13–15 It remains unclear whether these policies have influenced national trends in organ donation or transplantation. Furthermore, there have been no national data with which to evaluate the diversity or relative effectiveness of these policies. Such information is critical for policymakers seeking ways to increase organ donation and transplantation with limited resources to invest in these efforts.

In this study, we examined the effect of a variety of state policies on organ donation and transplantations in the United States for 2 decades. We studied 3 primary questions. First, what donation and transplantation policies did states adopt, and when? Second, which policies were related to increased organ donors per capita and transplantations per state, and were some policies more effective than others? Finally, did policies have a differential effect by donor status; that is, did some policies (such as paid leave and tax benefits) have a more pronounced effect among living donors while other policies (such as first-person consent and donor registries) have a larger effect among deceased donors?

Methods

Data

Identification of State Policies

We examined primary legal sources to create indicator variables for the passage of 6 major types of state policies designed to increase organ donation: (1) dedicated revenue pools comprising individual voluntary contributions and protected state funds for donor recruitment activities, such as community outreach campaigns, worksite campaigns, and hospital-based interventions to encourage donation and improve clinical practices for organ procurement among deceased donors; (2) population education programs on organ donation through classes in public schools or driver’s education programs; (3) leaves of absence for donors working in public and private sectors; (4) first-person consent laws registering individual consent for donation without family consent at the time of donation; (5) donor registries to document consent for donation; and (6) tax benefits for donors equal to the costs associated with the act of donation (eTable 1 in the Supplement). These policies were selected because they are recognized, defined, and publicly reported by Organdonor.gov, the US Department of Health & Human Services’ official site for organ and tissue donation. For each state, the presence of these policies and their passage dates were coded using qualitative data from the United Network for Organ Sharing and Organ Procurement and Transplantation Network databases,16 state-specific legislative codes, and WestLaw Next (a comprehensive legal database of federal and state laws). These sources were reviewed on a state-by-state basis and coded for the presence of each policy, passage dates, and other pertinent details using a standard data extraction template. Where discrepancies between sources existed, we relied on the primary legal documents and resolved coding questions through consensus. All data collection occurred between July 7, 2013, and September 27, 2013. This project was considered exempt from institutional review board approval under federal guidelines owing to the use of publicly available, deidentified aggregate data.

Control Variables

We included measures of economic environment, health systems, and risk of requiring transplantation in all statistical models. State income per capita and state population were acquired from the Bureau of Economic Analysis.17 The percentage of uninsured Americans and the percentage of Medicare patients per state were obtained from the Area Resource File.18 From the United States Renal Data System, we collected the number of patients with end-stage renal disease per state, per year during the study period.19

Outcomes

The primary outcomes were number of solid-organ donors (inclusive of living and deceased donors) per state population and number of solid-organ transplantations per state, per year from January 1, 1988, to December 31, 2010. This information was obtained from publicly available data from the United Network for Organ Sharing and Organ Procurement and Transplantation Network databases.20 Outcome data were limited to 41 states and the District of Columbia reporting the number of donors, as well as 47 states and the District of Columbia reporting the number of transplantations.

Statistical Analysis

We created cumulative adoption plots of the percentage of states that passed each policy during the study period. Summary statistics were calculated for the outcome variables of organ donors per capita and total number of transplants; control variables were also summarized.

We assessed the effect of state policies on the primary outcomes of organ donors per capita and transplantations using difference-in-differences regression models. Difference-in-differences models have been commonly used to study the effects of policies adopted at different times by treating the passage of a particular policy as a quasi-experiment.20 We used

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Effect of State Policies on Organ Donation and Transplantation

Results

Sample Characteristics

Donation rates and number of transplants were obtained for 41 states and the District of Columbia and 47 states and the District of Columbia, respectively, which represent the full set of states for which information is available in the United Network for Organ Sharing and Organ Procurement and Transplantation Network databases. Information on state policies was obtained for all 50 states and the District of Columbia. The number of states passing at least 1 donation-related policy increased from 7 (14%) to 50 (100%), with 6 states adopting all 7 policies by 2010 (Figure). Most policies were passed within the past decade, with all states adopting at least 2 policies as of 2010. The most commonly adopted policy during the study period was the passage of first-person consent laws (50 states and the District of Columbia), while the least common was granting leaves of absence from private sector employment (6 states). During the same period, the total number of organ donors increased nationally by 245.4% (from 5909 to 14,504), while the number of transplants increased by 140.3% (from 9617 to 13,490) (eFigure in the Supplement). The mean (SD) number of donors per state, per year was 4.6 (5.5) per 100,000 residents, and the mean (SD) number of transplants was 7.6 (6.8) per 100,000 (Table 1).

Multivariable Analyses of Organ Donation and Transplantation Rates

The passage of revenue policies was associated with a 5.3% increase in the number of transplantations ($P = .03$) (Table 2). This increase is equivalent, on average, to 15 additional transplants per state, per year. There was a trend toward an increase in donation rates and transplantations associated with leave-of-absence policies for public employees, but this increase did not reach statistical significance (4.1% increase in donation rates: $P = .05$; and 7.1% increase in transplantations: $P = .06$). No other policies had a statistically significant association with either donation rates or transplantations. The full set of coefficient estimates, including the covariates, is provided in eTable 2 in the Supplement.

Subgroup Analysis by Donor Type

Revenue policies were associated with a 4.9% increase in the number of deceased donors per capita ($P = .01$) (Table 3), as well...
as an 8.0% increase in the number of transplants of organs from deceased donors ($P = .001$). This increase represents an additional 6.5 deceased donors and 8 transplants from deceased donors per state, per year. Policies allowing for leaves of absence from public sector employment were associated with a 9.8% increase in transplants from living donors ($P = .01$), but there was no significant effect among deceased donors. This policy also exhibited a trend toward increasing the number of living donors, although it did not reach statistical significance (7.7% increase; $P = .05$). Using a Bonferroni correction for multiple comparisons and applying a significance threshold of $P < .007$, the only statistically significant effect remains the association between the revenue policy and transplants from deceased donors (Table 3).

**Sensitivity Analysis**

Regressions using a narrow time frame showed similar effects of the revenue policies on overall outcomes (7.7% increase in number of transplantations: $P = .05$ [eTable 3 in the Supplement]; 9.1% increase in number of deceased donors: $P = .01$; and 8.8% increase in the number of organ transplants from deceased donors: $P = .01$ [eTable 4 in the Supplement]). The associations between public leave policies and living donations and transplants were no longer significant in these specifications. This pattern of results from the first sensitivity analysis was consistent in models using flexible state-specific time trends (eTables 5 and 6 in the Supplement). Regression models inclusive of up to 5-year time lags showed no evidence for lagged policy effects (eTable 7 in the Supplement). Results were also consistent in models that used a negative binomial specification (eTable 8 in the Supplement), with the main variable as a count of the total policies passed (eTable 9 in the Supplement), stratified by organ (eTable 10 in the Supplement), and with a limited set of policy variables that was most closely related to each outcome (eTable 11 in the Supplement).

**Discussion**

In this national study of organ donation and transplantation, we found that state policies have had a modest effect during the past 2 decades. First-person consent laws, donor regis-

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**Table 1. Characteristics of State-Years Included in Analysis of Organ Donation Policies**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value, Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcomes, No.*</td>
<td></td>
</tr>
<tr>
<td>Donors</td>
<td>269.7 (260.7)</td>
</tr>
<tr>
<td>Donors per 100 000 population</td>
<td>4.6 (5.5)</td>
</tr>
<tr>
<td>Transplants</td>
<td>309.4 (250.9)</td>
</tr>
<tr>
<td>Transplants per 100 000 population</td>
<td>7.6 (6.8)</td>
</tr>
<tr>
<td>Covariatesb</td>
<td></td>
</tr>
<tr>
<td>Per capita income, $</td>
<td>27 232 (8693)</td>
</tr>
<tr>
<td>Uninsured, %</td>
<td>15.5 (4.9)</td>
</tr>
<tr>
<td>Population, No.</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4 225 601 (1 051 108)</td>
</tr>
<tr>
<td>End-stage renal disease</td>
<td>4901 (3996)</td>
</tr>
</tbody>
</table>

* There are 893 state-year observations from 1988 to 2010 for transplant analyses and 863 observations for donor analyses. These observations represent the full set of donor and transplant observations available from the United Network on Organ Sharing.

b These state-level factors were adjusted for in the regression models. The total number of observations is 893, which is the transplant sample.

**Table 2. Association Between Policy Passage and Organ Donation Rates and Absolute Number of Transplants Between 1988 and 2010**

<table>
<thead>
<tr>
<th>State Policy</th>
<th>Change in Donations per Capita, %</th>
<th>P Value</th>
<th>% Change in No. of Transplants</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue*</td>
<td>2.6</td>
<td>.14</td>
<td>5.3</td>
<td>.03</td>
</tr>
<tr>
<td>Education†</td>
<td>2.3</td>
<td>.38</td>
<td>6.5</td>
<td>.07</td>
</tr>
<tr>
<td>Leave</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public‡</td>
<td>4.1</td>
<td>.05</td>
<td>7.1</td>
<td>.06</td>
</tr>
<tr>
<td>Private§</td>
<td>2.8</td>
<td>.47</td>
<td>−0.7</td>
<td>.91</td>
</tr>
<tr>
<td>First-person consent¶</td>
<td>−0.2</td>
<td>.91</td>
<td>−7.2</td>
<td>.04</td>
</tr>
<tr>
<td>Registry©</td>
<td>−2.4</td>
<td>.13</td>
<td>0.9</td>
<td>.73</td>
</tr>
<tr>
<td>Tax incentives†</td>
<td>−0.5</td>
<td>.82</td>
<td>6.5</td>
<td>.17</td>
</tr>
</tbody>
</table>

* Estimates are derived from difference-in-differences models controlling for logged state income, logged state population, logged state population with end-stage renal disease, percentage of uninsured, state and year fixed effects, and state-specific linear time trends. Each column represents a separate regression. The percentage changes are calculated from ($B × 100$), where B is the model coefficient. The sample size for the donations per capita regression is 861 state-year observations. The sample size for the transplants regression is 893 state-year observations. The policies are defined in eTable 1 in the Supplement.

† Dedicated funds for donor and transplant promotion activities, including allowing residents to make voluntary contributions and direct provision of state funds.

‡ Specific population education initiatives on organ donation, which take place in state-run driver’s education courses or health classes in public schools.

§ Leave of absence for state or local government employees for all activities associated with organ donation, which frequently equate to 30 paid workdays for solid-organ donation and 5 to 7 paid workdays for bone marrow transplantation.

¶ Leave of absence for employees of private companies for all activities associated with organ donation; exact details of these activities are not available.

§ Mandated first-person consent for organ donation, allowing individuals to donate organs without family consent; legislative language often mirrors that of the federal Uniform Anatomical Gift Act.

© Establishment of organ donation registries that officially register consent for donation.

† Provision of tax benefits equal to the amount associated with organ donation activities; size frequently equates to a $10 000 tax deduction.
tries, public education programs, paid leave, and tax incentives had no robust, significant association with either donation rates or number of transplants, even after allowing for prolonged delays for policies to take effect. Policies that establish state-based revenue pools were associated with increases in the absolute number of transplants, specifically among deceased donors. However, the magnitude of the effect was small, with revenue policies contributing to an additional 6.5 deceased donors and 8 transplants from deceased donors per year for an average state.

This largely negative effect may be explained by multiple factors. First, state-by-state differences in policy implementation may have attenuated overall effects such that existing positive effects in certain states may have been of no effect by less successful efforts in others. For example, there is anecdotal evidence that the implementation of first-person consent laws involves a fundamentally new approach to procuring consent and required retraining staff, addressing families whose wishes conflict with those of the potential donor, and decisions on how to create the consent process. 

Second, existing incentives may not be sufficient to motivate the behavioral change required to become an organ donor. For instance, the maximum cash value of tax deduction policies under existing policies is approximately $600, which is markedly less than the suggested $10,000 threshold to motivate donation of a solid organ, as described in prior studies. Similarly, the loss of wages associated with leave-of-absence policies may be too great to forgo for potential donors: living kidney donors assume an average cost of $3650 for loss of income and other costs associated with donation, with 15% of donors incurring costs of greater than $7500. Future policies may consider incentives that offer sufficient benefit to outweigh the various costs associated with any act of donation.

Finally, the act of donation may be most strongly motivated by individual altruism, and existing policies may not be sufficient appealing to this aspect of donor characteristics. 

The small observed benefits from the institution of revenue pools—the only policy that had a statistically significant effect—may be owing to several possible mechanisms. Funding from revenue pools may be used for recruitment activities not covered under public education, such as community outreach campaigns and worksite campaigns. Funds may also be used to educate physicians, lawyers, funeral directors, and other professionals who may affect the public’s willingness to donate. Other states may choose to use revenue funds to strengthen other policies, such as supplementing the costs of running registries. These policies were particularly associated with increased rates of deceased donation, which may indicate that such funds are being targeted toward the improvement of clinical practices to optimize the organ procurement process at the time of deceased donation. Existing revenue policies rarely stipulate exactly how funds will be used in a state, allowing states to fund activities that may be particularly meaningful to the local context. We further explored these ideas by examining whether the effects for the other state policies were magnified in states that had passed revenue policies. However, these analyses, which involved interaction terms between the policies, were underpowered to draw meaningful policy conclusions.

These results offer the first examination of the national effect of a variety of policies on organ donation. Prior studies have been limited to fewer policies or single donor types. Previous work has examined policy promotion in isolated contexts but did not assess the effect on eventual downstream outcomes of donation or transplantation. Our findings are consistent with prior studies showing a minimal effect of tax benefits and paid leave policies on solid-organ donation. Small effect sizes are also consistent with research on repealed motorcycle helmet laws, which led to a 0.7% increase in the number of total donors in these states, representing an additional 0.5 donors per year. Furthermore, this study clarifies an important differential effect between donation and effective transplantation and offers a possible mechanism of action of policies leading to changes specific among deceased donors and transplants.

Our study has limitations. First, our use of state-level data may have limited the evaluation of policy efficacy. For instance, our ability to assess the effectiveness of donor registries may have been restricted owing to the lack of data on the number of registered donors, which could be more sensitive to these policies. Second, although we performed sensitivity analyses allowing policies up to 5 years to take effect, policy ramifications may simply take longer. Educational programs or registry policies may have led to increases in the donor pool,

Table 3. Subgroup Analyses of Policy Effect by Living vs Deceased Donors*

<table>
<thead>
<tr>
<th>State Policy</th>
<th>Change in Living Donors per Capita, %</th>
<th>P Value</th>
<th>Change in Deceased Donors per Capita, %</th>
<th>P Value</th>
<th>Change in Transplants From Living Donors, %</th>
<th>P Value</th>
<th>Change in Transplants From Deceased Donors, %</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>0.5</td>
<td>.91</td>
<td>4.9</td>
<td>.01</td>
<td>1.2</td>
<td>.78</td>
<td>8.0</td>
<td>.001</td>
</tr>
<tr>
<td>Education</td>
<td>4.6</td>
<td>.48</td>
<td>−1.9</td>
<td>.55</td>
<td>3.9</td>
<td>.53</td>
<td>4.5</td>
<td>.22</td>
</tr>
<tr>
<td>Leave</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>7.7</td>
<td>.05</td>
<td>3.3</td>
<td>.16</td>
<td>9.8</td>
<td>.01</td>
<td>5.9</td>
<td>.10</td>
</tr>
<tr>
<td>Private</td>
<td>7.8</td>
<td>.33</td>
<td>−1.6</td>
<td>.74</td>
<td>9.8</td>
<td>.23</td>
<td>−0.8</td>
<td>.92</td>
</tr>
<tr>
<td>First-person</td>
<td>1.1</td>
<td>.78</td>
<td>−0.8</td>
<td>.71</td>
<td>−0.9</td>
<td>.82</td>
<td>−3.5</td>
<td>.26</td>
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<tr>
<td>Registry</td>
<td>−6.5</td>
<td>.08</td>
<td>2.2</td>
<td>.25</td>
<td>−6.6</td>
<td>.08</td>
<td>−0.2</td>
<td>.95</td>
</tr>
<tr>
<td>Tax incentives</td>
<td>4.0</td>
<td>.39</td>
<td>1.8</td>
<td>.48</td>
<td>3.4</td>
<td>.46</td>
<td>6.1</td>
<td>.13</td>
</tr>
</tbody>
</table>

* Sample was stratified by living vs deceased donor and transplant status, and regressions were repeated in these subgroups. See Table 2 for description of the regressions, control variables, sample sizes, and calculation of percentage change.
but these effects will not be identifiable until the eventual date of organ procurement (most likely many years after the date of policy passage).

Third, we used dates of policy passage to determine changes in outcomes before and after passage; however, passage of legislation does not always correlate with immediate policy implementation. We explored details on the timing of policy enactment and implementation using additional legal and policy briefs, but they were incompletely obtained for all states. Analyses were repeated using the subset of states for which dates of policy enactment were available, and results were consistent. Fourth, our study is limited to policies that directly seek to increase organ donation rates. Other policies aimed at motorcycle helmet use, health system transformation, public health spending, smoking rates, and diabetes mellitus could conceivably affect donations by affecting the health of the donor pool. Finally, our study was observational in that state policies were not randomly assigned. Thus, even with a careful difference-in-differences research strategy, our estimates remain open to bias in which states that opted to implement policies may have different characteristics than those that did not. Causal claims, therefore, should be made with caution.

Conclusions
We found that state policies designed to increase organ donation and transplantation during the past 2 decades had little to no effect. The only policy with a statistically significant effect was the establishment of state-based revenue policies. This policy was associated with national increases in the number of transplants, specifically among deceased donors, during the past 2 decades. However, state-by-state variation in how these funds are used is large, limiting the generalizability of this finding. These findings suggest that new policy designs may be needed to increase donation rates. Future information on the successful use of revenue pools on a state-by-state basis will be beneficial to policymakers in providing crucial insights into how state and national policies can best use the current policies in place and help resolve critical organ shortages. More generally, using county-level data on donations and transplantations, as well as more granular information on specific policies passed in each state, can greatly advance the research in this area and provide deeper insights into best practices in organ donation policy.

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AUTHOR CONTRIBUTIONS: Drs Chatterjee and Martin had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: All authors.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Chatterjee.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Chatterjee, Venkataramani.

Administrative, technical, or material support: Vijayan, Wellen, Martin.

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REFERENCES


Time to Test Incentives to Increase Organ Donation

Sally Satel, MD; David C. Cronin II, MD, PhD, MHCM

In 1987, when the United Network for Organ Sharing began keeping records, there was a gap between the supply of organs and demand. With time, that gap has become a chasm. Last year, more than 120,000 people were in need of a kidney, liver, heart, or lung; roughly 7000 of them died while waiting.

During the past 2 decades, states have tried several ways to encourage nondirected organ donation from deceased and living donors. These methods have included, for example, a state tax deduction for expenses incurred by living donors.

But do such policies wield a meaningful effect? In this issue, Chatterjee and colleagues, to our knowledge, conduct the first examination of the national effect of a variety of policies on organ donation, and find that the policies barely made a dent.

The authors report their discouraging conclusion after examining United Network for Organ Sharing data on the per capita rate of donations and transplant operations from 1988 to 2010. They assess those data in relation to 6 state-level policies: the presence of first-person consent laws whereby the family cannot override an individual’s documented desire to be a donor at death, donor registries, dedicated revenue streams for donor recruitment and promotion activities, public education, paid job leave for living donors who work in the public and private sectors, and tax benefits for donors covering costs of living donation, such as child care, transportation to a medical center and follow-up trips, and lost wages. Only a modest rise in the rate of transplants was found and it was attributable to the revenue policy.

Chatterjee and colleagues suggest possible explanations for the disappointing findings. Perhaps some states did have positive results but the signal was obscured when pooled with data from other states. Possibly the tax breaks were too modest; after all, the maximum value of tax deductions under existing state policies is approximately $600. Along these lines, it would be interesting to see whether Utah and Idaho, the only 2 states with a tax credit for organ donation (a more generous form of tax break), fare better than the 15 other states that allow only a tax deduction.

Looking back across the past decade, only 1 policy has wielded a notable effect on deceased donation. The Organ Donation Breakthrough Collaborative, a federal effort initiated by the US Department of Health & Human Services in 2003, helped to increase the conversion rate (the number of deceased individuals whose organs are taken, divided by the number of people who are eligible to become posthumous donors) in participating centers by 60% by improving coordination between donor hospitals, where organs are procured, and transplant centers, where the organs are transplanted. However, transplant operations have hovered between 28,000 and 29,000 annually during the past 10 years. To be sure, paired kidney exchanges (wherein 2 biologically incompatible donor and recipient pairs “switch” donors and thus become compatible) and domino chains (the same idea as paired exchanges, involving multiple incompatible donors) are excellent developments for patients with poorly matched donors, but they are not intended to recruit new donors in large numbers. Presumed consent—wherein the organs are taken posthumously unless an individual has specifically forbidden their retrieval—will not yield enough new kidneys for transplant because less than 1% of deceased individuals are medically eligible to donate.

We believe it is time for disruptive innovation. By this concept, we mean compensating donors, not simply seeking to soften the financial ramifications of donation. It is time to test incentives, to reward people who are willing to save the life of a stranger through donation.

In-kind donor compensation will likely increase the donor pool, as have outright cash payments in other domains.