Determinants of the Decision to Accept a Kidney from a Donor at Increased Risk for Blood-Borne Viral Infection

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Background and objectives: The use of kidneys from donors at increased risk for viral infections (DIRVI) such as HIV could increase the number of transplants and decrease waiting times. This study aimed to identify the proportion of kidney transplant candidates that would accept a kidney from a DIRVI and the factors that influenced this decision.

Design, setting, participants, & measurements: Conjoint analysis was used to assess the conditions in which renal transplant candidates would accept a DIRVI kidney. Candidates completed 12 scenarios in which the waiting time for a kidney, the donor age as a surrogate for kidney quality, and the risk of contracting HIV were systematically varied.

Results: Among 175 respondents, 42 (24.0%) rejected DIRVI kidneys under all conditions, 103 (58.9%) accepted DIRVI kidneys under some conditions, and 31 (17.7%) always accepted DIRVI kidneys. In multivariable logistic regression, patients were more likely to accept a DIRVI kidney when waiting time was longer, the donor was younger, and HIV risk was lower (P < 0.01 for each variable). Patients on dialysis (P < 0.01) and older patients (P = 0.04) more commonly accepted DIRVI kidneys, but self-rated sense of health was not associated with DIRVI kidney acceptance.

Conclusions: Most renal transplant candidates would accept a DIRVI kidney under some circumstances. These findings suggest that recipients can be allowed to make prospective choices regarding DIRVI kidney acceptance without hindering placement of these organs.


The use of kidneys from deceased donors categorized as having increased risk for blood-borne viral infections (DIRVI) such as HIV could increase access to renal transplantation and decrease waiting times for everyone on the list (1–3). However, expanding DIRVI kidney use requires that transplant candidates accept the possible increased risks of such organs to gain the other benefits from transplantation. It is unknown what proportion of transplant candidates would accept DIRVI kidneys or what factors influence such decisions.

In 1994, a report from the Public Health Service (PHS) and Centers for Disease Control (CDC) advised against transplantation of organs from seronegative donors with a history of specific behaviors and health conditions associated with elevated risk for HIV infection “unless the risk to the recipient of not performing the transplant is deemed to be greater than the risk of HIV transmission and disease” (Table 1). This recommendation was based on the recognition that antibody tests for HIV used on donors have limited sensitivity, particularly during the window period after infection (4). The risk factors for viral infection published by the PHS/CDC have also been used to identify donors at higher risk of hepatitis B (HBV) and hepatitis C (HCV). However, since the PHS/CDC issued this recommendation, the wait list for kidney transplants has grown rapidly, better treatments for blood-borne viral infections have become available, and patients with pre-existing HIV and HCV have enjoyed superior outcomes from kidney transplantation than from remaining on dialysis (5–8). Additionally, nearly 10% of the overall pool of kidneys procured from deceased donors are recovered from DIRVIs (9). These facts suggest that policy and practice related to DIRVI kidney use should be re-evaluated.

A decision analysis of wait-listed patients showed that accepting DIRVI kidneys would lead to longer survival, although this strategy posed a higher risk of HIV infection compared with refusing these organs. However, this decision analysis rested on the untested assumption that 5% of the wait-listed population would accept a DIRVI kidney (2). Importantly, from the societal perspective, the benefits obtainable through the use of high-quality DIRVI kidneys are directly related to how many eligible wait-listed patients would actually accept these organs.

We hypothesized that ESRD patients would more commonly...
Table 1. Criteria for a seronegative deceased donor categorized as increased risk for HIV infection (4)

1. Men who have had sex with another man in the preceding 5 years
2. Persons who report nonmedical intravenous, intramuscular, or subcutaneous injection of drugs in the preceding 5 years
3. Persons with hemophilia or related clotting disorders who have received human-derived clotting factor concentrates
4. Men and women who have engaged in sex in exchange for money or drugs in the preceding 5 years
5. Persons who have had sex in the preceding 12 months with any person described in items 1 to 4 above or with a person known or suspected to have HIV infection
6. Persons who have been exposed in the preceding 12 months to known or suspected HIV-infected blood through percutaneous inoculation or through contact with an open wound, nonintact skin, or mucous membrane
7. Inmates of correctional systems

accept a DIRVI kidney when donor HIV risk was lower, donor age was lower, when candidate self-rated state of health was worse, and when candidate waiting time was longer.

Materials and Methods
We performed a cross-sectional study of adult kidney transplant candidates at the University of Pennsylvania. We used conjoint analysis to assess the conditions in which candidates would accept a DIRVI kidney. The University of Pennsylvania Institutional Review Board approved the study.

Pilot Study
We first developed a baseline description of the decision to accept a kidney from a DIRVI. The description included statements that a DIRVI has negative serologic tests for HIV and a risk factor for HIV infection (e.g., intravenous drug use or having been a prison inmate) and that patients who consider a DIRVI kidney should weigh the benefit of getting a kidney sooner against the risk of infection. This baseline description was refined with input from decision scientists and transplant nephrologists at our institution.

Two investigators (T.T. and M.L.) presented this description to 20 kidney transplant candidates and solicited feedback regarding clarity. Additionally, using a standard series of open-ended questions, these investigators interviewed the 20 candidates about what specific factors would be most important in deciding whether to accept a DIRVI kidney. The most important factors were (1) risk of HIV infection, (2) factors related to the quality of the kidney, and (3) waiting time.

Questionnaire and Experimental Design
On the basis of the pilot results, we developed 12 scenarios in which we systematically varied the quality of the DIRVI kidney, the anticipated waiting time for the next offer of a kidney if the DIRVI organ was declined, and the risk of contracting HIV from the organ. We used donor age and prior history of a cerebrovascular accident (CVA) as a surrogate for kidney quality (the donor was a 55-year-old with a history of CVA or an 18-year-old). The anticipated waiting time for the next kidney offer was varied between 1, 3, and 5 years. We chose 1 year as the lower bound because re-evaluation candidates may have accumulated substantial waiting time. We chose 5 years as the upper bound because this is the median time to kidney transplantation for candidates with the longest wait (blood types O or B) in our region. We chose 3 years as the intermediate value because it corresponds to waiting time for type A blood and because an equal interval between the lower and upper bounds simplified the analysis.

The stated risk for HIV infection was 1 in 1500 or 1 in 10,000 on the basis of the extreme estimates for injection-drug-use donors and inmate donors that were provided in a decision analysis by Schweitzer et al. (2). To facilitate comprehension, we informed respondents that the 1-in-1500 risk was comparable to the lifetime probability of dying in a fire and the 1-in-10,000 risk was comparable to the lifetime probability of dying from drowning in a bathtub.

In each scenario, the respondent was asked to make a binary choice to accept the DIRVI kidney or to decline and continue waiting the specified time until the next organ became available.

Participants and Administration of the Instrument
We pilot-tested this instrument among nurses, physicians, and social workers to ensure the appropriateness of the content. We tested it among an additional 20 transplant candidates for clarity (Appendix 1 presents a description and an example scenario).

From September 2008 until January 2009 we recruited renal transplant candidates waiting to meet with the physicians and social workers. Before being approached for participation, candidates coming for their initial visit had listened to a 45-minute presentation about the advantages and disadvantages of accepting various types of kidneys (from expanded criteria donors, donors with cardiac death, DIRVI). Printed information about DIRVI organs was not provided. Investigators attempted to recruit all candidates, but some patients were occupied with clinical meetings or phlebotomy.

Demographic and Clinical Data
The questionnaire asked the participant to report education, income, history of dialysis, prior transplant evaluation, prior transplantation, and sense of health (by rating on a visual analog scale how well he or she felt during the past year; the scale went from 1 representing “the worst you could imagine feeling” to 10 representing “the best you have ever felt in your life”).

We abstracted information about age, race, gender, cause of ESRD, HCV, and HIV infection from the electronic medical record.

Analyses
Our central analytic approach was to use conjoint analysis—a technique grounded in economic theory and developed for marketing research—to evaluate patients’ global preferences for accepting a DIRVI kidney and the independent influences of the three primary attributes (12,13). All analyses were performed using Stata 10.0 (Stata Corporation, College Station, TX).

To explore the possibility of a nonlinear relationship between patient age and high-risk organ acceptance, we explored age as a continuous variable and an ordinal variable in which participants were divided into quartiles of approximately equal size. Because the continuous sense of health variable was left-skewed, we converted this variable into three approximately equal tertiles (1 to 6, 7 to 8, and 9 to 10). Education was also left-skewed and grouped into three approximately...
equal categories (no college education, some college education, and finished college).

We used the t test to compare the means of continuous variables between scenarios in which respondents accepted or rejected a DIRVI kidney. We used the χ² test to compare categorical variables. We then fit a multivariable (MV) logistic regression model for the binary outcome of DIRVI kidney acceptance. We fit the model with (1) all variables related to our hypotheses, (2) those with unadjusted associations with acceptance of a DIRVI kidney in which \( P < 0.15 \), and (3) a prespecified interaction between HIV risk and waiting time. We used the robust variance estimator to account for the fact that the 12 responses of each participant were not independent (14). The Hosmer–Lemeshow goodness of fit test for calibration was acceptable for all models (\( P > 0.05 \)).

Lastly, to evaluate how patients view a tradeoff between a higher quality organ with higher HIV infection risk versus a lower quality organ with lower risk, we used a \( \chi^2 \) test to compare responses to scenarios in which the donor was 18 years old and HIV transmission risk was 1 in 1500 to scenarios in which donors were 55 years old with a history of CVA and the HIV transmission risk was 1 in 10,000.

Sample Size
We based our sample size estimates on the hypothesis requiring the most participants: the interaction of waiting time by risk of HIV. Enrolling only 30 participants would have provided 90% power to detect a waiting-time-by-HIV risk interaction with an odds ratio \( \leq 0.67 \) or \( \geq 1.5 \). This estimate accounts for the inflation required to detect statistical interactions rather than main effects (15), the expected intra-class correlation among responses within each individual (based on our pilot), and the number of scenarios administered to each respondent (12). However, we sought a sample larger than 30 to ensure power to detect between-respondent differences (e.g., among men versus women).

Missing Data
A small proportion of participants did not provide answers to demographic and clinical questions. A total of 16 participants (9.1%) did not report income, 7 (4.0%) did not indicate sense of health, and 6 (3.4%) did not report education. For our final regression model, we used multiple imputation (using the “ice” command in Stata) (16). We also performed secondary analyses restricted to individuals with complete information and analyses in which missing data were assigned extreme values.

Results
Three hundred and seven renal transplant candidates came to clinic on recruitment days and 220 were approached about study participation. Among this group who were approached, 27 refused to participate, 9 left the clinic without returning the study materials, 5 did not respond to all scenarios, and 4 could not read English and no translator or family member was present to help. The study cohort consisted of the remaining 175 (79.5%) candidates.

There were no differences between study participants and patients who did not enroll in terms of their age, gender, race, HIV or HCV infection, diabetes as a cause of ESRD, or history of prior transplantation. Participants were less likely than nonparticipants to be in clinic for annual re-evaluation versus a primary transplant evaluation (44.0% of participants versus 71.2% of nonparticipants were coming for a re-evaluation, \( P < 0.01 \)).

The mean age of participants was 52.4 years (±1.0) and 116 (66.3%) were men. One hundred one participants (57.7%) were white. The median education level was having completed some years of college. Sixteen participants (9.1%) had a history of a prior failed kidney transplant (Table 2).

Table 3 reports the percentage of participants who would accept the kidney in each of the 12 scenarios presented. Forty-two (24.0%) would not accept a DIRVI kidney in any scenario, 103 (58.9%) would accept a DIRVI kidney in some scenarios, and 31 (17.7%) would accept a DIRVI kidney in all scenarios.

Unadjusted Analyses
Lower donor HIV risk; younger donor age; increased waiting time for the next offer; and participant characteristics of non-black race, being on dialysis, never having had a prior transplant or undergone evaluation at another institution, and com-

<table>
<thead>
<tr>
<th>Table 2. Demographic and clinical characteristics of study cohort</th>
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<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>Age in years (SEM)</td>
</tr>
<tr>
<td>Male (%)</td>
</tr>
<tr>
<td>Race (%)</td>
</tr>
<tr>
<td>white</td>
</tr>
<tr>
<td>African American</td>
</tr>
<tr>
<td>Hispanic</td>
</tr>
<tr>
<td>other</td>
</tr>
<tr>
<td>Cause of ESRD (%)</td>
</tr>
<tr>
<td>diabetes</td>
</tr>
<tr>
<td>GN</td>
</tr>
<tr>
<td>hypertensive nephrosclerosis</td>
</tr>
<tr>
<td>polycystic kidney</td>
</tr>
<tr>
<td>other (%)</td>
</tr>
<tr>
<td>HCV positive (%)</td>
</tr>
<tr>
<td>HIV positive (%)</td>
</tr>
<tr>
<td>Median educational level</td>
</tr>
<tr>
<td>Median annual household income</td>
</tr>
<tr>
<td>Dialysis (%)</td>
</tr>
<tr>
<td>if dialysis, number of years (SEM)</td>
</tr>
<tr>
<td>Evaluation status at our center (%)</td>
</tr>
<tr>
<td>new evaluation</td>
</tr>
<tr>
<td>re-evaluation</td>
</tr>
<tr>
<td>Prior transplant evaluation at another center (%)</td>
</tr>
<tr>
<td>Prior renal transplant</td>
</tr>
<tr>
<td>Median sense of health in past year (1 to 10 scale) ( ^a )</td>
</tr>
</tbody>
</table>
ing for initial evaluation (versus an annual re-evaluation) were associated with greater likelihood of accepting DIRVI kidneys (all \( P < 0.01 \)).

There were steady increases in the proportions of patients accepting DIRVI kidneys across age quartiles: acceptances rates were 38.6% for individuals aged 20 to 45 years, 46.6% for ages 46 to 55 years, 50.5% for ages 56 to 62 years, and 61.6% for ages 63 to 82 years (\( P < 0.01 \)). Similarly, there were steady increases in the acceptability of a DIRVI kidney across health tertiles: acceptance rates were 45.2% among those with the worst self-reported health versus 48.2% among those with intermediate health and 56.1% among those with the highest self-rated health (\( P < 0.01 \)). Age and sense of health were entered as ordinal variables in our final model.

Income was not linearly associated with likelihood of accepting a DIRVI kidney. Among individuals with income \( \leq \$15,000 \), 41.3% of DIRVI kidney offers were accepted versus 42.6% of offers among those with income between \( \$15,000 \) and \( \$24,999 \), 53.0% of offers among those with income between \( \$25,000 \) and \( \$49,999 \), 51.1% of those with income between \( \$50,000 \) and \( \$74,999 \), and 55.3% of those with income \( \geq \$75,000 \) (\( P < 0.01 \)). Because of the change in likelihood of accepting a DIRVI kidney among individuals with income \( \geq \$25,000 \), we categorized income as a binary variable (defined by this threshold) in our MV regressions.

Participant education, gender, and HCV infection were not associated with DIRVI kidney acceptance. Only one patient was HIV infected, so we did not examine the association of this attribute with the outcome. The association of diabetes with DIRVI kidney acceptance met our criterion for inclusion in the MV model (\( P = 0.07 \)).

An almost equal proportion of participants accepted DIRVI kidneys in scenarios presenting a younger donor (higher quality) with higher HIV risk (47.2%) as compared with scenarios with an older donor (lower quality) and lower HIV risk (48.6%, \( P = 0.67 \)).

### Multivariable Logistic Regression

Longer waiting time (\( P < 0.01 \)), lower donor age (\( P < 0.01 \)), lower donor HIV risk (\( P < 0.01 \)), participant being on dialysis (\( P < 0.01 \)), and older participant age (\( P = 0.04 \)) remained associated with the outcome (Table 4).

### Secondary Analyses Related to Missing Data

Sensitivity analyses and secondary analyses restricted to patients with complete data showed similar results to those from the primary model.

### Secondary Analyses of Education and Lack of Variation in Responses to Scenarios

We evaluated whether education level was associated with choosing a dominant response to the questionnaire; that is, to accept or reject all kidney offers regardless of scenario. We reasoned that if less educated participants had less comfort handling numerical concepts, they would be more likely to make the same choice regardless of the risks; however, no association was found between education and the probability of a dominant response (\( P = 0.57 \)).

### Discussion

The high mortality of ESRD and the rising waiting time for a kidney transplant have created an urgent need to expand the pool of kidneys for transplantation (6,17,18). Increasing DIRVI kidney use could improve access to kidney transplantation, but only if candidates are willing to accept these organs. Our results reveal that people make rational tradeoffs between the risks conferred by DIRVI kidneys and their virtues (e.g., shorter waiting times).

These empirical results indicate that kidney transplant candidates can be allowed to make prospective choices regarding DIRVI kidney acceptance without hindering placement of these organs (1). Specifically, at the time of transplant evaluation, physicians and patients should discuss

### Table 3. Percentages of participants by scenario who would accept a kidney offer

<table>
<thead>
<tr>
<th>Scenario Number</th>
<th>Risk of HIV Infection</th>
<th>Donor Age (years)</th>
<th>Waiting Time (years)</th>
<th>Percent Who Would Accept</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/1500</td>
<td>18</td>
<td>5</td>
<td>61.7</td>
</tr>
<tr>
<td>2</td>
<td>1/1500</td>
<td>18</td>
<td>3</td>
<td>55.4</td>
</tr>
<tr>
<td>3</td>
<td>1/1500</td>
<td>18</td>
<td>1</td>
<td>24.6</td>
</tr>
<tr>
<td>4</td>
<td>1/10,000</td>
<td>18</td>
<td>5</td>
<td>73.7</td>
</tr>
<tr>
<td>5</td>
<td>1/10,000</td>
<td>18</td>
<td>3</td>
<td>70.3</td>
</tr>
<tr>
<td>6</td>
<td>1/10,000</td>
<td>18</td>
<td>1</td>
<td>42.9</td>
</tr>
<tr>
<td>7</td>
<td>1/1500</td>
<td>55(^a)</td>
<td>5</td>
<td>45.1</td>
</tr>
<tr>
<td>8</td>
<td>1/1500</td>
<td>55(^a)</td>
<td>3</td>
<td>42.3</td>
</tr>
<tr>
<td>9</td>
<td>1/1500</td>
<td>55(^a)</td>
<td>1</td>
<td>25.1</td>
</tr>
<tr>
<td>10</td>
<td>1/10,000</td>
<td>55(^a)</td>
<td>5</td>
<td>56.6</td>
</tr>
<tr>
<td>11</td>
<td>1/10,000</td>
<td>55(^a)</td>
<td>3</td>
<td>56.6</td>
</tr>
<tr>
<td>12</td>
<td>1/10,000</td>
<td>55(^a)</td>
<td>1</td>
<td>32.6</td>
</tr>
</tbody>
</table>

\(^a\)These donors were also specified to have died from a CVA.
whether or not the patient wishes to be considered for DIRVI or other nonstandard kidneys and listed accordingly. These discussions should incorporate the best available estimates of what the patient’s current and projected quality of life is and what his wait time for an organ might be based on blood type and other relevant factors. Additionally, because waiting time and quality of life can change, transplant candidates should be encouraged to readdress their decisions to accept or decline DIRVI organs during interval evaluations as needed.

The finding that patients on dialysis were more likely to accept DIRVI kidneys may reflect their heightened desires for change given the low overall quality of life associated with hemodialysis (19). The fact that self-rated sense of health was divided into three strata with higher strata representing better health; the odds ratio represents the odds associated with increasing one health stratum.

The odds ratio of the interaction term assesses the extent to which the effect of HIV risk and waiting time on the outcome is more or less than the additive effect of these two variables in the model.

Patients returning to center for annual evaluation.

Patient had undergone prior renal transplant evaluation at another institution (leading to a prior failed transplant or to getting a second opinion at our institution).

Table 4. Characteristics associated with acceptance of a DIRVI kidney in MV logistic regression

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Odds Ratio</th>
<th>Confidence Interval</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-year waiting timea</td>
<td>4.20</td>
<td>2.97 to 5.94</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>3-year waiting timea</td>
<td>3.50</td>
<td>2.57 to 4.75</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Dialysis</td>
<td>2.88</td>
<td>1.71 to 4.84</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Lower risk of HIV infection from kidneyb</td>
<td>2.12</td>
<td>1.61 to 2.81</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>18-year-old donorc</td>
<td>1.78</td>
<td>1.43 to 2.23</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Participant age (per additional quartile of older age)</td>
<td>1.28</td>
<td>1.02 to 1.63</td>
<td>0.04</td>
</tr>
<tr>
<td>Higher incomed</td>
<td>1.33</td>
<td>0.79 to 2.22</td>
<td>0.28</td>
</tr>
<tr>
<td>Sense of health (per additional tertile of feeling healthier)e</td>
<td>1.29</td>
<td>0.90 to 1.87</td>
<td>0.17</td>
</tr>
<tr>
<td>Cause of ESRD: diabetes</td>
<td>1.27</td>
<td>0.76 to 2.13</td>
<td>0.37</td>
</tr>
<tr>
<td>Interaction of level of HIV risk and duration of waiting timef</td>
<td>0.97</td>
<td>0.91 to 1.03</td>
<td>0.28</td>
</tr>
<tr>
<td>Re-evaluationg</td>
<td>0.93</td>
<td>0.55 to 1.59</td>
<td>0.79</td>
</tr>
<tr>
<td>Prior transplant or evaluation elsewhereh</td>
<td>0.71</td>
<td>0.41 to 1.23</td>
<td>0.22</td>
</tr>
<tr>
<td>Black race</td>
<td>0.71</td>
<td>0.42 to 1.22</td>
<td>0.21</td>
</tr>
</tbody>
</table>

aReference group: 1-year estimated waiting time until next offer of a kidney transplant.
bLower risk = 1 in 10,000, versus reference group of 1 in 1500 chance of HIV.
cReference group: 55-year-old donor with history of CVA.
dIncome was dichotomized as ≥$25,000 or not.
eSense of personal health was divided into three strata with higher strata representing better health; the odds ratio represents the odds associated with increasing one health stratum.
fThe odds ratio of the interaction term assesses the extent to which the effect of HIV risk and waiting time on the outcome is more or less than the additive effect of these two variables in the model.
gPatients returning to center for annual evaluation.
hPatient had undergone prior renal transplant evaluation at another institution (leading to a prior failed transplant or to getting a second opinion at our institution).
Our study has limitations. First, our results consist of responses to hypothetical scenarios. However, participants were those patients for whom the decision is relevant, and the results were largely consistent with our clinical intuitions about what patients would do in real settings. Second, we compared the one-time risks of contracting HIV from a kidney donor to the lifetime risks of dying in a fire or drowning in a bathtub. It is possible that these dissimilar time horizons could have made the scenarios seem less plausible, but we believe this approach clarified the meaning of small risks, particularly for participants with limited numeracy. Our results also indicate that participants were paying close attention to differences in HIV transmission. Third, our scenarios only focused on HIV risk, although accepting a DIRVI kidney may pose higher risk of exposure to other blood-borne viruses such as HCV and HBV. We presented the risks this way for simplicity and because we believed that, for participants, the social stigma and health hazards of HIV infection were at least as great as those of other infections. Nonetheless, transplant professionals counseling patients about DIRVI kidney use should also discuss the risk of HCV and HBV. Fourth, we studied participants from a single center. Although it is possible that results might not be generalizable to all other centers, our center performs approximately 200 kidney transplants a year and attracts a racially diverse population from a large geographic area. We also acknowledge that our results may not be generalizable to patients undergoing re-evaluation because study participants were more likely to be coming for a primary evaluation than nonparticipants. On the other hand, the lower participation by re-evaluation patients may have been attributable to the shorter times required for re-evaluation visits and hence reduced opportunities for us to request participation from these patients rather than differences in willingness to accept a DIRVI kidney.

Our study also has strengths. We designed the scenarios after considerable pilot testing. We had a large sample size. In addition, we used conjoint analysis—a statistically powerful approach that has advantages over simple questionnaires in that participants reveal, rather than express, preferences while simultaneously considering multiple factors that may influence complex decisions (13,22).

In conclusion, despite recent negative publicity about donor-derived viral infections, most renal transplant candidates would consider accepting DIRVI kidneys under some conditions. When listing patients for kidney transplantation, transplant physicians should openly discuss the possibility of being listed as eligible to receive DIRVI organs—with the benefits and risks associated with this choice—without fearing that such conversations will undermine the ability to place these organs.

**Appendix 1**

**Introductory Narrative and Example of a Scenario**

Kidney transplants improve the quality of life for patients with severe kidney disease and help them live longer. However, there are not enough kidneys for all the people who need them. One way to get a kidney transplant sooner is to accept a kidney from someone with a higher chance of being infected with a virus, like HIV.

We are interested in learning more about whether you would be willing to accept a kidney that was donated by someone with a chance of having a viral infection such as HIV. We want to know how you think about this tradeoff. Of course, everyone would prefer to receive a kidney that had no risk of transmitting an infection. But what if that meant you couldn’t get a kidney at all? Would you be willing to settle for a kidney that had a slightly higher chance of transmitting an infection?

These kidney donors are called Centers for Disease Control “increased risk” donors. The donors are called “increased risk” because of recent behavior—such as intravenous drug use or having gone to prison—that might have exposed them to a virus. We are not talking about kidneys that we know are infected with HIV. We test for HIV, and no one uses kidneys from donors who test positive. But it turns out that the HIV tests are not perfect, and so the safest approach is also to avoid kidneys from people who test negative for HIV, but who have engaged in behaviors that might mean they actually have HIV although the test is negative.

The chance of getting HIV from one of these “increased risk” donors is very small. Remember, these donors have negative tests for HIV. Doctors are not sure what the exact risk of infection is with these donors, but one study estimated that a patient who receives a kidney from a donor who was an intravenous drug user would have a 1 in 1500 chance of getting HIV. That study also estimated that a patient who receives a kidney from a donor who has gone to prison has a 1 in 10,000 chance of getting HIV.

Please look through the following 12 scenarios. Each scenario will ask you if you are willing to accept a kidney from an “increased risk” donor.

**Scenario 1**

Imagine that you are on dialysis. Your doctor now calls to offer you a kidney transplant from an 18-year-old man.

This kidney donor has a 1 in 1500 chance of being infected with HIV. In other words, 1499 people out of the same 1500 will not get HIV. This risk is similar to your lifetime risk of dying in a fire.

Your doctor predicts that you will be on the wait list for 5 more years before receiving another offer for a kidney transplant.

**What Will You Do?**

1. I will accept this kidney.
2. I will wait for a normal-risk kidney. I understand that I will probably wait 5 more years before I receive an offer for a normal risk kidney. I understand that I may get sick or even die while waiting for another kidney.

*Each study participant was presented 12 scenarios in which the donor age, chance of infection, and anticipated years on the waiting list before another offer of a transplant were varied.*

**Acknowledgments**

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Disclosures

None.

References
MOST KIDNEY TRANSPLANT CANDIDATES WILL ACCEPT RISK OF INFECTION

The Majority of Patients Would Accept a Kidney from a Donor at Increased Risk of Viral Infection

Washington, DC (March 19, 2010) — Most kidney transplant candidates are willing to receive a kidney from a donor at increased risk of viral infection, according to a study appearing in an upcoming issue of the Clinical Journal of the American Society Nephrology (CJASN). The results suggest that kidney disease patients can make rational tradeoffs between the virtues and risks conferred by donated kidneys.

Because thousands of patients die each year in the United States while waiting for a kidney transplant, greater efforts are needed to expand the pool of kidneys for transplantation. These efforts might include allowing patients to receive less-than-ideal organs, for example from deceased individuals at increased risk of viral infection. In these cases, patients must weigh the advantages of getting a transplant against the small risk of getting a serious infection such as HIV. The average dialysis patient has a 20% chance of dying annually, similar to the death rate from metastatic cancer. Therefore patients may decide that it’s better to accept an organ from a donor at increased risk of viral infection than to remain on dialysis.

Peter Reese, MD, Scott Halpern MD, PhD (University of Pennsylvania) and their colleagues conducted a study to determine what proportion of kidney transplant candidates would accept a kidney from a donor at increased risk of viral infection. They also examined what factors influenced this decision.

The investigators studied 175 kidney transplant candidates who responded to hypothetical scenarios that tested their willingness to accept a kidney from a donor at higher risk of viral infection. Each scenario varied the donor age (as a substitute for kidney quality), the risk of contracting HIV and the waiting time until the next offer of a kidney transplant. Among 175 respondents, 42 (24.0%) rejected kidneys from donors at increased risk of viral infections under all conditions, 103 (58.9%) accepted them under some conditions, and 31 (17.7%) always accepted them. Patients were more likely to accept a kidney from donors at increased risk of viral infections when the donor was...
younger, HIV risk was lower, and when the waiting time was longer. Also, patients on dialysis and older patients more commonly accepted such kidneys.

Increasing the use of kidneys from donors at increased risk of viral infections could improve access to kidney transplantation only if transplant candidates are willing to accept these organs. “Our study shows that the majority of kidney transplant candidates would accept the tradeoff some of the time – that is, they would accept a kidney transplant even if the risk of HIV infection was slightly elevated,” said Dr. Reese.

According to the authors, transplant physicians should talk with their patients about the possibility of receiving organs from donors at increased risk of viral infections without fearing that such conversations will undermine the ability to place these organs.

Study co-authors include Tara Tehrani, MD, MaryAnn Lim, MD, David Asch, MD, Emily Blumberg, MD, Maureen Simon, RN and Roy Bloom, MD (University of Pennsylvania).

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