



Renal Disease

Socioeconomic Status in Non-directed and Voucher-based Living Kidney Donation

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Abstract

Background: Little has been reported about the socioeconomic status (SES) and demographics of non-directed (altruistic) and voucher-based donation.

Objective: To analyze common characteristics amongst altruistic donors in order to promote non-directed and voucher-based donation.

Design, setting, and participants: Information regarding altruistic donations from 2008 to 2015 and voucher-based donors was obtained from the National Kidney Registry.

Outcome measurements and statistical analysis: An SES index, created and validated by the Agency for Healthcare Research and Quality (AHRQ), was created by geocoding the donor's zip code and linking it to seven publicly available SES variables found in the 2010 United States Census data.

Results and limitations: In total, 267 non-directed and 3 voucher-based donations were identified. Non-directed donors were predominantly female (58%), with an average age of 45.6 yr (range, 21–72). The mean SES index score was 55.6 (SD = 3.2), which corresponds to the 77th percentile of 1.5 million Medicare beneficiaries as reported by the AHRQ in 2008. Voucher-based donors were Caucasian males of high SES. The study was limited by the number of voucher-based donations.

Conclusions: Non-directed and voucher-based donors are in the upper end of the economic spectrum. The voucher-based program has built within it the inherent capacity to remove disincentives to donation, which currently limit altruistic donation.

Patient summary: We wanted to determine what types of people donated their kidneys altruistically, so that we could understand how to motivate more people to donate their kidneys. The voucher-based program was recently started and is a promising tool to motivate many people to donate kidneys by removing major disincentives to donation.

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1. Introduction

Non-directed donation (NDD) of an organ occurs when an individual donates a kidney to an unrelated, anonymous recipient with no direct personal benefit.

NDD has been shown to have a significant impact on living donor transplants by initiating non-simultaneous extended altruistic donor (NEAD) chains [1]. On average, each NDD generates a chain of approximately five transplants. The length of the transplantation chain increases if

the non-directed (altruistic) donor is of O blood type [2]. Altruistic donors report considerable satisfaction with their decision and almost all would repeat their decision to donate [3]. From 2007 to 2015, the prevalence of NDD has more than doubled, from 97 to 208 donations per year. Despite this, there remains a growing need to increase living kidney donations.

While biological incompatibility precludes living donation in approximately 35% of cases, the concept of chronological incompatibility has been recently raised [4]. For many individuals, the ideal time to donate a kidney does not coincide with the intended recipients' need for transplantation. Since 2014, voucher-based kidney donation has been developed as a means of circumventing chronological incompatibility. Donors in the voucher-based program function as pseudoaltruistic donors by initiating chains without adding a paired recipient to the current chain. If and when a voucher is redeemed, a future chain will end and provide the voucher holder with a compatible kidney. Herein, we evaluate the socioeconomic characteristics of living kidney donation, including NDD, and discuss the effect that voucher-based donation can have in generating pseudoaltruistic donors to increase the pool of living donors.

2. Materials and methods

2.1. Data collection

The National Kidney Registry (NKR) is a coalition of transplant programs in the United States that pools self-referred altruistic donors and both incompatible and compatible pairs that are willing to enter a kidney transplant exchange into a single database. To curate a contemporary cohort, we used data from February 2008 to June 2015. Starting in the final quarter of 2014, the NKR took on a new initiative to facilitate voucher-based donation.

2.2. Voucher-based program

There are currently 44 centers across the United States enrolled in the NKR Voucher Program. The matching algorithm of the NKR is focused on the creation of chains with clusters that maximize the number of transplants facilitated. Voucher redemption is the third of six categories in the current priority schema, following: (1) non-directed (altruistic) donors who previously donated their kidney and who now need a transplant; and (2) kidney-paired donation (KPD) recipients who have not received a kidney. A full description of the voucher-based program and details of redemption can be found in a recent publication [4].

2.3. Variables

We collected donor characteristics including sex, race/ethnicity, age at donation, blood type, transplant center, and residential zip code. As we did not have direct donor-level socioeconomic status (SES) data, we calculated an SES index, created and validated by the Agency for Healthcare Research and Quality (AHRQ), by geocoding the donor's zip code and linking it to seven publicly available SES variables found in the 2011 US Census data [5]. This index was initially created for use in conjunction with Medicare claims as these claims contain person-specific demographic characteristics (race, age, and sex) but no measures such as income or wealth that are usually considered as the indicators of SES

[6]. The index uses residential information to correspond with US Census data that has been established to predict SES at levels of neighborhood and communities. The developers of this index picked variables that are both related to and sometimes used in the literature as proxies for SES. The SES index was calculated using the following formula [5].

$$\begin{aligned} \text{SES index score} = & 50 + (-0.07 * \text{crowded}) \\ & + (0.08 * \text{prop100}) \\ & + (-0.10 * \text{pct_poverty}) \\ & + (0.11 * \text{hhinc100}) \\ & + (0.10 * \text{high_educ}) \\ & + (-0.11 * \text{low_educ}) \\ & + (-0.08 * \text{pct_unemp}) \end{aligned}$$

“Crowded” is the percentage of households containing one or more person per room; “prop100” is the median value of owner-occupied values (standardized to range from 0 to 100); “pct_poverty” is the percentage of persons below the federally defined poverty line; “hhinc100” is the median household income (standardized to range from 0 to 100); “high_educ” is the percentage of persons aged >25 yr with at least 4 yr of college; “low_educ” is the percentage of persons aged >25 yr with less than 12th-grade education, and “pct_unemp” is the percentage of persons aged >16 yr in the labor force who are unemployed and actively seeking work.

Though only three vouchers have been reported thus far, similar variables were identified and collected from this cohort of patients.

3. Results

In total, 267 NDDs from 53 transplant centers in 26 states were reported in the NKR database from 2008 to 2015. Table 1 represents the demographic data in this group. Altruistic donors were predominantly female (58%), and their average age was 45.6 (range, 21–72) yr. Overall, 92% were Caucasian, with no difference in race between men and women ($p = 0.35$). Almost half (46.1%) of the altruistic donors were of blood type O, 36.7% were of blood type A, 15.0% were of blood type B, and 2.2% were of blood type AB. There was no significant difference in blood type between men and women ($p = 0.93$).

The average distance between the home zip code of altruistic donors and recipient transplant centers was 954.0 miles. The organs were in transit for a median of 6 h. An average altruistic donor waited for 4.5 mo (SD = 5.2) to donate.

The mean SES index score was 55.6 (SD = 3.2), which corresponds to the 77th percentile of 1.5 million Medicare beneficiaries, as reported by AHRQ in 2008 [5]. The SES index score was not significantly different among men and women, corresponding to the 76.5th percentile and 80.7th percentile, respectively ($p = 0.23$). Based on the SES index score, the group of donors had a median income of \$60 000 (range, \$26 000–125 000), 12% were below the poverty line, and 5% were unemployed. The median house value was \$216 000 (range, \$50 000–\$1 000 000). Of the donors, 34% had a college degree and 9% were without a high school diploma.

The first three voucher-based donations performed triggered a total of 25 transplantations. All donors were Caucasian, two male and one female. Voucher-based

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