

Original article

Social determinants of health influencing the choice of dialysis modality in advanced chronic kidney disease: Need of an interdisciplinary approach



María Dolores Arenas^{a,b,*}, Marisol Fernández-Chamarro^b, Guillermo Pedreira-Robles^b, Silvia Collado^b, Julia Farrera^b, Isabel Galceran^b, Francesc Barbosa^b, Higinio Cao^b, Alicia Moreno^c, Laura Morro^c, Jose Luis Fernández-Martin^d, Marta Crespo^b, Julio Pascual^b

^a Fundación Renal Iñigo Álvarez de Toledo, Madrid, Spain

^b Department of Nephrology, Hospital del Mar, Hospital del Mar Medical Research Institute (IMIM), RD16/0009/0013 (ISCIII FEDER REDinREN), Barcelona, Spain

^c Department of Social Work, Hospital del Mar, Hospital del Mar Medical Research Institute (IMIM), Barcelona, Spain

^d Unidad de Gestión Clínica de Metabolismo Óseo, Instituto de Investigación Sanitaria del Principado de Asturias (ISPA), REDinREN (RD16/0009/0017) y RICORS2040 (RD21/0005/0019) del Instituto de Salud Carlos III, Hospital Universitario Central de Asturias, Oviedo, Asturias, Spain

ARTICLE INFO

Article history:

Received 21 October 2022

Accepted 5 April 2023

Available online 14 July 2024

Keywords:

Advanced chronic kidney disease
Socioeconomic status
Demographic factors
Shared decision-making
Renal replacement therapy
Peritoneal dialysis
Hemodialysis
Kidney transplantation
Language barrier
Social determinants of health

ABSTRACT

Introduction: The influence of socioeconomic and cultural barriers in the choice of renal replacement therapy (RRT) techniques in advanced chronic kidney disease (ACKD) has been scarcely explored, which can generate problems of inequity, frequently unnoticed in health care.

The aim of this study is to identify the non-medical barriers that influence the choice of RRT in an advanced chronic kidney disease (ACKD) consultation in Spain.

Material and methods: Retrospective analysis including the total number of patients seen in the ACKD consultation in a tertiary hospital from 2009 to 2020. Inclusion in the ACKD consultation began with an eligibility test and a decision-making process, conducted by a specifically trained nurse. The variables considered for the study were: age, sex, etiology of CKD, level of dependence for basic activities of daily living (Barthel Scale) and instrumental activities of daily living (Lawton and Brody Scale), Spanish versus foreign nationality, socioeconomic level and language barrier. The socioeconomic level was extrapolated according to home and health district by primary care center to which the patients belonged.

Results: A total of 673 persons were seen in the ACKD consultation during the study period, of whom 400 (59.4%) opted for hemodialysis (HD), 156 (23.1%) for peritoneal dialysis (PD), 4 (0.5%) for early living donor renal transplantation (LDRT) and 113 (16.7%) chose conservative care (CC). The choice of PD as the chosen RRT technique (vs. HD) was associated with people with a high socioeconomic level (38.7% vs. 22.5%) ($p=0.002$), Spanish nationality

DOI of original article:

<https://doi.org/10.1016/j.nefro.2023.04.001>.

* Corresponding author.

E-mail address: lola@olemiswebs.com (M.D. Arenas).

2013-2514/© 2023 Sociedad Española de Nefrología. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

(91% vs. 77.7%) ($p < 0.001$), to a lower language barrier (0.6% vs 10.5%) ($p < 0.001$), and to a higher score on the Barthel scale (97.4 vs 92.9) and on the Lawton and Brody scale (7 vs 6.1) ($p < 0.001$). Neither age nor sex showed significant differences in the choice of both techniques. Patients who opted for CC were significantly older (81.1 vs 67.7 years; $p < 0.001$), more dependent ($p < 0.001$), with a higher proportion of women (49.6% vs 35.2%; $p = 0.006$) and a higher proportion of Spaniards (94.7% vs 81%, $p = 0.001$) in relation to the choice of other techniques (PD and HD). Socioeconomic level did not influence the choice of CC.

Conclusion: Despite a regulated decision-making process, there are factors such as socioeconomic status, migration, language barrier and dependency of the population that influence the type of RRT chosen. To address these aspects that may cause inequity, an intersectoral and multilevel intervention is required with interdisciplinary teams that include, among others, social workers, to provide a more holistic and person-centered assessment.

© 2023 Sociedad Española de Nefrología. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Influencia de los determinantes sociales de la salud en la elección de tratamiento renal sustitutivo en la enfermedad renal crónica avanzada: necesidad de un enfoque multidisciplinar

R E S U M E N

Palabras clave:

Enfermedad renal crónica avanzada
Nivel socioeconómico
Factores demográficos
Toma de decisiones compartida
Terapia de reemplazo renal
Diálisis peritoneal
Hemodiálisis
Trasplante renal
Barrera idiomática
Determinantes sociales de la salud

Introducción: La influencia de los determinantes sociales de la salud en la elección de las técnicas de tratamiento renal sustitutivo (TRS) en la enfermedad renal crónica avanzada (ERCA) ha sido escasamente explorada, pudiendo generar problemas de inequidad, frecuentemente desapercibidos en la asistencia sanitaria.

El objetivo de este estudio es identificar las desigualdades sociales y económicas que influyen en la elección de TRS en una consulta de Enfermedad renal crónica avanzada (ERCA) en España.

Material y métodos: Análisis retrospectivo incluyendo el total de pacientes atendidos en la consulta de ERCA en un hospital terciario desde 2009 a 2020. La inclusión en la consulta de ERCA comenzaba por un proceso de toma de decisiones, conducido por una enfermera específicamente instruida. Las variables consideradas para el estudio fueron: edad, sexo, etiología de la ERC, nivel de dependencia para las actividades básicas de la vida diaria (Escala de Barthel) y actividades instrumentales de la vida diaria (Escala de Lawton y Brody), nacionalidad española versus extranjera, nivel socioeconómico y barrera idiomática. El nivel socioeconómico se extrapola según el domicilio y el distrito sanitario por centro de atención primaria al que pertenecían los pacientes.

Resultados: Un total de 673 personas fueron atendidas en la consulta de ERCA en el periodo de estudio, de los cuales 400 (59,4%) optaron por la técnica de hemodiálisis (HD), 156 (23,1%) por diálisis peritoneal (DP), 4 (0,5%) por trasplante renal de donante de vivo (TRDV) anticipado y 113 (16,7%) eligieron tratamiento conservador (TC). La elección de DP como técnica de TRS elegida (frente a HD) se asoció a personas con nivel socioeconómico alto (38,7% vs 22,5%) ($p = 0,002$), a la nacionalidad española (91% vs 77,7%) ($p < 0,001$), a una menor barrera idiomática (0,6% vs 10,5%) ($p < 0,001$), y a una mayor puntuación en la escala de Barthel (97,4 vs 92,9) y en la escala de Lawton y Brody (7 vs 6,1) ($p < 0,001$). Ni la edad ni el sexo mostraron diferencias significativas en la elección de ambas técnicas.

Los pacientes que optaron por TC eran significativamente de mayor edad (81,1 vs 67,7 años; $p < 0,001$), más dependientes ($p < 0,001$), con una mayor proporción de mujeres (49,6% vs 35,2%; $p = 0,006$) y una mayor proporción de españoles (94,7% vs 81%, $p = 0,001$) en relación con la elección de otras técnicas (DP y HD). El nivel socioeconómico no influyó en la elección de TC.

Conclusión: A pesar de que el proceso de toma de decisiones en la elección de TRS está reglado y estandarizado, existen factores como la situación socioeconómica, la migración, la barrera idiomática o la dependencia que influyen en el tipo de TRS elegido. Para abordar estos aspectos que pueden ser causa de inequidad se requiere de una intervención intersectorial y multinivel con equipos interdisciplinarios que incluyan, entre otros, trabajadores sociales, para brindar una evaluación más holística y centrada en la persona.

© 2023 Sociedad Española de Nefrología. Publicado por Elsevier España, S.L.U. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

There are studies that claim that incorporating patients with advanced chronic kidney disease (ACKD) into the decision making process regarding the choice of renal replacement therapy (RRT) would achieve an equal distribution between hemodialysis (HD) and home techniques (home HD and peritoneal dialysis [PD]).^{1,2} However, the reality is that, despite their undoubted advantages,³ home techniques continue to be underused RRT modalities in a large proportion of countries, including Spain.⁴⁻⁶ The latest report of the Spanish Registry of Renal Patients in 2020 shows that, as in the previous year, only 16% of the incident population in RRT chose PD, while 79.5% chose HD and 4.5% received a renal transplant (RT), mostly from a living donor, with no official data on the choice of conservative treatment (CT).⁶ This low use of home techniques is influenced by various factors and numerous ideas have been put forward to help minimize the barriers to the adoption and retention of these treatments at home.^{7,8}

It is well known that clinical factors, such as severity of comorbid conditions,⁹ or considerations related to the individual values of the person making the choice, for example, the need for travel or independence¹⁰ have an influence on the patient's choice of the modality of RRT. However, the influence on the choice of technique of socioeconomic and cultural barriers has not been explored adequately, and it may generate an undetected inequity problem in health care. Since the publication in 1974 of the Lalonde report, it has been known that sociodemographic, economic and cultural determinants explain more than 75% of health outcomes,¹¹ thus it is essential to consider the individual, including his or her background and circumstances, in order to address needs and activities we propose to carry out with an individual patient.

The main objective of this study was to identify the non-medical barriers that influence the choice of RRT, such as demographic factors, CKD etiology, socioeconomic factors, nationality or language in an ACKD consultation in a tertiary hospital in Spain. As a secondary variable, we analyzed glomerular filtration rate (GFR) on arrival at the ACKD clinic and whether or not they were potential candidates for RT.

Methods

Patients

This is a retrospective analysis performed from 2009 to 2020 of all patients seen in the ACKD outpatient clinic (CKD stages 4 and 5) (estimated GFR rate < 30 ml/min/1.73 m²) of the Hospital del Mar, in Barcelona (Catalonia, Spain), who had completed the discussion and decision-making process.

Decision-making methodology

Inclusion of the patient in the ACKD clinic was initiated through a nursing consultation, which was the one that carried out the decision-making process, and consisted of 3 consecutive visits, divided into 3 phases. In the first phase, the patient's values and preferences were explored using value

cards labeled not important; somewhat important; and very important; and from which the patient chose 2 cards that were "very important ones" (for example, if a patient chose to be independent and fear of blood and needlesticks; his possible most value-oriented treatment option could be PD). In a second phase, information about the different options available was provided with audio-visual material. Finally, in a third deliberative phase, the patient made a decision on their choice of RRT modality, whenever he felt ready. After a clinical assessment to determine whether or not the option was feasible, patients that opted for PD were sent to a specific clinic on this technique with the nurse and physician responsible for PD. The rest of the patients who opted for HD, live transplant and CT remained in the initial consultation. This study only shows the final result of the decision-making process and the patient's choice of one technique or another based on his or her specific values and preferences after the nursing consultation. It does not describe the start of the technique; therefore, those patients who were subsequently excluded from PD due to medical problems were not considered.¹² In the center analyzed, the possibility of choosing home HD was not available.

Variables

Demographic and clinical data were obtained from the electronic medical records of the reference center. The variables considered for the study were: age, sex, etiology of CKD, level of dependence for basic activities of daily living (Barthel scale) and instrumental activities of daily living (Lawton and Brody scale), nationality (Spanish vs. foreign), socioeconomic level and language barrier (those patients with communication difficulties due to not speaking or understanding the language).

Other variables recorded were GFR on arrival at the ACKD clinic and whether they were potentially transplantable according to the nephrologist's opinion.

Measuring instruments

Barthel scale

The Barthel scale¹³ explores whether there is independence for basic activities of daily living. There are 10 activities included in the original index: eating, transferring between chair and bed, personal grooming, toileting, bathing or showering, moving (walking on a smooth surface or in a wheelchair), climbing or descending stairs, dressing or undressing, stool control and urine control. The range of possible values for the Barthel scale is between 0 and 100, with 5-point intervals for the original version. The closer a subject's score is to 0, the more dependent he or she is, and the closer it is to 100, the more independent. This information is obtained by directly asking the individual or his or her primary caregiver.

Lawton and Brody scale

The Lawton and Brody scale¹⁴ explores instrumental activities of daily living. Activities included are: using the telephone, shopping, food preparation, cleaning, washing, traveling, taking medications, and managing finances. Each item can have a numerical value from 1 (independent) to 0 (dependent). The final score is the sum of the value of all responses and ranges

Table 1 – Sociodemographic factors associated with the choice of a modality of renal replacement therapy (hemodialysis versus peritoneal dialysis) in ACKD.

	N	Total	HD	DP	p
N		556	400	156	
Age (years), mean (SD)	556	67.8 (13.3)	68.4 (12.9)	66.1 (14.2)	0.068
Sex (male), n (%)	556	360 (64.7)	254 (63.5)	106 (67.9)	0.375
Baseline disease, n (%)	556	556	400	156	<0.001
Glomerulonephritis		51 (9.2)	31 (7.8)	20 (12.8)	
Diabetic nephropathy		127 (22.8)	110 (27.5)	17 (10.9)	
Vascular nephropathy		137 (24.6)	98 (24.5)	39 (25.0)	
Tubulointerstitial nephropathy		53 (9.5)	47 (11.8)	6 (3.8)	
Non-affiliated		112 (20.1)	70 (17.5)	42 (26.9)	
Other		52 (9.4)	33 (8.2)	19 (12.2)	
Polycystic kidney disease		24 (4.3)	11 (2.8)	13 (8.3)	
Glomerular (yes), n (%)	556	51 (9.2)	31 (7.8)	20 (12.8)	0.090
Diabetic nephropathy (yes), n (%)	556	127 (22.8)	110 (27.5)	17 (10.9)	<0.001
Type of support, n (%)	243	243	216	27	0.512
Family		168 (69.1)	146 (67.6)	22 (81.5)	
Formal or institutions		18 (7.4)	17 (7.9)	1 (3.7)	
Informal (friends, neighbors)		2 (0.8)	2 (0.9)	0 (0.0)	
Without support		55 (22.6)	51 (23.6)	4 (14.8)	
Socioeconomic level, n (%)	431	431	320	111	0.002
Low socioeconomic level		173 (40.1)	141 (44.1)	32 (28.8)	
Low-medium socioeconomic level		143 (33.2)	107 (33.4)	36 (32.4)	
Medium-high socioeconomic level		115 (26.7)	72 (22.5)	43 (38.7)	
Spanish nationality, n (%)	555	452 (81.4)	310 (77.7)	142 (91.0)	<0.001
Language barrier, n (%)	555	43 (7.7)	42 (10.5)	1 (0.6)	<0.001
Barthel scale score, mean (SD)	507	94.0 (10.9)	92.9 (11.7)	97.4 (7.0)	<0.001
Lawton and Brody scale score, mean (SD)	507	6.3 (1.9)	6.1 (2.0)	7.0 (1.4)	<0.001
GFR at onset of ACKD (ml/min), mean (SD)	556	20.7 (6.6)	19.9 (6.0)	22.7 (7.7)	<0.001
Renal transplant candidate, n (%)	552	316 (57.2)	214 (53.5)	102 (67.1)	0.005
Months in ERCA, mean (SD)	556	31.1 (29.7)	30.6 (29.6)	32.5 (29.8)	0.488

Patients who chose conservative treatment and those who chose live transplantation were excluded.

ACKD: advanced chronic kidney disease; GFR: glomerular filtration rate (ml/min); PD: peritoneal dialysis; HD: hemodialysis; SD: standard deviation.

from 0 (maximum dependence) to 8 (total independence). This information is obtained by directly asking the individual or his or her primary caregiver.

Assessment of socioeconomic level

The socioeconomic level was extrapolated according to home residence and health district of primary care center to which the patient belongs. Primary care centers were classified according to their corresponding district to obtain the total number of cases per district. The most recent information (2017) on the average income of the health districts was extracted from official data provided by the Barcelona City Council.¹⁵ The estimate used was the per capita household income, which considers the income available for consumption and the accumulated savings per person. Subsequently, and with the aim of simplifying the analysis, we summarized and grouped the scores according to the socioeconomic level of the district in which they live.¹⁶ In this way, patients were classified into 3 socioeconomic level groups: low, medium-low and medium-high.

Statistical analysis

Numerical variables were described as mean and standard deviation, while categorical variables were shown as the number and percentage of subjects. Comparisons between groups

were performed with Student's t-test for continuous variables and the chi-square test for categorical variables. Multivariate analysis was also performed using binary logistic regression to assess which factors were independently associated with decision making and the choice between HD and PD. In the multivariate analysis, the dependent variable was PD versus HD and the variables included in the model were age, sex, diabetic nephropathy, GFR at the start of ACKD, socioeconomic level, nationality, language barrier, Barthel index, Lawton and Brody index, and candidacy for RT. All statistical analyses were performed using the R statistical package version 4.0.4 (R Foundation for Statistical Computing, Vienna, Austria).

Ethical considerations

This analysis followed the regulations of the European Union law on data protection and privacy for all individuals within the European Union (GDPR/2018), and the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects.

Results

A total of 673 persons with stage 4 or 5 CKD were seen in the ACKD clinic during the study period, of whom 400 (59.4%) opted for HD, 156 (23.1%) for PD, 4 (0.5%) for live RT and 113

Table 2 – Sociodemographic factors associated with the choice of conservative treatment modality in ACKD.

	N	Total	Conservative treatment	Rest	p
N		673	113	560	
Age (years), mean (SD)	673	69.9 (14.1)	81.1 (12.3)	67.7 (13.3)	<0.001
Sex (male), n (%)	672	419 (62.4)	57 (50.4)	362 (64.8)	0.006
Baseline disease, n (%)	672	672	113	559	0.033
Glomerulonephritis		55 (8.2)	3 (2.7)	52 (9.3)	
Diabetic nephropathy		149 (22.2)	22 (19.5)	127 (22.7)	
Vascular nephropathy		172 (25.6)	35 (31.0)	137 (24.5)	
Tubulointerstitial nephropathy		64 (9.5)	10 (8.8)	54 (9.7)	
Non-affiliated		146 (21.7)	33 (29.2)	113 (20.2)	
Other		61 (9.1)	9 (8.0)	52 (9.3)	
Polycystic kidney disease		25 (3.7)	1 (0.9)	24 (4.3)	
Glomerular (yes), n (%)	672	55 (8.2)	3 (2.7)	52 (9.3)	0.031
Diabetic nephropathy (yes), n (%)	672	149 (22.2)	22 (19.5)	127 (22.7)	0.526
Type of support, n (%)	285	285	39	246	0.161
Family		203 (71.2)	33 (84.6)	170 (69.1)	
Formal or institutions		18 (6.3)	0 (0.0)	18 (7.3)	
Informal (Friends, neighbors).		2 (0.7)	0 (0.0)	2 (0.8)	
Without support		62 (21.8)	6 (15.4)	56 (22.8)	
Socioeconomic level, n (%)	535	535	208	434	0.901
Low socioeconomic level		216 (40.4)	40 (39.6)	176 (40.6)	
Low-medium socioeconomic level		175 (32.7)	32 (31.7)	143 (32.9)	
Medium-high socioeconomic level		144 (26.9)	29 (28.7)	115 (26.5)	
Spanish nationality, n (%)	671	559 (83.3)	107 (94.7)	452 (81.0)	0.001
Language barrier, n (%)	671	48 (7.2)	5 (4.4)	43 (7.7)	0.301
Barthel scale score, mean (SD)	609	91.8 (13.3)	80.6 (18.0)	94.0 (10.9)	<0.001
Lawton and Brody scale scores, mean (SD)	610	6.0 (2.1)	4.3 (2.5)	6.3 (1.9)	<0.001
GFR at the onset of ACKD (mL/min), mean (SD)	673	20.9 (6.9)	22.2 (7.9)	20.7 (6.6)	0.038
Months in ERCA, mean (SD)	673	30.3 (28.5)	26.7 (21.7)	31.1 (29.6)	0.141

ACKD. advanced chronic kidney disease; GFR: glomerular filtration rate (ml/min); SD: standard deviation; GFR: glomerular filtration rate (ml/min).

Table 3 – Comparison of type of treatment initiated by patients vs. treatment chosen (N = 397).

Type of treatment chosen	Total	PD	HD	Conservative tt	RT live	p
N	673	156	400	113	3	
Type of renal treatment initiated, n (%)	276 (41)	74 (47.4)	197 (49.2)	2 (1.7)	3 (100)	<0.001
PD	52 (18.8)	52 (70.3)	0 (0.0)	0 (0.0)	0 (0.0)	
HD	200 (72.5)	8 (10.8)	192 (97.5)	0 (0.0)	0 (0.0)	
RT	24 (8.7)	14 (18.9)	5 (2.5)	2 (100.0)	3 (100.0)	

Patients who died, were lost in consultation, transferred or were still active in the advanced chronic kidney disease clinic at the time of analysis are not included.

PD: peritoneal dialysis; HD: hemodialysis; RT: renal transplantation; tt: treatment.

(16.7%) for CT. Table 1 shows the comparison between the persons who chose the 2 dialysis modalities (HD at the center vs. PD) and the sociodemographic factors associated with the choice of the different treatments. The choice of PD as the RRT technique (vs. HD) was associated with a medium-high socioeconomic level (38.7 vs. 22.5%; $p=0.002$), Spanish nationality (91 vs. 77.7%; $p<0.001$) and a lower language difficulty (0.6 vs. 10.5%; $p<0.001$), as well as with a higher score on the Barthel scale (greater independence in basic activities of daily living) (97.4 vs. 92.9) and on the Lawton and Brody scale (greater independence in instrumental activities of daily living) (7 vs 6.1; $p<0.001$). Neither age nor sex showed significant differences in the choice of both techniques. The proportion of potentially transplantable persons was higher in the group that chose PD vs. HD (67.1 vs. 53.5%; $p=0.005$). Those who chose PD had a significantly higher GFR than those who opted for HD at the time when the technique was chosen (22.7 vs. 19.9 ml/min; $p<0.001$) (Table 1).

Table 2 shows the comparison between patients who chose CT vs. the rest who chose some dialytic technique as their RRT modality. Patients who opted for CT were significantly older (81.1 vs. 67.7 years; $p<0.001$), more dependent ($p<0.001$), with a higher proportion of women (49.6 vs. 35.2%; $p=0.006$) and of Spanish nationality (94.7 vs. 81%; $p=0.001$), compared to those. Socioeconomic level did not influence the choice of TC.

Table 3 shows the techniques chosen compared to the techniques with which they started treatment.

In view of the possibility that variables such as nationality and language barrier were related to each other, 2 multivariate analyses were performed: one including nationality and the other excluding it. This analysis showed that male sex, diabetic nephropathy, Spanish nationality, and greater independence in instrumental activities of daily living were associated with the choice of PD independently of the rest of the variables (Table 4). Once nationality was excluded, the lan-

Table 4 – Multivariate analysis of the choice of peritoneal dialysis versus hemodialysis (binary logistic regression).

Variable	OR ^a [95% CI]	p
Age (years)	0.97 [0.95–1.00]	0.042
Sex (male)	2.12 [1.18–3.94]	0.015
Diabetic nephropathy (yes)	0.38 [0.18–0.76]	0.009
GFR at the beginning of ERCA	1.04 [0.99–1.09]	0.083
Lower-middle socioeconomic level	1.08 [0.56–2.08]	0.827
Medium-high socioeconomic level	1.59 [0.82–3.11]	0.174
Spanish nationality (yes)	3.44 [1.30–10.39]	0.019
Language barrier (yes)	0.26 [0.01–1.71]	0.230
Barthel scale score	1.00 [0.96–1.04]	0.839
Lawton and Brody scale scores	1.42 [1.14–1.81]	0.003
Kidney transplant candidate (yes)	1.34 [0.70–2.58]	0.383

Number of patients included in the analysis: 390 (83 peritoneal dialysis and 307 hemodialysis).

Spanish nationality were considered to have no language barrier.

ACKD: advanced chronic kidney disease; CI: confidence interval; GFR: glomerular filtration rate (ml/min); OR: odds ratio; SD: standard deviation.

^a Odds ratio of those who chose peritoneal.

Table 5 – Multivariate analysis of the choice of peritoneal dialysis versus hemodialysis (binary logistic regression), excluding nationality.

Variable	OR [95% CI]	p
AGE	0.98 [0.96–1.01]	0.210
SEX male	2.01 [1.12–3.71]	0.021
Diabetic nephropathy (yes)	0.36 [0.17–0.72]	0.006
GFR- ERCA	1.05 [1.00–1.10]	0.046
ABS2intermediate socioeconomic level	1.19 [0.62–2.27]	0.606
ABS2high socioeconomic level	1.72 [0.89–3.35]	0.106
Language barrier (yes)	0.10 [0.01–0.52]	0.029
BARTHEL	1.00 [0.96–1.04]	0.846
LAWTONBRODY	1.39 [1.11–1.76]	0.005
POTENTIAL TX (yes)	1.40 [0.73–2.70]	0.314

Number of patients included in the analysis: 390.

Spanish nationals were considered to have no language barrier.

CI, confidence interval; OR, odds ratio.

language barrier was independently associated with the choice of HD versus PD (Table 5).

Discussion

The main finding of this study is that in people living in areas with a high socioeconomic level, Spanish nationality, a higher level of independence in basic and instrumental activities of daily living, and the no existence of a language barrier favor the choice of PD over HD in the center, while age, sex, and degree of dependence favor the choice of CT. In the multivariate analysis, male sex, Spanish nationality and greater independence in instrumental activities of daily living are independent variables that favor the choice of PD, and having diabetic nephropathy favored the choice of in-center HD.

These results show that some variables, such as nationality and language barrier, are related to each other; foreign patients have a greater probability of presenting a language barrier, which is why this is no longer significant in the multivariate model that includes nationality; the case with

socioeconomic level is similar. Its inclusion in the multivariate model does not improve prediction because nationality is probably correlated with socioeconomic level. Excluding nationality in the model shows that the language barrier is independently associated with the choice of HD versus PD.

These findings confirm the known higher incidence, prevalence, progression and complications and lower survival of CKD in socioeconomically disadvantaged populations.^{17–19} In relation to the choice of RRT technique, a reduced utilization of PD has been described in areas with low resources.²⁰ Only one study conducted in Australia showed more likelihood of using HD at the center by patients from more economically advantaged areas.²¹ Although there are studies that help to understand the influence of socioeconomic gradients on health status, adequate policies to reduce these inequalities have not yet been developed.²² To exercise true person-centered care and equity in decision making, additional interventions that address patients' knowledge, education, attitudes, motivations, skills and resources should be supported, and where identified deficits are specifically addressed, with interdisciplinary teams that include social workers.²³

Another finding of this study is the association between migrants and/or people with a language barrier and the choice of in-center HD versus PD. It has been argued that the underutilization of home dialysis by racial/ethnic minorities²⁴ cannot be explained solely by differences in age and health status.²⁵ There are barriers, such as differences in language, religion, lower levels of health literacy, or less access to health care services and information,²⁶ that could give rise to these disparities. The language barrier can increase vulnerability in hospital care and creates a gap in the freedom of choice of these individuals. Therefore, personalized interventions to overcome these barriers should be implemented in the process of making decisions about the modality of RRT in order to achieve equitable, free and tailored decision-making.^{27,28}

Traditionally, functional and/or psychological dependence has restricted the use of home therapies. In this study, a higher level of dependency favors the choice of in-center HD over PD. The incorporation of assisted PD programs could be an alternative to in-center HD for people with a higher degree of dependency who choose this technique, in whom a better health-related quality of life has been demonstrated.²⁹

In relation to the choice of CT, the results obtained are the same as those reported in the reference literature,^{30,31} highlighting that the persons who opted for this alternative were significantly older, had greater functional deterioration and there was a greater predominance of women (50%) than in the group that chose to undergo RRT (30%). Sex has been described as a cause of inequity in health care, sometimes due to biological factors (sex) and other times due to cultural factors (gender). Qualitative studies would be necessary to study these gender differences in the choice of technique in greater depth.

This study has several limitations, such as the observational/retrospective nature of the analysis, the fact that it involves a single center, the lack of home hemodialysis among the techniques offered, the absence of data on comorbidity and social support, and the cross-sectional design, which means that the results are limited to associations and not causality. Although there is a possibility that the mean

income of health districts differs from the personal income of one individual patient, it is a proxy measure and widely used.^{15,16} Future studies should analyze the socioeconomic circumstances of this population on an individualized basis (contributory pensions, non-contributory pensions, no pensions, etc.).

In addition, some factors that have been related to the choice of RRT in ACKD have not been considered, such as the degree of comorbidity, coping capacity, frailty, modality adjustment with lifestyle, distance to the center, level of education, and verbal and written information on the modality.³² These limitations should be balanced with the strengths of this study, which includes a cohort of patients in ACKD that evaluates for the first time in our country the influence of sociodemographic factors on the choice of technique.

In conclusion, the findings obtained indicate that although the decision-making process is described and regulated, there are factors, often not taken into account, that can affect equity in the choice of RRT modality. Taking into account the socioeconomic, cultural and dependency needs of the population we serve it is increasingly necessary to effectively reduce health inequities. It is necessary to address the states of vulnerability that affect RRT options. Achieving this imperative requires an intersectoral and multilevel intervention, i.e., with intervention of the Third Sector of Social Action and the competent public administrations, including hospital network, primary through case managers and socio-health network), with interdisciplinary teams that include, among others, social workers, in order to identify specific needs, review available governmental aid and the processing of the same adapted to the need, to provide a holistic and person-centered assessment.

Financing

This manuscript has not received any funding.

Conflict of interest

The authors declare that they have no conflicts of interest.

REFERENCES

- Prieto-Velasco M, Quiros P, Remon C, Spanish Group for the Implementation of a Shared Decision-Making Process for RRT Choice with Patient Decision Aid Tools. The concordance between patients' renal replacement therapy choice and definitive modality: Is it a utopia? *PLoS One*. 2015;10:e0138811.
- Dahlerus C, Quinn M, Messersmith E, Lachance L, Subramanian L, Perry E, et al. Patient perspectives on the choice of dialysis modality: Results from the Empowering Patients on Choices for Renal Replacement Therapy (EPOCH-RRT) study. *Am J Kidney Dis*. 2016;68:901-10.
- Lewicki MC, Polkinghorne KR, Kerr PG. Debate: Should dialysis at home be mandatory for all suitable ESRD patients?: Home-based dialysis therapies are the second choice after transplantation. *Semin Dial*. 2015;28:147-54.
- Li PK, Chow KM, Van de Luijngaarden MW, Johnson DW, Jager KJ, Mehrotra R, et al. Changes in the worldwide epidemiology of peritoneal dialysis. *Nat Rev Nephrol*. 2017;13:90-103.
- ERA-EDTA Registry, Available from: <http://www.era-edta-reg.org/files/annualreports/pdf/AnnRep2019.pdf>
- Registro Español de Enfermos Renales. Informe 2020 [Accessed 14 February 2022]. Available from: <https://www.senefro.org/modules.php?name=webstructure&idwebstructure=29>.
- Slon Roblero MF, Borman N, Bajo Rubio MA. Integrated care: enhancing transition from renal replacement therapy options to home haemodialysis. *Clin Kidney J*. 2019;13:105-10.
- Chan CT, Collins K, Ditschman EP, Koester-Wiedemann L, Saffer TL, Wallace E, et al. Overcoming barriers for uptake and continued use of home dialysis: An NKF-KDOQI Conference Report. *Am J Kidney Dis*. 2020;75:926-34.
- Miskulin DC, Meyer KB, Athienites NV, Martin AA, Terrin N, Marsh JV, et al. Comorbidity and other factors associated with modality selection in incident dialysis patients: The CHOICE Study. Choices for Healthy Outcomes in Caring for End-Stage Renal Disease. *Am J Kidney Dis*. 2002;39:324-36.
- Wongboonsin J, Merighi JR, Walker PF, Drawz PE. Travel arrangements in chronic hemodialysis patients: A qualitative study. *Hemodial Int*. 2020, <http://dx.doi.org/10.1111/hdi.12893>.
- Lalonde M. A new perspective on the health of Canadians. Ottawa, Ontario, Canada: Minister of Supply and Services; 1974.
- Devine PA, Aisling EC. Renal replacement therapy should be tailored to the patient. *Practitioner*. 2014;258:19-22.
- Mahoney FI, Barthel DW. Functional evaluation: The Barthel Index. *Md Med J*. 1965;14:61-5.
- Lawton MP, Brody EM. Assessment of older people: Self-maintaining and instrumental activities of daily living. *Gerontologist*. 1969;9:179-86.
- Ajuntament de Barcelona [Accessed 28 June 2020]. Available from: https://ajuntament.barcelona.cat/barcelonaeconomia/sites/default/files/RFD_2017_BCN.pdf, 2017.
- Baena-Díez JM, Barroso M, Cordeiro-Coelho SI, Díaz JL, Grau M. Impact of COVID-19 outbreak by income: hitting hardest the most deprived. *J Public Health (Oxf)*. 2020;42:698-703.
- Ameh OI, Ekrikpo UE, Kengne AP. Preventing CKD in low- and middle-income countries: A call for urgent action. *Kidney Int Rep*. 2019;5:255-62.
- Luyck VA, Cherney DZI, Bello AK. Preventing CKD in developed countries. *Kidney Int Rep*. 2019;5:263-77.
- Marinovich S, Lavorato C, Rosa-Díez G, Bisigniano L, Fernández V, Hansen-Krogh D. La falta de ingresos económicos se asocia a menor supervivencia en hemodiálisis crónica. *Nefrología*. 2012;32:79-88.
- Niang A, Iyengar A, Luyckx VA. Hemodialysis versus peritoneal dialysis in resource-limited settings. *Curr Opin Nephrol Hypertens*. 2018;27:463-71.
- Grace BS, Clayton PA, Gray NA, McDonald SP. Socioeconomic differences in the uptake of home dialysis. *Clin J Am Soc Nephrol*. 2014;9:929-35.
- Glouberman S, Millar J. Evolution of the determinants of health, health policy, and health information systems in Canada. *Am J Public Health*. 2003;93:388-92.
- Hansen MS, Tesfaye W, Sewlal B, Mehta B, Sud K, Kairaitis L, et al. Psychosocial factors affecting patients with end-stage kidney disease and the impact of the social worker. *J Nephrol*. 2022;35:43-58.
- Wallace EL, Lea J, Chaudhary NS, Griffin R, Hammelman E, Cohen J, et al. Home dialysis utilization among racial and ethnic minorities in the United States at the national, regional, and state level. *Perit Dial Int*. 2017;37:21-9.
- Mehrotra R, Soohoo M, Rivara MB, Himmelfarb J, Cheung AK, Arah OA, et al. Racial and ethnic disparities in use of and outcomes with home dialysis in the United States. *J Am Soc Nephrol*. 2016;27:2123-34.

26. Mayeda DP, Ward KT. Methods for overcoming barriers in palliative care for ethnic/racial minorities: A systematic review. *Palliat Support Care*. 2019;17:697–706.
27. Squires A, Sadarangani T, Jones S. Strategies for overcoming language barriers in research. *J Adv Nurs*. 2020;76:706–14.
28. Van Rosse F, de Bruijne M, Suurmond J, Essink-Bot M, Wagner C. Language barriers and patient safety risks in hospital care. A mixed methods study. *Int J Nurs Stud*. 2016;54:45–53.
29. Iyasere OU, Brown EA, Johansson L, Huson L, Smee J, Maxwell AP, et al. Quality of life and physical function in older patients on dialysis: A comparison of assisted peritoneal dialysis with hemodialysis. *Clin J Am Soc Nephro*. 2016;11:423–30.
30. Pyart R, Aggett J, Goodland A, Jones H, Prichard A, Pugh J, et al. Exploring the choices and outcomes of older patients with advanced kidney disease. *PLoS One*. 2020;15:e0234309, <http://dx.doi.org/10.1371/journal.pone.0234309>. PMID: 32520955; PMCID: PMC7286495.
31. Hödlmoser S, Carrero JJ, Kurnikowski A, Fu EL, Swartling O, Winkelmayer WC, et al. Kidney function, kidney replacement therapy, and mortality in men and women. *Kidney Int Rep*. 2021;7:444–54.
32. Chanouzas D, Ng KP, Fallouh B, Baharani J. What influences patient choice of treatment modality at the pre-dialysis stage? *Nephrol Dial Transplant*. 2012;27:1542–7.