ORIGINAL ARTICLE

Nephrologists' likelihood of referring patients for kidney transplant based on hypothetical patient scenarios

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Abstract

Background: There is wide variation in referral for kidney transplant and preemptive kidney transplant (PKT). Patient characteristics such as age, race, sex and geographic location have been cited as contributing factors to this disparity. We hypothesize that the characteristics of nephrologists interplay with the patients' characteristics to influence the referral decision. In this study, we used hypothetical case scenarios to assess nephrologists' decisions regarding transplant referral.

Methods: A total of 3180 nephrologists were invited to participate. Among those interested, 252 were randomly selected to receive a survey in which nephrologists were asked whether they would recommend transplant for the 25 hypothetical patients. Logistic regression models with single covariates and multiple covariates were used to identify patient characteristics associated with likelihood of being referred for transplant and to identify nephrologists' characteristics associated with likelihood of referring for transplant.

Results: Of the 252 potential participants, 216 completed the survey. A nephrologist's affiliation with an academic institution was associated with a higher likelihood of referral, and being '>10 years from fellowship' was associated with lower likelihood of referring patients for transplant. Patient age <50 years was associated with higher likelihood of referral. Rural location and smoking history/chronic obstructive pulmonary disease were associated with lower likelihood of being referred for transplant. The nephrologist's affiliation with an academic institution was associated with higher likelihood of referring for preemptive transplant, and the patient having a rural residence was associated with lower likelihood of being referred for preemptive transplant.

Conclusions: The variability in transplant referral is related to patients' age and geographic location as well as the nephrologists' affiliation with an academic institution and time since completion of training. Future educational interventions should emphasize the benefits of kidney transplant and PKT for all population groups regardless of geographic location and age and should target nephrologists in non-academic settings who are 10 or more years from their fellowship training.

Key words: case scenarios, disparities, kidney, preemptive, transplant

Introduction

End-stage renal disease (ESRD) is an important public health concern. It is associated with significant morbidity, cost and years of life lost due to premature death [1]. Kidney transplantation (KT) is the treatment of choice for the majority of patients with ESRD and the most effective method to reduce morbidity and mortality. Compared with dialysis, transplantation is associated with improved survival, a better quality of life and lower costs [2, 3]. Despite the known improved outcomes, there is wide variation in the rate of referral for KT [4]. Preemptive kidney transplant (PKT) is generally associated with improved outcomes compared with KT after a period of dialysis [5]. However, most transplant candidates are referred for KT after initiation of dialysis, and PKT is underutilized as an option for patients with ESRD [6, 7]. The reasons for the infrequent use of PKT remain unclear. Identifying factors that influence referral practices for KT and PKT is an important step in improving disparities in transplant. Patient characteristics such as age, race, sex and geographic location have been implicated as affecting the likelihood of referral for KT and particularly for PKT [8–12]. While each of the patient demographic factors has an independent effect on referral for KT, there is also a complex interplay between these factors. For example, racial disparities amplify overall regional disparities in KT [13]. Also, while men are more likely than women to receive a KT, the sex disparity is influenced by age and race; the sex disparity is stronger among older patients and black patients [14]. Even in programs in which the majority of patients on dialysis are women or African American, White men are more likely to receive a KT [9]. It has been proposed that a physician's assessment of the perceived benefit of KT for a particular patient is partially based on the patient's demographic characteristics [15–17]. In a qualitative study of nephrologists, we have observed geographic differences in perceptions of nephrologists regarding patient candidacy for KT [18].

We hypothesize that nephrologists' demographics, training and practice characteristics interact with the patients' characteristics to influence the decision for referral for KT and PKT. Hypothetical case scenarios have previously been used to examine physicians' choice of treatment modality for patients based on their demographic characteristics [19–24]. In the current study, we used hypothetical case scenarios to assess nephrologists' decisions regarding referral of patients for transplant. The study is unique because it addresses the association between nephrologist characteristics and likelihood of referral for transplant in a hypothetical scenario-based format.

Materials and methods

Participants

Following approval from the Institutional Review Board and using the AMA Masterfile, 3180 nephrologists practicing in the eastern USA were invited to participate in the survey study. Among those interested, 822 were following at least 20 ESRD patients. Assuming the likelihood of referral by urban and rural nephrologists for transplant to be 75 and 50%, respectively, the sample size of 252 is expected to achieve an alpha of 0.05 and a power of 0.8. In order to ensure adequate representation of nephrologists practicing in rural areas, 63 nephrologists from rural regions and 189 nephrologists from urban regions were selected to receive the full survey. Rural/urban location was based on the Urban Influence Code (UIC). Participants had the option of completing the survey on paper or using an email link to access the survey.

Case scenarios

The survey contained 25 investigator-designed case scenarios, generated by reviewing of literature and focus group discussions [18], and was refined following pilot testing. Nephrologists were asked whether they would recommend transplant for the 25 hypothetical patients (19 on dialysis and 6 not yet on dialysis). The scenarios for dialysis patients varied in age, race, sex, living situation (alone or with spouse), rural/urban location and smoking history/presence of chronic obstructive pulmonary disease (COPD). Scenarios for PKT did not have smoking history/COPD as a variable and age of all hypothetical patients for PKT was below 50 years.

Statistical analysis

The outcome variable for all analyses was 'likelihood of referring for transplant'. Patient-related characteristics analyzed in the scenarios included age, race, sex, living situation (alone or with a spouse), smoking history/COPD and urban/rural location. Nephrologist-related characteristics included age, race, sex, academic affiliation, time since completion of fellowship and attendance at national nephrology meetings. Logistic regression models with single covariates and multiple covariates were used to identify patient characteristics associated with higher and lower likelihood of recommending KT and PKT and to identify characteristics of nephrologists associated with higher or lower likelihood to recommend KT and PKT. As data were clustered with two levels (observation level and nephrologist level), multilevel model was used for analysis.

Results

Of the 252 potential participants who received the questionnaire, 216 completed the survey (online: 198; paper: 18). Respondent characteristics are shown in Table 1.

Referral for KT

In univariate analysis of nephrologist-related factors, academic affiliation and urban practice were associated with higher likelihood of recommending KT; male nephrologists and '>10 years from fellowship' were associated with a lower likelihood of recommending KT. In multivariate analysis, academic affiliation [odds ratio (OR): 1.64; 95% confidence interval (CI): 1.34–2.00; P < 0.005] was associated with higher likelihood of recommending transplant, and '>10 years from fellowship' was associated with lower likelihood of referring patients for transplant (OR: 0.64; 95% CI: 0.53–0.78; P < 0.005) (Table 2). In univariate analysis of patient-related factors, age <50 years was associated with higher likelihood of being referred for KT. Factors associated with lower likelihood of being referred for KT included smoking

Table 1. Characteristics of 216 respondents

Age, years (mean ± SD)	45.74 ± 9.8
Age >50 years	77 (36%)
White	123 (57%)
Male	182 (84%)
Urban practice	153 (71%)
>10 years from fellowship	100 (46%)
Academic affiliation	125 (58%)
Attended >2 national nephrology meetings in past 5 years	86 (40%)

Data are presented as number and percentage in parentheses except as indicated.

Table 2. Single- and multiple-covariate OR for nephrologist-related characteristics (n = 216) and recommendation of transplant for 19 hypothetical patients on dialysis

Characteristic	Single-covariate model	P-value	Multiple-covariate model	P-value
Academic affiliation	1.60 (1.34–1.91)	<0.005	1.64 (1.34–2.00)	<0.005
Urban practice	1.23 (1.02–1.48)	0.03	0.93 (0.76–1.14)	0.49
Attended >2 national nephrology meetings in past 5 years	1.20 (1.00–1.44)	0.05	1.06 (0.87–1.29)	0.55
Male	0.75 (0.58–0.98)	0.03	0.80 (0.61–1.05)	0.10
>10 years from fellowship	0.73 (0.61–0.88)	<0.005	0.64 (0.53–0.78)	<0.005
Age >50 years	1.01 (0.83–1.21)	0.97		

Data are presented as OR (95% CI). The multiple-covariate model includes only variables significant at P ≤ 0.05 in single-covariate analysis (variables: >10 years from fellowship, male sex, attended >2 national meetings in past 5 years, urban practice and academic affiliation).

Table 3. Single- and multiple-covariate OR for characteristics of 19 hypothetical dialysis patients and referral for transplant

Characteristic	Single-covariate model	P-value	Multiple-covariate model	P-value
Age <50 years	2.19 (1.83–2.61)	<0.005	2.32 (1.67–3.21)	<0.005
Smoking history/COPD	0.52 (0.44–0.62)	<0.005	0.49 (0.35–0.68)	<0.005
Rural residence	0.50 (0.39–0.65)	<0.005	0.35 (0.25–0.50)	<0.005
Living alone	0.49 (0.39–0.61)	<0.005	0.82 (0.54–1.25)	0.36
White	0.29 (0.23–0.36)	<0.005	1.08 (0.77–1.53)	0.64
Male	0.85 (0.69–1.04)	0.11		

Data are presented as OR (95% CI). The multiple-covariate model includes only variables significant at P ≤ 0.05 in single-covariate analysis (variables: White, living alone, rural residence, co-morbidity and age <50 years).

Table 4. Multiple-covariate OR for characteristics of 19 hypothetical dialysis patients and referral for transplant adjusted for nephrologist characteristics (n = 216)

Patient characteristic	Nephrologist characteristic			
	Academic affiliation	P-value	>10 years from fellowship	P-value
Age <50	2.24 (1.50–3.33)	<0.005	2.08 (1.42–3.05)	<0.005
Smoking history/COPD	0.61 (0.40–0.92)	0.02	0.43 (0.29–0.62)	<0.005
Rural residence	0.39 (0.26–0.58)	<0.005	0.37 (0.25–0.54)	<0.005

Data are presented as OR (95% CI). The model includes variables significant at P ≤ 0.05 in multiple-covariate analysis (variables: co-morbidity, rural residence and age <50 years) adjusted for each of the nephrologist characteristics identified as significant (variables: academic affiliation and >10 years from fellowship).

history/COPD, rural residence, living alone and White race. In multivariate analysis, age <50 years was associated with higher likelihood of referral for KT (OR: 2.32; 95% CI: 1.67–3.21; P < 0.005). Rural location (OR: 0.35; 95% CI: 0.25–0.50; P < 0.005) and smoking history/COPD (OR: 0.49; 95% CI: 0.35–0.68; P < 0.005) were associated with lower likelihood of being referred for KT (Table 3). These factors remained significant when adjusted for significant nephrologist-related factors (academic affiliation and years from fellowship) (Table 4).

Referral for PKT

In univariate and multivariate analyses of nephrologist-related characteristics, academic affiliation was associated with higher likelihood of recommending PKT (Table 5). In univariate analysis of patient-related factors, living alone was associated with higher likelihood, while male sex and rural residence were associated with lower likelihood of being referred for PKT. The only characteristic that remained significant in multivariate analysis was rural residence, which was associated with lower likelihood

(OR: 0.39; 95% CI: 0.24–0.63; P = 0.0001) of being referred for PKT (Table 6). This remained significant when adjusted for nephrologists' academic affiliation (Table 7).

Discussion

In this scenario-based study, *academic affiliation* and *time from fellowship* are important nephrologist-related factors associated with likelihood of referring patients for transplant. *Age*, *medical co-morbidity* and *rural/urban residence* are important factors that affect whether or not patients would be referred for transplant. The nephrologist's *academic affiliation* and the patient's *rural/urban residence* are associated with likelihood of referral for pre-emptive transplant. We assume that these findings reflect the nephrologists' likelihood of being current on the knowledge about benefits of KT and PKT. This study also confirms previous findings that age [25], comorbidities [26] and rural residence [11] are significant considerations in being referred for kidney transplant.

Our study does not show any racial or sex difference in likelihood of being referred for transplant or preemptive transplant.

Table 5. Single- and multiple-covariate OR for nephrologist-related characteristics and recommendation of preemptive transplant for six hypothetical patients

Characteristic	Single-covariate model	P-value	Multiple-covariate model	P-value
Academic affiliation	1.77 (1.23–2.55)	0.002	1.88 (1.30–2.72)	0.0008
Age >50 years	1.46 (0.96–2.20)	0.08		
>10 years from fellowship	1.43 (0.99–2.06)	0.06		
Attended >2 national nephrology meetings in past 5 years	1.43 (0.97–2.10)	0.07		
Urban practice	0.99 (0.67–1.47)	0.97		
Male	0.72 (0.42–1.25)	0.24		

Data are presented as OR (95% CI). The multiple-covariate model includes academic affiliation as the only variables significant at P ≤ 0.05 in univariate analysis.

Table 6. Single- and multiple-covariate OR for characteristics of six hypothetical patients with stage 5 chronic kidney disease and referral for preemptive transplant

Characteristic	Univariate model	P-value	Multivariate model	P-value
Living alone	1.48 (1.02–2.14)	0.04	1.25 (0.80–1.96)	0.33
Male	0.55 (0.38–0.81)	0.002	0.69 (0.44–1.08)	0.11
Rural residence	0.32 (0.21–0.48)	<0.005	0.39 (0.24–0.63)	0.0001
White	0.92 (0.64–1.32)	0.64		

Data are presented as OR (95% CI). The multiple-covariate model includes only variables significant at P ≤ 0.05 in single-covariate analysis (variables: living alone, male sex and rural residence).

Table 7. Multiple-covariate OR for characteristics of six hypothetical patients with stage 5 chronic kidney disease and referral for preemptive transplant adjusted for nephrologist characteristics

Patient characteristic	Academic affiliation	P-value
Rural residence	0.23 (0.12–0.45)	<0.005

Data are presented as OR (95% CI). The model includes the only variables significant at P ≤ 0.05 in multiple-covariate analysis (rural residence) adjusted for each of the nephrologist characteristics identified as significant (variables: academic affiliation and White race).

Previous studies have shown that ethnic minorities and women are less likely to be referred for KT or to be placed on the waiting list [12, 27–33]. Physicians are less likely to perceive that KT improves survival in African-American versus White patients, although acknowledging that KT improves quality of life in both groups of patients [17]. Women with ESRD are less likely to have had discussions about KT compared with men [25]. Previous studies have identified age and racial disparities in likelihood of being referred for PKT [10, 34–36]. The main limitations in our study include the response bias inherent to survey studies, and possible hypothesis guessing and social desirability bias. The latter is particularly likely in regard to the case scenarios' race and sex. However, these biases are less likely to impact the analyses relating to the nephrologists' demographic factors and the patients' age, comorbidities and rural residence. The completion rate by urban nephrologists was 80.9%, while all of the rural nephrologists completed the survey. The reason for this discrepancy, which is a potential source of error, is not clear. Another limitation of the study is that only smoking history/COPD were included as comorbidities; some of the major clinically relevant comorbidities such as diabetes, ischemic heart disease and peripheral vascular disease were not included in the hypothetical scenarios.

We conclude that the substantial variability in referral for transplant and preemptive transplant among facilities might be partially related to non-medical factors, including patients' geographic location, nephrologists' practice setting and the amount of time since completion of training. Future interventions that address disparities in transplant should include educational activities particularly targeting nephrologists in non-academic settings who are >10 years from their training. These activities should emphasize benefits of KT and PKT for all population groups regardless of geographic location and age.

Acknowledgements

Conflict of interest statement

None declared.

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