



FULL LENGTH ARTICLE

Factors Affecting Access to the Kidney Transplant Waiting List in Eastern Hungary

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ABSTRACT

Kidney transplantation is the best available treatment choice for patients suffering from end-stage renal disease; however, not all patients with end-stage renal disease have equal access to it. The aim of the study was to measure the factors that may influence access to the kidney transplant waiting list in eastern Hungary. A total of 254 patients with renal failure between 18 and 75 years old from 8 dialysis centers participated in the study. The factors associated with access to the waiting list were identified by univariate descriptive analysis and multivariate logistic regression analysis where the outcome variable was placement on the kidney transplant waiting list. Our findings demonstrate that patients registered on the waiting list were younger (odds ratio [OR] = 0.96; 95% confidence interval [CI], 0.94-0.98), were male (OR = 0.54; 95% CI, 0.30-0.98), were economically active (OR = 0.53; 95% CI, 0.29-0.98), and had greater knowledge in the field (OR = 1.17; 95% CI, 1.03-1.33). Disparity in access to the kidney transplant waiting list in Hungary does exist.

KIDNEY transplantation is the most beneficial renal replacement therapy option because it provides a longer life expectancy, better quality of life, and lower health costs compared with long-term dialysis treatment [1,2]. In Hungary, Eurotransplant has been responsible for the allocation and distribution of donor organs for transplantation since 2013 [3]. The number of patients undergoing kidney transplantation has increased in the last few decades in Hungary [4]. According to the latest Eurotransplant annual report, Hungary reported 236 (living and deceased donors) kidney transplants and 863 active patients on the kidney transplant waiting list in 2019 [5]. However, considering the number of patients on dialysis, a very small proportion is waitlisted for transplantation [6]. Thus the question: What are the modifiable and nonmodifiable factors that affect access to the transplant waiting list?

The pathway to transplantation consists of several steps. All patients should have equitable access to transplantation; nonetheless, there are factors that may affect registration on the waiting list. Inequity was found in America [7], Asia [8], Australia [9], and Europe [10]. Several studies have shown that

registration may be affected by nonmedical factors as age, sex, education, socioeconomic status, and ethnicity. Researchers found that older, female, minority, and lower socioeconomic status patients were less likely to be referred to the waiting list [11-13]. Furthermore, medical factors such as the presence of comorbid conditions play an important role. For example, patients with diabetes mellitus or cardiovascular disease had a lower probability of being waitlisted [14-17]. Studies have shown that disease-specific knowledge and health literacy can be important influencing factors as well [18-21].

It is necessary to determine the possible influencing factors in the Hungarian setting. The purpose of this study was to measure the medical and nonmedical factors that may affect access to the kidney transplant waiting list in the eastern part of Hungary. Identifying whether discrepancies exist may help us to design methods that may help to reduce inequity.

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PATIENTS AND METHODS

Study Population and Data Collection

A total of 254 patients participated in our follow-up study. The inclusion criteria were age (18-75 years) and transplant status (patient on the waiting list, patient referred for transplant evaluation, and patients who reject the procedure). A questionnaire was developed with questions related to sociodemographic, cultural, economic, and clinical background as well as a disease-specific knowledge test and health literacy survey. The knowledge test consisted of 15 items related to renal replacement therapies, and the Newest Vital Sign test was used to measure health literacy level [22,23].

Statistical Analysis

Statistical analyses were conducted using SPSS version 22.0 statistic software package. Statistical significance was accepted for P values $<.05$. Descriptive statistics were calculated for variables of interest and included medians with interquartile ranges for continuous variables and counts and percentages for categorical variables. Factors influencing access to the waiting list were evaluated by multivariate logistic regression analysis adjusted for 13 explanatory variables. In all cases, the outcome variable was the dichotomized placement on the renal transplant waiting list. The explanatory variables included sociodemographic (age, sex, education level, ethnicity), economic (place of living, economic status), clinical (time on dialysis, modality of dialysis, hypertension, diabetes), and education (health literacy and knowledge level) factors.

RESULTS

General Characteristics of the Study Population

A total of 254 patients from 8 different dialysis centers in eastern Hungary participated in the study. The mean age of participants was 48.75 years ($SD = 13.24$). Two-thirds of the study population were male (65%), and most had a high school equivalency diploma (67%). There were 212 (83%) non-Roma in the sample. One-third were living in rural areas (31%), and only 32% were economically active (employed and unemployed patients). The majority had received dialysis for less than 3 years (62%), and 83% were on hemodialysis. The primary renal diseases were hypertension (35%) and diabetes (20%). Overall, 63% had adequate health literacy and achieved 10.6 points ($SD = 2.76$) out of a maximum of 15 points on the knowledge test. Ninety-seven participants were on the kidney transplant waiting list (38%; Table 1).

Access to the Waiting List

Table 2 shows the results of the univariate descriptive analysis. Among the sociodemographic factors examined, age proved to be a significant influencing factor ($P = .007$). The median age of patients on the waiting list was lower (median = 47, interquartile range [IQR] = 16) compared with those who were not on it (median = 52, IQR = 19). Economic status also seemed to be an important factor ($P = .019$). Among patients who were not on the waiting list, the proportion economically inactive (74%) was much higher than the active proportion (26%). Among the primary renal diseases examined both hypertension ($P = .010$) and diabetes ($P = .023$) had a negative influence. Patients were more likely to be listed if they did not have these

Table 1. Characteristics of the Study Population

Characteristics		n (%) or Mean \pm SD
Sociodemographic		
Age	Year	48.75 \pm 13.24
Sex	Male	164 (65)
	Female	90 (35)
Education level	Less than high school	51 (20)
	High school	170 (67)
	More than high school	32 (13)
Ethnicity	Roma	42 (17)
	Non-Roma	212 (83)
Economic		
Place of residence	Urban	175 (69)
	Rural	79 (31)
Economic position	Active	80 (32)
	Inactive	171 (67)
Clinical		
Time spent on dialysis	<3 y	158 (62)
	≥ 3 y	96 (38)
Modality of dialysis	Hemodialysis	211 (83)
	Peritoneal dialysis	29 (11)
	Predialysis	14 (6)
Original renal diagnosis		
Hypertonia	No	165 (65)
	Yes	89 (35)
Diabetes	No	203 (80)
	Yes	51 (20)
Waiting list	No	157 (62)
	Yes	97 (38)
Education		
Health literacy	Adequate	159 (63)
	Inadequate	95 (38)
Knowledge	Knowledge score	10.6 \pm 2.76

comorbidities. Moreover, the results of our study suggest that the disease-specific knowledge score ($P < .001$) plays a key role. Patients who had higher scores (median = 12, IQR = 3) on the test were more likely to be registered on the list than those with lower scores (median = 11, IQR = 3).

Table 3 shows the results of the multivariate logistic regression analysis of patient characteristics influencing access to the waiting list. Older patients were less likely to be registered on the waiting list (odds ratio [OR] = 0.96; 95% confidence interval [CI], 0.94-0.98). Female patients had 46% lower odds of being listed compared with males (OR = 0.54; 95% CI, 0.30-0.98). Economically inactive patients had a 47% lower odds of being on the list (OR = 0.53; 95% CI, 0.29-0.98). Furthermore, patients with lower knowledge score were less likely to be registered on the waitlist (OR = 1.17; 95% CI, 1.03-1.33). The likelihood of placement on the waiting list was independent of the following variables: education level (high school: OR = 0.66; 95% CI, 0.29-1.52; more than high school: OR = 0.64; 95% CI, 0.20-2.03), ethnicity (OR = 1.88; 95% CI, 0.77-4.56), place of residence (OR = 1.31; 95% CI, 0.70-2.46), time spent on dialysis (OR = 0.56 95% CI, 0.08-3.74), modality of dialysis (peritoneal dialysis: OR = 0.85; 95% CI, 0.33-2.14; predialysis: OR = 0.74; 95% CI, 0.21-2.69), primary diseases such as hypertension (OR = 0.69; 95% CI, 0.36-1.29) and diabetes (OR = 0.62;

Table 2. Association Between Transplant Status and Other Variables Using Univariate Descriptive Analysis

		Transplant Waiting List		
Characteristics		Yes,n (%) or Median (IQR)	No,n (%) or Median (IQR)	Fisher's <i>P</i> Value
Sociodemographic				
Age	Year	47 (IQR = 16)	52 (IQR = 19)	.007
Sex	Male	67 (69)	97 (61)	.228
	Female	30 (31)	60 (39)	
Education level	Less than high school	18 (19)	33 (21)	.869
	High school	65 (68)	105 (67)	
	More than high school	13 (13)	19 (12)	
Ethnicity	Roma	13 (13)	29 (18)	.385
	Non-Roma	84 (87)	128 (82)	
Economic				
Place of residence	Urban	65 (68)	110 (70)	.889
	Rural	31 (32)	48 (30)	
Economic position	Active	40 (42)	40 (26)	.019
	Inactive	56 (58)	115 (74)	
Clinical				
Time spent on dialysis	<3 y	63 (66)	95 (60)	.425
	≥3 y	33 (34)	63 (40)	
Modality of dialysis	Hemodialysis	80 (83)	131 (84)	.932
	Peritoneal dialysis	12 (12)	17 (11)	
	Predialysis	5 (5)	9 (5)	
Hypertonia	No	73 (75)	92 (59)	.010
	Yes	24 (25)	65 (41)	
Diabetes	No	85 (88)	118 (75)	.023
	Yes	12 (12)	39 (15)	
Education				
Health literacy	Adequate	36 (37)	59 (37)	.999
	Inadequate	61 (63)	98 (63)	
Knowledge of field	Knowledge score	12 (IQR = 3)	11 (IQR = 3)	<.001

IQR, interquartile range.

Bold font indicates statistical significance.

95% CI, 0.28-1.38), and health literacy level (OR = 1.53; 95% CI, 0.82-2.86).

DISCUSSION

Inequity was found in access to the kidney transplant waiting list in Hungary and is influenced by a number of important factors. Firstly, age tends to be an important factor. Consistent with prior research findings, older age was associated with reduced likelihood of placement on the waiting list [11,13,14,17]. Our findings may be related to increased comorbidities with age, which may decrease acceptability. However, numerous studies have demonstrated that kidney transplantation offers longer survival and better quality of life even among elderly patients with end-stage renal failure who are carefully evaluated before the procedure [24-26]. This suggests the importance of encouraging older patients to begin the transplantation process. Surprisingly, women have greater disadvantages compared with men. However, the present results confirm previous studies on an inverse correlation between sex and access to the waiting list [11,27]. According to Melk et al [28], the potential underlying reasons are varied on a wide scale, including biological and sociocultural determinants. Explanations for sex

discrepancies include a high prevalence of pregnancy-related sensitization and that the presence of panel-reactive antibody or active autoimmune disease is more common in woman. It may also be that they have less encouragement or less social support. In addition, the incidence of end-stage renal disease requiring transplantation has been reported to be higher in males [28,29]. Thirdly, the likelihood of placement on the waiting list decreased among economically inactive (people who were neither employed nor unemployed) patients. There is a strong association between employment and physical and mental health and general well-being, which may increase self-confidence, self-esteem, and the motivation for a longer and better quality of life. Previous studies have reported that socioeconomic status is an important determinant [11,12,14,15]. Finally, well-informed patients had a higher likelihood of being waitlisted. Adequate disease-specific knowledge regarding renal replacement therapies is essential for active involvement in the decision-making process. Not surprising, well-tailored educational interventions play an important role in reducing disparities, as suggested by studies from different countries with similar outcomes [30,31]. Understanding the whole procedure better, including the benefits of transplantation [32], may be associated with increased acceptance of kidney

Table 3. Association Between Transplant Status and Other Variables Using Multivariate Logistic Regression Analysis

Characteristics		Multivariate Logistic Regression OR (95% CI)
Sociodemographic		
Age	Year	0.96 (0.94-0.98)
Sex	Male	1.00 (reference)
	Female	0.54 (0.30-0.98)
Education level	Less than high school	1.00 (reference)
	High school	0.66 (0.29-1.52)
	More than high school	0.64 (0.20-2.03)
Ethnicity	Roma	1.00 (reference)
	Non-Roma	1.88 (0.77-4.56)
Economic		
Place of residence	Urban	1.00 (reference)
	Rural	1.31 (0.70-2.46)
Economic position	Active	1.00 (reference)
	Inactive	0.53 (0.29-0.98)
Clinical		
Time spent on dialysis	<3 y	1.00 (reference)
	≥3 y	0.56 (0.08-3.74)
Modality of dialysis	Hemodialysis	1.00 (reference)
	Peritoneal dialysis	0.85 (0.33-2.14)
	Predialysis	0.74 (0.21-2.69)
Hypertonia	No	1.00 (reference)
	Yes	0.69 (0.36-1.29)
Diabetes	No	1.00 (reference)
	Yes	0.62 (0.28-1.38)
Education		
Health literacy	Adequate	1.00 (reference)
	Inadequate	1.53 (0.82-2.86)
Knowledge	Knowledge score	1.17 (1.03-1.33)

CI, confidence interval; OR, odds ratio.
 Bold font indicates statistical significance.

transplantation and may also be related to better compliance. In contrast with other reports, in the present study there was no association between access to transplantation and education level, ethnicity, place of residence, time spent on dialysis, modality of dialysis, primary diseases, and health literacy level. Nevertheless, the results of univariate descriptive analysis (Table 1) show that patients with hypertonia and diabetes as a cause of end-stage renal disease were at a disadvantage. However, this was not confirmed in the multivariate analysis.

In conclusion, our study indicates that age, sex, economic status, and knowledge are associated with access to the kidney transplant waiting list. It is essential to design and apply targeted interventions adjusted for these special groups taking into the consideration the results of psychological studies in the region as well [33] to increase the number of patients on the waiting list and thus the number of transplant patients in Hungary. These implementations could be done in cooperation with dialysis centers by involving previously transplanted patients. These inequities may exist elsewhere in Hungary because the kidney transplantation process is the same throughout the country, which suggests that further investigations are necessary.

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