

Factors affecting willingness to receive a kidney transplant among hemodialysis patients in West China

A cross-sectional survey

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Abstract

Many factors are associated with the willingness of ESRD patients to receive a kidney transplant. No data are available for patients in China. The study aim was to describe the attitudes toward transplantation in a cohort of patients at a single dialysis center in China.

A study questionnaire derived from previously published literature was completed by 239 hemodialysis outpatients. Factors associated with willingness to receive a transplant were identified by univariate and multivariate logistic regression analyses.

The respondents were primarily men 50.7 ± 15.1 years of age; 46.4% were willing to receive a transplant. Younger age (OR = 0.928, 95% CI: 0.898–0.959), good self-reported health (OR = 0.203, 95% CI: 0.081–0.51), and awareness of the benefits of transplantation (OR = 0.195, 95% CI: 0.083–0.456) were less likely to deny the transplant. Patients ≤ 60 years of age were about 13 times more likely to favor transplantation than those > 60 years of age (OR = 12.99, 95% CI: 3.75–45.45). For every 10 years under 60, participants were 2.16 times more willing to receive a kidney transplant (OR = 2.16, 95% CI: 1.53–3.02). Older patients were also less likely to be referred for evaluation (OR = 0.955, 95% CI: 0.923–0.989, *P* = .009).

The percentage of ESRD patients in China, particularly older patients, who are willing to accept a transplant, is relatively low. A better understanding of the benefits of transplantation is needed to increase their acceptance.

Abbreviations: 95% CI = 95% confidence interval, ESRD = end-stage renal disease, KT = kidney transplantation, OR = odds ratio.

Keywords: hemodialysis, kidney transplant, perception, willingness

1. Introduction

Kidney transplantation (KT) is the treatment of choice for patients with end-stage renal disease (ESRD) because it increases the quality of life and life expectancy compared with dialysis.^[1–3]

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QT and TS contributed equally to this study.

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KT also confers benefits to society because it incurs less health care expenditure compared with dialysis.^[4] However, KT may not be suitable for every candidate,^[5] and progressing from the ESRD diagnosis through dialysis to referral to evaluation, wait-listing, and transplantation requires the efforts of both physicians and patients. This complex process may discourage some patients from initiating it.^[6,7] The initial step in the whole referral process is patient's interest, which largely influences subsequent decisions made by patients and their providers regarding the choice of renal replacement therapy. The factors that influence access to KT include age, sex, ethnicity, comorbidities, and insurance status.^[8–12] Little is known of what influences patient choice or acceptance of transplantation. The limited information that is available suggests that individual patient preferences, perceptions, social, and demographic characteristics influence attitudes toward KT and treatment decisions.^[13,14]

Time on dialysis is recognized as an important prognostic factor that adversely influences the survival of grafts and patients after transplantation.^[15] Time spent waiting on national transplant lists has long been an important influence on allocation of deceased donor kidneys in Western countries. Waiting time is now plays a role in China,^[16,17] where in addition to other factors, obtaining authorization of the health authorities extends the dialysis time of those waiting to receive a donor kidney. Additionally, there are no data on the willingness of ESRD patients in China to accept KT. A better understanding of the variables that influence patient willingness in China to receive a donated kidney is very important. Identifying and addressing

modifiable variables that promote patient acceptance and willingness to be transplanted would help to initiate the evaluation process sooner and shorten the time on dialysis.

2. Methods

2.1. Population and study design

This cross-sectional survey enrolled patients routinely receiving hemodialysis at West China Hospital, Sichuan University between December 2014 and January 2015. Patients who had received a kidney prior to the study or were unable to complete the questionnaire because of debilitating illness or other reasons were excluded. Participation was completely voluntary and anonymous and verbal consent was obtained. The hospital Institutional Review Board approved the study.

2.2. Data collection and measurement

2.2.1. Study questionnaire. We developed the study questionnaire from survey items used in previous studies conducted in chronic kidney disease and hemodialysis patients.^[1,2] The questions were modified to suit our population and supplemented with additional items judged useful for identifying factors that influence patient decisions regarding KT. The final questionnaire included domains on demographics, social status, self-perceived health status, and attitudes toward kidney transplantation and referral for KT evaluation. Participants were asked to complete the questionnaire in the waiting room before receiving dialysis. Nephrologists and fellows in the dialysis department were trained in administering the questionnaire and in helping participants answer the questions.

2.2.2. Demographic and social characteristics. Participant age, sex, highest education level, marital status, health insurance, and employment status were recorded. Education was described as postsecondary, high school, grade school, or less. Marital status was described as married, divorced, single never married, widowed. Employment status was described as employed or unemployed. The Chinese government provides 2 kinds of health care, one for rural areas and another is for urban populations. Participants covered by either were noted as having health care insurance.

2.2.3. Self-reported health status and perception of kidney transplantation. Self-reported health status was assessed by the question “do you think you are too weak to receive KT” (yes or no). Perception of KT was evaluated by 2 questions: “Have you ever heard of KT” and “Do you think KT would improve quality of life and life expectancy” (yes or no). Household income might affect willingness to accept KT. However, as that is difficult to assess directly, we asked whether participants agreed with the statement that “KT is too expensive. I cannot afford it” (yes or no).

2.2.4. Outcomes. The primary outcome was willingness to pursue KT. It was assessed by asking “Would you be willing to accept a transplant if you had the chance?” (yes or no). In addition to assessing willingness to accept KT, another question, “Have you ever being referred to a transplant surgeon for a pretransplant evaluation?” (yes or no) was asked to assess referral history.

2.2.5. Statistical analysis. Descriptive analysis included calculation of means and standard deviation for continuous

variables; numbers and percentages were used to report categorical variables. Chi-square and Fisher’s exact tests were used to compare categorical variables, that is, demographic, health, and perception variables (yes vs no). Student’s *t*-test was used to compare continuous variables. Univariate and multivariate logistic regression was used to identify factors associated with willingness to undergo transplantation and referral for transplant evaluation, and were reported as odds ratios (OR) and 95% confidence intervals (CIs). The confounding variables included in the regression models were demographic data, comorbidities, self-reported health status, and perception of KT. Statistical analysis was performed using SPSS 18.0 (SPSS Inc.); the statistical significance threshold was a 2-tailed *P*-value <.05.

3. Results

3.1. Participant characteristics

The participant characteristics are shown in Table 1. The 239 hemodialysis patients who participated were predominantly male, 50.7 ± 15.1 years of age (range 18–86 years) and had a body mass index (BMI) of 22.3 ± 9.3 kg/m². A total of 86.7% had completed high school or college, 82.8% were married, 28.9% were employed, and 98.3% were covered by the national health care system. All participants had heard of KT, 46.4% were willing to undergo KT, and 18.8% had been referred for evaluation. Those willing to receive a transplant were significantly younger, had more education, a higher employment rate, and fewer had comorbidities, including diabetes, heart failure, arteriosclerosis, and cardiovascular disease, but not HBV/HCV infection, compared with those not willing to accept transplantation.

3.2. Perception of health status and KT

A significantly larger proportion of participants unwilling to undergo KT reported “I am too weak to receive a transplant” compared with those who were willing. Of those who do not want to be transplanted 32% reported that financial concerns strongly influenced their decision, which was almost twice as high as among those who wanted to be transplanted. Willingness to undergo KT was associated with the perception that it would improve quality of life and extend life expectancy compared with dialysis.

3.3. Factors that influenced willingness to undergo transplantation

The results of univariate and multivariate analyses are shown in Table 2. Univariate analysis revealed that older age, less education, unemployment, diabetes, heart failure, and arteriosclerosis were associated not being willing to receive a kidney transplant. Perception of health status, financial concerns, and awareness of the benefits of KT were associated with willingness to undergo transplantation. Adjusted multivariate analysis of social and demographic characteristics revealed that only age was independently associated with willingness to undergo KT. With each year of increase in age, the likelihood decreased by 9% (OR = 0.91, 95% CI: 0.883–0.939, *P* < .001). When participant perceptions were included in the multivariate analysis, older patients were less likely to receive a transplant, and with each year of increase, the likelihood decreased by 7% (OR = 0.928, 95% CI: 0.898–0.959, *P* < .001). Compared with

Table 1
Demographic characteristics of included patients.

	Continue dialysis	Willing to receive kidney transplantation	P
Age	57.9 ± 14.8	42.4 ± 10.6	<.001
Gender, M	75 (58.6%)	66 (59.5%)	.892
BMI, kg/m ²	22.1 ± 3.8	22.6 ± 13.0	.656
Marital status			
Married	108 (84.4%)	90 (81.1%)	.003
Single, never married	5 (3.9%)	14 (12.6%)	
Divorced	6 (4.7%)	7 (6.3%)	
Widowed	9 (7%)	0	
Household size	3.6 ± 1.3	3.5 ± 1.1	.736
Dialysis time, mo	3.3 ± 2.6	3.2 ± 2.8	.683
Education			
Postsecondary	26 (20.3%)	38 (34.2%)	.035
High school	81 (63.3%)	62 (55.9%)	
Grade school or less	21 (16.4%)	11 (9.9%)	
Medicare, yes	125 (97.7%)	110 (99.1%)	.386
Work			
Employed	24 (18.7%)	45 (40.5%)	.001
Unemployed	104 (81.3%)	66 (59.5%)	
Smoking, yes	26 (20.3%)	21 (18.9%)	.787
Alcohol use, yes	16 (12.5%)	10 (9%)	.387
Comorbidity			
Diabetes	35 (27.3%)	13 (11.7%)	.003
Hypertension	108 (84.4%)	93 (83.8%)	.901
Heart failure	25 (19.5%)	11 (9.9%)	.038
Arteriosclerosis	27 (21.1%)	12 (10.8%)	.032
Cardiovascular disease	37 (28.9%)	20 (18%)	.049
Peripheral vascular disease	13 (10.2%)	5 (4.5%)	.099
Asthma/COPD	17 (13.3%)	10 (9%)	.298
HCV/HBV	11 (8.6%)	19 (17.1%)	.047
Cancer history	2 (1.6%)	1 (0.9%)	.647
Patient perception			
I'm too weak to receive kidney transplantation	74 (57.8%)	12 (10.8%)	<.001
Kidney transplantation is too expensive, I cannot afford it	41 (32%)	18 (16.2%)	.005
Kidney transplantation will not improve the quality of life and life expectancy	69 (53.9%)	16 (14.4%)	<.001
Referral to evaluation	8 (6.3%)	37 (33.3%)	<.001

BMI=body mass index, COPD=chronic obstructive pulmonary disease, HBV=hepatitis B virus, HCV=hepatitis C virus.

those reporting good health status, participants who said that they were too weak were less willing to accept KT (OR=0.203, 95% CI: 0.081–0.51, $P=.001$). Participants who did not know that a kidney transplant would improve quality of life and life expectancy compared with dialysis were about 5 times less likely to accept KT compared with participants who were aware of the benefits (OR=0.195, 95% CI: 0.083–0.456, $P<.001$).

When we evaluated the impact of age, we found that participants <60 years of age were about 13 times more likely to accept KT compared with those older than 60 years of age (OR=12.99, 95% CI: 3.75–45.45, $P<.001$). For every 10-year difference, participants were 2.16 times more likely to be willing to undergo a KT (OR=2.16, 95% CI: 1.53–3.02, $P<.001$). In those <60 years of age, less education (OR=0.446, 95% CI: 0.231–0.861, $P=.016$), reporting “I am too weak to receive a transplant” (OR=0.184, 95% CI: 0.061–0.553, $P=.003$) and “I do not know whether KT improves quality of life and life expectancy” (OR=0.146, 95% CI: 0.056–0.380, $P<.001$) were less likely to accept KT. However, we found no significant associations of social and demographic characteristics, patient perception, or willingness to undergo KT in participants >60 years of age.

3.4. Factors that influenced referral for evaluation

If a patient is willing to undergo KT, the next step is consulting a transplant physician for pretransplant evaluation. Univariate analysis showed that age, BMI, household size, less education, employment, self-reported health status, and perception of the benefits of KT were associated with referral for evaluation. Adjusted multivariate analysis of social and demographic characteristics revealed that older age (OR=0.955, 95% CI: 0.923–0.989, $P=.009$) and household size were negatively associated with referral for evaluation (OR=0.625, 95% CI: 0.402–0.971, $P=.037$). Analysis including participant perceptions found that older age (OR=0.955, 95% CI: 0.923–0.989, $P=.009$) and household size (OR=0.625, 95% CI: 0.402–0.971, $P=.037$) remained independently associated with not accepting referral for evaluation (Table 3). Patients <60 years of age were 5 times more likely to be receptive of referral (OR=0.199, 95% CI: 0.043–0.934, $P=.041$).

When participants unwilling to undergo KT were excluded, univariate analysis found that age, BMI, and marital status were associated with referral for evaluation. In the multivariate models, patients without a companion (single/widowed/divorced) were 6.368-fold (OR=6.368, 95% CI: 2.011–20.163, $P=.002$), those with longer dialysis duration were 0.767-fold

Table 2**Univariate and multivariate logistic regression model for the willingness of kidney transplantation of a dialysis patient.**

	Univariate analysis			Multivariate analysis (without patient perception)			Multivariate analysis (with patient perception)		
	OR	95%CI	P	OR	95%CI	P	OR	95%CI	P
Age	0.915	0.893–0.938	<.001*	0.91	0.883–0.939	<.001*	0.928	0.898–0.959	<.001*
Gender, M	0.965	0.575–1.618	.892	0.972	0.467–2.022	.94	1.287	0.588–2.817	.528
BMI, kg/m ²	1.006	0.978–1.036	.662	1.021	0.974–1.071	.385	1.072	0.98–1.076	.27
Marital status, Ref:married	0.842	0.591–1.200	.342	0.656	0.379–1.136	.133	0.678	0.388–1.186	.173
Household size	0.965	0.786–1.186	.735	1.017	0.776–1.332	.905	1.069	0.795–1.439	.657
Dialysis time, mo	0.98	0.891–1.078	.682	1.066	0.942–1.205	.312	1.056	0.928–1.202	.409
Education, Ref:Postsecondary	0.58	0.379–0.887	.012*	0.748	0.417–1.342	.331	0.803	0.433–1.488	.485
Medicare, yes	0.379	0.039–3.695	.404	0.2	0.012–3.277	.26	0.240	0.014–4.173	.327
Work	0.338	0.189–0.607	<.001*	0.747	0.44–1.27	.281	0.786	0.450–1.373	.398
Smoking, yes	0.915	0.482–1.738	.787	0.88	0.373–2.072	.769	0.836	0.336–2.084	.701
Alcohol use, yes	0.693	0.301–1.597	.389	0.744	0.236–2.347	.614	1.084	0.314–3.743	.899
Comorbidity									
Diabetes	0.352	0.176–0.708	.003*	1.069	0.422–2.712	.887	1.321	0.499–3.568	.583
Hypertension	0.957	0.478–1.956	.901	0.917	0.379–2.218	.847	1.052	0.420–2.636	.914
Heart failure	0.453	0.212–0.970	.041*	1.412	0.502–3.966	.513	1.469	0.487–4.430	.495
Arteriosclerosis	0.453	0.218–0.945	.035*	0.890	0.296–2.673	.835	0.881	0.261–2.973	.838
Cardiovascular disease	0.541	0.292–1.002	.051	0.923	0.387–2.202	.856	1.489	0.552–4.018	.432
Peripheral vascular disease	0.417	0.144–1.210	.108	0.959	0.224–4.095	.955	0.854	0.189–3.855	.837
Asthma/COPD	0.646	0.283–1.477	.301	1.933	0.616–6.07	.259	1.393	0.391–4.964	.609
HCV/HBV	2.197	0.996–4.846	.051	2.243	0.857–5.868	.100	1.875	0.684–5.143	.222
Cancer history	0.573	0.051–6.403	.651	1.298	0.063–26.729	.866	1.672	0.084–33.172	.736
Patient perception									
I am too weak to receive kidney transplantation	0.088	0.044–0.177	<.001*				0.203	0.081–0.51	.001*
Kidney transplantation is too expensive, I cannot afford it	0.411	0.219–0.769	.005*				0.685	0.281–1.669	.405
Kidney transplantation will not improve the quality of life and life expectancy	0.144	0.076–0.271	<.001*				0.195	0.083–0.456	<.001*

BMI=body mass index, CI=confidence interval, COPD=chronic obstructive pulmonary disease, HBV=hepatitis B virus, HCV=hepatitis C virus, OR=odds ratio.

* $P < .05$, statistical significance.

(OR=0.767, 95% CI: 0.596–0.987, $P=.039$), and those not drinking alcohol were 9.914-fold (OR=9.914, 95% CI 1.436–68.42, $P=.02$) more likely to visit a transplant physician for evaluation. Similar results were obtained when the multivariate model included participant perceptions (Table 4).

4. Discussion

Interest in KT is the first step in the transplantation process. We found that the key factor that influenced the willingness to receive a kidney transplant was increasing age. Negative perception of health outcomes and self-reported health status were also associated with unwillingness to consider transplantation. Older age was negatively associated with referral for evaluation. Increasing age is regarded as a negative predictor of the access to KT registers.^[18,19] In a cross-sectional study of 591 dialysis patients in Budapest, Hungary 325 (71%) of responders received a transplant. Increasing age was associated with decreasing odds of wanting a transplant, and the likelihood of being interested in transplantation was 87% at 18 to 44 years of age, 76% at 45 to 64 years, and 49% at >65 years of age. The likelihood of transplantation decreased by 6% (OR 0.94, 95% CI: 0.89–0.98) with each year of increase in age.^[13] Another ethnographic study of 79 newly diagnosed ESRD patients found that older patients were more likely to want to remain on dialysis than to seek transplantation.^[20] Schold et al^[21] found that the increased age was the primary factor associated with the likelihood of not receiving an evaluation, which had decreased by 81% in those

70 years of age or older. Our finding that those willing to undergo KT were significantly younger, and that older patients, particularly those older than 60 years of age, were less likely to accept KT are consistent with previous results. This can be explained by the higher unemployment rate of older participants (81.3% vs 59.5%), putting them in an inferior economic condition. The older participants also had more comorbidities, which would lead them to believe that they were too weak for the transplantation procedure, and ultimately to reject it. That is in line with a report by Salter et al that, in patients >60 years of age, comorbidities were associated with health-related concerns and worse self-reported health status. They also reported that patients with more health-related concerns were less likely to receive a transplanted organ.^[22] An analysis of United Network for Organ Sharing data found that patients ≥75 years of age with live donor or deceased donor transplants had 59.59%, 40.3%, 29.7%, and 12.5% better 5-year survival rates than dialysis patients waiting for transplant, and those remained on dialysis.^[23] Compared with younger patients (<65 years of age), older recipients had comparable rates of delayed graft failure and readmission in the first year, but fewer episodes of acute rejection.^[24] In a cohort study from Turkey, there was no difference in death censored graft survival in patients <65 and those ≥65 years of age. Patients in the older cohort had better 3-year survival (94.7% vs 88%).^[25] The demonstrated benefits of KT in older patients support additional efforts to expand pretransplant evaluation and to encourage older patients to initiate the transplantation process.

Table 3
Univariate and multivariate logistic regression model for the evaluation from referral.

	Univariate analysis			Multivariate analysis (without patient perception)			Multivariate analysis (with patient perception)		
	HR	95%CI	P	HR	95%CI	P	HR	95%CI	P
Age	0.938	0.913–0.964	<.001*	0.948	0.918–0.979	.001*	0.955	0.923–0.989	.009*
Gender, M	0.754	0.384–1.478	.41	0.81	0.344–1.908	.63	0.97	0.404–2.330	.945
BMI, kg/m ²	0.905	0.823–0.995	.039*	0.918	0.825–1.021	.114	0.913	0.821–1.061	.095
Marital status, Ref:married	1.429	0.978–2.087	.065	1.415	0.848–2.360	.183	1.505	0.899–2.520	.12
Household size	0.697	0.51–0.952	.023*	0.614	0.398–0.946	.027*	0.625	0.402–0.971	.037*
Dialysis time, mo	0.905	0.788–1.038	.154	0.944	0.8–1.114	.494	0.931	0.788–1.101	.404
Education, Ref:Postsecondary	0.515	0.297–0.891	.018*	0.723	0.356–1.467	.368	0.738	0.360–1.512	.406
Medicare, yes	4.465	0.612–32.588	.14	5.64	0.581–54.736	.136	10.234	1.012–103.517	.049*
Work	0.563	0.363–0.874	.011*	0.772	0.429–1.387	.387	0.816	0.447–1.488	.507
Smoking, yes	0.859	0.371–1.993	.724	0.836	0.298–2.343	.733	0.753	0.263–2.151	.596
Alcohol use, yes	1.03	0.366–2.896	.956	1.737	0.468–6.445	.409	1.961	0.511–7.519	.326
Comorbidity									
Diabetes	0.333	0.113–0.980	.046	0.457	0.109–1.919	.285	0.528	0.123–2.268	.391
Hypertension	0.846	0.359–1.995	.702	0.952	0.343–2.642	.924	0.928	0.337–2.557	.885
Heart failure	0.494	0.165–1.476	.206	1.101	0.249–4.863	.899	1.121	0.256–4.906	.88
Arteriosclerosis	0.751	0.294–1.917	.549	2.258	0.582–8.760	.239	2.842	0.699–11.550	.144
Cardiovascular disease	0.531	0.223–1.264	.152	0.685	0.213–2.199	.525	0.883	0.267–2.923	.838
Peripheral vascular disease	0.852	0.236–3.079	.807	2.028	0.352–11.686	.429	1.567	0.264–9.297	.621
Asthma/COPD	0.314	0.072–1.379	.125	0.661	0.102–4.287	.664	0.536	0.081–3.542	.517
HCV/HBV	1.37	0.548–3.423	.501	1.397	0.459–4.246	.556	1.379	0.434–4.385	.586
Cancer history	–	–	–	–	–	–	–	–	–
Patient perception									
I am too weak to receive kidney transplantation	0.219	0.089–0.542	.001*				0.482	0.138–1.821	.253
Kidney transplantation is too expensive, I cannot afford it	0.409	0.163–1.022	.056				2.304	0.129–1.464	.179
Kidney transplantation will not improve the quality of life and life expectancy	0.329	0.145–0.723	.008*				1.036	0.418–2.227	.933

BMI=body mass index, CI=confidence interval, COPD=chronic obstructive pulmonary disease, HBV=hepatitis B virus, HCV=hepatitis C virus, HR=hazard ratio.

*P<.05, statistical significance.

In a cross-sectional survey of 213 minority population participants, those who believed that a kidney transplant would improve their quality of life were about 5 times more likely to be willing to undergo the procedure than those who did not think so or said they did not know (OR=5.40, 95% CI: 1.97–14.81).^[26] A cross-sectional study in Canada found that comorbidities such as heart disease, bone disease, infection, or hypertension, did not influence willingness to receive a transplant, but the perception that life expectancy is extended by transplantation did (OR=4.85, 95% CI: 1.88–12.53).^[27] Dudley et al^[18] found that patients with a previously failed transplant had a more positive attitude toward transplantation than those who had not received a transplant and were more likely to be listed on the transplant registry. Kasiske also found that patients with a previous kidney transplant were more likely to be listed for replantation before starting dialysis.^[5] One reasonable explanation is that they had experienced the quality of life benefit of KT. Our results are consistent with those findings and highlight potentially modifiable factors associated with willingness of patients in China to undergo KT. It is therefore necessary to consider methods to increase patient awareness of benefits of KT early in the progression of ESRD. Ilori et al^[26] demonstrated that attending a class on KT increased the willingness to accept a transplant by 7.15 times.

Medical coverage is an important factor in determining referral for evaluation. In a cross-sectional study of 3029 consecutive

adult ESRD patients in the USA, Schold et al^[21] found that patients with nationally provided Medicare insurance were less likely to proceed from referral for evaluation to transplantation. The relative likelihood compared with those covered by private insurance was 0.13 (95% CI: 0.09–0.17). When in progress to the listing step, there was a significant difference between private and Medicare insurance coverage in both the odds for preemptive listing (6.83, 95% CI: 6.41–7.27) and the mean difference in duration of dialysis before placement on the waiting list (527 fewer days for those with private insurance; 95% CI: 511–544) in patients <65 years of age.^[28] In this study, we found that patients with Medicare were more likely to be evaluated. Because most medical expenses of those with nationally provided Medicare are paid by the government, which is different from Western countries, we did not include commercial insurance in the analysis. As we did not collect data on listing, we could not evaluate the impact of Medicare status on listing.

The study limitations include the relatively small sample of participants served by a single tertiary-care referral center. Further, multicenter studies that include patients at primary care centers would be helpful. That would also allow consideration of heterogeneous racial and ethnic data encompassing Tibetan and other minorities who may not have health-related outcomes as those in the study population. Also, our hospital is also a transplantation center, making it easier to inform patients about KT, and that may have biased the participants' perceptions of KT.

Table 4**Univariate and multivariate logistic regression model for the transfer to pretransplant evaluation of a dialysis patient willing to receive kidney transplantation.**

	Univariate analysis			Multivariate analysis (without patient perception)			Multivariate analysis (with patient perception)		
	HR	95%CI	P	HR	95%CI	P	HR	95%CI	P
Age	0.943	0.904–0.983	.006*	0.979	0.922–1.040	.493	0.988	0.927–1.052	.142
Gender, M	0.844	0.376–1.896	.682	1.84	0.514–6.588	.349	2.931	0.697–12.323	.703
BMI, kg/m ²	0.838	0.726–0.967	.015*	0.896	0.730–1.099	.291	0.891	0.724–1.098	.279
Marital status	4.043	1.785–9.158	.001*	6.368	2.011–20.163	.002*	7.096	2.169–23.212	.001*
Household size	0.704	0.468–1.059	.092	0.671	0.371–1.212	.186	0.698	0.383–1.472	.24
Dialysis time, mo	0.878	0.747–1.032	.114	0.767	0.596–0.987	.039*	0.764	0.591–0.988	.04*
Education	0.648	0.336–1.250	.195	1.143	0.408–3.203	.8	1.16	0.402–3.344	.784
Medicare	–	–	–	–	–	–	–	–	–
Work	0.733	0.436–1.235	.243	0.679	0.299–1.546	.357	0.652	0.265–1.604	.352
Smoking	1	0.365–2.739	1	1.265	0.302–5.304	.748	1.287	0.288–5.751	.741
Alcohol use	2.156	0.583–7.98	.25	9.914	1.436–68.420	.02*	16.732	1.934–144.786	.011*
Comorbidity									
Diabetes	0.565	0.146–2.191	.409	0.981	0.111–8.679	.986	1.795	0.168–19.182	.628
Hypertension	1	0.343–2.917	1	1.432	0.298–6.881	.654	1.683	0.322–8.536	.53
Heart failure	1.16	0.317–4.245	.822	2.326	0.280–19.319	.434	2.166	0.272–17.241	.465
Arteriosclerosis	1	0.281–3.564	1	1.655	0.158–17.311	.674	1.608	0.156–16.523	.689
Cardiovascular disease	0.829	0.29–2.37	.727	0.51	0.098–2.670	.426	0.618	0.116–3.303	.574
Peripheral vascular disease	3.176	0.507–19.903	.217	2.438	0.081–73.721	.608	2.448	0.085–70.331	.601
Asthma/COPD	0.471	0.095–2.341	.358	0.347	0.022–5.344	.448	0.14	0.007–2.747	.195
HCV/HBV	0.67	0.221–2.027	.478	0.546	0.117–2.541	.441	0.506	0.095–2.690	.425
Cancer history	–	–	–	–	–	–	–	–	–
Patient perception									
I'm too weak to receive kidney transplantation	1.569	0.398–6.181	.519				3.518	0.363–34.082	.278
Kidney transplantation is too expensive, I cannot afford it	1.925	0.586–6.325	.281				2.427	0.428–13.761	.317
Kidney transplantation will not improve the quality of life and life expectancy	1.28	0.546–2.999	.569				1.619	0.467–5.615	.448

BMI = body mass index, CI = confidence interval, COPD = chronic obstructive pulmonary disease, HBV = hepatitis B virus, HCV = hepatitis C virus, HR = hazard ratio.

* $P < .05$, statistical significance.

Future studies should enroll patients treated at dialysis-only centers; stratification would also increase the reliability of data. Finally, 98.3% of the patients included in our analysis were covered by national medical insurance. The number of uninsured patients was not large enough to determine whether that influenced willingness to accept referral for evaluation and undergo KT.

5. Conclusion

The survey demonstrated that older age, individual perception of KT, and self-reported health status significantly influenced willingness to undergo a kidney transplant. It is essential that the benefits of KT be communicated to individuals with ESRD before starting dialysis, especially to older age groups. The goal is to empower their shared decision-making in choice of ESRD treatment modalities.

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