

## Factors Considered by Nephrologists in Excluding Patients from Kidney Transplant Referral

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### ABSTRACT

**Background:** Provider perceptions about patient candidacy for kidney transplant (KT) are potentially significant contributors to disparities in KT.

**Objective:** To examine nephrologists' perceptions about factors that are important in excluding patients from KT referral, and to analyze the association between these perceptions and nephrologists' demographic and practice characteristics.

**Methods:** Invitations were sent to 3180 nephrologists. Among those who consented, 822 fulfilled the inclusion criteria, and 250 were randomly invited to complete a questionnaire about perceptions of factors essential in deciding not to refer patients for KT.

**Results:** Responses from 216 participants with complete responses were analyzed. The 3 most common reasons for excluding patients were "patient's inadequate social support" (44%), "limited understanding of the process due to patient's inadequate education" (32%), and "patient's age above 65" (26%). Nephrologists practicing in rural settings were more likely to consider inadequate support and limited education of patients as reasons not to refer for KT. In multivariate analysis, physicians with 2 or fewer transplant centers within 50 miles were more likely to report inadequate social support (OR: 3.15, 95% CI: 1.59–6.24) and age greater than 65 years (OR: 1.88, 95% CI: 1.01–3.49) as reasons to exclude patients from KT referral. Nephrologists whose practice included patients majority of whom had not completed high school were more likely to consider limited understanding due to inadequate education as an important reason to exclude patients from KT (OR: 3.31, 95% CI: 1.60–6.86).

**Conclusion:** Patient's social support, understanding, and age were the most common factors regarded by nephrologists as important in not referring patients for KT evaluation. Practice location, particularly rural setting, proximity to a transplant center, and the education level of a nephrologist's patient population were important determinants of referral for KT.

**KEYWORDS:** Health status disparities; Kidney; Nephrologist; Perceptions; Referral and consultation; Life support systems; Transplant; Rural population; Urban population

### INTRODUCTION

Kidney disease is a leading cause of premature mortality in the United States. End-stage renal disease (ESRD), defined as  $>3$  months of GFR  $<15$  mL/min, is increasing in both prevalence and incidence [1]. Kidney transplantation (KT) has emerged as the preferred intervention for this popula-

tion, exhibiting benefits in quality of life, survival, and cost compared with long-term dialysis, regardless of the dialytic modality [2, 3].

Despite the benefits of KT, less than 30% of prevalent dialysis patients [4] and less than 15% of incident dialysis patients are wait-listed [1]. Referral for a KT is a complex process that involves both patient and health-care associated factors. Early referral for a KT has established benefits, including time allocated to look for potential living donors and wait time acquisition for pre-emptive transplants [5], the latter of which provides additional advantages over transplantation after maintenance

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**Table 1:** Demographic characteristics of respondents. Values are either mean±SD or n (%).

Characteristic	Total (n=216)	Urban (n=153, 29%)	Rural (n=63, 71%)	p value for urban/rural difference
Age	45.7±9.8	45.3±9.6	46.8±10.2	0.31
Age <50 yrs	139 (64)	96 (63)	43 (68)	0.44
White	123 (57)	88 (58)	35 (56)	0.79
Male	182 (84)	125 (82)	57 (90)	0.10
Years from medical school ≤15	107 (50)	81 (53)	26 (41)	0.11
Years from fellowship ≤10	116 (54)	88 (58)	28 (44)	0.07
Academic affiliation	125 (58)	105 (69)	20 (32)	<0.001
Transplant nephrologist	27 (13)	23 (15)	4 (6)	0.07
Medical director of dialysis	109 (50)	71 (46)	38 (60)	0.06

dialysis [6].

Known disparities in access to a KT include minority status (African Americans and Hispanics), female sex, low socioeconomic status, older age, and dialysis centers that are for-profit or located in the southeastern United States [7-9]. Factors associated with higher referral rates include a greater number of facility staff, previous use of peritoneal dialysis, and a larger number of transplant centers per 10,000 ESRD patients [4, 8]. Each of these factors has an independent effect on KT access, but are also influenced and even augmented by concomitant demographic factors [10, 11].

The nephrologist is integral in facilitating the majority of referrals for KT. Considerable heterogeneity exists in nephrologists' attitudes and decisions to refer for KT based on both physician demographics and patient characteristics [12, 13]. Identified nephrologist-related factors in the KT referral process include academic affiliation as a positive influence and

longer time from fellowship as a negative influence [14].

Nephrologist perceptions about the candidacy of certain patients for KT may be an important contributor to disparities identified in KT. In this study, we examined nephrologists' perceptions about factors they consider important in excluding patients from KT referral and analyzed the association between these perceptions and nephrologists' demographic and practice characteristics.

## MATERIALS AND METHODS

Participant recruitment has been described elsewhere [14]. The Institutional Review Board of Penn State College of Medicine approved the research protocol and the survey instrument. We used the AMA Masterfile to identify and invite 3180 nephrologists practicing in the eastern United States to participate in the survey study. Among those who provided consent, 822 were following at least 20

**Table 1a:** Frequency (%) of practice characteristics of respondents

Characteristic	Total (n=216)	Urban (n=153, 29%)	Rural (n=63, 71%)	p value for urban/rural difference
>50 patients in practice	163 (75)	110 (72)	53 (84)	0.06
>5 nephrologists in practice	120 (56)	96 (63)	24 (38)	<0.001
≤2 transplant centers within 50 miles	148 (68)	93 (61)	55 (87)	<0.001
Distance to nearest transplant center <50 miles	155 (72)	136 (89)	19 (30)	<0.001
>50% of patients have completed high school	147 (68)	109 (71)	38 (60)	0.11

**Table 1b:** Frequency (%) of training and continuing medical education characteristics of respondents

Characteristic	Total (n=216)	Urban (n=153, 29%)	Rural (n=63, 71%)	p value for urban/ rural difference
US/Canadian graduate	147 (68)	103 (67)	44 (70)	0.72
Transplant center at fellowship institution	191 (88)	133 (87)	58 (92)	0.28
≤5 months of transplant training in fellowship	152 (70)	111 (73)	41 (65)	0.27
Attended <3 national nephrology meetings in the past 5 years	130 (60)	83 (54)	47 (75)	0.005
≥1 transplant-related CME activity/year	129 (60)	99 (65)	30 (48)	0.01
Type of transplant-related CME activity during the past 5 years				
Podcast-webcast	84 (39)	56 (37)	28 (44)	0.28
Local	87 (40)	69 (45)	18 (29)	0.02
Regional/State	45 (21)	32 (21)	13 (21)	0.96
National	137 (63)	104 (68)	33 (52)	0.03

patients with ESRD. The sample size was determined by the assumption of the likelihood of referral by urban and rural nephrologists for transplant to be 75% and 50%, respectively. To achieve a type I error of 0.05 and a study power of 0.8, and to ensure adequate representation of nephrologists practicing in rural areas, we selected 63 nephrologists from rural regions and 189 from urban regions to participate in the study. Participants had the option of completing the survey on paper or using an e-mail link. The questionnaire consisted of investigator-designed questions generated by a review of literature and focus group discussions [15]. The initial questionnaire was revised for clarity following a pilot study on 30 nephrologists and nephrology trainees. The final survey instrument consisted of 102 items comprising of multiple choice and Likert-style items probing perceptions about various aspects of transplant. Ten items specifically explored reasons the nephrologist would take into consideration while referring patients for transplant.

### Statistical Analysis

The dependent variable was considering a factor “important” or “very important” in the decision not to refer patients for transplant. The independent variables in the multivariate analyses included age, race/ethnicity, sex,

years since completing training, academic affiliation, position as transplant nephrologist, position as medical director of dialysis, urban/rural location, number of patients in practice, number of nephrologists within the practice, number of transplant centers within 50 miles, distance to the nearest transplant center, presence of transplant center at fellowship, months of transplant training during fellowship, and participation at nephrology and transplant-related continuing medical education (CME) programs.

Patients’ characteristics included race/ethnicity, their education level, and employment status.  $\chi^2$  test and stepwise regression analysis were conducted to perform univariate and multivariate analyses, respectively. All analyses were conducted using SAS *ver* 9.2 (SAS Institute Inc., Cary, NC, USA). A p value <0.05 was considered statistically significant.

### RESULTS

Responses from 216 participants who submitted complete responses were analyzed. Table 1 presents the demographic characteristics of the participants. Tables 1a and 1b present the practice characteristics, and training and CME characteristics of respondents, re-

**Table 2:** Frequency of patient-related factors considered “important” or “very important” by nephrologists for not referring patients for transplant

Factor	Total (n=216)	Urban practice (n=153, 29%)	Rural practice (n=63, 71%)	OR (95% CI) Rural vs Urban
Inadequate support	94 (44%)	58 (38%)	36 (57%)	2.18 (1.20–3.96)
Limited education	69 (32%)	41 (27%)	28 (45%)	2.19 (1.18–4.03)
Older than 65	55 (26%)	36 (24%)	19 (30%)	1.40 (0.72–2.70)

spectively. The most commonly cited patient-related reason considered in transplant referral was inadequate social support, followed by patients’ limited education, and age above 65 (Table 2). Nephrologists practicing in rural settings were more likely to consider inadequate support and limited education of patients as reasons not to refer patients for KT.

Practice-related reasons considered by nephrologists in transplant referral included the extent of the pre-transplant workup, complexities of caring for the post-transplant patient, scarcity of transplant centers in the area, financial disincentive to provide care to transplanted patients, limited clinical and administrative support, and concern that the transplant center may take over their patients’ care (Table 3). Nephrologists practicing in rural settings were more likely to consider complexities of caring for the post-transplant patient and scarcity of transplant centers in the area in the decision not to refer patients for KT.

In multivariate analysis, physicians with two or fewer transplant centers within a 50-mile

radius were more likely to consider inadequate social support and age greater than 65 years as reasons not to refer patients for KT. Nephrologists caring for a predominantly undereducated patient panel were more likely to report limited understanding due to patient’s education as an important reason not to refer patients for KT (Table 4).

## DISCUSSION

In this study, we used a survey to evaluate perceptions of nephrologists about the importance of various factors considered in the decision to exclude patients from evaluation for KT. The three most common factors taken into consideration were patients’ inadequate social support, limited patient understanding of the KT process due to an inadequate level of education, and patient age >65. Other factors included the extent of the pre-transplant workup, complexities of caring for the post-transplant patient, and the scarcity of transplant centers in the area. Compared with urban nephrologists, nephrologists practicing in rural settings were more likely to consider

**Table 3:** Frequency of practice-related factors considered “important” or “very important” by nephrologists for not referring patients for transplant

Factor	Total (n=216)	Urban practice (n=153, 29%)	Rural practice (n=63, 71%)	OR (95% CI) Rural vs Urban
Extent of pre-transplant work-up	31 (14)	20 (13)	11 (17)	1.41 (0.63–3.13)
Complexities of care for transplanted patients	24 (11)	11 (7)	13 (21)	3.36 (1.41–7.97)
Scarcity of transplant centers in area	21 (10)	8 (5)	13 (21)	4.71 (1.84–12.03)
Financial disincentive to provide care to transplanted patients	19 (9)	12 (8)	7 (11)	1.47 (0.55–3.92)
Limited clinical and administrative support	18 (8)	12 (8)	6 (10)	1.24 (0.44–3.45)
Concern that transplant center may take over patients’ care	16 (7)	12 (8)	4 (6)	0.80 (0.24–2.57)

**Table 4:** Multivariate analysis of factors considered “important” or “very important” by nephrologists for not referring patients for transplant vs practice-related and patient-related characteristics

Characteristics	Factors (OR, 95% CI)
≤2 Transplant centers within 50 miles	“Inadequate social support” (3.15, 1.59–6.24) “Age > 65” (1.88, 1.01–3.49)
Majority of patients have not completed high school	“Education limits understanding” (3.31, 1.60–6.86)

some of these factors as important in the KT referral decision. The perceived importance of individual factors was also influenced by the availability and distance from a transplant center and education level of the patient.

Our results indicated that “patient’s inadequate social support” was the most frequently selected reason a patient may not be referred for KT, consistent with previous surveys [16]. While considered a strong factor in the decision for KT referral, there is no uniform definition for “social support.” Social support analysis is a highly subjective assessment with no predictive value in post-transplant adherence and outcomes [17-20]. Furthermore, inadequate social support was more commonly cited by nephrologists practicing in rural settings and areas with fewer transplant centers, posing a concern for geographic location and socioeconomic status impacting eligibility for KT referral [21]. Rural health disparities exist due to multiple factors, including scarce services, poor technologic support and lack of adequately trained physicians [22-24]. Inequalities in KT access and outcomes in rural communities include lower completion rates of the pre-transplant evaluation and a higher chance of dying on the wait list [25-27]. Rural nephrologists have a clear disadvantage in terms of geographic distance from transplant centers, practice in smaller groups of physicians and have less access to CME, all of which may potentially pose barriers for timely referral for KT. Physician access to CME opportunities has a strong correlation with improvement in physician competency [28, 29]. Technologic advances, including telemedicine (Telehealth), have already shown promise in improving KT wait list evaluation, though studies targeting an effect on rural communities are still needed [30].

Our findings suggested that undereducated patients were at a disadvantage in the consideration for transplant referral. The “education disadvantage” in transplant is multifaceted. For instance, limited patient education may prevent consent by the patient for expanded criteria donor kidneys despite the patient benefiting from transplant [31]. Other aspects of the education disadvantage include low-quality resources used at for-profit dialysis centers compared with nonprofit, a lack of nephrologist involvement in transplant education, and delayed timing in the education process [7, 32, 33]. Patients frequently withdraw from pre-KT work-up due to fear of the transplant, preconceived beliefs that they will fail the work-up for transplant, and financial reasons, all of which could be potentially alleviated with proper education [34]. Considering that rural communities have limited options in terms of transplant centers, dialysis units, and nephrologists, these factors may disproportionately affect rural communities. Frequent, intensive and tailored educational programs are needed to improve wait-listing for KT, regardless of geographic location [35].

Patient’s age >65 was also identified as a reason nephrologists’ might exclude patient’s for a KT referral. While once common practice to exclude based on age, evidence does not support such routine practice [36-40]. Although in some parts of the world, age-based criteria have been replaced with life expectancy cut-offs, mortality estimates are difficult to predict without well-validated objective assessments [18, 41, 42].

As in most survey studies, a limitation of this study was responder bias. The study sampled nephrologists in the eastern United States, which limited the generalizability of the results. We did not measure demographics of ne-

phrologist's patient panel, and as such did not address the impact of minority status and sex on the nephrologists' perceptions of patient suitability for transplant referral.

In conclusion, there were considerable differences in perceptions of nephrologists about the suitability of patients for KT referral. Practice factors and rural-urban location influenced some of these differences. Rural nephrologists were likely to have more restrictive criteria, some with little supportive evidence when deciding on whether to refer a patient for KT. Our study underscored the need to improve the availability of transplant-related CME activities targeting nephrologists practicing in rural areas and exploring the potentials of telemedicine to bridge the rural-urban gap in perceptions of transplant candidacy. To optimize referral and selection of patients for KT, additional research is needed to verify or disprove the validity of relative contraindications that currently lack evidence-based impacts on kidney transplant outcomes. This includes the need to define social support, to improve tools for assessment of social support and to study the impact of social support on transplant outcomes. Further studies are also needed to assess the impact of the use of age-based criteria vs life expectancy cut-off.

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