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Determination of Reasons for the Exclusion of Kidney Transplant Candidates from the Organ Offer List

Böbrek Nakli Adaylarinin Organ Teklif Listesinden Dışlanma Nedenlerinin Belirlenmesi

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ABSTRACT

Objective: The study aims to determine why kidney transplantation candidates are excluded from the organ offer list.

Materials and Methods: The study was conducted as a retrospective screening of archived records. The data of 228 patients who met the study criteria were included. Evaluations were made concerning sociodemographic characteristics, blood group, dialysis type and time, panel reactive antibody results, duration of waiting for an organ, and the recipient's current status (on the active waiting list, transplanted, or deceased).

Results: Of the candidates on the organ transplantation waiting list, 14.9% could not be contacted at the telephone number in the records, and 6.1% could not attend the centre because of transport problems. A statistically significant difference was determined between the age range, the time since starting dialysis, and the candidate's current status according to the waiting duration.

Conclusions: Through collaboration with dialysis and transplantation centres and the Regional Health Authority, nurses can update the contact telephone numbers and resolve transplant candidates' transport problems, thereby allowing those receiving dialysis treatment to be added to the organ transplantation waiting list without losing time.

Keywords: Kidney transplantation, nursing care, organ waiting list

ÖZ

Amaç: Çalışmamız böbrek nakli adaylarının teklif listesinden dışlanma nedenlerini tespit etmek için planlanmıştır.

Materyal ve Metot: Çalışmamız retrospektif arşiv taraması şeklinde yapılmıştır. Örneklem kriterlerine uyan 228 adayın dosyası çalışmaya dahil edilmiştir. Adayların sosyo-demografik özellikleri, kan grubu, diyaliz türü ve zamanı, panel reaktif antikorlar (PRA) sonuçları, organ bekleme süresi, alıcının güncel durumu (aktif bekleme listesinde, nakil olan ve yaşamını kaybeden) bilgileri elde edilmiştir.

Bulgular: Organ teklif listesinden dışlanan adayların % 14,9'una sistemde kayıtlı olan telefon numarasından ulaşılamadığı, %6,1'inin ulaşım sorunları nedeni ile merkeze gelemediği saptanmıştır. Bekleme süresi ile yaş aralığı, diyalize girme süresi, adayın güncel durumu arasında istatistiksel olarak anlamlı farklılık saptanmıştır ($p<0,05$).

Sonuç: Hemşireler diyaliz, nakil merkezleri ve İl Sağlık Müdürlükleri ile iş birliği yaparak adayların iletişim numaralarını güncelleyebilir, ulaşım sorunlarına çözüm bulabilir, diyaliz tedavisi alan adayların vakit kaybetmeden bekleme listesine alınmasına olanak sağlayabilir.

Anahtar Kelimeler: Böbrek nakli, hemşirelik bakımı, organ bekleme listesi

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INTRODUCTION

Kidney transplantation is the best treatment option for patients with end-stage renal failure who have been accepted onto the waiting list. However, as there are insufficient organs available to meet the needs, there is an increasing number of candidates waiting for transplantation. In the USA, there are more than 109,000 candidates on the organ waiting list.[1] According to the 2022 statistical data, there are 26,757 candidates registered on the kidney transplantation waiting list in Türkiye.[2]

The organ waiting list in Türkiye is managed by the National Coordination Centre (NCC). For organ transplantation from a cadaver, candidates must be registered on the organ waiting list of a transplantation centre and wait until there is a suitable organ available. Organs are presented to the transplantation centres through the Regional Coordination Centres (RCC).[3] The details of each organ are sent electronically to the organ transplantation coordinator physician/nurse. Then, when the coordinator nurse has reviewed the characteristics of the organ, it is presented to a transplantation surgeon. After the necessary evaluations, the organ is accepted.[4] After the transplantation centre accepts the organ, the NCC sends an organ offer list to the centres. Candidates are then invited to the transplantation centre according to the order of the organ offer list sent by the NCC, and a suitable recipient is determined.[3]

Transplantation centres make a comprehensive evaluation concerning the suitability of the candidate for transplantation and complications that may develop following transplantation.[5,6] In addition, the organ transplant coordination nurse prepares a detailed report for candidates who cannot undergo transplantation according to the order of the organ offer list. The status of the candidates and reasons that they are not suitable for transplantation are addressed in this report, which is then presented to the NCC.[7]

Many candidates registered on the waiting list have a complex medical history and comorbidities which can prevent transplantation. There are several protocols which are recommended for the evaluation of candidate recipients. Still, very few recipient studies in the literature have shown the reasons for the exclusion of candidates from transplantation. [8]

This study aimed to determine the efficacy of the organ offer list evaluation process and the reasons for excluding the candidates from the kidney transplantation offer list.

MATERIALS AND METHODS

Ethics Committee Approval: Approval for the study was granted by the Clinical Research Ethics Committee of the Medical Faculty and the Medical Director of the hospital (Date: 08.02.2021, decision no: 06). All the procedures in this study were applied in accordance with the ethical requirements of the National Research Committee and the 1964 Helsinki Declaration and revisions or comparable ethical standards.

Study Design: This study was conducted as a descriptive, retrospective archive screening study.

Place and Date of the Study: The study was conducted in a public hospital's organ transplantation coordination unit between March 15 and April 15, 2021.

Patients who develop renal failure apply to the organ transplantation coordination unit to be able to have a transplant from a cadaver and are registered on the kidney transplant waiting list. The organ transplantation coordinator nurses undertake the tests necessary for registration (tissue type, blood group, hepatitis, etc). The coordinator nurse also obtains the contact information to reach the candidate when a cadaver organ becomes available, invites the candidate to the centre at certain intervals and performs the tests necessary for transplantation so that the candidate is waiting and ready for transplantation at any time.

By educating the candidates about what needs to be done while waiting, the coordinator nurse also contributes to the process of the Coordination system. After receiving the offer list sent by the NCC, the organ transplantation coordinator nurse invites the candidates to the transplantation centre in the order in which they appear on the list and coordinates the preparation of the candidate for transplantation.

Population and Sampling: Between January 2009 and December 2020, 350 recipient candidates were invited to our centre according to the order of the offer list for cadaver kidney transplantation. Since the file information of (n=122) candidates could not be accessed, the candidates were excluded from the research. The files of (n=228) candidates were included in the study.

All the patients meeting the following criteria were included in the study;

- Age >18 years,
- A diagnosis of kidney failure,
- Undergoing dialysis,
- Registered on the waiting list,
- Having received an offer of kidney transplantation,
- Data available in the electronic patient records system.

Data Collection Tools: The hospital information system data, the organ offer list, and the information in council reports were examined for all the candidates included. For each candidate, a record was made of sociodemographic characteristics such as age, gender, marital status, blood group, dialysis

type and time, panel reactive antibody (PRA) results, and the time spent on the waiting list. The information was also examined on the candidates who remained actively on the waiting list and those who had undergone transplantation and died.

Statistical Analysis: Data obtained in the study were analyzed statistically using SPSS vn. 20.0 software (IBM Corp., Armonk, NY, USA). The conformity of the data to normal distribution was evaluated with histograms, q-q graphs, and the Shapiro-Wilk test. Categorical data were analyzed using the Chi-square test and were stated as number (n) and percentage (%). A value of $p < 0.05$ was accepted as statistically significant.

RESULTS

The transplantation candidates included in the study comprised 51.3% males and 48.7% females, 58.8% were aged ≤50 years, 78.9% were married, and body mass index (BMI) was determined to be ≤25 in 83.8% (Table 1).

The transplant offer list and some clinical findings of the candidates are shown in Table 2. Of the total candidates, 61.4% had been receiving dialysis for less than 10 years, and 54.8% had been waiting for a kidney transplant for less than 5 years. Of the organs offered to the candidates, 5.9% were presented with full compatibility. In the order of the organ offer list, 60.1% of the candidates were placed 1-5, of which 64.5% were excluded for other reasons (a candidate placed higher on the list was found to be suitable, PRA positivity, high BMI). Of the 80.3% of the candidates invited to the centre once for transplantation, 89% were determined to be PRA negative. According to the offer list, 40.8% of the candidates were determined to be compatible with 2 HLA, 44.7% were blood group A, and 14.5% had died while waiting for a transplant (Table 2).

Table 1. Sociodemographic characteristics of the candidates (n=228)**.**

Candidate characteristics		n (%)
Age	≤50 years	134 (58.8)
	≥51 years	94 (41.2)
Gender	Female	111 (48.7)
	Male	117 (51.3)
Marital status	Married	180 (78.9)
	Single	48 (21.1)
BMI	≤25	191 (83.8)
	≥26	37 (16.2)

Table 2. The offer list and some clinical findings of the candidates (n=228)**.**

Characteristics		n (%)
Time in dialysis	≤10 years	140 (61.4)
	≥11 years	88 (38.6)
Dialysis type	Hemodialysis	215 (94.3)
	Peritoneal dialysis	13 (5.7)
Waiting time	≤5 years	125 (54.8)
	6-10 years	89 (39.0)
	≥11 years	14 (6.1)
Reason for organ offer*	Centre order	29 (85.3)
	Treatment order	2 (8.8)
	Full match	3 (5.9)
Place in organ offer list	1-5th place	137 (60.1)
	6-10th place	91 (39.9)
Reasons for exclusion	HCV infection	3 (1.3)
	Not attending the centre/not wishing to have a transplant	14 (6.1)
	LCM positivity	17 (7.5)
	Active infection	1 (0.4)
	Cardiac problems	2 (0.9)
	Patient could not be contacted	34 (14.9)
	Patient did not wish to have a transplant	10 (4.4)
	Other reasons**	147 (64.5)
Number of invitations to the centre	1 time	183 (80.3)
	2 times	40 (17.5)
	3 times	5 (2.2)
PRA	Negative	203 (89.0)
	Positive	25 (11.0)

*: Calculated according to the number of organs offered; **: Other reasons (a candidate in a higher position on the list found to be a suitable recipient, PRA positivity, high BMI), (LCM) Lymphocyte Cross-match.

Table 2. Continue.

Number of HLA matches	1 match	50 (21.9)
	2 matches	93 (40.8)
	3 matches	72 (31.6)
	4 matches	10 (4.4)
	6 matches	3 (1.3)
Blood group	0	97 (42.5)
	A	102 (44.7)
	B	28 (12.3)
	AB	1 (0.4)
Candidate cuuurrent status	Transplantation performed	51 (22.4)
	Waiting	144 (63.2)
	Deceased	33 (14.5)

*: Calculated according to the number of organs offered; **: Other reasons (a candidate in a higher position on the list found to be a suitable recipient, PRA positivity, high BMI), (LCM) Lymphocyte Cross-match.

Comparisons of the offer list characteristics and the offer list order of the candidates are shown in Table 3. No significant difference was determined between the age and gender of the candidates in the order of the offer list (p>0.05). It was determined that 75% of the candidates in dialysis for longer than 11 years were placed 1-5 on the organ offer list, and a highly significant difference was determined between the ordering of the organ offer list and the time of starting dialysis (p=0.000). Of the candidates in dialysis for longer than 11 years, 85.7% were placed 1-5 on the organ offer list, and a statistically significant difference was determined between the ordering of the organ offer list and the time of waiting for an organ (p=0.030). When the ordering of the organ offer list was examined according to the number of HLA matches, it was determined that all the candidates with 6 matches, 60% of those with 4 matches, and 63.9% of those with 3 matches were placed 1-5 on the offer list, but no statistically significant difference was determined between the number of HLA matches and the offer list order (p>0.05). No statistically significant difference was determined between the current status of the candidates and the organ offer list order (p>0.05) (Table 3).

Comparisons of the PRA test results and the offer list characteristics and gender of the candidates are shown in Table 4. No statistically significant difference was determined in the PRA test results according to the gender of the candidates, time in dialysis, waiting time and current status (p>0.05) (Table 4).

Table 3. Comparisons of the offer list characteristics of the candidates according to the place on the organ offer list (n=228).

Offer list characteristics		**Place on organ offer list**		**χ2**	**p**
		1-5th place n (%)	**6-10th place n (%)**		
Age	≤50 years	83 (61.9)	51 (38.1)	0.465	0.495
	≥51 years	54 (57.4)	40 (42.6)		
Gender	Female	60 (54.1)	51 (45.9)	3.284	0.070
	Male	77 (65.8)	40 (34.2)		
Time in dialysis	≤10 years	71 (50.7)	69 (49.3)	13.289	0.000**
	≥11 years	66 (75.0)	22 (25.0)		
Waiting time	≤5 years	67 (53.6)	58 (46.4)	6.986	0.030*
	6-10 years	58 (65.2)	31 (34.8)		
	≥11 years	12 (85.7)	2 (14.3)		
Number of HLA matches	1 match	29 (58.0)	21 (42.0)	2.890	0.576
	2 matches	53 (57.0)	40 (43)		
	3 matches	46 (63.9)	26 (36.1)		
	4 matches	6 (60.0)	4 (40.0)		
	6 matches	3 (100)	0 (0)		
Candidate current status	Transplantation performed	33 (64.7)	18 (35.3)	1.471	0.479
	Waiting	87 (60.4)	57 (39.6)		
	Deceased	17 (51.5)	16 (48.5)		

*: p<0.05; **: p<0.001; χ2: Ki-kare.

Table 4. Comparisons of the candidate gender and offer list characteristics according to the PRA test results (n=228).

Characteristic		PRA test Negative n (%)	PRA test Positive n (%)	χ2	p
Gender	Female	99 (89.2)	12 (10.8)	0.966	0.617
	Male	104 (88.9)	13 (11.2)		
Time in dialysis	≤10 years	123 (87.9)	17 (12.1)	0.966	0.617
	≥11 years	80 (90.9)	8 (9.1)		
Waiting time	≤5 years	111 (88.8)	14 (11.8)	1.045	0.903
	6-10 years	79 (88.8)	10 (11.2)		
	≥11 years	13 (92.9)	1 (7.1)		
Candidate current status	Transplantation performed	45 (88.2)	6 (11.8)	3.624	0.459
	Waiting	128 (88.9)	16 (11.1)		
	Deceased	30 (90.9)	3 (9.1)		

χ2: Ki-kare.

Comparisons of some candidate characteristics according to waiting time are shown in Table 5. Of the candidates aged ≤50 years, 62.7% had been waiting for kidney transplantation for ≤5 years and a significant difference was determined in waiting time according to age (p=0.016). Of the patients in dialysis for longer than 11 years, 33% had been waiting for a kidney transplant for less than 5 years, and a highly significant difference was determined between the duration of dialysis and the waiting time (p=0.000). No significant difference was determined in the waiting time according to the number of invitations to the centre and the number of HLA matches (p>0.05). Of the patients who had developed mortality, 57.6% had been waiting for an organ transplant for ≤5 years and a significant difference was determined between current status and waiting time (p=0.017) (Table 5).

DISCUSSION AND CONCLUSION

From a literature screening, a limited number of studies related to patients excluded from the cadaver organ offer list were determined.[8,9] Therefore, the results of this study are discussed with those of studies conducted with similar patient groups.

In Türkiye, organ offers are made on a points basis. As age increases, the candidate points decrease.[7] Stewart et al. [10] reported no difference between patients waiting for kidney transplantation concerning sociodemographic factors such as age, gender, and education level. In a study by Holley et al., it was reported that patients who underwent organ transplantation were younger than those excluded from the offer list. [8] In the current study, no significant difference was determined in the organ offer list ordering according to age and gender (p>0.05). While access to organs was allocated to young candidates, this decreased for older adults, but in the comparison of other conditions required for equitable organ offers (blood group, number of HLA matches, time in dialysis, etc.), the inequality decreased.[10,11]

According to the scoring table for cadaver kidney distribution in Türkiye, 3 points are given every

Table 5. Comparisons of candidate characteristics according to waiting time (n=228)

Candidate characteristics		Waiting time ≤5 years n (%)	Waiting time 6-10 years n (%)	Waiting time 11≥ years n (%)	χ2/p
Age	≤50 years	84 (62.7)	44 (32.8)	6 (4.5)	8.328/**0.016***
	≥51 years	41 (43.6)	45 (47.9)	8 (8.5)	
Time in dialysis	≤10 years	96 (68.6)	43 (30.7)	1 (0.7)	36.329/**0.000****
	≥11 years	29 (33.0)	46 (52.3)	13 (14.8)	
Number of invitations to the centre	1 time	104 (56.8)	70 (38.3)	9 (4.9)	4.991/ 0.288
	2 times	20 (50.0)	16 (40.0)	4 (10.0)	
	3 times	1 (20.0)	3 (60.0)	1 (20.0)	
Number of HLA matches	1 match	27 (54.0)	19 (38.0)	4 (8.0)	12.967/0.113
	2 matches	44 (47.3)	40 (43.0)	9 (9.7)	
	3 matches	49 (68.1)	22 (30.6)	1 (1.4)	
	4 matches	4 (40.0)	6 (60.0)	0 (0)	
	6 matches	1 (33.3)	2 (66.7)	0 (0)	
Candidate current status	Transplantation performed	38 (74.5)	11 (21.6)	2 (3.9)	4/**0.017***
	Waiting	68 (47.2)	65 (45.1)	11 (7.6)	
	Deceased	19 (57.6)	13 (39.4)	1 (3.0)	

*: p<0.05; **:p<0.001; χ2: Ki-kare.

month in dialysis.[12] Of the candidates in the current study, 38.6% had been in dialysis for ≥11 years, of which 6.1% had been waiting for an organ for ≥11 years, and 75.0% of the candidates in dialysis for ≥11 years were in the top places of the offer list ($p<0.05$). A statistically significant difference was determined between the time since starting dialysis and the duration of being registered on the kidney transplantation waiting list ($p<0.05$). It was also determined that 85.7% of those waiting for kidney transplantation for ≥11 years were placed 1-5 on the offer list ($p<0.05$). Being in the top places on the organ offer list was due to the candidates having been in dialysis for a long time and the high points awarded associated with that. The difference between the time in dialysis and the duration of waiting for a kidney transplant shows that the candidates were registered on the waiting list a long time after having started dialysis. This finding suggests that there is no information about the registration of patients who have developed kidney failure at any transplantation centre for a cadaver organ transplant. Therefore, much time is lost for registration on the waiting list.

Any negative condition that may develop during the organ waiting time can cause a candidate to be excluded from the list or can have a negative effect on follow-up after transplantation.[9,11,13] In a previous study, it was reported that candidates on whom transplantation could not be performed for non-clinical reasons (the candidate could not be contacted on the telephone number recorded in the system or could not attend the centre because of transport problems) were temporarily suspended from the waiting list. The 5-year survival of patients suspended from the list for 2 years was found to be extremely low.[14] Among the reasons for exclusion from the offer list determined in the current study, it was found that 14.9% of the candidates could not be contacted on the telephone number recorded in the system, 10% did not wish to have transplantation, and 6.1% could not or did not wish to attend the centre because of transport problems. It appears that some patients failed to show up for their transplantation appointments, and there were cases where necessary information was missing after they had been added to the waiting list.

Lymphocyte cross-match (LCM) positivity is a significant problem that prolongs the waiting time on the list and causes exclusion from the offer list.[9] Oruç et al. reported that cross-match positivity was among the reasons for the exclusion of candidates from the offer list. [9] In the current study, LCM positivity was determined to be the reason for exclusion from the offer list in 7.5% of the candidates. These findings in the current study support the results of previous research showing that LCM positivity causes graft rejection after transplantation. In another study that evaluated liver offer acceptance models, it was determined that adult candidates for liver transplantation received an offer of a liver a mean of 5 times while on the waiting list. [15] In the current study, it was determined that 80.3% of the candidates were offered a kidney once. This difference between the studies can be attributed to the difference in transplantation types and the waiting list scoring of the candidates.

Various risk factors, including blood transfusions, pregnancy, and previous organ transplantation, have been defined as related to HLA antigen sensitivity.[16,17] These risk factors can cause graft rejection after transplantation.[18] In a study by Oruç et al., the PRA positivity rate was determined to be high in females, and therefore there were more females in the group excluded from the offer list. [9,19] This finding could be linked to cross-match and PRA positivity that can emerge in pregnancy. In the current study, 48.7% of the candidates were female, but no significant difference was determined between the groups concerning gender and PRA positivity. The difference between these study results can be due to the differences in the birth status or the number of births of the female candidates.

The tissue group is recorded on the list before the patient characteristics to ensure the organ transplantation to the appropriate candidate and avoid serious problems after transplantation.[20,21] When creating the organ offer list in Türkiye, 150 points are assigned for each DR antigen match, 50 points for B antigen, and 25 points for A antigen. When there is a complete match (2A 2B 2DR match), the donor's kidney is presented directly to a recipient with a full match, without conditions. [7,12]In a study by Holley et al., tissue incompatibility (28%) was determined among the medical reasons for exclusion from transplantation.[8] In the current study, a kidney was offered to 3 candidates with full compatibility, and it was determined that patients moved up the offer list as the tissue compatibility increased. This was due to the high points obtained by the candidates according to the tissue matching.

Approximately 15%-20% of patients in dialysis die each year while waiting for an organ.[16,22] Sokas et al.[23] reported that 49.4% of patients removed from the transplantation list died within the first 5 years. In the current study, a significant difference was determined between the current status of the patients and the waiting time ($p<0.05$), and 57.6% of those waiting for ≥5 years were determined to have died while waiting. It was thought that these findings could be associated with increased age and dialysis complications.

In conclusion, the results of this study demonstrated the inability to contact the patient, that the patient

did not wish to undergo transplantation, and that PRA positivity was among the reasons for the exclusion of candidates from the organ offer list. It can be considered that the problems determined in this study could be resolved with information and education of candidates through regular follow-up and evaluation of patients with the collaboration of the transplantation and dialysis centres with the Regional Health Authorities. Coordinator nurses who can monitor the waiting list can improve collaboration between centres. They can also make necessary updates and provide patient education to prevent any loss of patient rights that may occur due to non-clinical reasons. There were some limitations to this study, primarily that as it was a retrospective records study, the data were restricted to the data that could be accessed from the records. A second limitation was a lack of detail in the recorded data, which limited the understanding of the causes behind the events leading to exclusion from the organ offer list. Finally, it was not possible to fully explain why patients did not attend the transplantation centre or declined transplantation.

Ethics Committee Approval: Approval for the study was granted by the Clinical Research Ethics Committee of the Medical Faculty and the Medical Director of the hospital (Date: 08.02.2021, decision no: 06). All the procedures in this study were applied in accordance with the ethical requirements of the National Research Committee and the 1964 Helsinki Declaration and revisions or comparable ethical standards.

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept –DS, AS, FYZB; Supervision – DS, AS, FYZB; Materials – DS; Data Collection and/or Processing – DS, AS; Analysis and/ or Interpretation – DS, AS, FYZB; Writing – FYZB, DS.

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