

Duration of Living Kidney Transplant Donor Evaluations: Findings From 2 Multicenter Cohort Studies

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Background: A prolonged living kidney donor evaluation may result in worse outcomes for transplant recipients. Better knowledge of the duration of this process may help inform future donors and identify opportunities for improvement.

Study Design: 1 prospective and 1 retrospective cohort study.

Setting & Participants: At 16 Canadian and Australian transplantation centers (prospective cohort) and 5 Ontario transplantation centers (retrospective cohort), we assessed the duration of living kidney donor evaluation and explored donor, recipient, and transplantation factors associated with longer evaluation times. Data were obtained from 2 sources: donor medical records using chart abstraction and health care administrative databases.

Predictors: Donor and recipient demographics, direct versus paired donation, center-level variables.

Outcomes: Duration of living donor evaluation.

Results: The median total duration of transplantation evaluation (time from when the candidate started the evaluation until donation) was 10.3 (IQR, 6.5-16.7) months. The median duration from evaluation start until approval to donate

was 7.9 (IQR, 4.6-14.1) months, and from approval until donation was 0.7 (IQR, 0.3-2.4) months, respectively. The median time between the first and last consultation among donors who completed a nephrology, surgery, and psychosocial assessment in the prospective cohort was 3.0 (IQR, 1.0-6.3) months, and between computed tomography angiography and donation was 4.8 (IQR, 2.6-9.2) months. After adjustment, the total duration of transplantation evaluation was longer if the donor participated in paired donation (6.6 [95% CI, 1.6-9.7] months) and if the recipient was referred later relative to the donor's evaluation start date (0.9 [95% CI, 0.8-1.0] months [per month of delayed referral]). Results depended on whether the recipient was receiving dialysis.

Limitations: Living donor candidates who did not donate were not included and proxy measures were used for some dates in the donor evaluation process.

Conclusions: The duration of kidney transplant donor evaluation is variable and can be lengthy. Better understanding of the reasons for a prolonged evaluation may inform quality improvement initiatives to reduce unnecessary delays.

Complete author and article information (including a list of the DONOR Network Investigators) provided before references.

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Am J Kidney Dis. XX(XX):
1-16. Published online
Month X, 2018.

doi: 10.1053/
j.ajkd.2018.01.036

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Kidney transplantation for patients with kidney failure is associated with improved survival and better quality of life at a fraction of the cost compared to dialysis.¹⁻⁴ Compared to deceased donor kidney transplantation, living donor kidney transplantation offers many advantages, including superior rates of patient and graft survival and shorter time to transplantation.⁵

The evaluation of a living kidney donor candidate begins when they contact a transplantation center. What follows is a series of screening tests (questionnaires and blood and urine tests), diagnostic tests (ultrasound and chest x-ray), and specialist consultations (nephrologist, surgeon, and an assessment of psychosocial health).⁶⁻⁸ During the evaluation, a donor candidate often makes multiple trips to local clinics or the transplantation center, and there may be frequent periods waiting for appointments or test results. We consider an efficient living donor candidate evaluation as one that is completed in as timely a manner as possible, is clinically appropriate, and promotes

patient and provider satisfaction. At a recent international consensus conference, the efficiency of the donor evaluation was highlighted as a high-priority area for improvement.^{8,9} In keeping with this, several donors perceive the evaluation process as the worst phase of the donation experience.^{10,11}

In response to such concerns, the 2017 KDIGO (Kidney Disease: Improving Global Outcomes) guideline on the evaluation and care of living kidney donors recommends that transplantation programs allow a donor evaluation that is as efficient as possible to meet the needs of donor candidates, intended recipients, and transplantation programs.¹² Similarly, a United Kingdom goal by 2020 is for donors to be offered the opportunity to complete their evaluation within 4.5 months when appropriate.¹³ To put these recommendations into context, we require knowledge of current performance. To date, the time to complete the living kidney donor evaluation has received limited attention as an outcome or as a focus for quality improvement.^{14,15}

To address this knowledge gap and advance a patient-driven research priority,¹⁶ we estimated the time to complete the donor evaluation process using data from multiple transplantation centers in 2 cohorts. We also assessed the variability in donor evaluation times between transplantation centers and individual and transplantation center factors associated with longer evaluation times.

Methods

Data Sources

Prospective Cohort

Donors who donated between September 2009 and January 2015 were prospectively enrolled from 16 transplantation centers in Canada and Australia (Item S1). Participants were recruited before donation, spoke and read English or French, and were deemed good candidates for postdonation follow-up. Data were obtained from medical records (evaluation test results, consultation notes, and surgical records) and questionnaires. No data for recipient characteristics were used for this study. All records were deidentified and sent to a coordinating center for abstraction and analysis. All participants provided written informed consent, and centers obtained ethics approval before starting recruitment (Table S1).

Retrospective Cohort

We obtained linked health care administrative data for living donors who were evaluated and donated at one of Ontario's 5 transplantation centers between March 2004 and April 2014. Data were obtained from Ontario's organ procurement organization Trillium Gift of Life Network and multiple data sets available at the Institute for Clinical Evaluative Sciences (ICES). All recipients were Ontario residents who received a first-time kidney transplant (described previously¹⁷). This study was approved by the Research Ethics Board at Sunnybrook Health Sciences Centre, Toronto, Canada (patient consent was waived; Table S1). A summary of each cohort is provided in Table S1.

Measures of Evaluation Time

Total evaluation time was defined as the time the donor started the evaluation until donation. Total approval time was defined as the time from evaluation start to the date the donor was approved to donate. Because the date the evaluation started and the date of approval were unavailable (and may not be well defined), we used tests relevant to the evaluation process to inform these dates (tests usually performed early or late in the evaluation; Table S2 for the prospective cohort; Habbous et al¹⁷ for the retrospective cohort). Time to donation postapproval was defined as the time from approval to donation. Time from computed tomography until donation was defined as the time from first computed tomography angiography (to assess kidney anatomy and vasculature) until donation.

Time between consults was defined as the period between the first and last of the nephrologist, surgeon, and psychosocial assessments (restricted to donors with all 3 consults).

Individual- and Center-Level Characteristics

We obtained individual-level donor, recipient, and transplant characteristics by abstracting medical records (prospective cohort) or linking across health care databases (retrospective cohort). Sociodemographic factors included age at donation, sex, marital status, race, and smoking status at the time of study recruitment. Individual-level socioeconomic factors included education, employment status, and rural residence. Neighborhood-level median household income quintile was obtained from the 2006 Canada Census (Canada only). Other socioeconomic indicators were assessed, including the Canadian Marginalization (Can-MARG) Index and the Australian Socioeconomic Index for Areas (SEIFA); both derived using several variables from each country's 2006 census.^{18,19} Predonation clinical factors included donor and recipient estimated glomerular filtration rates (eGFRs) calculated using the CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration) equation.²⁰ Based on at least 5 systolic (SBP) and diastolic (DBP) blood pressure measurements before donation, donors were considered normotensive for SBP < 120 mm Hg and DBP < 80 mm Hg, prehypertensive for SBP of 120 to <140 mm Hg or DBP of 80 to <90 mm Hg, and hypertensive for SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg. Other factors included year of donation, distance to the transplantation center (Euclidean distance between postal codes), the donor's relationship to the intended recipient (which may differ from the actual recipient if the donation occurred through paired donation), participation in kidney paired donation, surgical technique, the recipient's referral date to a transplantation center for evaluation, and the recipient's primary cause of kidney failure.

Transplantation center characteristics were obtained for the prospective cohort for 2012 (midyear and peak of participant recruitment), including transplantation center volume (number of living and deceased donor kidney transplantations) and resources (number of full-time equivalent living donor nurse coordinators).

Statistical Analysis

We present continuous data as mean ± standard deviation or median (25th, 75th percentile). Differences between cohorts on categorical variables were compared using χ^2 tests from contingency tables. To evaluate individual-level predictors, we used generalized estimating equations to accommodate clustering by transplantation center (identity link; normal distribution). Point estimates with 95% confidence intervals (CIs) are presented. Multivariable models included all covariates yielding unadjusted $P < 0.2$ (no selection algorithm was used) or variables considered

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