

Determinants of Health Related Quality of Life of dialysis patients in Uruguay

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Abstract

There are limited studies reporting on the Health Related Quality of Life (HRQL) of patients with end stage renal disease living in non-industrialized countries. This study describes the underlying relationships among determinants of HRQL in patients under renal replacement treatment. A cross-sectional design was used with a sample of 243 patients attending five hemodialysis and peritoneal dialysis centers of Montevideo (mean age 56.6 years, SD 16.2; 58% males). A univariate linear regression analysis was performed for each independent variable. A total of 61 independent variables were included: biological/clinical, sociodemographic, and psychosocial. HRQL outcomes were evaluated using the SF-36 Health Survey eight subscales, Physical Component Summary (PCS) and Mental Component Summary (MCS) scores. Variables shown to have significant association in the univariate analysis ($p < 0.10$) were included in a multivariate regression analysis. Ten regression models were studied, for the 8 SF-36 subscales, PCS and MCS scores. Fifteen variables were significant in the multivariable models; time in renal replacement treatment, urea, creatinine, haemoglobin, iron, hospitalizations, acute illness, blindness, age, gender, living with someone, working status, administration of antidepressants or antipsychotic medications, and maintenance of sex life, explaining 43% of the variance of PCS and 35% of MCS. The type and relevance of the explanatory variables differed along the various dimensions of HRQL. As a conclusion we underline the entwining of biological, sociodemographic and psychosocial factors as determinants of health related quality of life patients with end stage renal disease, thus supporting the multidimensional definition and modelling of the construct.

Key Words: Determinants, quality of life, dialysis, Uruguay.

Título: Determinantes de la calidad de vida relacionada con la salud de pacientes en diálisis de Uruguay.

Resumen

Existen pocos estudios sobre la percepción subjetiva de la calidad de vida relacionada con la salud (HRQL por sus siglas en inglés) en pacientes renales cursando su etapa terminal, que vivan en países no industrializados. El propósito de este estudio fue comprender las relaciones subyacentes entre los diferentes determinantes de la calidad de vida relacionada con la salud, en los pacientes en tratamiento sustitutivo renal en Uruguay. Se realizó un estudio transversal en una muestra de 243 pacientes de cinco centros de hemodiálisis y diálisis peritoneal de la ciudad de Montevideo (edad media de 56,6 años, SD 16,2; 58% hombres). Se realizó un análisis de regresión lineal univariado para cada variable

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independiente. Se incluyó un total de 61 variables independientes biológicas/clínicas, sociodemográficas y psicosociales. La HRQL fue evaluada utilizando el cuestionario SF-36, que consta de ocho subescalas, más el Componente de Resumen Físico (PCS) y el Componente de Resumen Mental (MCS). Aquellas variables que mostraron una asociación significativa en el análisis univariado ($p < 0.10$) fueron incluidas en un análisis de regresión multivariado. Fueron estudiados diez modelos de regresión, para las 8 subescalas del SF-36, el PCS y MCS. Quince variables fueron significativas en los modelos multivariados: tiempo en tratamiento sustitutivo renal, urea, creatinina, hemoglobina, hierro, hospitalizaciones, enfermedades agudas, ceguera, edad, género, vivir con alguien, situación laboral, administración de antidepresivos o de antipsicóticos y mantenimiento de la vida sexual; explicando el 43% de la varianza de PCS y el 35% de MCS. El tipo y relevancia de las variables explicativas difieren a lo largo de las diversas dimensiones de la HRQL. Destacamos como conclusión el entrelazamiento de factores biológicos, sociodemográficos y psicosociales como determinantes de la calidad de vida relacionada con la salud en los pacientes renales cursando su etapa terminal, lo que apoya la definición y modelado multidimensional del constructo.

Palabras clave: Determinantes, calidad de vida, diálisis, Uruguay.

Background

In the last decades, noteworthy advances in the quality of renal replacement treatments (RRT) have been observed. With treatments being now accessible to elderly patients and to those with precarious clinical status there is an increasing concern as for the impact of the RRT in patients' overall health related quality of life (HRQL). In the context of a health system with limited financial resources, as those prevailing in Latin-American countries, ongoing evaluations of treatment results can lead to better adequacy of treatments, better allocation of resources consistent with better patients' quality of life and satisfaction with treatment.

HRQL enhancement has become a main goal in nephrology and other clinical settings [1, 2, 3, 4]. The impact that renal replacement treatments have on HRQL is well known [5-8]. Several factors have been identified as affecting patients' HRQL in studies carried on in industrialized countries [9-16].

A systematic review of papers referring to the association of several biomarkers and HRQL in dialysis [17] showed that adequacy of dialysis (Kt/V), calcium level, parathyroid hormone level and the calcium-phosphorus product had a weak or even null effect on HRQL; hematocrit had a little to moderate association specially with the physical component of HRQL while albumin and creatinine serum levels and the body mass index were important predictors of quality of life. These

findings have supported the need of implementing better nutritional programs in the dialysis units. A recent study carried out in Brazil reported that albumin was associated with several domains of SF-36, while the calcium-phosphorus product was only associated with the Vitality dimension [18]. Other studies reported that perception of social support had a significant correlation with HRQL in end stage renal disease (ESRD) patients [19], and even more important, that patients' perception of the adequacy of their social support -as measured by the discrepancies between expected and received social support- could be an independent predictor of mortality in dialysis patients [20]. Depression has an important impact on HRQL and has also been associated with poorer outcomes in morbidity and mortality [21-23].

There are limited studies on these issues in South-American Spanish speaking populations that could shed light on the particular perceptions of patients with ESRD replacement treatment living in non-industrialized countries. Uruguay has the second highest prevalence of renal dialysis in Latin America, yet little is known about its impact on the patients' general sense of well-being [24, 25].

The purpose of this study was to describe the impact on quality of life in a sample of Uruguayan patients with ESRD, and to understand the underlying relationships among the different determinants of HRQL.

Material and methods

A cross-sectional study design was used with a convenience sample of Spanish-speaking Uruguayan patients undergoing hemodialysis or peritoneal dialysis as a first step toward the implementation of a longitudinal evaluation of HRQL in major centers of the country.

All patients older than 18 years of age attending five centers of the city of Montevideo were eligible. A total of 303 patients (approximately 10% of the country dialysis population) were approached during a 6 month period; 243 responded to the survey while 60 patients refused to participate or were excluded due to various reasons (cognitive deficits, severe psychiatric disorders) or were too sick to complete the questionnaires, with a response rate of 80%. Patients filled out the questionnaires by self-administration or assisted by an interviewer according to their preferences. In case of hemodialysis, the patients completed the forms during the dialysis procedure. Peritoneal dialysis patients responded prior to the clinical control.

Data on biomedical and sociodemographic variables were obtained from the patients records. Data on nutritional variables and compliance with diet were obtained from the records by the nutritionist. Mental health status data were obtained from the medical records of the consultation liaison psychiatry interviews.

This study was reviewed and approved by the Review Boards of the participating institutions and by the Ethics Committee of the Hospital de Clínicas (Universidad de la República); patients were informed and signed written consent. All personal data was handled according to national regulations to ensure confidentiality.

Independent variables

Independent variables were grouped in three categories: biological/clinical, sociodemographic, psychosocial, including mode of questionnaire administration. The 46 biological/clinical variables included in the analyses are listed in table 1.

Ten sociodemographic variables were included: age, gender, race, marital status, living arrangement, education, working status, family income, satisfaction with income, health coverage (Table 1).

The five psychosocial variables were prescription of antidepressants, prescription of benzodiazepines, prescription of antipsychotics, sexuality, and mode of administration of the questionnaire (Table 1).

Dependent variables

Several instruments, both generic and specific questionnaires, have been used to evaluate the quality of life of dialysis patients. For the purpose of our study, the Medical Outcomes Study 36-Item Short Form Health Survey was chosen as it was the most widely used HRQL questionnaire in the ESRD population [26]. It is brief, easy to administer, and as a generic instrument, it allows comparisons with other populations of chronic patients. Specific instruments such as the Kidney Disease Quality of Life Instrument (KDQOL) [27] can provide additional information on HRQL issues of patients in dialysis but the 80 item version available in Spanish at the time of the study represented a significant higher burden for respondents. HRQL outcomes were evaluated using the SF-36 Health Survey eight subscales, Physical Component Summary (PCS) and Mental Component Summary scores (MCS) [28]. It is a self-administered questionnaire, also useful for interviewer administration, consisting of 36 items that assess 8 dimensions of health status, Physical Function (PF), Role Physical (RP), Bodily Pain (BP), Vitality (VT), General Health (GH), Social Function (SF), Role Emotional (RE), and Mental Health (MH). For each dimension the items are recoded, aggregated and transformed into a range from 0 to 100, with higher scores meaning better health status for that dimension. Two summary measures, the PCS and the MCS can be calculated by a combination to the ratings for each dimension that are standardized for the United States population norms so that a score of 50 (SD 10) is the population mean. Several studies have addressed the psychometric properties of the SF-36 in Spain [29] and in Uruguayan patients showing good reliability and validity [30, 31]. Permission from the developers was obtained.

Statistical analysis

Ten separate outcome measures were evaluated which correspond to the SF-36 eight subscale, PCS and MCS scores.

Univariate linear regression analysis was first performed for each independent variable. Variables shown to have significant association in the univariate analysis were included in a multivariable regression analysis. A statistical level of $p < 0.10$ was set in order to be more inclusive at the time of selecting possible determinant factors.

All the variables included in the analyses are listed in table 1. Continuous and categorical variables were entered in the models. For the analyses, dummy variables were created for several categorical variables as follows, treatment modality (hemodialysis vs peritoneal dialysis); no vs yes for: previous transplant, predialysis program (clinical follow-up prior to dialysis); Kt/V >1.20, urea >1.7g/l, hemoglobin >10g/l, treatment with erythropoietin, calcium >10.5, albumin >3.5 g/l, hypertension, diabetes, glomerulonephritis, insulin

treatment, blindness, lower limb amputation, peripheral vascular disease, ischemic heart disease, revascularization, other heart diseases, pulmonary disease, cerebrovascular disease, chronic liver disease, malignancies, acute illness, hepatitis B, hepatitis C; compliance with diet (very often or always vs never or sometimes); hospitalization (yes vs no), gender (female vs male), ethnicity (Caucasian and White Latin vs others), marital status (unmarried vs married couple), living with someone (no vs yes), education (below vs above 6th grade), working status (unemployed vs employed), family income (less or more than 750 US dollars per month), satisfaction with income ("I am in need" or "not enough for my needs" vs "I get enough" or "I can save"), health coverage (public vs private hospital); no vs yes for antidepressants, benzodiazepines, antipsychotics; sexuality (sexual activity present no

<i>BIOLOGICAL VARIABLES</i>		<i>BIOLOGICAL VARIABLES</i>	
Tx modality (Hemodialysis) n (%)	205 (84.4%)	Ischemic heart disease n (%)	35 (14.4%)
Previous transplant n (%)	12 (4.9%)	Revascularization n (%)	10 (4.1%)
Predialysis program n (%)	139 (57.2%)	Other Heart Diseases n (%)	46 (18.9%)
Mean RRT in years (SD)	5.0 (4.3)	Pulmonary Disease n (%)	23 (9.5%)
Mean Present RRT in years (SD)	4.7 (4.2)	Cerebrovascular disease n (%)	21 (8.6%)
Mean Kt/V (SD)	1.3 (0.4)	Chronic liver disease n (%)	3 (1.2%)
Kt/V > 1.20 n (%)	109 (44.9%)	Malignancies n (%)	14 (5.8%)
Mean Urea g/l (SD)	1.4 (0.3)	Acute illness n (%)	11 (4.5%)
Urea >1.7g/l n (%)	47 (19.3%)	Hepatitis B n (%)	12 (4.9%)
Mean Creatinine mg% (SD)	8.2 (2.6)	Hepatitis C n (%)	18 (7.4%)
Mean phosphate mg% (SD)	5.6 (1.4)	Mean weight gain kg	2.5 (1.2)
Mean Hematocrit %	31.5 (4.9)	Compliance with diet "very often or always" n (%)	142 (73.8)
Mean Hemoglobin g/l (SD)	10.3 (1.7)	Hospitalization n (%)	83 (34.2%)
Hemoglobin >10g/l	130 (53.7%)	<i>SOCIODEMOGRAPHIC VARIABLES</i>	
Erythropoietin n (%)	115 (47.3%)	Mean Age (SD)	56.6 (16.2)
Mean serum iron microg (SD)	83.1 (33.1)	Gender (Male) n (%)	141 (58%)
Mean calcium mg% (SD)	8.9 (1.0)	Race (Caucasian and White Latin) n (%)	224 (92.6%)
Calcium >10.5 n (%)	8 (3.3%)	Marital status (married/unmarried couple) n (%)	144 (59.3%)
Mean serum Ferritin microg/ml (SD)	393.6 (338.0)	Living with someone n (%)	241 (99.2%)
Mean Albumin g/l (SD)	4.4 (3.2)	Education (> 6 th grade) n (%)	181 (74.5%)
Albumin >3.5 g/l n (%)	140 (57.6%)	Working status (employed) n (%)	95 (39.4%)
Hypertension n (%)	180 (74.1%)	Family Income (> 750 US\$) n (%)	80 (32.9%)
Diabetes (all cases) n (%)	36 (14.8%)	Satisfaction with income "I get enough" & "I can save" n (%)	140 (57.6%)
Glomerulonephritis n (%)	55 (22.6%)	Health coverage (Private Hospital) n (%)	159 (65.4%)
Insulin treatment n (%)	16 (6.6%)	<i>PSYCHOSOCIAL VARIABLES</i>	
Blindness n (%)	12 (4.9%)	Antidepressives n (%)	18 (7.4%)
Lower limb amputation n (%)	5 (2.1%)	Benzodiazepines n (%)	65 (26.7%)
Peripheral Vascular Disease n (%)	27 (11.1%)	Antipsychotics n (%)	5 (2.1%)
		Sexuality n (%)	66 (27.2%)
		Self administered n (%)	151 (63.4%)

Table 1. Description of the Biological/clinical, Sociodemographic and Psychosocial Variables N=243.

vs yes); questionnaire administration (administered by interviewer vs self-administration).

The most recent laboratory results at the time of completing the questionnaires were used for the analyses.

A hierarchical regression model was applied starting with the clinical/biological variables, followed by sociodemographic and psychosocial ones. The level of significance for the multivariable regression model was set at $p < 0.05$. Collinearity diagnostics were performed by means of the variance inflation factors (VIF) for each independent variable entered in the ten regression equations. A rule of thumb for evaluating VIFs is to be concerned with any value larger than 10.0 [32].

Results

The description of the 243 patients included in the study in terms of the biomedical, psychosocial and sociodemographic characteristics are presented in table 1.

Significant differences were observed between participants and non-participants with a higher frequency of patients on hemodialysis ($p=0.03$), with low albumin level ($p=0.02$), low family income ($p < 0.001$), living alone ($p < 0.001$), and with no sexual activity ($p < 0.001$) among those who were excluded or refused to participate ($n=60$).

Table 2 shows SF-36 subscales and summary components mean scores and SD. Cronbach alpha coefficients showed good reliability for the instrument in our sample of patients.

The descriptive analysis showed RRT had a severe impact on the physical dimensions of HRQL with PCS mean score values close to one standard deviation below the population mean, while MCS mean score was similar to the population mean.

The results of the univariate linear regression analysis for those variables that were significant at the $p < 0.10$ level for the eight dimensions of the SF-36 and physical and mental component summaries are presented in table 4 (also accesible on line). Three variables were excluded assuming collinearity: treatment modality, haemoglobin g/l, and diabetes with complications. The following variables were included in the multivariable analyses: renal replacement treatment in years (RRTy), present renal replacement treatment in

SF-36 Version 1 Spanish for Uruguay		
Subscales	Mean (SD)	Cronbach alpha coefficients
Physical Functioning PF (10 items)	65.0 (28.0)	0.91
Role Physical RP (4 items)	53.9 (42.6)	0.88
Bodily Pain BP (2 items)	65.8 (29.0)	0.85
General Health GH (5 items)	55.4 (21.7)	0.72
Vitality VT (4 items)	60.9 (23.1)	0.82
Social Functioning SF (2 items)	77.3 (26.6)	0.72
Role Emotional RE (3 items)	79.3 (35.9)	0.87
Mental Health MH (5 items)	69.6 (23.5)	0.85
Physical Component Summary PCS	41.3 (10.0)	
Mental Component Summary MCS	49.6 (12.7)	

Table 2. Scores and reliability of the SF-36 in the study sample.

years (PRRT), predialysis program, and several serum parameters, urea g/l; urea > 1.7 g/l; Kt/V, Kt/V-urea IV (high Kt/V and high urea), creatinine mg%, phosphate, hematocrit, haemoglobin > 10 g/l, erythropoietin, serum iron, calcium > 10.5 ; albumin > 3.5 g/l, hospitalization in the last year, compliance with diet, hypertension, weight gain in kg, acute illness, diabetes, insulin treatment, blindness, peripheral vascular disease, lower limb amputation, pulmonary disease, cerebrovascular disease, glomerulonephritis, and hepatitis C, age, gender; marital status; living arrangement, working status, family income, prescription of antidepressants, prescription of benzodiazepines, prescription of antipsychotics, sexuality, and mode of questionnaire administration.

The results of the multivariable analyses (Table 3) showed that fifteen variables were significantly associated with at least one outcome variable ($p < 0.05$). Six variables (urea > 1.7 g/l; haemoglobin > 10 g/l, serum iron, acute illness,

hospitalization, age) explained 43% of the variance of the PCS scores (R^2 Adj=0.25; $p=0.001$); while four variables (creatinine mg%, hospitalization, living with someone, antipsychotics) explained 36% of the variance of the MCS scores (R^2 Adj =0.15; $p=0.02$).

The multivariable models were statistically significant for Physical Functioning with five explanatory variables: hospitalization, blindness, age, gender, working status (R^2 Adj=0.37; $p<0.000$); Role Physical with three explanatory variables: hospitalization, age, antidepressants (R^2 Adj =0.22 $p=0.004$); Bodily Pain with four explanatory variables: RRT in years, urea g/l, age, and gender (R^2 Adj =0.21 $p=0.002$); Vitality with three explanatory variables: age, living with someone, sexuality (R^2 Adj =0.23 $p=0.001$); Mental Health with three explanatory variables: hospitalization, living with someone and sexuality (R^2 Adj =0.15).

The multivariable models were not significant for the General Health, Social Functioning, and Role Emotional subscales.

Discussion

In our study, while the SF-36 PCS mean score values were close to one standard deviation below the population mean, the MCS mean score was similar to the population mean. However, considering the SF-36 subscales and summary components, we found scores that were higher than those observed in international samples of three continents in both the physical and mental dimensions of the questionnaire [5]. Similarly, a study indicated important differences in HRQL among patients of different ethnic groups in the United States with Hispanic patients reporting higher PCS and lower MCS scores [7].

The number of hospitalizations in the last year showed a significant impact across several dimensions of HRQL. Several studies have addressed the importance of HRQL as a predictor of adverse events in dialysis. The DOPPS study showed that lower scores in the three summaries of the KDQOL-SF (PCS, MCS and Kidney Disease Component Summary) were significantly associated with higher risk of hospitalization and death, and had a greater capacity to identify patients

at greater risk than albumin which has previously been recognized as a key marker among dialysis patients. This association was found independent of a series of demographic and comorbidity factors [8]. Having more information about the correlates of hospitalizations for these patients may help provide insight into interventions that can reduce the risk of hospitalizations and reduce the ancillary costs for patients with end-stage renal disease. Knowing which patients are more likely to need hospitalization can help target higher-risk patients for less expensive interventions and allocate resources for hospital care [9, 33].

In our study, levels of haemoglobin higher than 10 g/l were associated with higher levels of HRQL as measured by the PCS. Similar results have been reported elsewhere [34], showing that the maximal increase in HRQL per change in haemoglobin level occurred in the range of 10–12 g% [35-36].

Time in dialysis was associated with higher bodily pain. However no other associations were found with other outcome variable in our study. In a Brazilian study, they found that time in dialysis was only associated with the Physical Function domain of the SF-36 [17].

We found no differences in HRQL according to treatment modality in the multivariable model. There is evidence showing that renal transplant recipients experience better HRQL than those patients undergoing peritoneal dialysis or hemodialysis [4]. However, it is not clear whether there are any differences between the latter two treatments [37].

Pain control is a common problem in dialysis [38-41]. We identified several factors associated with higher levels of pain such as RRT in years, older age, female gender, and lower serum urea levels.

No relationship was found between albumin and HRQL. However, higher level of urea, indicating higher protein intake and better nutritional status, were significantly related to better HRQL as measured by the PCS. A recent study however could not demonstrate association between nutritional status and HRQL [14].

Several sociodemographic variables were significant determinants of HRQL in our sample of patients. Significant associations were found between age and the physical subscales of the

	Physical Functioning	Role Physical	Bodily Pain	General Health	Vitality	Social Functioning	Role Emotional	Mental Health	PCS	MCS
	Standard $\beta\delta$ (t statistics)	Standard $\beta\delta$ (t statistics)	Standard $\beta\delta$ (t statistics)	Standard $\beta\delta$ (t statistics)	Standard $\beta\delta$ (t statistics)	Standard $\beta\delta$ (t statistics)	Standard $\beta\delta$ (t statistics)	Standard $\beta\delta$ (t statistics)	Standard $\beta\delta$ (t statistics)	Standard $\beta\delta$ (t statistics)
BIOLOGICAL VARIABLES										
RRT in years			-0.22 (-2.10) a							
Urea g/l			0.26 (2.70) b						0.20 (2.09) a	
Creatinine mg%										-0.20 (-1.95) a
Hemoglobin >10g/l									0.17 (1.91) a	
Serum iron mg%							0.22 (2.21) a		-0.18 (-2.03)	
Hospitalization	-0.22 (-2.8) b	-0.28 (3.11) b		-0.19 (-1.99) a		-0.25 (-2.57) b		-0.22 (-2.43) a	-0.22 (-2.54) b	-0.20 (-2.12) a
Acute illness									-0.19 (-2.01)	
Blindness	-0.18 (-2.3) a			-0.21 (-2.06) a						
SOCIODEMOGRAPHIC VARIABLES										
Age	-0.31 (3.21) b	-0.32 (-2.86) b	-0.24 (-2.21) a		-0.23 (-2.19) a				-0.27 (-2.5) b	
Gender	0.17 (2.0) a		0.31 (3.34) b							
Living with someone					0.27 (3.04) b	0.20 (2.03) a		0.19 (2.06) a		0.26 (2.70) b
Working status	0.21 (2.29) a									
PSYCHOSOCIAL VARIABLES										
Antidepressives		-0.21 (-2.34) a								
Antipsychotics										-0.23 (-2.5) b
Sexuality					0.18 (2.17) a			0.21 (2.31) a		
N	243	243	243	243	243	243	243	243	243	243
R ²	0.52	0.39	0.40	0.27	0.42	0.26	0.29	0.36	0.43	0.36
Adjusted R ²	0.37	0.22	0.21	0.37	0.23	0.030	0.06	0.15	0.25	0.15
Model F	3.44	2.02	2.11	0.27	2.24	1.13	1.28	1.78	2.33	1.73
p	<0.000	0.004	0.002	0.284	0.001	0.314	0.176	0.015	0.001	0.020

Standard. $\beta\delta$ = Standardized coefficient $\beta\delta$

a: p<0.001; b: p< 0.01

Table 3. Multiple regression analyses of HRQL outcome variables

SF-36 (Physical Functioning, Role Physical, Bodily Pain, Vitality and the Physical Component Summary). However, age was not significantly associated with mental dimensions of the SF-36. It is worth mentioning that, as stated by Valderrábano et al., the impact of ESRD on HRQL could be less in elderly patients in comparison with their healthy mates than it is between younger patients and the general population [4].

As for gender, females reported lower levels of physical well-being and higher levels of pain. These findings are consistent with other studies reporting that women had significantly lower scores than males in symptom burden scales (Physical Functioning, Bodily Pain, and Vitality) [9, 16].

The patient's living arrangements (living alone vs living with others) was included as an indirect indicator of social support showing that patients living with another person had higher scores in Vitality, Social Functioning, Mental Health.

In our sample, 7.4% of the patients had been diagnosed as having depression by a psychiatrist and were receiving treatment with antidepressant drugs. The prescription of antidepressants was related only with the Role Physical dimension of the SF-36 in the multivariable model. The prescription of antipsychotics was associated with Role Emotional and the MCS scores. The use of this type of medication is most commonly aimed at controlling behavioral problems related with chronic cognitive deficits, delirium or personality disorders, or as mood stabilizers. Since psychiatric diagnosis were not collected for the purpose of our study, there is lack of information on the reasons for the prescription of antipsychotic drugs in our sample of patients.

A major limitation of this study was the high number of patients who refused or were unable to fill out the questionnaires, 19.8% of total patients eligible for the study. Non respondents differed in relevant variables in relation to those who responded (level of haemoglobin, albumin, family income, living arrangements and sexual activity), that might have biased our results. Differences between respondents and non-respondents may have other implications as mortality and the risk of hospitalization might be higher in the non-respondent group [8].

Another important limitation refers to the exploratory nature of the study. However, considering that this is the first report in Uruguay, and the very scarce data available on the impact of dialysis on HRQL in the South American region, we believe our results represent an important input to other researchers in the region. Based on these results our group is developing an ongoing longitudinal study of several centers along the country. In the meantime, these data might help to define better treatments and a better health policy.

Several variables potentially associated with HRQL in this group of patients were not included in the study. These variables such as early vs late start of dialysis, nocturnal dialysis, transportation and community resources, quality and satisfaction with doctor-patient relationship, spirituality, or religious involvement have shown impact in other studies [13, 18, 42-47] and should be included in future research.

There are few published reports on multivariable analysis of the determinants of HRQL in ESRD patients in South American Spanish-speaking populations that could shed light on the particular perceptions of patients living in this region. This fact prevents us from making assumptions on the generalizability of the results. A recent study conducted in patients undergoing hemodialysis in Chile using a univariate methodology reported that HRQL was significantly affected by age, the presence of diabetes and coronary artery disease, poor nutritional status and a low educational and socioeconomic level, but other variables that were found relevant in our study such as hemoglobin level were not significant [48]. In spite of these differences, considering the cultural, ethnic, and socioeconomic similarities, we might expect similar findings in other countries of the Latin America Southern Cone that would be a relevant hypothesis for future transnational studies.

Conclusions

This study could identify a set of variables of biomedical, sociodemographic and psychosocial nature able to significantly affect the quality of life of patients undergoing dialysis. We underline the entwining of these factors as determinants of end stage renal disease patients health related quality

of life, thus supporting the multidimensional definition and modelling of the construct. The importance of those factors that can be modified to enhance the patient's health related quality of life was also emphasized.

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