

Strategic Innovations to Reduce Disincentives and Increase Living Kidney Donation --Manuscript Draft--

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Abstract:	Background While up to 59% of the U.S. population report willingness to donate a kidney, only about 6,000 living kidney donations occur annually. This study described the use and impact of National Kidney Registry (NKR) programs designed to eliminate disincentives to living kidney donation. Methods This was a retrospective cohort analysis utilizing administrative data records from the NKR, a national database capturing information on potential living kidney donors at 103 transplant centers across the continental US. Descriptive statistics were used to summarize donor characteristics, program participation, and outcome measures. An interrupted time series was used to analyze changes in registration conversion rates before and after program implementation. Results Following the implementation of Donor Connect, the registration conversion rate increased from 8.4% immediately preceding implementation to 18.4% by the end of

	follow-up. At the time of intervention, a statistically significant 8% increase in registration conversion rate was observed ($p<0.001$), with an additional 0.3% increase per quarter thereafter ($p=0.017$). Remote donors were significantly more likely to live > 150 miles from the recipient's transplant center (84% vs 21%); the Remote Donor Program reduced travel burden by 597 [205,1196] miles. Referral conversion rates were significantly higher for donors living within 50 miles (8.3%) compared to those 51–150 miles (6.5%, $p<0.001$) and >150 miles (5.3%, $p<0.003$), corresponding to an increased donation odds of 1.31 and 1.62, respectively). Fifty-one percent of donors received cost reimbursement through the Donor Shield program. Donors who participated were more racially diverse and were more likely to reside further from the transplant center. Conclusions This analysis indicates that the outcomes from NKR's programs support the efficacy of disincentive-targeted innovations as a way to increase donation rates by supporting donors and streamlining the donation process. These innovations represent a modern, donor-centered approach to living kidney donation. By addressing known barriers, these programs have the potential to expand the donor pool, improve the efficiency in donor evaluation, and improve the overall donor experience.
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Scale of Data Generated (<i>select all that apply</i>)	Large dataset (e.g., omics data, health care data, clinical trial data, imaging data)
Data Availability (<i>select all that apply</i>)*Additional information: Original data generated for the study will be made available upon reasonable request to the corresponding author: This is not recommended for large datasets but is acceptable for low-throughput experimental data. If data are not deposited in a public access repository, or access will otherwise be subject to partial restriction, provide details in the textbox.- Data belong to a third party, and authors are not authorized to share the data: If data cannot be shared because they belong to a third party, specify the identity of the third party and reason for the restriction (e.g., proprietary data, administrative data governed by regulatory or legal frameworks).- Original data cannot be shared: This choice is allowable in select instances only, such as for research that applies to the CARE Principles — Global Indigenous Data Alliance, and requires editor approval.	Original data generated for the study will be made available upon reasonable request to the corresponding author.*

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Strategic Innovations to Reduce Disincentives and Increase Living Kidney Donation

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Abbreviations

DASH – Donor Automated Screening & History

DDKT – deceased donor kidney transplant

KPD – kidney paired donation

LD – living donor

LDKT – living donor kidney transplant

LKD – living kidney donation

NKR – National Kidney Registry

PWL – pre-workup lab

US – United States

ACCEPTED

Abstract

Background

While up to 59% of the U.S. population report willingness to donate a kidney, only about 6,000 living kidney donations occur annually. This study described the use and impact of National Kidney Registry (NKR) programs designed to eliminate disincentives to living kidney donation.

Methods

This was a retrospective cohort analysis utilizing administrative data records from the NKR, a national database capturing information on potential living kidney donors at 103 transplant centers across the continental US. Descriptive statistics were used to summarize donor characteristics, program participation, and outcome measures. An interrupted time series was used to analyze changes in registration conversion rates before and after program implementation.

Results

Following the implementation of Donor Connect, the registration conversion rate increased from 8.4% immediately preceding implementation to 18.4% by the end of follow-up. At the time of intervention, a statistically significant 8% increase in registration conversion rate was observed ($p < 0.001$), with an additional 0.3% increase per quarter thereafter ($p = 0.017$). Remote donors were significantly more likely to live > 150 miles from the recipient's transplant center (84% vs 21%); the Remote Donor Program reduced travel burden by 597 [205,1196] miles. Referral conversion rates were significantly higher for donors living within 50 miles (8.3%) compared to those 51–150 miles (6.5%, $p < 0.001$) and > 150 miles (5.3%, $p < 0.003$), corresponding to an increased donation odds of 1.31 and 1.62, respectively). Fifty-one percent of donors received cost reimbursement through the Donor Shield program. Donors who participated were more racially diverse and were more likely to reside further from the transplant center.

Conclusions

This analysis indicates that the outcomes from NKR's programs support the efficacy of disincentive-targeted innovations as a way to increase donation rates by supporting donors and streamlining the donation process. These innovations represent a modern, donor-centered approach to living kidney donation. By addressing known barriers, these programs have the potential to expand the donor pool, improve the efficiency in donor evaluation, and improve the overall donor experience.

Supplemental Digital Content: <http://links.lww.com/KN9/B322>

Introduction

Living donor kidney transplants (LDKTs) are associated with superior clinical outcomes, including significantly longer graft survival, improved long-term renal function, and reduced post-transplant rate of delayed graft function and mortality when compared to deceased donor kidney transplants (DDKTs).¹⁻⁴ Despite these advantages, a persistent challenge remains: while up to 59% of the United States (US) population indicate that they might be willing to and 28% indicate they would definitely consider donating a kidney, only approximately 6,000 people per year ultimately proceed with living kidney donation (LKD).^{5,6} This low conversion rate contributes to a growing disparity between the rising demand for transplants and the limited availability of LKDs.^{7,8}

Recent studies have identified a wide range of factors that influence an individual's decision to proceed with LKD, including economic constraints, religious or cultural beliefs, geographic location and distance from transplant centers, as well as demographic variables such as age and gender.⁹⁻¹² Psychological considerations—such as perceived surgical risks, fear of postoperative complications, and varying degrees of altruistic motivation—also may impact the likelihood of an individual completing the donation process.⁹⁻¹¹ Yet research shows a substantial proportion of the population remains open to LKD, particularly when a loved one may benefit.^{11,13} A 2024 national survey found that most US adults would consider donating a kidney to a stranger if two key conditions were met: that their loved ones would be prioritized for a transplant in the future if needed, and that donation would not result in significant out-of-pocket medical expenses.⁶ These findings underscore the need to eliminate disincentives that prevent

LKD, a critical step toward expanding the living donor (LD) pool and meeting the growing demand for LDKTs.

As the largest paired exchange network in the US, the National Kidney Registry (NKR) facilitates approximately 27% of all LDKTs nationwide—a proportion that has increased with NKR's ongoing technological advancements and innovations in kidney paired donation (KPD).¹⁴⁻¹⁶ The NKR has developed a suite of innovative programs to remove logistical, financial, and emotional barriers to LKD and increase the number of individuals who proceed with donation (Table 1). To help increase living donation, NKR developed the Donor Automated Screening & History (DASH) portal, a comprehensive online platform that guides prospective donors and tracks them from registration through post-donation follow-up (Figure 1).¹⁷⁻²¹

Through innovative strategies, the NKR aims to enhance donor convenience, safety, and satisfaction, thereby improving both access to and participation in LKD. The aim of this analysis is to describe the use and impact of three major programmatic innovations developed by the NKR to reduce barriers to kidney donation.

Materials and Methods

Study Design

We conducted a retrospective cohort study utilizing administrative data records from the NKR, a national database capturing information on individuals pursuing LKD at 103 transplant centers across the continental US. The NKR dataset includes anonymized donor-level data for individuals who register through the NKR DASH platform.

Demographic and clinical characteristics including gender, race/ethnicity, education level, and income are self-reported by the registrants. As all data were fully

anonymized, this study is not considered Human Subjects Research and was exempt from institutional review board (IRB) approval.

Study Population

The study included all potential LDs who initiated donor registration using the NKR DASH platform between January 1, 2018, and December 31, 2024. Individuals who completed registration outside of the DASH platform were excluded. Demographic and clinical data were analyzed to evaluate registration and referral conversion rates and the association of outcomes with key innovation programs.

Program Definitions

DASH (Donor Automated Screening & History): A web-based platform that supports early-stage registration, eligibility screening, and tracking for potential LKD. DASH captures self-reported demographics, financial information (income ranges), and clinical data.

Pre-Workup Labs (PWL): A decentralized testing strategy that allows potential donors to complete early-stage laboratory testing via home blood draw or local diagnostic centers, prior to engagement with a transplant center. NKR defines a completed referral only after PWL have been completed.

Donor Connect: An optional, structured peer mentorship where living donor candidates are paired with experienced kidney donors for emotional and informational support throughout the living donor process, including encouragement and guidance on actions

needed to move forward in the donation process. Participation was identified through mentor assignment documentation.

Remote Donation: Remote Donation Network is a logistics program enabling donors to undergo evaluation and nephrectomy at an NKR-affiliated center closer to their home, even if the intended recipient is listed at a different NKR affiliated transplant center. It leverages advanced logistical infrastructure and GPS tracking technology to ensure the secure and efficient delivery of LD kidneys to transplant centers across the US. Use of this program was identified through administrative records indicating remote surgery and kidney transport.

Donor Shield: The Donor Shield Program is an overarching program that includes some of the previously described programs, such as Donor Connect and Remote Donation, but also includes a financial protection program that mitigates the financial, legal, and logistical challenges associated with LKD. The program offers reimbursement to LDs for donation-related expenses, including travel expenses, lost wages, and dependent care. For this analysis, Donor Shield refers to participation in the cost reimbursement component of the program, identified by documentation of requesting and receiving lost wage or travel reimbursement. Donors are eligible for Donor Shield if they donate their kidney through the NKR at an NKR Member Center. Donors are educated on the availability of LD cost reimbursement and details on how to submit documentation and reimbursement requests.

Study Outcomes

LKD registration was defined as initiation of the donor process (registration) through the NKR DASH portal. Referrals were defined as donor candidates who completed the following: DASH registration, PWL, and were referred to a transplant hospital.

Registration conversion rate was defined as the proportion of donor registrants who advanced to referral. Living kidney donation was defined as completion of a nephrectomy for the purpose of LKD. Referral conversion rate was defined as the proportion of referrals who proceeded to LKD.

Statistical Analysis

Descriptive statistics were used to summarize donor characteristics, program participation, and outcome measures. Pearson's chi-square and Mann-Whitney U tests were used to compare categorical and continuous variables, respectively. To evaluate changes in registration and referral conversion over time in association with implementation of innovation programs, we used interrupted time series (ITS) analysis with segmented regression analysis. The Durbin-Watson statistic was applied to test and correct for serial autocorrelation. An autoregression model was used to test for correlations in the data, estimate autoregressive parameters to be included in the model, and correct for them to estimate the final parameters. A p-value of less than 0.05 was considered statistically significant.

Data were exported from the NKR administrative database into MS Excel (Microsoft Corp, Seattle, WA) and all analyses were conducted using SAS Studio (SAS Institute Inc., Cary, NC).

Results

Overall, 363,024 donor registrations were found within the NKR database during the study period. After exclusion of donor registrations through affiliated hospitals outside of the NKR DASH (n=250,807), the primary analysis included 112,217 LD candidates that registered through the NKR DASH platform. The median donor age was 42 (IQR 32,55) with 57% females and 22% as non-white. A total of 19% had an educational level of a 4-year degree or advanced degree and 62% of donors lived within 50 miles of a transplant center. Of those registered, 15.6% completed donor referrals and 1.1% ultimately proceeded to LKD (Table 2).

There was an increase in donor registrations across the study period, from 6,881 in 2018 to 32,328 in 2024, representing a 369% overall growth (Supplemental Figure 1A). From 2018 to 2024, registration conversion rates increased from 7% to 19%. Annual living kidney donations increased from 63 to 434 (Supplemental Figure 1B).

The median time between NKR DASH registration and donation was 7.2 months, with over 75% of donations occurring in less than 12 months (Supplementary Figure 2).

There was no clinically appreciable difference in time between registration and donation based on gender, predominant subgroups of race, education level, or income status.

Program Participation and Impact

Donor Connect

Between 2018 and 2024, a total of 112,217 individuals registered as potential LDs. Of these, 29,988 (27%) were paired with a Donor Connect mentor (Table 3). To assess differences between those who opted for mentorship vs those who did not, comparisons

were limited to the cohort of donors who were formally referred for evaluation. Among referred donors, 9,852 (56%) participated in the Donor Connect program.

Registrants who engaged with a mentor had visually fewer missing data fields for gender, education, and income, suggesting greater data completeness in this group.

During the referral phase, demographic and clinical characteristics differed significantly between mentored and non-mentored donors. Gender distribution was similar between

groups, with approximately two-thirds of each group identifying as female. Age and

educational levels were also similar. However, significant differences in race and

ethnicity were observed: mentored donors were more likely to identify as Black or African American or Hispanic/Latino compared to those who did not engage with a

mentor. Additionally, mentored donors were more likely to report higher income levels.

Following the implementation of Donor Connect, the registration conversion rate

increased significantly. Prior to the program, the conversion rate was 7.0% at the end

of the first quarter of 2018, with only a modest quarterly increase of 0.1%. After Donor

Connect was introduced, the conversion rate rose immediately by 8% ($p < 0.001$) with a

continued quarterly increase of 0.3% thereafter ($p = 0.017$) (Figure 2). Importantly,

interrupted time series analyses are best utilized to measure changes in entire

populations, not only those who utilized the “intervention”. When comparing the

registration conversion rate in potential donors who received mentoring vs those that did

not, there was a progressively larger gap in registration conversion rates each year.

Potential donors who did not request a mentor had conversion rates between 7.6% and

10.7% for each full year where mentoring was available (2022 to 2024), while mentored

potential donors saw an increase in registration conversion rate from 26.4% to 38.3%

over the same 3 years (Supplemental Figure 3). Additionally, while the focus of the Donor Connect program is to increase registration conversion rate so more donors are referred to transplant centers for workup, there is some downstream impact on actual donation rates. Since the implementation of Donor Connect, potential donors who received mentoring have been more likely to eventually donate compared to those that do not receive mentoring, including a nearly 7-fold increased donation rate in 2024 (3.4% vs. 0.5%, Supplemental Figure 4).

Remote Donation

Of the 1,239 LDs in the study cohort, 135 (11%) donated through the Remote Donation Network (Table 4). Donors who used the program were similar to those who donated at the recipient's transplant center in age (median 48 [IQR 38, 58] vs 46 [IQR 36,57] years) and gender (63% vs 60% female). Educational attainment and racial/ethnic distribution were also comparable between groups, with most donors identifying as Caucasian and reporting higher levels of education.

The most notable difference between groups was geographic distance. Remote donors were significantly more likely to live more than 150 miles from the recipient's transplant center (84% vs 21%), underscoring the program's role in reducing geographic barriers to donation. However, distance to the *donation center* did not differ significantly, suggesting that the Remote Donation Network successfully allowed donors to access centers closer to home. The Remote Donation Network program reduced travel burden by a median of 597 [205,1196] miles.

Referral conversion rates declined as donor distance from a transplant center increased. Candidates living within 50 miles from a transplant center had a significantly higher conversion rate (8.3%) compared to those living 51-150 miles (6.5%, $p < 0.001$) or more than 150 miles away (5.3%, $p < 0.001$) (Figure 3). This corresponds to an increased odds of donation if candidates live within 50 miles as compared to 51-150 miles (odds ratio 1.31 (1.15,1.49), $p < 0.001$) and compared to those more than 150 miles away (odds ratio 1.62 (1.43,1.84), $p < 0.001$).

Donor Shield

Among the 1,239 LDs in the study period, 637 (51%) received cost reimbursement through the NKR Donor Shield program, while 602 (49%) did not (Table 5). Donors who received reimbursement were slightly younger (median age 45 [35-56]) vs 48 [38-58] years) and had similar gender distribution (61% vs 60% female). Educational attainment was not statistically different between groups, though reimbursed donors appeared more likely to report a high school diploma/GED or associate's degree compared to those who did not receive reimbursement (32% vs 26%). Reimbursed donors were slightly less likely to hold an advanced degree compared to those who did not receive reimbursement (33% vs 35%). Significant differences were observed in racial and ethnic composition. Donors who received reimbursement were more racially and ethnically diverse, with a lower proportion identifying as Caucasian (82% vs 89%) and a higher proportion identifying as Hispanic/Latino (7% vs 4%). Geographic distance from the transplant center also differed significantly. Donors receiving reimbursement were more likely to live > 151 miles from the transplant center (28% vs 17%) and less likely to live within 50 miles (47% vs 62%), suggesting that Donor Shield plays an

important role in offsetting travel-related barriers. Income distributions varied substantially between groups. Donors who received reimbursement were less likely to report annual incomes over \$104,000 (19% vs 27%) and more likely to report lower income levels. To assess the impact of Donor Shield on lower income donors, outcomes were stratified by reported annual income. Among donor candidates with annual income under \$62,000 (approximately 30% of the donor population), the registration conversion rate increased from 21.3% in 2018 to 35.2% in 2024. The registration to donation rate remained consistent or slightly increased over time, which, combined with the geometrically increasing number of donor candidates, led to an increase in total donations in this population from 20 in 2018 to 137 in 2024 (Figure 4A). When expanding the population to donor candidates with a reported annual salary <\$83,000, the registration to referral conversion rate increased from 21% in 2018 to 33% in 2024 and an increase in registration to donation conversion rate from 1% in 2018 to 2% in 2024 (Figure 4B). This corresponded to an increase in donations in this population from 11 in 2018 to 174 in 2024.

Discussion

This study describes programmatic innovations implemented by the National Kidney Registry and the impact on improving access to and completion of LKD. By analyzing donor characteristics and outcomes associated with participation in Donor Connect, Remote Donation Network, and Donor Shield cost reimbursement, we demonstrate that these services are widely utilized and equitably accessed across diverse donor populations.

Donor Connect, a peer support program, was associated with increased registration conversion rates and was particularly used by racially diverse and higher educated donors. Mentored donors were more likely to have complete demographic data and report higher income. These findings suggest that engagement with Donor Connect may be associated with greater demographic diversity and fewer informational gaps in the donor registration process.

One of the most interesting findings in our analysis is the increase in registration to referral conversion demonstrated by the donor mentoring program, as well as downstream impact on donation. The inclusion of multiple interventions over a few years can make it difficult to justify causal associations to a single intervention, however the immediate impact of the implementation of the Donor Connect program is difficult to attribute to any other factor. This is especially remarkable because even as the number of registrations geometrically increased in 2022 and 2023, the conversion rate to transplant center referrals continued to consistently increase. Notably, there is expected to be some confirmation bias in donor candidates who opt to be connected with a mentor, as they may be more committed to the altruistic act of donation. However, since approximately half of registrants opt in to the program and are successfully assigned a mentor, this still represents an interesting finding to further explore. Although prior surveys of previous and potential LDs in Sweden and the US have indicated donor mentors are important to prevent potential donors from feeling underprepared or underinformed and are associated with improved recovery post-donation, we believe this is the first large-scale reporting of the impact of donor mentors on donor progression.^{24,25}

The Remote Donation Network effectively addressed geographic barriers to donation by allowing donors to undergo evaluation and nephrectomy at centers closer to home. Over 80% of donors who participated in this innovation strategy lived more than 150 miles from the recipient's transplant center, demonstrating the program's success in overcoming distance-related challenges. Remote donation was not associated with significant demographic or socioeconomic differences, suggesting that geographic flexibility may be offered without compromising equity or safety. Remote donation may offer a scalable solution that can enable donation for otherwise geographically isolated candidates.

The Donor Shield program demonstrated a meaningful association with increased participation among lower-income donors. Donors who received reimbursement were more likely to live farther from the transplant center and to report lower household incomes. They were also more racially and ethnically diverse. These findings suggest that Donor Shield may promote equity in donation by making the process more accessible to donors with fewer financial resources. The association between younger donor age and Donor Shield program use may reflect greater financial vulnerability or willingness to use novel support programs.

The financial impact of donation is one of the largest perceived barriers to LKD, and multiple analyses have indicated that removing this disincentive can increase LKD by 14 to 231% per year.²⁶ This largely agrees with our sub analysis on lower income donors, which ultimately showed a 6-fold increase in LKD in donors with annual income < \$62,000 and 16-fold increase in those with annual income < \$83,000 over the course of 5.5 years. McCormick and colleagues estimated that removal of the significant financial

disincentive to LKD could increase LKD by over 11,000 transplants per year if available to all.²⁶

Collectively, these innovations address common structural and psychosocial barriers in the LD process. By targeting mentorship, geographic access, and financial burden – key modifiable factors in the donation process – these programs represent a coordinated strategy to expand LKD equitably. Without doubt, the NKR had an impact on this, with a 12-fold increase in donor candidate referrals to transplant centers and a 6.9-fold increase in donations over the course of the 7-year study period.

This study has several limitations. First, the analysis was based on administrative data from the NKR which may be subject to misclassification or incomplete reporting, particularly for self-reported demographic and socioeconomic variables. Although data quality appeared higher among program participants (e.g. Donor Connect users), the possibility of differential data completeness may introduce bias. Second, this was a retrospective observational study and causality cannot be definitively established between innovation use and donation outcomes. Program participation was voluntary, and donors who opted into mentorship or reimbursement may differ systematically from those who did not participate in the programs, leading to selection bias. For example, individuals who seek peer support may already be inherently more motivated to pursue living donation. Additionally, there are potential center-level outreach practices that could confound the results of our analysis. Finally, although ITS analysis was used to assess the impact of the donor mentorship program implementation, this method is sensitive to unmeasured secular events and concurrent interventions. Improvement in center-level practices, public awareness campaigns, transplant policy changes, and the

presence of an international pandemic may have also influenced the observed trends. Finally, generalizability is limited to populations engaged within the NKR system, which may differ from donors referred through other transplant center pathways. Nonetheless, the national scope and longitudinal nature of the dataset offer important insights into real-world donation trends and opportunities for innovation.

In conclusion, these innovations represent a modern, donor-centered approach to LKD that is facilitated by a nimble and innovative company. By addressing known barriers, these programs have the potential to expand the donor pool, improve the efficiency in donor evaluation, and improve the overall donor experience. Future analyses should evaluate the impact of these programs on outcomes, transplant center practices, and donor satisfaction.

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Table 1: National Kidney Registry Innovations

Program Name	Year Launched	Key Features	Purpose
DASH Platform	2017	Online donor intake platform for assessing preliminary donor eligibility. Guides donors from registration through post-donation follow up	Reduces logistical burden; early eligibility screening
Pre-Workup Labs (PWL)	2017	Home blood draws for early-stage evaluation	Minimizes travel expenses and streamlines early donor screening
Remote Donation Network	2018	Enables donation at a local NKR transplant center, regardless of recipient's location	Increases flexibility in donor evaluation and surgery location
Donor Shield	2019	Covers lost wages, travel, dependent care, and medical complications; \$9.3M disbursed in 2024	Provides donors with financial protection and support
Donor Connect	2021	Matches donor candidates with experienced mentors for guidance and encouragement	Offers peer support to donors

Table 2: Demographics

	Donor Registrations (n=112,217)	Donor Referrals (n=17,613)	Donations (n=1,251)
Age, years	42 [32,55]	47 [36,60]	47 [37,57]
Gender			
Male	27,366 (24%)	6,330 (36%)	532 (39%)
Female	63,614 (57%)	11,283 (64%)	833 (61%)
Unknown	21,237 (19%)		
Missing	12,109		
Education Level			
High School/GED	17,786 (16%)	5,170 (29%)	244 (18%)
Associates/Technical Degree	10,875 (10%)	3,505 (20%)	170 (12%)
4-Year Degree	12,165 (11%)	4,926 (28%)	476 (35%)
Advanced Degree	8,841 (8%)	3,961 (22%)	453 (33%)
Unknown	62,550 (56%)	51 (<1%)	25 (2%)
Race			
White/Caucasian	38,891 (78%)	13,471 (77%)	1,143 (85%)
Black/African American	3,455 (7%)	1,375 (8%)	42 (3%)
American Indian/Alaskan Native	390 (1%)	101 (1%)	2 (<1%)
Asian	1,072 (2%)	488 (3%)	33 (2%)
Native Hawaiian/Pacific Islander	189 (<1%)	69 (<1%)	2 (<1%)
Multiple	1,229 (2%)	404 (2%)	29 (2%)
	3,888 (8%)	1,438 (8%)	85 (6%)

Hispanic/Latino	496 (1%)	186 (1%)	7 (1%)
Other	74,716	81	25
Missing			
Miles from Transplant Center			
0-50	9,723 (9%)	8,020 (46%)	729 (53%)
51-100	3,208 (3%)	2,651 (15%)	183 (13%)
101-250	4,365 (4%)	3,487 (20%)	247 (18%)
250+	4,682 (4%)	3,128 (18%)	194 (14%)
Unknown	90,239 (80%)	336 (2%)	15 (1%)
Missing	12,109		
Reported Income Ranges			
\$0-16,000	1,549 (1%)	409 (2%)	22 (2%)
\$16,001-26,000	2,695 (2%)	761 (4%)	49 (4%)
\$26,001-36,000	3,956 (4%)	1,141 (6%)	65 (5%)
\$36,001-47,000	4,458 (4%)	1,356 (8%)	100 (7%)
\$47,001-62,000	5,567 (5%)	1,906 (11%)	170 (12%)
\$62,001-83,000	4,874 (4%)	1,850 (11%)	179 (13%)
\$83,001-104,000	3,363 (3%)	1,348 (8%)	144 (11%)
>\$104,000	5,185 (5%)	2,349 (13%)	309 (23%)
Unknown	80,570 (72%)	6,493 (37%)	330 (24%)
Missing	12,109		

Table 3: Donor Connect Program Utilization

	Registrations		Referrals		
	No Mentor (n=82,229)	Mentor (n=29,988)	No Mentor (n=7,762)	Mentor (n=9,852)	p-value*
Age, years	41 [32,54]	44 [33,56]	47 [36,59]	48 [36,60]	0.351
Gender					
Male	18,114 (22%)	9,252 (31%)	2,800 (36%)	3,530 (36%)	0.739
Female	42,941 (52%)	20,673 (69%)	4,962 (64%)	6,322 (64%)	
Unknown	21,174 (26%)	63 (<1%)			
Education Level					
High School/GED	9,385 (11%)	8,401 (28%)	2,292 (30%)	2,878 (29%)	0.001
Associates/Technical	5,655 (7%)	5,220	1,503 (19%)	2,003 (20%)	
Degree	6,409 (8%)	(17%)	2,269 (29%)	2,657 (27%)	
4-Year Degree	4,391 (5%)	5,756 (19%)	1,680	2,281	
Advanced Degree	56,389 (69%)	4,450			
Unknown					

		(15%) 6,161 (21%)	(22%) 18 (<1%)	(23%) 33 (<1%)	
Race					
White/Caucasian	20,763 (80%)	18,128 (76%)	6,062 (78%)	7,410 (76%)	<0.001
Black/African American	1,458 (6%)	1,997 (8%)	509 (7%)	866 (9%)	
American Indian/Alaskan Native	196 (1%)	194 (1%)	47 (1%)	54 (1%)	
Asian	516 (2%)	556 (2%)	211 (3%)	277 (3%)	
Native Hawaiian/Pacific Islander	104 (<1%)	85 (<1%)	39 (1%)	30 (<1%)	
Multiple	666 (3%)	563 (2%)	199 (3%)	205 (2%)	
Hispanic/Latino	1,843 (7%)	2,045 (9%)	584 (8%)	854 (9%)	
Other	263 (1%)	233 (1%)	79 (1%)	107 (1%)	
Reported Income Ranges					
\$0-16,000	881 (1%)	668 (2%)	180 (2%)	229 (2%)	0.005
\$16,001-26,000	1,527 (2%)	1,168 (4%)	361 (5%)	400 (4%)	
\$26,001-36,000	2,123 (3%)	1,833 (6%)	514 (7%)	627 (6%)	
\$36,001-47,000	2,341 (3%)	2,117 (7%)	583 (8%)	773 (8%)	
\$47,001-62,000	2,877 (4%)	2,487 (3%)	835	1,071 (11%)	

\$62,001-83,000	1,681 (2%)	2,690 (9%)	(11%)	1,058 (11%)	
\$83,001-104,000	2,482 (3%)		792 (10%)	780 (8%)	
>\$104,000	65,830 (80%)	2,387 (8%)	568 (7%)	1,381 (14%)	
Unknown		1,682 (6%)	968 (12%)	3,533 (36%)	
		2,703 (9%)	2,961 (38%)		
		14,740 (49%)			

*Statistical Comparison between Referrals with a Mentor compared to Referrals with No Mentor

Table 4: Remote Donation

	Not Remote Donation (n=1104)	Remote Donation (n=135)	p-value
Age, years	46 [36,57]	48 [38,58]	0.226
Gender			
Male	437 (40%)	50 (37%)	0.795
Female	666 (60%)	85 (63%)	
Education Level			
High School/GED	185 (17%)	26 (19%)	0.516
Associates/Technical Degree	138 (13%)	12 (9%)	
4-Year Degree	399 (36%)	46 (34%)	
Advanced Degree	372 (34%)	51 (38%)	
Race			
White/Caucasian	942 (86%)	117 (87%)	0.977
Black/African American	33 (3%)	4 (3%)	
American Indian/Alaskan Native	1 (<1%)	0 (0%)	
Asian	26 (2%)	4 (3%)	
Native Hawaiian/Pacific Islander	2 (<1%)	0 (0%)	
Multiple	26 (2%)	2 (1%)	
Hispanic/Latino	59 (5%)	8 (6%)	
Other	5 (<1%)	0 (0%)	
Miles from Transplant Center			<0.0001

0-50	553 (56%)	6 (5%)	
51-150	230 (23%)	12 (10%)	
151+	203 (21%)	98 (84%)	
Miles from Donation Center			0.185
0-50	553 (56%)	59 (51%)	
51-150	230 (23%)	36 (31%)	
151+	203 (21%)	21 (18%)	
Reported Income Ranges			0.969
\$0-16,000	21 (2%)	1 (1%)	
\$16,001-26,000	43 (4%)	4 (3%)	
\$26,001-36,000	49 (4%)	6 (4%)	
\$36,001-47,000	82 (7%)	9 (7%)	
\$47,001-62,000	140 (13%)	16 (12%)	
\$62,001-83,000	150 (14%)	16 (12%)	
\$83,001-104,000	119 (11%)	15 (11%)	
>\$104,000	255 (23%)	34 (25%)	
Unknown	245 (22%)	34 (24%)	

Table 5: Cost Reimbursement

	No Reimbursement (n=602)	Reimbursement (n=637)	p-value
Age, years	48 [38,58]	45 [35,56]	0.001
Gender			0.563
Male	239 (40%)	248 (39%)	
Female	362 (60%)	389 (61%)	
Education Level			0.071
High School/GED	96 (16%)	115 (18%)	
Associates/Technical Degree	58 (10%)	92 (14%)	
4-Year Degree	231 (38%)	214 (34%)	
Advanced Degree	211 (35%)	212 (33%)	
Unknown	6 (1%)	4 (1%)	
Race			0.040
White/Caucasian	531 (89%)	528 (83%)	
Black/African American	16 (3%)	21 (3%)	
American Indian/Alaskan	0 (0%)	1 (<1%)	
Native	9 (2%)	21 (3%)	
Asian	0 (0%)	2 (<1%)	
Native Hawaiian/Pacific	15 (3%)	13 (2%)	
Islander	24 (4%)	43 (7%)	
Multiple	1 (<1%)	4 (1%)	
Hispanic/Latino			
Other			
Miles from Transplant Center			<0.0001
0-50	366 (62%)	295 (47%)	
51-150	124 (21%)	157 (25%)	
151+	102 (17%)	180 (28%)	
Reported Income Ranges			<0.0001
\$0-16,000	6 (1%)	16 (3%)	
\$16,001-26,000	20 (3%)	27 (4%)	
\$26,001-36,000	17 (3%)	38 (6%)	
\$36,001-47,000	35 (6%)	56 (9%)	
\$47,001-62,000	64 (11%)	92 (14%)	
\$62,001-83,000	73 (12%)	93 (15%)	
\$83,001-104,000	59 (10%)	75 (12%)	
>\$104,000	165 (27%)	124 (19%)	
Unknown	163 (27%)	116 (18%)	

Figure 1. National Kidney Registry DASH Workflow

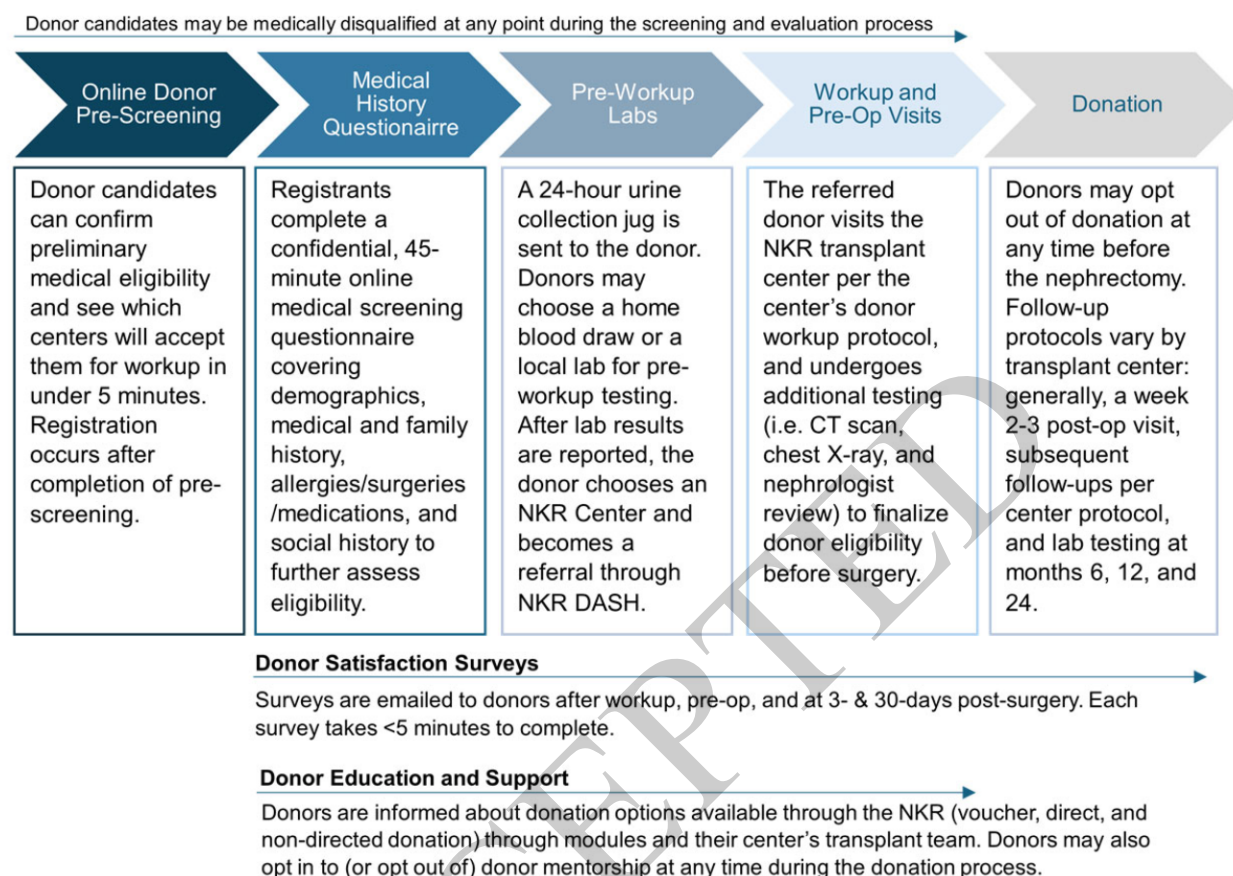


Figure 2. Registration Conversion Rate Interrupted Time Series

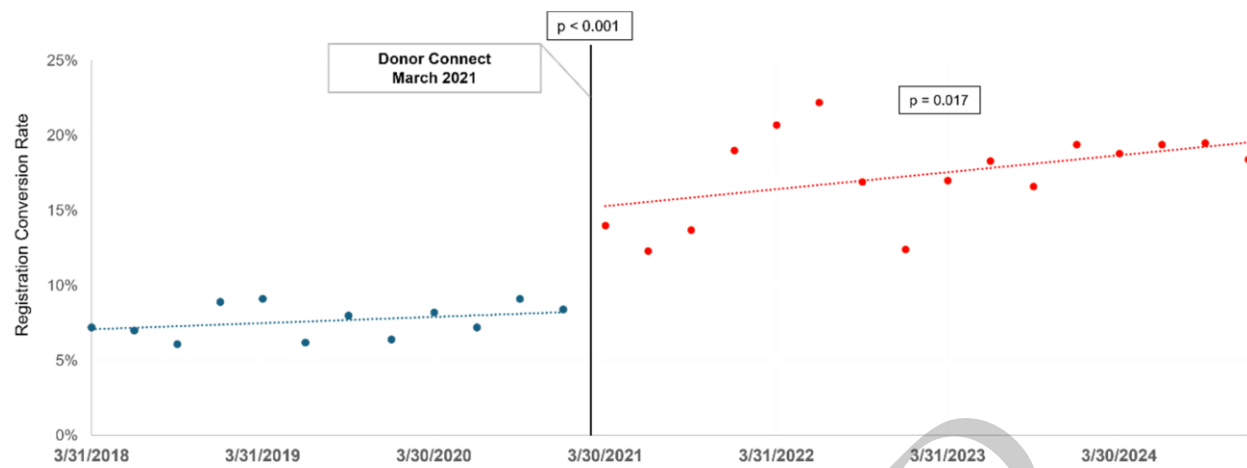


Figure 3. Referral Conversion Rate Based on Distance from Transplant Center

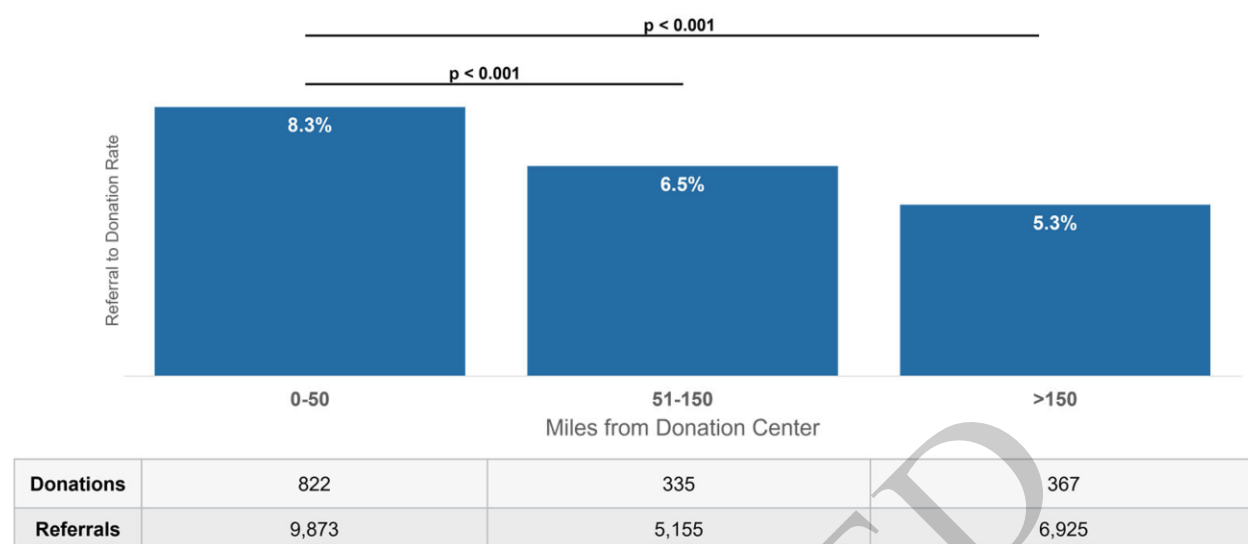


Figure 4A. Conversion Rates in Reported Salary <\$62,000

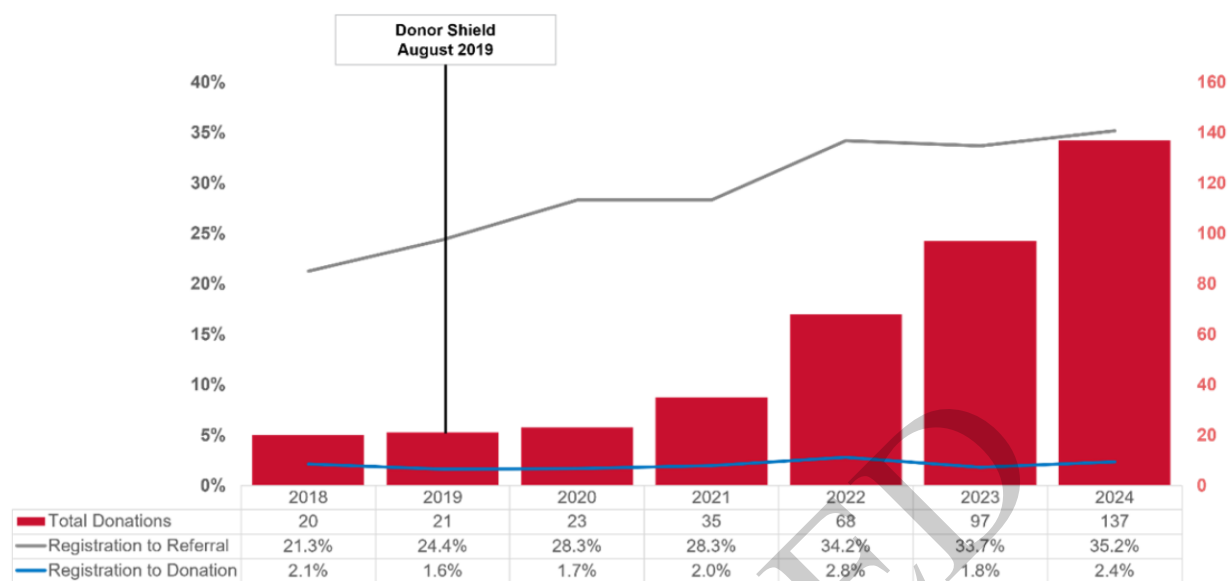
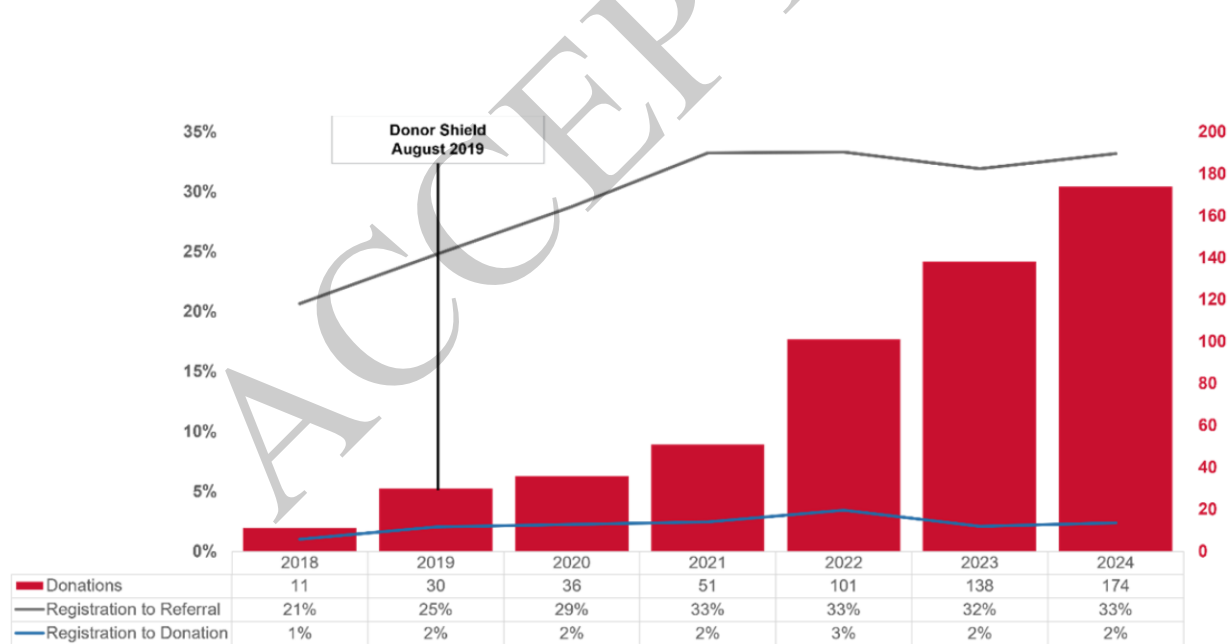


Figure 4B. Conversion Rates in Reported Salary <\$83,000



Strategic Innovations to Reduce Disincentives and Increase Living Kidney Donation

KIDNEY360[®]

Accessing Our World From Every Angle

Clinical Research

Methods and Cohort



Retrospective cohort using data from the NKR database



103 transplant centers across the continental US



Look for the impact of the NKR programs to eliminate disincentives to living kidney donation (LKD)



Interrupted time series to analyze changes in registration before and after program implementation

Outcomes



Registration conversion rate ↑ 18.4% by the end of follow-up



↑ 8% at the time of intervention ($p < 0.001$)



Remote donors were more likely to live >150 miles from the recipient's transplant center (84%)



Remote donor program ↓ travel by 597 miles



↑ donation odds 1.31-1.62



Donors were more racially diverse

Conclusions: NKR's programs support the efficacy of disincentive-targeted innovations as a way to increase donation rates by supporting donors and streamlining the donation process.

Amanda Leonberg-Yoo, Robert Redfield, Ty Dunn et al. *Strategic innovations to reduce disincentives and increase living kidney donation*. *Kidney360*. DOI: 10.34067/KID.0000001001

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