

Employment in the patient with chronic kidney disease related to renal replacement therapy

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ABSTRACT

Background: Chronic kidney disease (CKD) is a limiting condition, but they are shown the benefits the work activity occurs in these patients. The modality of renal replacement therapy (RRT) can influence the activity of work.

Objectives: Analyze the employment of people with CKD related to of RRT in which they are: hemodialysis (HD), peritoneal dialysis manual (CAPD), automated peritoneal dialysis (APD) or transplantation (Tx). **Methods:** Descriptive analysis of the employment about 243 kidney patients of both sexes between 16 and 64 years, conducting RRT with HD, CAPD, APD or Tx from 8 Spanish hospitals.

Results: Only 33.3% of patients with RRT in the working age were employed. Statistically significant differences are observed in the percentage of employed men (40.1%) and females (22.9%), between the average age of the employed (43.5 years) and unoccupied (49.6 years), and in the mean time to treatment of employees (4.8 years) and unoccupied (7.9 years). Finally there are also differences in the percentage of employed persons in the various forms of TSR considered, being much higher in APD patients (47.8%) than in patients on HD (21.7%) having the lowest percent. **Conclusions:** Chronic Kidney Disease (CKD) and RRT are a major source of disability. Active patients opt for treatment largely APD, so that almost half of the patients in this modality are working, while in HD only one of every five patients is working.

Keywords: Employment. Renal replacement therapy. Chronic kidney failure.

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La situación laboral del paciente con enfermedad renal crónica en función del tratamiento sustitutivo renal RESUMEN

Antecedentes: La enfermedad renal crónica (ERC) es una patología limitante, sin embargo están demostrados los beneficios que la actividad laboral produce en estos pacientes. La modalidad de tratamiento sustitutivo renal (TSR) puede influir sobre dicha actividad laboral. **Objetivos:** Analizar la situación laboral de las personas con ERC en función del TSR: hemodiálisis (HD), diálisis peritoneal manual (DPCA), diálisis peritoneal automática (DPA) o trasplante (Tx). **Métodos:** Análisis descriptivo de la situación laboral de 243 pacientes renales de ambos sexos entre 16 y 64 años, que llevan a cabo TSR con HD, DPCA, DPA o Tx en 8 hospitales españoles. **Resultados:** Sólo el 33,3% de los pacientes con insuficiencia renal en edad laboral están trabajando. Se observan diferencias estadísticamente significativas en el porcentaje de ocupados entre hombres (40,1%) y mujeres (22,9%), entre la edad media de los ocupados (43,5 años) y los no ocupados (49,6 años), y también en el tiempo medio de tratamiento de ocupados (4,8 años) y no ocupados (7,9 años). Por último, existen también diferencias en el porcentaje de ocupados en función del TSR consideradas, siendo el más elevado en los pacientes en DPA (47,8%), y el menor, el de los pacientes en HD (21,7%). **Conclusiones:** La ERC y los TSR son un importante factor de incapacidad laboral. Los pacientes en activo optan mayoritariamente por un tratamiento de DPA; casi la mitad de los pacientes en DPA están trabajando, mientras que en HD apenas trabaja uno de cada cinco pacientes en edad laboral.

Palabras clave: Empleo. Tratamiento sustitutivo renal. Enfermedad renal crónica.

INTRODUCTION

Advanced chronic kidney disease is a pathology that severely limits the capacity of afflicted patients,¹⁻³ especially when considering the impacts of renal replacement therapy (RRT).

The quality of life of chronic kidney patients is normally measured in relation to RRT, and within this context, several variables must be assessed. One of these is patient occupational situation,¹ which also constitutes an important parameter for patient rehabilitation.⁴

Employment also produces the benefit of improved economic stability and emotional state by recovering self-esteem and the various capacities initially lost due to the underlying condition.³

Social security protection for patients that must receive RRT in the form of dialysis (whether haemodialysis [HD] or peritoneal dialysis [PD]) during normal employment periods are well defined in Spain, allowing the patient and the patient's family to face the start of dialysis treatment with economic guarantees. Although assessing capacity for work is a process of individual evaluation that depends on the specific limitations produced by the disease in each patient, we can generally state that the majority of patients on dialysis treatment can obtain the status of permanent incapacity for work (PIW) if they cannot continue with their normal occupation.

Workers find themselves in a situation of PIW when, after having received prescribed treatment and given a medical discharge, they experience severe anatomical or functional disabilities that can be objectively and definitively evaluated, and that decrease or abolish the patient's capacity for gainful employment, producing various levels of incapacity.⁵

- Several different types of PIW have been established based on severity^{6,7}:
- Permanent partial incapacity for the patient's normal profession
- Permanent total incapacity for the patient's normal profession
- Permanent absolute incapacity for any form of employment
- Severe invalidity

However, when patients have not worked for the required number of years or have not started gainful employment, social protections in Spain are virtually non-existent, such that these patients must seek out some form of employment based on their limitations. In this case, it is especially important to obtain a certificate of disability of 33% or more, since this provides substantial benefits and subsidies for the businesses hiring patients on RRT, as well as significant tax exemptions for the patient. These constitute important advantages for renal patients and a guarantee for employers against possible missed work due to health issues.

Nephrologists must understand that a complete and exhaustive medical report (including the medical history, background, and associated morbidity of the patient) can be decisive in the ability of renal patients (especially, transplant recipients) to obtain this assistance for finding employment. In this sense, what might appear to be a system that supports inactivity in renal patients becomes an essential tool for their ability to find employment.

In the case of patients that have no family income, have not worked for a sufficient period of time, and cannot work, they can only access a non-working pension due to invalidity, which requires a certificate of disability equal to or greater than 65%, a relatively easy percentage to reach for patients on dialysis treatment (regardless of modality).

Once a renal patient receives a transplant, the social protection usually provided by the public system when the patient was on dialysis treatment becomes severely reduced, and the patient is considered to be rehabilitated and ready for a return to gainful employment (which is also assessed on an individual basis in light of the patient's normal profession). However, the years that the patient has spent outside of the job market are not taken into account, nor is the necessary support provided for adequate social and professional rehabilitation.

Almost half of all patients that start dialysis treatment are in the working age bracket (SEN-ONT registry 2009) of 16-65 years, and the retirement age is predicted to increase in coming years.

As such, the decision each patient makes regarding the option of RRT and the possibility of continuing with employment, as well as the need for changing treatment modalities based on occupational circumstances, becomes an important issue.^{2,8}

OBJECTIVES

With this study, we sought to analyse the employment situation of patients with chronic kidney disease based on the type of RRT provided (dialysis, continuous ambulatory peritoneal dialysis [CAPD], automated peritoneal dialysis [APD] or transplantation [Tx]). With this information, we aimed to assess the rehabilitative function of each type of RRT in the important context of occupational activity and means for employment.

We also sought to analyse the economic considerations provided to these patients, above all when these were the product of a PIW evaluation.

MATERIAL AND METHOD

Between August 2007 and May 2009, we surveyed 243 patients of working age (16-64 years old) at 8 Spanish hospitals (Hospital Arnau de Vilanova de Lleida, Hospital Clínic de Barcelona, Hospital de León, Hospital de Donostia, Hospital Gregorio Marañón de Madrid, Hospital Carlos Haya de Málaga, Hospital Joan XXIII de Tarragona, and Hospital La Paz de Madrid) that represent the different areas of the country. The study was carried out in two parts: from August 2007 to April 2008, we administered a pilot study in the first 5 hospitals mentioned, with a sample size of 169 patients; after evaluating the results, we decided to carry out a second round of surveys in order to reach the optimal sample size in a second phase that took place between November 2008 and May 2009 in the last 3 hospitals.

CALCULATION OF SAMPLE SIZE

Based on the "Report on renal replacement therapy in Spain" by the Spanish Society of Nephrology in 2005, the total population of patients with chronic renal failure (CRF) and of working age was estimated for each type of dialysis treatment. A total of 22 592 patients aged 16-64 years were estimated to have CRF in 2005, approximately 7118 of which were on HD, 1204 on PD, and 14 270 with a Tx. From these overall population totals, we calculated the sample size necessary to carry out a study that would allow us to detect differences of at least 10% in the proportions between the different modalities of dialysis treatment, with a type I error of 5% and a power of 80%. The resulting sample size was $n=285$ patients (96 on HD, 97 with Tx, and 92 on PD). Since **age** and **sex** are variables that are undoubtedly related to economic activity, we also aimed for a stratified study design in order to avoid possible biases from an unbalanced ratio in the final samples for these two variables.

Surveys were distributed in the same quantity for each modality of RRT (HD, PD, and Tx), except for at the Hospital Joan XXIII, where no transplanted patients were available. In the case of patients on PD, the surveys assigned to this category were proportionally administered to patients on CAPD and APD in order to avoid possible selection biases.

A nurse was charged with distributing the questionnaires and informed consent documents, resolving any doubts that might arise, and aiding in patient compliance when necessary.

We performed a descriptive analysis of the different study variables (age, sex, time on RRT, modality of RRT), calculating the standard summary statistics. We also analysed the possible correlation between each baseline variable included in the study and variables related to the job market (paid employment, PIW pension, invalidity pension, certificate of disability).

Given the dichotomic nature of the study variables, we used chi-square tests with Fisher's exact statistics in 2x2 tables in order to examine the relationship with other categorical variables. We also used Student's two-sampled t-tests for two independent sample means comparison in order to assess the relationship between continuous variables, with parametric tests justified by the final sample size.

With the aim of evaluating the individual and global influence of each baseline variable on employment variables, we used adjusted fit univariate and multivariate models. In all tests, we considered a P -value <0.05 to be statistically significant. All analyses were performed using SPSS statistical software version 15.0 for Windows.

RESULTS

Table 1 shows the primary study results. The estimated proportion of patients within the working age group that were employed was 33.3%. The four baseline variables considered (sex, age, time of treatment, and modality of dialysis) were strongly correlated with patient employment.

We observed a significant difference ($P=.006$) between the percentage of employed male patients (40.1%) and female patients (22.9%).

As regards patient age, we also observed a significant difference ($P<.001$) between the mean age of employed patients (43.5 years) and unemployed patients (49.6 years).

We calculated the time of treatment as the difference between the year in which the survey was carried out and the year in which each patient started treatment, with significant differences ($P=.001$) in the mean time of treatment between employed patients (4.8 years) and unemployed patients (7.9 years).

The results for modality of renal replacement therapy administered to each patient in the study are also shown, with significant differences ($P=.012$) in the percentage of employed patients on each type of RRT considered. The rate of employment was much higher in patients on APD (47.8%) than in patients on HD (21.7%).

It appears that a patient's employment situation is strongly dependent on age and sex, and so we decided to correct our results for these two variables in order to avoid biases in sample composition when comparing and estimating the independent effect of RRT modality on employment.

To this end, we constructed a multivariate model in order to control for the effects of each of the four aforementioned variables on patient employment situation (which we considered as an event) in the potentially employable patient

Table 1. Patient occupation by treatment type

	Total	Occupational situation		P-value
		No	Yes	
16-64 years of age	243 (100%)	162 (66.7%)	81 (33.3%)	
Sex				0.006 ^a
- Male	147 (100%)	88 (59.9%)	59 (40.1%)	
- Female	96 (100%)	74 (77.1%)	22 (22.9%)	
Age (years)				
- Median (range)	49 (20-64)	51 (20-64)	44 (23-64)	
- Mean (SD)	47.6 (10.6)	49.6 (10.1)	43.5 (10.5)	< 0.001 ^b
Time on treatment (years)				
- Median (range)	3.0 (0-32)	3.0 (0-32)	3.0 (0-27)	
- Mean (SD)	6.87 (8.02)	7.89 (8.77)	4.84 (5.78)	0.001 ^b
Modality of RRT				0.012 ^a
- Haemodialysis	83 (100%)	65 (78.3%)	18 (21.7%)	
- Transplant	82 (100%)	50 (61.0%)	32 (39.0%)	
- Continuous Ambulatory PD	32 (100%)	23 (71.9%)	9 (28.1%)	
- Automated PD	46 (100%)	24 (52.2%)	22 (47.8%)	

^a Chi-square test with Fisher's exact test statistic; ^b Student's two sample t-test for independent means comparison

PD: Peritoneal dialysis; SD: standard deviation; RRT: renal replacement therapy

population (age 16-64 years), fitting both univariate and multivariate logistic regression models in order to evaluate the independent effects of each of the covariables on patient employment.

Table 2 demonstrates that the four characteristics considered were all significantly associated with the probability of employment, both from a univariate and multivariate point of view.

As regards PIW, of the 243 patients of working age, 103 received a pension due to PIW, which makes 42.4%, with a 95% confidence interval of 36.1%-48.6%. We only observed significant differences in this variable between sexes (Table 3).

As regards the percentage of working age patients (16-64 years) with a certificate of disability >33%, we observed that 144 of the 243 patients of working age had such a certificate, yielding a 59.3% estimated rate, with a 95% confidence interval of 53.0%-65.5%. We only observed significant differences in terms of this value between the different treatment times reported (Table 4).

DISCUSSION

Chronic kidney disease and RRT play important roles in the capacity for patients to hold gainful employment, since only

33.3% of working age patients with this pathology were employed. However, there are important differences that affect this result that we must discuss.

Actively employed patients usually opt for APD treatment, such that almost half of all patients on this type of dialysis treatment are working, whereas this value drops to one patient in five in the case of HD. Other studies have shown the positive effects of maintaining consistent employment in patients on dialysis.^{2,4}

Especially at the start of RRT with dialysis, the choice of APD holds clear advantages over other options, with the result that prestigious entities such as the NKF⁹ have declared that patients of working age should be specifically offered home dialysis options (including home HD, which was not included in this study due to the scarcity of these cases in Spain).

These differences are sustained even when controlling other variables that affect patient employment situation, such as gender (men work more than women: 40.1% vs 22.9%), time on dialysis (with greater time on RRT, greater probability of unemployment), and age (the mean age of employed patients was 43.5 years, versus 49.9 years for unemployed patients).

Even patients with kidney transplants are less active in the workplace (39%) than patients on APD (47.8%), and this may be due to the fact that these patients obtained a PIW

Table 2. Probability of employment

	Univariate model			Multivariate model		
	OR	95% CI	P-value	OR	95% CI	P-value
Sex			0.006			0.021
- Male	(Baseline)			(Baseline)		
- Female	0.443	(0.249-0.791)		0.478	(0.256-0.896)	
Age	0.945	(0.920-0.971)	<0.001	0.944	(0.918-0.971)	<0.001
Time on treatment	0.946	(0.910-0.985)	0.006	0.946	(0.904-0.990)	0.017
Modality			0.014			0.022
- Haemodialysis	(Baseline)			(Baseline)		
- Transplant	2.311	(1.165-4.585)	0.017	2.481	(1.185-5.194)	0.016
- Continuous ambulatory PD	1.413	(0.557-3.584)	0.467	1.155	(0.421-3.165)	0.780
- Automated PD	3.310	(1.519-7.215)	0.003	2.964	(1.269-6.925)	0.012

PD: peritoneal dialysis; CI: confidence interval; OR: odds ratio

while on HD and have maintained this status since receiving a kidney transplant, among other factors.

However, this situation has been revised and transplanted patients can find themselves in challenging situations, such as being looking for a job after several years of incapacity, with limited possibilities of finding employment. The regulations for social protection do not take into account this particular situation faced by many renal patients, and only require that companies facilitate the recuperation of original

positions for patients returning to their jobs with a PIW. Several studies have also analysed the positive effects of maintaining gainful employment in patients on dialysis.⁴

We did not observe significant differences in terms of PIW pension coverage for patients on RRT, with similar percentages in patients on all types of treatment. This indicates that there are no *a priori* RRT modalities that are more “incapacitating” than others, although one might think that Tx would provide the greatest potential for

Table 3. Pension benefits for permanent incapacity for work

	Total	PIW pension received		P-value
		No	Yes	
16-64 years of age	243 (100%)	140 (57.6%)	108 (42.4%)	
Sex				0.047 ^a
- Male	147 (100%)	77 (5.2%)	70 (47.6%)	
- Female	96 (100%)	63 (65.6%)	33 (34.3%)	
Age (years)				
- Median (range)	49 (20-64)	49 (20-64)	49 (24-64)	
- Mean (SD)	47.6 (10.6)	47.7 (11.1)	47.4 (10.0)	0.824 ^b
Time on treatment (years)				
- Median (range)	3.0 (0-32)	3.0 (0-30)	3.5 (0-32)	
- Mean (SD)	6.87 (8.02)	6.22 (7.58)	7.76 (8.54)	0.140 ^b
Modality of RRT				0.841 ^b
- Haemodialysis	83 (100%)	45 (54.2%)	38 (45.8%)	
- Transplant	82 (100%)	50 (61.0%)	32 (39.0%)	
- Continuous Ambulatory PD	32 (100%)	19 (59.4%)	13 (40.6%)	
- Automated PD	46 (100%)	26 (56.5%)	20 (43.5%)	

^a Chi-square test with Fisher’s exact test statistic; ^b Student’s two sample t-test for independent means comparison

PD: Peritoneal dialysis; SD: standard deviation; RRT: renal replacement therapy; PIW: permanent incapacity for work

Table 4. Patients certified with disability >33%

	Total	Certificate of disability >33%		P-value
		No	Yes	
16-64 years of age	243 (100%)	99 (40.7%)	144 (59.3%)	0.596 ^a
Sex				
- Male	147 (100%)	62 (42.2%)	85 (57.8%)	
- Female	96 (100%)	37 (38.5%)	59 (61.5%)	
Age (years)				0.480 ^b
- Median (range)	49 (20-64)	49 (22-64)	47 (20-64)	
- Mean (SD)	47.6 (10.6)	47.9 (10.3)	47.4 (10.8)	
Time on treatment (years)				<0.001 ^b
- Median (range)	3.0 (0-32)	20 (0-26)	5.0 (0-32)	
- Mean (SD)	6.87 (8.02)	431 (6.11)	8.64 (8.69)	
Modality of RRT				0.531 ^a
- Haemodialysis	83 (100%)	32 (38.6%)	51 (61.4%)	
- Transplant	82 (100%)	30 (36.6%)	52 (63.4%)	
- Continuous Ambulatory PD	32 (100%)	15 (46.9%)	17 (53.1%)	
- Automated PD	46 (100%)	22 (47.8%)	24 (52.2%)	

^a Chi-square test with Fisher's exact test statistic; ^b Student's two sample t-test for independent means comparison

PD: Peritoneal dialysis; SD: standard deviation; RRT: renal replacement therapy

rehabilitation, with fewer transplanted patients on PIW. The results show something quite different, but it would appear that this situation could change considerably in the near future.

It is surprising that only 59% of patients on dialysis are certified as disabled, above all considering that the current administration would likely assign a level of disability equal to or greater than 50% to the majority of these patients.¹⁰

As such, we believe that is important to assess renal patients at the start of treatment, especially if they are actively employed or wish to be, in order to analyse all possibilities that would allow for maintaining employment or re-orienting patient activity.^{11,12}

The ALCER kidney foundation will create a specific document regarding this issue to be used alongside information regarding values, lifestyle, and type of treatment that patients should receive before opting for a RRT.

Conflicts of interest

The authors would like to declare the following potential conflicts of interest: the ALCER kidney foundation, during the study period, was provided with economic donations from the following companies associated with RRT: Astellas, Amgen, Baxter, Fresenius Medical Care, and Ge.

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