

ORIGINAL ARTICLE

Physician and patient acceptance of policies to reduce kidney discard

Sanjay Mehrotra¹  | Karolina Schantz¹  | John J. Friedewald¹ | Daniela P. Ladner² | Yolanda Becker³ | Richard Formica⁴ | Masoud Barah¹  | Jiayi Gu¹ | Elisa J. Gordon² 

¹Department of Engineering and Management Sciences, Northwestern University, Evanston, IL, USA

²Comprehensive Transplant Center, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

³University of Chicago Medicine, Chicago, IL, USA

⁴Yale-New Haven Transplantation Center, New Haven, CT, USA

Correspondence

Sanjay Mehrotra, Department of Industrial Engineering and Management Sciences, McCormick School of Engineering, Northwestern University, Evanston, IL, USA.
Email: mehrotra@northwestern.edu

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Abstract

Despite the shortage of kidneys for transplantation in the United States, approximately 18%-20% of deceased donor kidneys are discarded each year. These discarded kidneys can offer a survival benefit to suitable patients. Revisions to the current kidney allocation policy may be needed to reduce deceased donor kidney discard. We surveyed transplant physicians and patients to assess their perceived acceptability of policy proposals to reduce the discard of deceased donor kidneys. Members of professional societies (AST, ASTS) and a patient organization (AAKP) were invited to complete the survey. Responses were obtained from 97 physicians and 107 patients. The majority of physicians (73.4%) and patients (73.8%) "somewhat" or "completely" accepted a policy for fast-tracking kidneys at risk of discard. Physicians and patients also supported returning a proportion of waiting time to patients who accept KDPI >85 kidneys and experience graft failure within the first 12 months, with 36% of physicians and 50% of patients electing to return 100% of the waiting time. The majority of physicians (75%) "somewhat or completely" accepted a policy to skip less aggressive centers for KDPI 90 + offers. Physicians and patients provided insights into factors researchers, and policymakers should consider in the design and implementation of these policies.

KEYWORDS

ethics, kidney allocation, kidney transplantation, policy

1 | INTRODUCTION

Despite the shortage of kidneys for transplantation, more than 3500 deceased donor kidneys are discarded each year.¹ Many discarded kidneys are still viable for transplantation.¹ Prior research shows that even with very high KDPI kidneys (KDPI = 99) patient survival with transplant exceeds that of remaining on dialysis.²

The kidney discard rate varies globally. In the United States, it has remained between 18% and 20% over the last decade.¹ A

number of factors contribute to the high discard rate in the United States, including the allocation policies for high KDPI kidneys, regulatory oversight, and the payment structure for kidney transplantation. By contrast, France has a discard rate of only 9% and in UK it is also nearly 10%.³ Transplant centers in France face less regulatory scrutiny and fewer financial disincentives to performing higher risk transplants, and do not use donor kidney biopsies in organ acceptance decisions.⁴ A 2019 study applied French kidney acceptance practices to US deceased donor kidneys and found that 62% of the

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kidneys discarded in the United States between 2004 and 2014 would have been transplanted under the French system. According to this study, transplanting these discarded kidneys could have contributed additional 132 435 allograft life years to wait-listed patients over a 10-year period. This suggests that a reduction in kidney discard is possible through modifications to our allocation policies and regulatory environment.

Kidney discard rates increase with KDPI, with the discard rates exceeding 50% for kidneys with KDPI >85. Increasing the utilization of higher KDPI kidneys in the United States holds significant potential to improve wait-listed patients' longevity and quality of life. While a significant body of research indicates the need for policy proposals to reduce kidney discard, more information is needed on perceptions of the acceptability of such policy proposals among transplant physicians and patients. This paper compares physician and patient acceptance of policy proposals designed to reduce deceased donor kidney discard.

2 | MATERIALS AND METHODS

2.1 | Survey design and development

Two cross-sectional surveys, one for transplant surgeons and nephrologists, and one for kidney transplant candidates and recipients, were conducted to assess the perceived acceptability of four policy proposals to reduce kidney discard. These surveys are provided as supplementary material. A fact sheet with information about KDPI, the relationship between KDPI and graft survival, and the risks of delayed graft function and suboptimal graft function was presented at the beginning of the surveys. The proposals assessed included:

(a) A fast-tracking policy that would offer kidneys with a KDPI >85 directly to patients lower on the wait-list who have a high chance of dying before receiving another offer; (b) a fast-tracking policy that would use an algorithm that identifies the kidneys at high risk of discard (instead of using KDPI) and would offer these kidneys directly to patients lower on the wait-list who have a high chance of dying before receiving another offer; (c) a policy that would return a proportion of waiting time to patients who accept kidneys with KDPI >85 and experience graft failure during the first 12 months post-transplant; and (d) a policy that would skip centers that have not transplanted a kidney with a KDPI of 80 or higher within the past year when offers with KDPI ≥90 become available. Table 1 outlines each policy proposal.

Proposals 2 and 3 (fast-tracking and returning wait-time) were presented to both physicians and patients, while 1 and 4 were only included in the physician survey. The patient survey included two scenarios to assess willingness to accept delayed graft function or ongoing suboptimal kidney function post-transplant in exchange for reduced waiting time. Both physician and patient surveys offered respondents the opportunity to comment on the policies in an open-ended format.

The policy proposals and patient scenarios were developed based on findings from the National Kidney Foundation Consensus Conference to Decrease Kidney Discards⁵ and formative interviews with 4 patient advocates and 10 clinical experts from the project's Research Scientific Advisory Board. Surveys were refined through cognitive "think aloud" interviews with five clinicians (transplant nephrologists and surgeons) and six patients (transplant recipients and candidates) who verbalized their thought process of interpreting question meaning and responses to gauge their understanding of questions.⁶ Based on this feedback, the study team revised question

TABLE 1 Policy proposals

Policy	Respondents	Description	Response scale
Fast-tracking KDPI > 85 kidneys	Physicians	This policy would offer all kidneys with KDPI > 85 directly to patients lower on the wait-list who have a high chance of higher chance of dying before receiving another kidney offer.	1. Completely unacceptable 2. Somewhat unacceptable 3. Neutral 4. Somewhat acceptable 5. Completely acceptable
Fast-tracking kidneys at risk of discard	Physicians and patients	This policy would use an algorithm to identify kidneys at risk of discard and would offer these kidneys directly to patients lower on the wait-list who have a high chance of dying before receiving another kidney offer	1. Completely unacceptable 2. Somewhat unacceptable 3. Neutral 4. Somewhat acceptable 5. Completely acceptable
Giving waiting time back to patients who accept KDPI >85 kidneys and experience graft failure within the first 12 mo	Physicians and patients	This policy would give some or all of the waiting time back to patients who accept KDPI >85 kidneys and experience graft failure within the first 12 mo post-transplant. Respondents were asked what percentage of waiting time they would give back to a patient whose graft failed at 12 mo	1. No waiting time back (0%) 2. 25% (one quarter) 3. 50% (half) 4. 75% (three quarters) 5. 100% (all)
Skipping centers that have not transplanted kidneys with a KDPI of at least 80 within the past year when offers with KDPI 90 and above had become available	Physicians	This policy would over kidneys with KDPI 90 or higher only to centers that have transplanted a kidney with KDPI 80 or higher within the last year.	1. Completely unacceptable 2. Somewhat unacceptable 3. Neutral 4. Somewhat acceptable 5. Completely acceptable

wording and response options to improve clarity. Participants were compensated \$100 for participating in cognitive interviews.

The kidney fast-tracking proposals and the proposal of offering KDPI ≥ 90 kidneys only to centers that have performed KDPI 80 + transplants within the last year had a 5-point Likert-style acceptability scale. The categories were completely acceptable, somewhat acceptable, neutral, somewhat unacceptable, and completely unacceptable. Respondents rated the proposal of returning waiting time with the following options: no time back, 25%, 50%, 75%, and 100%. Respondents could also select "other" and write in a different percentage or formula. The two patient scenarios allowed patients to select yes, no, or unsure. Patients who selected unsure were asked what additional information they would need to make a decision.

2.2 | Sample and recruitment

Surveys were programmed using Redcap electronic data capture tools hosted at Northwestern University.^{7,8} Physician surveys were distributed via email listservs to transplant center medical directors and members of the American Society of Transplant Surgeons (ASTS). Reminder emails were sent at 1 week intervals, for a total of three reminders. A link to the survey was also included in two American Society of Transplantation (AST) e-newsletters.

Patient recruitment was conducted through the American Association of Kidney Patients (AAKP) in order to obtain a national sample. AAKP is the largest independent kidney patient organization in the United States. Patient surveys were distributed through two email blasts to AAKP members. Three subsequent reminders to complete the survey were included in AAKP's email newsletters to members.

Overall response rates for the patient and physician surveys cannot be determined due to the fact that AAKP and AST distributed the surveys via e-newsletters and email blasts. The response rate for ASTS members and transplant center medical directors was 7%. The institutional review board at Northwestern University approved the study (STU00208614), and electronic informed consent was obtained.

All participants were age 21 years or older and English speaking. Physicians were eligible if they were involved in the clinical care of transplant patients and the acceptance of kidney offers. Patients were eligible if they were currently on the wait-list for a kidney transplant and/or had received a deceased donor kidney transplant since 2015.

2.3 | Analysis

Quantitative data were analyzed using the statistical software system R.⁹ Frequencies by response category were calculated for each policy proposal. Categorical data (yes/no responses) were compared using χ^2 . Ordinal data (acceptability ratings) were compared using the Mann-Whitney *U* test/Wilcoxon rank sum test for independent samples and the Wilcoxon rank signed rank test for paired samples

(using the `wilcox.test` function with automatic continuity correction in R). Physician responses were compared by center volume (less than 100 versus >100) using the Wilcoxon rank sum test. Patient responses were compared by education level (less than a college degree versus college degree or higher) using Wilcoxon rank sum tests and χ^2 .

Qualitative data were analyzed using Nvivo12.¹⁰ Written responses were coded according to the policy components addressed, and a study team member identified repeated emergent patterns within the data. Themes were generated following these patterns,¹¹ and the study team reviewed and refined the themes, using triangulation to aid in data interpretation.

3 | RESULTS

3.1 | Respondent demographics

Ninety-seven physicians answered at least one question on the physician survey. Most (86.5%) were surgeons, and many (40%) had 20 years or more of experience. One hundred and seven patients answered at least one question on the patient survey. Of these, 52% were recipients and 48% were candidates. Table 2 presents respondents' demographics.

3.2 | Returning waiting time

In the current point-based system for allocating donor kidneys, waiting time is used in assigning points to prioritize patients.¹² Most physicians and patients supported returning at least some waiting time to a patient who accepted a KDPI >85 kidney and experienced graft failure 12 months post-transplant. The most frequent response for both physicians and patients was to return 100% of the waiting time; however, patients selected this response more often than physicians (36% of physicians and 50% of patients selected to return 100% of the waiting time). See Figure 1 for a comparison of response frequencies by patients and physicians. The difference in physician and patient rankings of percentage of waiting time to return was statistically significant (Wilcoxon rank sum test; $P = .03$). Physicians' responses did not differ significantly by center volume (Wilcoxon rank sum test; $P = .7$). Patients' responses did not differ significantly by education level (Wilcoxon rank sum test; $P = .5$).

A few patients (9%) and physicians (6%) selected "other." Fifty percent of the physicians who selected other recommended returning all of the wait-time minus the amount of time the patient had a functioning graft. Patients' most commonly suggested using a sliding scale that would consider patient and kidney characteristics instead of returning a uniform amount of waiting time.

Physicians were also asked what if any changes they would make to the policy. Among the 29 physicians who responded, the most common suggestion (28%) was that the policy should ensure that graft failure was not due to patient non-adherence:

TABLE 2 Respondent demographics

Category	Physicians N (%)	Patients N (%)
Gender		
Female	25 (26.3%)	52 (51.5%)
Male	68 (71.6%)	49 (48.5%)
Nonbinary	2 (2.1%)	0 (0%)
Race		
White	74 (77.1%)	69 (69.7%)
African American or Black	4 (4.2%)	23 (23.2%)
Asian	12 (12.5%)	3 (3%)
Mixed or multiple races	1 (1%)	2 (2%)
Other	5 (5.2%)	2 (2%)
Ethnicity		
Not Hispanic or Latino	87 (91.6%)	93 (93.9%)
Hispanic or Latino	8 (8.4%)	6 (6.1%)
Physician Characteristics		
Specialty		
Nephrologist	12 (12.5%)	
Surgeon	83 (86.5%)	
Other	1 (1.0%)	
Years of experience		
<5	13 (13.8%)	
5-10	10 (10.6%)	
11-15	17 (18.1%)	
16-20	16 (17.0%)	
>20	38 (40.4%)	
Transplant center volume		
0-49	10 (10.4%)	
50-99	20 (20.8%)	
100-199	33 (34.4%)	
200+	33 (34.4%)	
OPTN region		
Region 1	5 (6%)	
Region 2	14 (17%)	
Region 3	13 (16%)	
Region 4	6 (7%)	
Region 5	8 (10%)	
Region 6	3 (4%)	
Region 7	10 (12%)	
Region 8	5 (6%)	
Region 9	9 (11%)	
Region 10	8 (10%)	
Region 11	2 (2%)	
Patient characteristics		
Age		
Under 50		27 (27%)
50-70		60 (60%)

TABLE 2 (Continued)

Category	Physicians N (%)	Patients N (%)
Above 70		13 (13%)
Education		
High school or equivalent		6 (5.9%) (6)
Some college but no degree		17 (16.8%)
Technical or Associate's degree		10 (9.9%)
4-y college degree		26 (25.7%)
Some graduate school but no degree		12 (11.9%)
Graduate or professional degree		30 (29.7%)
Patient type		
Transplant recipient		56 (52.3%)
Transplant candidate		51 (47.7%)
Dialysis		
On dialysis		89 (89%)
Not on dialysis		11 (11%)
Diabetes		
No		75 (74.3%)
Yes		26 (25.7%)
Insurance		
Medicare		63 (62.4%)
Medicaid		6 (5.9%)
Private		29 (28.7%)
Other		3 (3%)

"It would be ideal to have data to support that the graft loss was due to donor disease rather than patient related factors, but these are often difficult to measure."

Most patients who provided additional comments expressed overall agreement with the policy (75%). The majority of those who agreed reasoned that it was fair to the patient to return waiting time (58%). A smaller number disagreed on the grounds that it would be unfair to other patients (13%). Nearly one quarter of the patients who agreed with the policy (21%) noted that policy would increase acceptance of high KDPI kidneys:

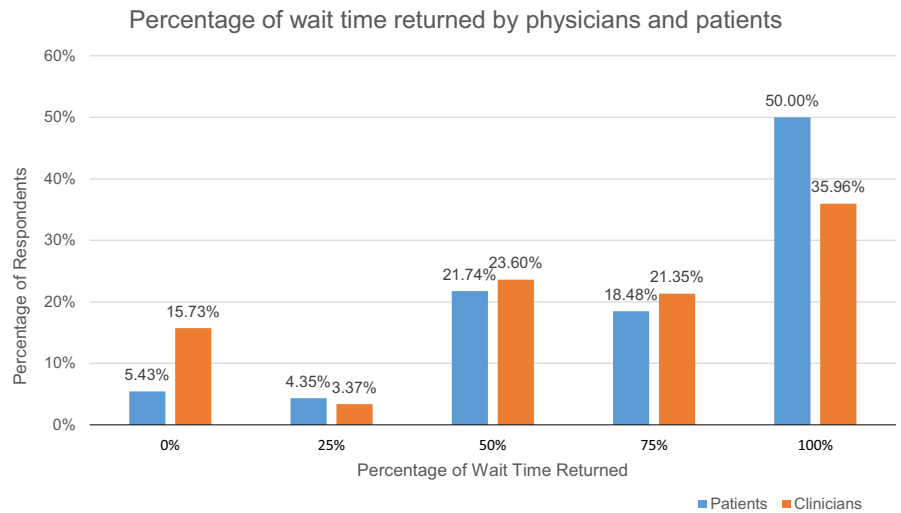
"This one year back on the wait list would really give people more of a peace of mind. It would make a real difference in the decision of whether to do this or not."

3.3 | Fast-tracking kidneys at risk of discard

Both fast-tracking policy proposals were rated as "somewhat" or "completely" acceptable by the majority of physicians. However,

(Continues)

FIGURE 1 Percentage of wait-time given back by patients and physicians. This figure compares patient and physician responses on the proportion of waiting time that should be returned to a patient who accepted a KDPI >85 kidney and experienced graft failure 12-mo post-transplant



more physicians rated fast-tracking using the risk of discard as "somewhat" or "completely" acceptable (73.4%) compared to fast-tracking using only KDPI (57.3%). The difference in physician ratings between the two policies was statistically significant (Wilcoxon rank sum test; $P < .001$). Similarly, most patients rated the policy of fast-tracking based on risk of discard as "somewhat" or "completely" acceptable (73.8%). Patient and physician ratings of this policy were not significantly different (Wilcoxon Rank Sum Test; $P = .8$). See Figure 2 for a comparison of response frequencies on the fast-tracking policy for patients and physicians. There was not a significant difference in response by center volume for physicians (Wilcoxon rank sum test; $P = .8$), nor by education level for patients (Wilcoxon rank sum test; $P = .6$).

Physicians were also asked what, if any, changes they would suggest to each of the fast-tracking policies. Thirty-four physicians provided feedback on the KDPI based fast-tracking policy, while 29 commented on the policy using a risk of discard model. The comments are consistent with the quantitative data, suggesting a preference for a risk of discard model that accounts for kidney characteristics beyond KDPI. While many physicians expressed agreement with the

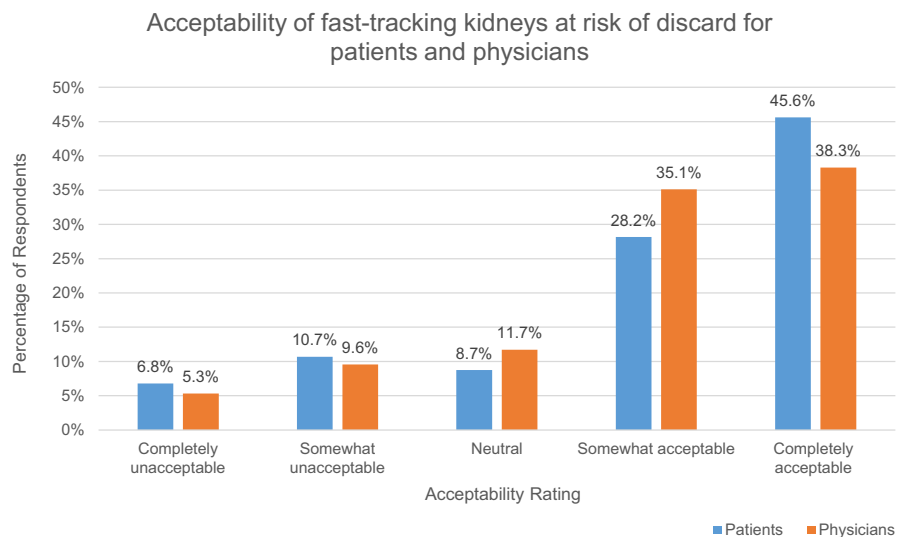
policy overall, some raised concerns about how appropriate patients would be identified, and pointed out the additional risks that come with transplanting marginal kidneys in frail patients. Physicians listed additional patient factors that a fast-tracking policy should consider, such as degree of recipient sensitization, age, vascular access considerations, and body size:

"The "right" recipient for a high KDPI donor kidney is not only dependent on mortality risk but also related to older age, smaller size, low immunological risk, etc Matching nephron mass to nephron capacity, not just life expectancy."

Physicians mentioned that their acceptance of the policy would depend on the accuracy of the models used to identify kidneys and patients:

"This would be appropriate IF the modeling is accurate enough to identify those organs likely to be discarded, and if the allocation algorithm could accurately identify

FIGURE 2 Acceptability of fast-tracking kidneys at risk of discard for patients and physicians. This figure compares patient and physician acceptance of fast-tracking kidneys at risk of discard to patients lower on the waiting list who are likely to die before receiving another offer



patients who are lower on the waiting list and are likely to die before getting another kidney offer."

Forty-nine patients provided additional comments on the policy of fast-tracking kidneys at risk of discard. Many (55%) expressed agreement with the policy, stating that it would be better than dialysis, help older patients, and could save lives and get patients transplanted sooner. Thirty-three percent of respondents suggested additional considerations for the policy. The majority of these additional considerations (63%) pertained to ensuring that patients understand their options and have the information they need to make an informed decision about accepting a kidney offered under this policy:

"People should be very aware of the opt out policy. A program like this should have clear rules on if and when you can change your mind. They also should be clearly informed of the KDPI number of the kidney and any possible issues that it might have. The patient should have a clear idea of their general health and life expectancy (as much as is possible.)"

3.4 | Limiting KDPI 90 + kidney offers to the centers that transplant higher KDPI kidneys

The proposal to skip centers that have not transplanted a kidney with KDPI 80 or above during the last year for KDPI 90 and above offers was also rated as somewhat or completely acceptable by most physicians (75%). See Figure 3 for the frequencies of physician responses to this policy. Physicians' ratings of this policy did not differ significantly from their ratings of the policy of fast-tracking kidneys at risk of discard ($P = .3$). There was not a significant difference in response by center volume (Wilcoxon rank sum test; $P = .2$).

A total of 22 physicians responded with additional comments or suggested changes to this policy. These included using acceptance rate rather than requiring one KDPI 80 or higher transplant per year regardless of center size, using additional criteria besides KDPI to

determine quality of a kidney offer, and including high CPRA patients on offers regardless of their center.

3.5 | Patient kidney acceptance scenarios

Most patients (71%) responded that they would accept a marginal kidney that was likely to have 2-3 weeks of delayed graft function in order to avoid two additional years on the wait-list. Fourteen percent would not accept the kidney, while another 15% were unsure. Those who were unsure most commonly expressed that they would need additional information about the kidney or the donor (31%) or additional information about their own health status and age at the time of the offer (19%).

Patient responses were mixed when asked about a marginal kidney that was likely to have delayed graft function and would never function optimally. Patients were told the kidney would work well enough to get them off of dialysis, but they would require additional medical care for the life of the kidney. In this case, 45.6% would accept the kidney, while 39.8% would not, and 14.6% were unsure. Respondents who were unsure about the kidney offered in scenario 2 expressed a desire for additional kidney and donor information (31%), more information about their own health status at the time of the offer (25%), and more detail about the additional medical care that would be needed if they accepted the kidney (31%). Excluding those patients who selected unsure for either offer, patients were significantly more likely to accept the kidney offered in scenario one than the kidney offered in scenario two (83.5% vs 53.41%; $P = .001$). There was no significant difference in acceptance by education level for either scenario ($P = .3$ and $P = .5$).

3.6 | Additional policy suggestions

Physicians provided some additional suggestions on ways to reduce kidney discard, including: increasing dual kidney transplants; increasing centers' acceptance of kidneys prior to procurement and biopsy; penalizing centers for provisionally accepting kidneys and then declining; changing or eliminating outcomes reporting that incentivizes centers to decline kidneys; and shipping kidneys on pump.

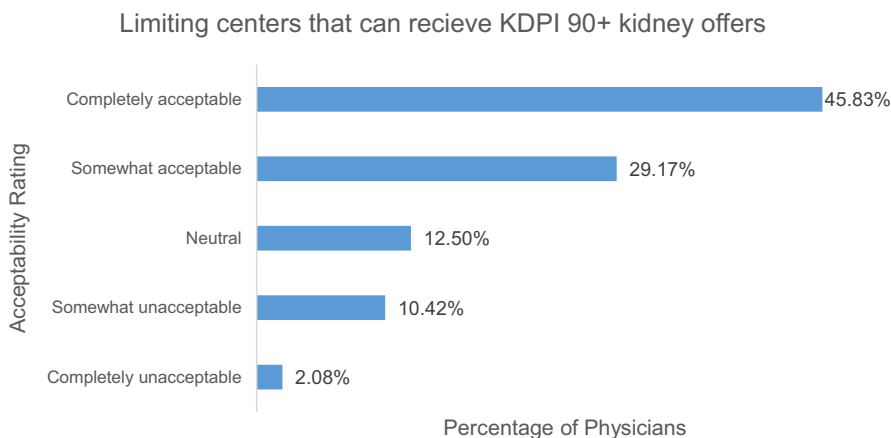


FIGURE 3 Limiting centers that can receive KDPI >90 offers. This figure looks at physicians' acceptance of a policy that would offer kidneys with KDPI >90 only to centers that have transplanted a kidney with KDPI 80 or higher in the past year

4 | DISCUSSION

Fast-tracking kidneys at risk of discard to patients unlikely to survive until they reach the top of the wait-list are a policy that most surveyed physicians and patients considered acceptable. Physicians and patients also supported returning time to patients who accept high KDPI kidneys and experience graft failure within 12 months. Many patients favored giving all of the waiting time back, and their comments suggest that such a policy may increase patients' willingness to accept KDPI >85 kidneys. There is also a high level of support among surveyed physicians for a policy that would skip less aggressive centers when high KDPI offers become available.

While the physicians and patients surveyed agreed on the acceptability of fast-tracking kidneys using an algorithm to predict a kidney's chance of discard, they expressed some concerns about how it would be implemented into practice. Patients cautioned that additional education would be needed to ensure that patients are well informed about kidneys offered under this policy. Physicians highlighted the challenge of designing a statistical model able to identify appropriate patients for high risk of discard kidneys. Clinical judgment would still be necessary to identify appropriate patients for higher risk kidney offers.

Physicians also suggested the need for a more nuanced policy for returning waiting time. Specifically, their comments indicated that the reason for graft failure must be considered. Graft failure attributable to the low quality of the kidney may warrant up to 100% of the time back, while graft failure due to non-adherence would not warrant the same response. Physicians indicated that the policy of skipping non-aggressive centers for KDPI 90 + offers could be improved by using acceptance rate, rather than requiring just one KDPI 80 and above transplant each year, regardless of center size.

This study has limitations. Despite repeated reminders, the patient and physician sample sizes were small. It is possible that the study was underpowered to detect differences in response by patient education level and center volume. Additionally, the samples may not be representative of all transplant physicians or kidney patients. The majority of physicians who completed the survey are transplant surgeons. Their views may differ from those of nephrologists, who often care for patients with poor allograft function. Patients who elect to join a patient advocacy organization such as AAKP are likely to differ from the general wait-list and recipient population. The use of an online survey and recruitment of patients through an email campaign to members of the American Association of Kidney Patients may have resulted in oversampling of patients with a college degree.

In sum, fast-tracking kidneys at risk of discard and returning waiting time to patients experiencing graft failure within the first 12 months are acceptable policy proposals among the surveyed transplant physicians and patients. Implementing a policy that would skip less aggressive centers for high KDPI offers was also acceptable among surveyed transplant physicians. Future research should focus on the design and implementation of these policies. It will be important to take into account the ways in which the current payment structure for kidney transplant and the regulatory requirements

for transplant centers may complicate efforts to reduce kidney discard. The comments made by patients and clinicians involved in this study provide insight into factors that researchers and policymakers should consider to ensure that policies are fair to transplant patients and centers and can be implemented effectively.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

ORCID

Sanjay Mehrotra  <https://orcid.org/0000-0003-1106-1901>

Karolina Schantz  <https://orcid.org/0000-0002-5466-0536>

Masoud Barah  <https://orcid.org/0000-0003-0953-3789>

Elisa J. Gordon  <https://orcid.org/0000-0003-0969-1998>

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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