

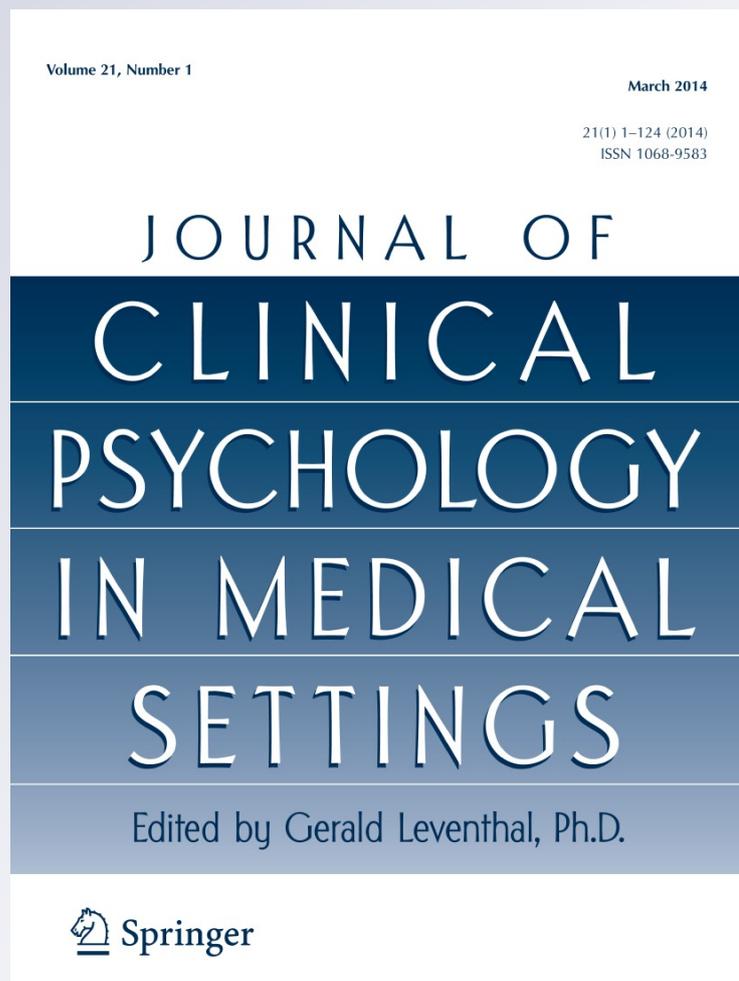
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# Motivational Interviewing Promotes Adherence and Improves Wellbeing in Pre-Dialysis Patients with Advanced Chronic Kidney Disease

Helena García-Llana · Eduardo Remor ·  
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**Abstract** Low rates of adherence to medical treatments and adverse emotional states are a widespread problem in advanced chronic kidney disease (ACKD). Motivational interviewing using the stages of change model is an effective combination in promoting behavior modifications. The objective of the present study was to determine the effectiveness of an individual, pre-dialysis intervention program (monthly sessions of 90 min over a 6-month period) in terms of adherence, emotional state and health-related quality of life (HRQL). Forty-two patients were evaluated for adherence, depression, anxiety and HRQL with standardized self-report questionnaires. Biochemical markers were also registered. The results show that after the intervention, patients reported significantly higher levels of adherence, lower depression and anxiety levels, and better HRQL (i.e., general health and emotional role domains). Biochemical parameters were controlled significantly better after the intervention, except for iPTH. These findings highlight the potential benefit of applying individual psycho-educational intervention programs based on motivational interviewing and using the stages of change

model to promote adherence and wellbeing in ACKD patients.

**Keywords** Chronic kidney disease · Adherence · Psychoeducation · Psychological state · Adults

## Introduction

Chronic loss of kidney vital functions leads to the development of chronic kidney disease. This process has five stages, of which stage 5 is the most severe. Progression between stages depends on the severity of renal failure mechanisms. In advanced chronic kidney disease (ACKD), stages 4 and 5 (ACKD 4–5), there is a severe reduction in glomerular filtration rates,  $GFR < 30$  ml/min (Soriano, 2004). The pillars of medical treatment for renal patients at any stage, but particularly those in the advanced stage, involve strict control of cardiovascular risks (arterial hypertension, hyperphosphatemia, vascular calcifications and anemia), adequate nutrition management and specific monitoring of uremic repercussions. The objective is to slow the progression of the disease as well as to prepare the patient for renal replacement therapy. There are three available therapies: hemodialysis, peritoneal dialysis and kidney transplantation. Chronic kidney disease, like other chronic diseases, is a serious public health problem because of its high prevalence, high cost and its significant associated morbidity and mortality (Alcazar, Orte, & Otero, 2008). The Epidemiological Study of Chronic Renal Disease in Spain, carried out by the Spanish Nephrology Society (Otero, Francisco, Gayoso, García, & EPIRCE Study Group, 2010) states that 6.8 % of the Spanish population suffers from chronic kidney disease at stages 3–5, including 3.3 % of 40–64 year olds and 21.4 % of those

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over 64 years of age. Mortality in ACKD is elevated: the global mortality of patients in renal replacement therapy was 8.04 % in 2007 (Sánchez-Tomero, 2010).

Current care in ACKD advocates three fundamental and complementary practices in order to provide quality care: early referral, patient-centered education and interdisciplinary teams (Covic, Bammens, Lobbedez et al., 2010; Orte & Barril, 2008; Powe, 2003). This last practice is especially important since the diagnosis of ACKD entails a complex set of physical, social and emotional demands that result from the perception of the illness as a threat capable of overwhelming the coping skills of the patient and the health care providers. Biological and emotional dimensions are both important in health psychology in general and in nephrology health care in particular (SantaCruz, Rangel, Navas, & Bolivar, 2006).

As described in literature, multidisciplinary pre-dialysis teams, composed of nephrologists, nurses, dieticians, social workers and psychologists, are necessary to improve patient knowledge about dialysis treatment, to promote adherence to prescriptions and to enhance coping skills with a highly demanding health condition (Fox and Kohn, 2008; Levin et al., 2008). For example, Fayer, Nascimento, and Abdulkader (2011) compared two groups of ACKD patients with late and early referral. It was demonstrated that early care from a nephrologist led to better metabolic control. However, care from a nephrologist alone was not enough to mitigate the psychological burden of the disease.

Indeed, outcome studies evaluating the psychological impact of dialysis have reported that depressive symptoms are very common upon initiation of this treatment (Watnick, Kirwin, Mahnensmith, & Concato, 2003). Impairments in nutritional and biological markers (i.e. albumin and hemoglobin) are also observed upon the initiation of hemodialysis treatment and have been associated with a decline in the psychological dimensions of health-related quality of life (HRQL) (Fukuhara et al., 2007; Walters, Hays, Spritzer, Fridman, & Carter, 2002). In summary, the progressive decline in glomerular filtration rate is associated with a progressive deterioration in HRQL, as well as an increase in the frequency and severity of certain psychological symptoms and their impact (Alvarez-Ude & Rebollo, 2008). The extent to which these poor mental and physical indicators are related to inadequate pre-dialysis educational care remains to be determined.

Screening adherence should be one of the bases of adequate pre-dialysis educational care. Adherence is a complex and multidimensional behavior (Remor, 2011) and implies active and collaborative involvement from the patient with great emphasis on the patient's role in deciding to carry on with a particular treatment (Bezher, Laws, Taubin, Rifkin, & Wilson, 2012). A lack of adherence behavior in patients is often due to the complexity of the

regimens they are put on (consumption of oral medication, strict diet and specific cooking procedures), which create the demanding lifestyle changes needed to control kidney disease progression. Poor adherence constitutes an extensive problem in patients with ACKD and causes severe consequences for patients, even death (Leggat et al., 1998; Rosenthal, Ver Halen, & Cukor, 2012).

Promoting behavior change and adherence is complex and difficult. One approach that has been proposed is the transtheoretical model (stages of change model). Intervention based on this model conceives behavioral change as a process, not a dichotomous event (Prochaska & DiClemente, 1982). These authors described a series of stages (precontemplation, contemplation, preparation, action and maintenance) through which a person passes in the process of changing a particular behavior. When using this model, the goal is to achieve action or maintenance of the desirable behavior. Professionals must use various communication strategies to motivate the patient depending on the patient's current stage of change. Motivational interviewing is a skillful clinical method, a style of counseling and psychotherapy that is widely used in medical settings to promote autonomy for self-direction based on patient goals and values (Miller & Rollnick, 2002). It can be used with patients in the early stages, when they are not ready to change, and with those in later stages, as they prepare to take action. A meta-analysis of controlled clinical trials conducted by Burke, Arkowitz, and Mencia (2003) concluded that in terms of comparative efficacy, motivational interviewing was equivalent to other active treatments and superior to non-treatment or placebo controls for problems involving alcohol, drugs and diet and exercise. There is good evidence that motivational interviewing works with people who abuse substances, so experts have been encouraged to study motivational interviewing in health settings beyond substance abuse, smoking cessation, increasing condom use and diet/exercise (Dunn, Deroo, & Rivara, 2001). As a result, motivational interviewing now has proven efficacy as an intervention to improve adherence in dialysis patients (Russell et al., 2011) and in other chronic conditions (Hill & Kavoorkjian, 2012).

Studies designed to promote adherence based on the stages of change model have been conducted with patients already on dialysis. For example, Molaison and Yadrick (2003) evaluated the effects of a 12-week-intervention based on the stages of change model to decrease fluid gain in dialysis patients. Ghaddar, Shamseddeen, and Elzein (2009) found that placement of dialysis patients into stages of change based on their readiness to comply with recommended fluid intake was an effective strategy to better understand the behavior of non-adherence. However, there is a lack of specific studies assessing educational programs for patients with ACKD during pre-dialysis care based on the stages of change.

Guidelines on management of kidney disease suggest that pre-dialysis educational programs should include lifestyle modifications and medication management, as well as other patient concern-related treatment options (Levin et al., 2008). A growing body of evidence substantiates the value of educational interventions in the management of patients on dialysis, even though limited evidence is available evaluating the effect of psychoeducational programs in pre-dialysis care. A systematic review of randomized trial educational interventions on kidney disease conducted by Mason, Khunti, Stone, Farooqi, and Carr (2008) identified only five predialysis studies out of the 22 relevant interventions to be included in the meta-analysis. Manns et al. (2005) conducted a two-phase educational intervention involving the provision of written material and a 15-min video on self-care dialysis followed by a single-session patient-centered group. The remaining studies were conducted by the same research group and included a specific psychoeducational intervention that consisted of a 75-min slide lecture presentation delivered by a non-medical health educator (Binik et al., 1993; Devins et al., 2000; Devins, Mendelssohn, Barré, Taub, & Binik, 2005). A modified version included an extended session and follow-up telephone calls evaluating—among other outcomes—anxiety, depression and social support (Devins, Mendelssohn, Barre, & Binik, 2003). Recently, three more studies have been published regarding multi-dimensional education in pre-dialysis care based on motivation empowerment (Jia, Bi, Lindholm, & Wang, 2012), the National Kidney Foundation Dialysis Outcomes Quality Initiative (NKF/DOQI) guidelines (Wu et al., 2009) and on self-management support (Chan et al., 2011). According to these studies, as well as other previous research, pre-dialysis interventions help improve knowledge about kidney disease and its treatments (Devins et al., 2000, 2003), promote quality of life (Klang, Bjorvell, Berglund, Sundstead, & Clyne, 1998), increase patient intention to choose dialysis self-care (Goovaerts, Jadoul, & Goffin, 2005; Manns et al., 2005), facilitate treatment maintenance (Rasgon et al., 1993) and extend the time to dialysis therapy (Chan et al., 2011; Devins et al., 2005; Jia et al., 2012; Wu et al., 2009). Little is known about the impact of specific psychoeducational pre-dialysis programs on adherence, psychological and HRQL outcomes, which is why efforts should be made to investigate the effect of different types of interventions on these variables.

The purpose of this study was to examine the effectiveness of a six-month individual psychoeducational session program, using the principles of the stages of change model, in promoting adherence to medical treatments, psychological state and HRQL in patients with ACKD who attended an interdisciplinary unit for intensive pre-dialysis care.

## Method

### Participants

A non-random sample of 52 patients was evaluated for the present study. They were drawn from a total of 100 patients who were being monitored in the ACKD Unit during the year of the study. All 52 patients in the study sample met the following eligibility criteria: older than 18 years; diagnosis of ACKD under pre-dialysis treatment; GFR of 20 ml/min or less; no DSM IV psychiatric diagnoses; able to read and speak Spanish; and had accepted and signed an informed consent form to participate in the program. Ten patients dropped out of the program for the following reasons: one patient changed hospitals; five patients initiated hemodialysis; three patients initiated peritoneal dialysis; and one patient died. Forty-two patients completed the program and were included in the analysis. No differences were observed between those patients who completed the intervention and those who dropped out due to unavoidable reasons. The characteristics of participants are presented in Table 1.

### Measures

Assessments were administered prior to the intervention and after the intervention. They included self-reported questionnaires and clinically-related measures. Cronbach's  $\alpha$  coefficients were calculated for the current sample ( $n = 42$ ) and are presented in parentheses.

#### *Sociodemographic and Clinical Indicators Questionnaire*

The following indicators were used: age, Charlson comorbidity index, time under care by a nephrologist, etiology of the kidney disease, number of pills daily, gender, nationality, marital status, education, employment, hypertension, hyperphosphatemia collected from patient chart; GFR, albumin, hemoglobin, potassium, calcium, phosphate and Parathyroid Hormone (iPTH) collected from routine blood and urine tests.

#### *Survey of Adherence to Treatment* ( $\alpha = 0.62$ ; García-Llana, Remor & Selgas, 2013)

Nine items adapted from a previous survey of facilitators of adherence to medical treatments in chronic patients (Remor, 2002) were applied. The survey gathers information on: the treatment, the relationship with the healthcare team, family support, knowledge of medications, self-administration of medications, perceived benefits of medications, following nephrologists' instructions, perceived effort and perceived capacity to follow treatment. In a previous study

**Table 1** Demographic and clinical characteristics of the participants who completed the intervention program ( $n = 42$ )

Demographic and clinical characteristics	Mean (SD), range	$n$ (%)
Age	64 (15.87), 20–86	
Charlson comorbidity index	6.79 (2.58), 3–12	
Time under care by a nephrologist before entering the ACKD 4–5 Unit		
<1 year		9 (22)
1–5 years		18 (44)
6–10 years		3 (7)
>10 years		12 (27)
Etiology renal disease		
Hypertension		9 (21)
Diabetes mellitus		9 (21)
Glomerulonephritis		4 (10)
Obstructive nephropathy		2 (5)
Hereditary disease		9 (21)
Unknown		7 (17)
Others		2 (5)
Number of daily pills		
0–10		20 (48)
>10		22 (52)
Gender		
Male		25 (60)
Female		17 (40)
Nationality		
Spanish		36 (86)
Others		6 (14)
Marital status		
Married		25 (59)
Single		6 (14)
Divorced		2 (5)
Widowed		9 (21)
Studies		
Primary		21 (50)
Secondary		15 (36)
University		6 (14)
Employed		
Yes		13 (31)
No		29 (69)
Hypertension		
Yes		42 (100)
No		0 (0)
Hyperphosphatemia		
Yes		15 (36)
No		27 (64)

(García-Llana, Remor & Selgas, 2013), the survey has shown a reliability of .67 ( $n = 61$ ) and evidence of validity in terms of patterns of convergence with various adherence measures (i.e., associations with the Morisky–Green–Levine Test for specific adherence to antihypertensive drugs ( $r = .24$ ,  $p < .05$ ,  $n = 61$ ) and the Morisky–Green–

Levine Test for specific adherence to phosphate binders ( $r = .20$ ,  $p < .05$ ,  $n = 61$ ). A sample of the adapted items are presented in Table 2.

*Morisky–Green–Levine Test* ( $\alpha = 0.53$ ; Morisky, Green, & Levine, 1986)

A four-item questionnaire was used to measure adherence to oral medications. The Spanish version of the scale was previously validated (Val-Jiménez, Amorós, Martínez, Fernández-Ferre, & León, 1992). A sample of the items are presented in Table 2.

*Stages of Behavior Change related to Oral Medication Compliance Assessment Scale* ( $\alpha = 0.60$ ; DiClemente et al., 1991; Prochaska & DiClemente, 1992)

A five-item scale assessing the stages of behavior change as related to medication compliance was used. We adapted the scale from previous research in our country conducted on patients with pathological gambling (Pellicer, Palau, Santos, Albiach, & Camacho, 2002). The scale consists of the following mutually exclusive questions: Are you thinking of taking every prescribed medication needed for your kidneys? (Response “no” = precontemplator); Are you thinking of taking every prescribed medication needed for your kidneys in the next six months? (Response “yes” = contemplator); Are you considering taking every prescribed medication needed for your kidneys in the next thirty days? (Response “yes” = prepared for action); Are you taking every prescribed medication needed for your kidneys? (Response “yes” = action); How many months have you been taking every prescribed medication needed for your kidney? (Response “six months or more” = maintenance). Prior to the initiation of this study, the scale was pre-tested on dialysis patients to establish face validity. In a pilot study, a psychologist evaluated understanding of the questions in a sample of 10 dialysis patients. Minor changes were made in relation to patient suggestions to improve their understanding of the questions.

*Beck Depression Inventory, Version II* ( $\alpha = 0.91$ ; BDI-II; Beck, Steer, & Brown, 1996)

A twenty-one-item Spanish version of BDI-II (Sanz, Perdígón, & Vázquez, 2003) was used to measure symptoms of depression. Higher scores indicated a higher level of depression.

*State-Trait Anxiety Inventory (STAI, S-Anxiety Subscale)* ( $\alpha = 0.52$ ; STAI, Spielberger, Gorsuch, & Lushene, 1983)

A twenty-item Spanish version (Seidedos, 1982) was used to assess state-anxiety. The data reflected on the scale are

**Table 2** Adherence related scores: results of the 42 patients before and after the intervention program

Adherence-related scores	Possible range score	Pre Mean (SD), range	Post Mean (SD), range	Statistical	$\Delta$ Mean 1–mean 2	<i>p</i> value
Survey of adherence to treatment						
Treatment information	1 nothing to 5 a lot	2.90 (1.15), 1–5	4.38 (0.74), 3–5	$t = -9.45$	-1.48	<.001
Relationship with healthcare team	1 bad to 5 good	4.33 (0.73), 2–5	4.95 (0.22), 4–5	$t = -5.12$	-0.63	<.001
Family support	1 bad to 5 good	4.43 (1.01), 1–5	4.85 (0.66); 1–5	$t = -3.18$	-0.42	<.01
Do you know every medication you need to take?	0 no–1 yes	0.70 (0.46), 0–1	0.80 (0.40), 0–1	$\chi^2 = 15.74$		<.001
Do you manage your medication yourself?	0 no–1 yes	0.88 (0.33), 0–1	0.93 (0.26), 0–1	$\chi^2 = 22.70$		<.001
Do you think medication has any benefit?	1 none to 5 a lot	3.70 (0.88), 1–5	4.68 (0.65), 3–5	$t = -7.15$	-0.97	<.001
Do you follow your nephrologists' prescriptions?	5 (100 %) to 1 (0 %)	4.31 (0.71), 3–5	4.76 (0.43), 4–5	$t = -3.80$	-0.45	<.001
Perceived effort	1 a lot to 5 nothing	4.20 (1.11), 1–5	4.95 (0.22), 4–5	$t = -4.13$	-0.75	<.001
Perceived capacity	1 a lot to 5 nothing	1.63 (0.77), 1–4	1.05 (0.22), 1–2	$t = 4.47$	-0.57	<.001
Final score (0–37) <sup>a</sup>	Min 0–Max 37	27.12 (2.74), 22–33	31.45 (2.05), 26–33	$t = -10.29$	-4.33	<.001
Test Morisky–Green–Levine		(%) no/yes	(%) no/yes	$\chi^2 = 3.36$		<.001
Do you ever forget to take the medication?	0 No–1 yes	64/36	100/0			
Are you careless with schedules?	0 No–1 yes	52/48	86/14			
When you feel well, do you stop taking medication?	0 No–1 yes	90/10	100/0			
If you ever feel bad, do you stop taking medication?	0 No–1 yes	76/24	95/5			
Final score (0–4) <sup>b</sup>	0 No (adherent)–1 to 4 yes (non-adherent)	71/29 (non-adherent)	83/16 (non-adherent)			
Stages of change		(%)	(%)	$\chi^2 = 1.79$		<.001
Precontemplation	1	17	0			
Contemplation	2	31	7			
Preparation	3	13	0			
Action	4	39	60			
Maintenance	5	0	33			
Motivational diagnosis target <sup>c</sup>	0 (1–3)–1 (4–5)	39	93			

<sup>a</sup> Higher score indicates greater degree of treatment adherence

<sup>b</sup> Non-adherence with one positive answer

<sup>c</sup> If the participant moves to the action or maintenance phase the objective of the program has been reached

of a transitory nature; that is, they should be considered a representative sample of the subject's anxiety response only at the time of administering the test. Higher scores indicate greater state-anxiety.

*Short Form 36 Health Survey, version 2 (SF-36, McHormey, Ware, & Raczeck, 1993)*

A thirty-six-item Spanish version of the SF-36v2 (Alonso, Prieto, & Antó, 1995) was used to evaluate HRQL domains.

Eight domains were included: physical function ( $\alpha = 0.93$ ), physical role ( $\alpha = 0.97$ ), bodily pain ( $\alpha = 0.72$ ), general health ( $\alpha = 0.56$ ), vitality ( $\alpha = 0.75$ ), social function ( $\alpha = 0.68$ ), emotional role ( $\alpha = 0.96$ ) and mental health ( $\alpha = 0.82$ ). Higher scores indicate greater HRQL.

#### Procedures

The study began after approval of the research protocol by the Ethics Committee for Research and Clinical Trials of

University Hospital La Paz (Madrid). Data collection was undertaken over the 12-month period from January 2010 to December 2010. All patients received information regarding the study before the assessment took place, and all gave their consent to participate. The patients did not receive any financial compensation for participating in the study, and all data was analyzed after the intervention program finished.

#### Individual Psychological Intervention Program

The six-month individual program was managed by a trained health psychologist from the ACKD Unit. Every patient entering the study attended their regular appointments with the nephrologist, the nurse and the nutritionist of the ACKD Unit.

Each patient received six individual monthly face-to-face sessions (90 min duration) with a health psychologist. Every session had two distinct aims. The first 45 min of the sessions provided training in skills that facilitated the patient's adaptation to the ACKD and its treatments, while the last 45 min helped improve adherence to medication through motivational interviewing. During the first session, behavioral health issues concerning adherence in chronic illnesses in general and specifically in ACKD were addressed through psychoeducational techniques. After, this 45-min psychoeducational segment, the stages of change model is presented by a diagram of a wheel encouraging the patient to position himself/herself in one of the five stages (precontemplation, contemplation, preparation, action or maintenance) through motivational interviewing procedures. The second session mainly provided psychoeducation on the role of emotions in the illness adaptation process, including identifying the main stressors of ACKD and self-reactions to them. After this psychoeducational approach, the last 45 min were devoted to motivational interviewing procedures. The first half of the third session included training in relaxation techniques ranging from conscious breathing to self-hypnosis techniques. The first half of the fourth session focused on strengthening self-esteem, challenging negative thought patterns, promoting the identification of limits and focusing on personal strengths, which was followed by the 45-min motivational interviewing segment. The main goal of the first 45 min of the fifth session was to provide training in assertive patterns of communication that are likely to increase social support from family and from the healthcare team members and thereby minimize ACKD-related stress. Role-play methods were used to provide training in basic assertiveness techniques such as: positive reinforcement; requesting changes; giving and accepting constructive criticism; and denying requests. After this assertive communication training, the 45-min motivational interviewing

**Table 3** Brief description of the content of individual intervention program

Contents of the session
First session
Initial 45-min
Defining adherence to medical treatment, importance to own health and how to deal with treatment
Last 45-min
The stages of change model applied to ACKD (identification of actual motivational status and final target)
Second session
Initial 45-min
Role of emotions in the illness adaptation process
Phases of the process and common emotional reactions (i.e. denial, anger, sadness, negotiation, and acceptance)
Identification of main stressors related to ACKD and self-reactions
Last 45-min
Helping move from one stage of change to another
Third session
Initial 45-min
Training in emotional self-regulation strategies (i.e. conscious breathing, and self-hypnosis techniques)
Last 45-min
Helping move from one stage of change to another
Fourth session
Initial 45-min
How ACKD affects my self-esteem
The long way to achieve balance: acceptance of limits and skills and challenging negative thought patterns
Last 45-min
Helping move from one stage of change to another
Fifth session
Initial 45-min
Assertiveness as an engine to mobilize loved ones in planning for change.
Assertive communication style and training in basic assertive skills (e.g., positive reinforcement)
Last 45-min
Helping move from one stage of change to another
Sixth session
Initial 45-min
Making the decision about renal replacement therapy options: applying problem solving strategies
Facilitating shared decision making regarding renal replacement therapy
Last 45-min
Final assessment of the stage of change after the program

segment was conducted. The first half of the sixth and last session of the program provided training in processes of shared decision making regarding treatment options,

including methods of problem solving and deliberating alternatives with health care team members. A summary of the sessions is presented in Table 3.

As previously mentioned, the last 45 min concentrated specifically on promoting adherence behavior through motivational interviewing procedures. The first session of the motivational interview begins with an assessment of the patient's readiness to use their CKD medications as prescribed. This is based on their responses to the Stages of Behavior Change related to Oral Medication Compliance Assessment Scale. The diagram of the stages of change model stands by the patient during the second part of the session's program encouraging the patient to position himself/herself at the end of each session. In order to adapt the intervention to the model, the program was based on the core constructs of the transtheoretical model: processes of change (those activities that an individual uses in an attempt to progress through the five stages), decisional balance (benefits and barriers related to adopting a specific behavior) and self-efficacy (the confidence a person has that they can perform a specific behavior). Previous research based on this model (Molaison & Yadrick, 2003) has found that the use of these constructs aids in improving the health outcomes of renal patients. Some of the main purposes of each stage of change are: facilitating awareness (precontemplation), increasing personal risk perception (precontemplation), encouraging decisional balance (contemplation), identifying and promoting new, positive outcome expectations (contemplation), providing skills training (preparation), encouraging small initial steps (preparation), rewarding efforts and achievements (action), reducing perceived effort (action), planning for follow up support (maintenance) and preventing relapses (maintenance). Following guidelines, a motivational, therapist style interview was adopted during the program (Miller, Benefield, & Tonigan, 1993). In addition, the intervention followed the recommendations from DiClemente and Velasquez (2002) to promote change. Although a description of these strategies is beyond the scope of this study, interested readers can refer to DiClemente and Velasquez (2002) and Miller and Rollnick (2002) for additional information. Two steps were taken to assure fidelity to motivational interviewing procedures. First, the therapist received intensive training in motivational interviewing procedures, including 40 h of supervised training in workshops (taught by two senior clinical psychologists with credentials from The Spanish Psychological Society—Clinical and Health Psychology Division, plus reading of manuals for motivational interviewing (e.g., Miller & Rollnick, 2002; material from <http://www.motivationalinterview.org> website) and additional 60 h of self-study. Second, throughout the entire study, from the design phase to the end of the intervention phase, an independent adviser supervised the entire process (a senior clinical psychologist with credentials from The

Spanish Psychological Society—Clinical and Health Psychology Division). Specific steps were developed by the adviser to assure therapist fidelity to Motivational Interviewing's documented procedures. These steps included actions such as ensuring that sessions included all the steps of Motivational Interviewing's documented sessions (i.e., 1. Set the agenda—find the target behavior; 2. Ask about the positive aspects of the target behavior; 3. Ask about the negative aspects of the target behavior; 4. Explore life goals and values; 5. Restate their dilemma or ambivalence then ask for a decision; 6. Set goals). Additional steps taken by the assessor were to ensure that the therapist, when approaching precontemplators, built readiness (in order to move to contemplation phase) through established rapport and trust, explored events that precipitated treatment entry and commended patients for entering treatment. These steps ensured that documented procedures were followed and that motivational interviewing was done properly.

### Statistical Analysis

Descriptive statistics were calculated, including means, SD's, and ranges for quantitative variables, and frequency tables for qualitative variables. The outcomes of the intervention were assessed at two time points, before and after the program, 6 months apart. To compare pre- and post- measures paired sample *t*-tests for quantitative variables were conducted. The  $\chi^2$  test was performed for qualitative variables at the two assessment points. Some values were missing for the clinical markers (i.e., potassium, iPTH) due to the fact that some data were not available during the study period (analytics are ordered according to the clinical needs of the patient, and there is no standard frequency other than that dictated by the patient's clinical situation). The missing values are indicated in Table 4. For all analyses, two-tailed tests were used to determine statistical significance. The SPSS/PC statistical package 17.0 version was used.

## Results

### Demographic and Clinical Data of the Participants

The characteristics of the 42 patients who were enrolled in this study are described in Table 1. The average age was 68 ( $SD = 15.8$ ). Most patients were men (60 %), married (59 %) and their prescriptions included more than 10 daily pills (52 %). Most were unemployed (69 %). Half (50 %) had completed primary education. All the participants had hypertension requiring anti-hypertensive therapy and 36 % had hyperphosphatemia requiring oral phosphate binders.

**Table 4** Psychological outcomes, HRQL and clinical markers: results of the 42 patients before and after the intervention

Outcomes	Pre Mean (SD), range	Post Mean (SD), range	<i>t</i>	$\Delta$ Mean 1–mean 2	<i>p</i> value
Psychological variables					
BDI-II	10.92 (8.47), 0–33	8.86 (7.91), 0–33	2.00	2.05	.05
STAI-S	18.22 (8.83), 1–40	14.41 (9.64), 1–47	2.33	3.81	.03
HRQL SF36v2					
Physical function	69.28 (28.03), 10–100	66.90 (24.98), 20–100	0.71	2.38	.48
Physical role	62.94 (39.48), 0–100	68.15 (29.82), 0–100	−0.87	−5.21	.39
Bodily pain	56.90 (26.91), 0–90	52.85 (31.25), 0–90	0.56	4.04	.57
General health	37.19 (16.69), 0–75	45.97 (20.47), 15–95	−3.00	−8.78	<.01
Vitality	61.10 (11.61), 0–100	51.40 (14.86), 0–100	−0.16	−0.59	.87
Social function	77.74 (24.28), 0–100	69.20 (24.38), 25–100	1.60	8.53	.11
Emotional role	71.82 (36.34), 0–100	77.57 (27.88), 0–100	−2.80	−5.75	<.01
Mental health	67.14 (21.61), 20–100	72.26 (21.61), 15–100	−1.40	−5.12	.17
Clinical markers					
Creatinine clearance	18.53 (4.62), 12.00–22.00	18.42 (5.57), 9.20–26.90	0.16	0.11	.88
Albumin	3.06 (0.49), 2.30–4.60	3.57 (0.50), 2.20–4.50	0.40	0.02	.69
Hemoglobin	11.81 (1.21), 9.40–14.50	11.79 (1.13), 7.90–3.90	0.83	0.01	.93
Potassium <sup>a</sup>	4.77 (0.57), 3.80–5.80	4.68 (0.46), 3.80–5.80	1.03	0.09	.31
Calcium	9.29 (0.67), 7.70–11.70	9.17 (0.45), 7.90–10.00	1.24	0.11	.22
Phosphate	4.00 (0.82), 2.50–6.00	4.27 (0.82), 2.80–6.40	−2.26	−0.27	.03
iPTH <sup>b</sup>	192.0 (151.31), 22.00–733.00	191.00 (170.00), 32.00–976.00	0.33	5.73	.74

<sup>a</sup> Potassium (8 patients without analytics, *n* total 34)

<sup>b</sup> iPTH (7 patients without analytics, *n* total 35)

#### Adherence Results for the ACKD Patients in Pre-Dialysis Before and After the Individual Intervention Program

As shown in Table 2, patients reported better adherence to treatments after the individual session program as measured by the adherence to treatment survey ( $p < .001$ ) and by the Morisky–Green–Levine Test ( $p < .001$ ). This result means that the rates of non-adherence to oral medication, as measured by the Morisky–Green–Levine Test, decreased significantly from before the intervention (29 %) to after the intervention (16 %). Regarding the stages of change model, at the beginning of the program 39 % of the participants were at the action stage, and by the end of the program this percentage had increased to 60 % with an additional 33 % at the maintenance stage. In summary, 93 % of participants reached their motivational diagnosis target after the intervention program ( $p < .001$ ).

#### Psychological and HRQL Results of the ACKD Patients in Pre-Dialysis Before and After the Individual Intervention Program

Depression levels significantly decreased from before ( $M = 10.92$ ) to after ( $M = 8.86$ ) the intervention, as did anxiety levels (from  $M = 18.22$  to  $M = 14.41$ ). Related to HRQL, scores on the General Health subscale increased

significantly (from  $M = 37.19$  to  $M = 45.97$ ), as did scores on the Emotional Role subscale (from  $M = 71.82$  to  $M = 77.57$ ). No effects were found in the other domains of HRQL. Details are shown in Table 4.

#### Clinical Markers of the ACKD Patients in Pre-Dialysis Before and After the Individual Intervention Program

Data regarding biological markers related to kidney disease progression were included and analyzed (see Table 4). Comparisons of the outcomes before and after the program showed that serum phosphate levels increased significantly with the intervention (from  $M = 4.00$  mg/dl to  $M = 4.27$  mg/dl). In order to study changes in clinical markers in more depth, we transformed quantitative laboratory data into a dichotomous variable (non-controlled value vs. controlled value) based on values stated by the NFK/KDOQI guidelines. A crosstabs analysis indicated that, except for iPTH, all biological markers were better controlled after the intervention program. See Table 5.

#### Discussion

The present study reports the effects of an individual pre-dialysis intervention program for CKD on adherence,

depression, anxiety and HRQL. As previously mentioned, there was a lack of specific studies on this matter. To our knowledge, this is the first study to examine psychological, clinical-related and HRQL outcomes in a Spanish sample of ACKD patients after an individual intervention program.

In this study we have demonstrated that an intervention based on the stages of change model and motivational interviewing techniques was effective in promoting adherence in pre-dialysis patients in terms of various outcomes (i.e., self-reported adherence and readiness to change related to oral medication compliance). We have presented a theoretically guided study, which makes it more than a program evaluation study. The stages of change model has been employed to conceptualize both the intervention and the outcome measures. The intervention is guided by a theoretical framework that conceptualizes the behavior we wanted to change and by using a method, the motivational interviewing technique, which facilitates such change. These study findings are consistent with other studies based on motivational interviewing techniques conducted in ACKD populations to improve adherence to exercise (Van Vilsteren, De Greef, & Huisman, 2005), fluid management (Fisher et al., 2006) and self-care management for oral medication (Van Zuilen, Wetzels, Bots, Van Blankenstijn, & MASTERPLAN Study Group, 2008). There has been considerable interest from medical professionals in utilizing motivational interviewing-based programs to address adherence in the field of chronic health behaviors related to high cardiovascular risk in diabetes (Greaves et al., 2008), obese female cardiac patients (Low, Giasson, Connors, Freeman, & Weiss, 2012), and co-existing diabetes and ACKD (Williams, Manias, Walker, & Gorelik, 2012). The complexity of chronic medical regimes and a lack of therapeutic communication strategies to assess and promote patient adherence makes it difficult for healthcare professionals to design interventions in this area. There are still challenges in physician-patient communication about medication use, and discussing non-adherence

can be a delicate matter (Bezher et al., 2012). We believe that tailored training on motivational techniques and counseling for nephrologists and specialized nurses may be an effective strategy to reduce the distance between the patient and healthcare team. Our results have demonstrated that additional motivational sessions may benefit the patient's health-related outcomes. There is evidence that practitioners working in busy clinical settings can learn how to carry out brief interventions and be proficient in motivational interviewing techniques in as little as 1 month (Dunn, Trusz, Bumgardner, & Roy-Birne, 2012).

A relevant percentage of the participants (39 %) were at the action stage at beginning of the intervention. After this intervention the vast majority of participants (93 %) had moved to the action or maintenance stage, a successful outcome for this type of program. Such success has been replicated elsewhere in individuals with chronic kidney conditions (Molaison & Yadrick, 2003). Renal patients are usually quite informed about the importance of the treatment they need to follow and are generally ready to try to complete oral medication courses, although self-reported measures may indicate some lack of adherence. The complexity of regimens and difficulties in integrating oral treatments into particular lifestyles may be a barrier that explains this discrepancy.

One of the major problems in studying medication adherence is obtaining accurate measures of adherence behavior. The assessment of adherence is a complex task that requires a creative multidimensional approach, and no method is considered the gold standard (Osterberg & Blaschke, 2005). Remor (2011) states that it goes beyond the simple intake of prescribed medication. In our study, we have employed three different markers to measure adherence to prescribed medication: a self-reported measure, a widely used validated test to evaluate adherence to oral medication and a professional diagnosis of the stage of change in which the patient is currently situated. Recently, a study conducted on hemodialysis patients, describing the prevalence of adherence to fluid restriction (Iborra-Moltó, López-Roig, & Pastor, 2012), has shown a significant association between an objective indicator (interdialysis weight gain) and reported adherence behavior. This encouraging finding supports the use of self-reported measures for studying adherence in renal patients. It has been found that easy self-reports can simply and effectively measure adherence in other chronic conditions (Walsh, Mandalia, & Hazzard, 2002). However, these data do not confirm the concordance between both means of assessment.

As Lee, Grace, and Taylor (2009) suggest, when conducting an adherence intervention study it is crucial to map adherence changes to improved health outcomes so that the results can be successfully translated to clinical practice. In our study, improvements in adherence are accompanied by

**Table 5** Frequency (%) of controlled clinical markers in the 42 patients before and after the intervention

Clinical markers	Pre		Post		$\chi^2$ (1)	<i>p</i> value
	<i>n</i>	%	<i>n</i>	%		
Albumin	24	57.1	33	78.6	2.65	.03
Hemoglobin	37	88.1	38	90.5	6.12	.01
Potassium <sup>a</sup>	24	70.6	26	76.5	5.52	.02
Calcium	25	59.5	37	88.1	3.68	.05
Phosphate	32	76.2	36	85.7	7.09	<.01
iPTH <sup>b</sup>	9	25.7	16	45.7	2.14	.14

<sup>a</sup> Potassium (8 patients without analytics, *n* total 34)

<sup>b</sup> iPTH (7 patients without analytics, *n* total 35)

better results in levels of depression, anxiety and HRQL. It is encouraging that depression levels measured by the BDI-II prior ( $M = 10.92$ ) and after ( $M = 8.86$ ) the program reached clinical significance, moving from mild depression to an absence of depression. It seems that the area of pre-dialysis education would be an adequate scene in which to manage preventive psychological strategies regarding emotional states. As mentioned before, our participants reported lower anxiety levels after the program. A Spanish study conducted by Gutiérrez-Vilaplana, Zampieron, Craver, and Burja (2009) with pre-dialysis patients in an educational group intervention also concluded that patients reported significantly lower anxiety levels after the intervention, although depression levels were not assessed. A pre-dialysis psychoeducational controlled trial conducted by Devins et al. (2003) measured depression, anxiety and social support before and after the intervention. In contrast to our results, no significant changes were found in these psychological variables. This difference could be explained by the nature of the intervention. While Devins et al. (2003) employed a 90-min interactive individual educational session followed by supportive telephone calls every three weeks, our intervention was significantly more intensive, based on six individual sessions of 90-min duration. It seems that in order to generate changes in emotional state, effective pre-dialysis programs should be longer than one isolated session.

Despite the fact that experts recommend the assessment of HRQL, the most common outcomes included in pre-dialysis educational programs studies are still survival rates and disease progression (Bolton & Owen, 2002). We have evaluated HRQL as another outcome linked to meaningful clinical and wellbeing effects in ACKD patients. Improvements in General Health and Emotional Role subscales were observed after our intervention. Regarding dialysis educational programs and in accordance with our results, one nurse-led disease management program for peritoneal dialysis patients observed that after the program, patients reported better HRQL on the specific subscales of General Health Perception, Overall Health and Staff Encouragement (Wong, Chow, & Chan, 2010). These results were also confirmed by an adaptation training program for patients with ACKD who received dialysis (Tsay, Lee, & Lee, 2005).

The proportion of patients with better biochemical control was significantly higher after the program, except for iPTH values. These improvements in biological markers have been described by Jia et al. (2012), who compared multi-dimensional long-duration pre-dialysis education to short-duration pre-dialysis education. We reported a significant increase of 0.27 in serum phosphate. However, these findings have non-clinical relevance since both pre-intervention ( $M = 4.00$  mg/dl) and post-intervention

( $M = 4.27$  mg/dl) measures are within the parameters that clinical guidelines recommend for the care of patients at the pre-dialysis stage. Friedman, Wald, and Goldstein (2008) found that multidisciplinary pre-dialysis care had a limited effect on mineral metabolic control markers (serum phosphate, calcium, calcium-phosphate product and iPTH). In our study, this increase in phosphate levels runs parallel to a non-significant increase in plasma albumin. Both parameters are suggestive of an increase in nutrient intake, probably derived from simultaneous nutritional intervention. These biological marker results may be due to factors beyond improved nutrition habits, such as improvements in patients' general adherence to oral treatment, adoption of a healthier lifestyle or the result of a less anxious or depressed mood. We were not able to accurately discern the factors behind these biological marker results with the present study design. Our data, in addition to that from previous literature, support the importance of pre-dialysis multidisciplinary team and psychoeducational strategies as ways to help patients against the progression of ACKD by improving patient health outcomes and promoting wellbeing (Strand & Parker, 2012). It is important to note that health objectives in pre-dialysis care are not only about measuring creatinine, glomerular filtration and preserving renal function in general. It is also about promoting the wellbeing of the patient, which is related to emotional as well as biological dimensions.

The current study does, however, pose a number of limitations, notably related to the small sample studied, which was recruited by convenience and without a control group. This is a multifaceted psychoeducational program with many components. Unfortunately, due to design concerns, we are not yet able to discern the relative importance of specific active ingredients of the program. We assume it is risky to reach conclusions about the impact of the various components, but next steps would justify the design of a Randomized Clinical Trial maintaining the intervention with several combinations. We have concentrated our current activity on patients close to requiring dialysis (expecting to require dialysis in a range of 1–3 years) due to the importance of adherence at this level of kidney function, and much more so when dialysis is required. In the future we would like to address the potential usefulness of the intervention at previous CKD stages when patients are healthier. Nevertheless, this is the first study to take place in a Hospital Nephrology Department in Spain addressing adherence as well as the psychological and health benefits of a psychoeducational program in this kind of patient. Design and methodological improvements need to be addressed in future studies. Generalization of the results presented here to other samples is not possible, despite the encouraging results. This is because psychoeducational programs are more effective

when compatible with client cultural patterns and worldviews (Bernal, Jiménez-Chafey, & Domenech-Rodríguez, 2009). Further research is needed to improve the current intervention protocol, to identify mechanisms underlying the beneficial effects of the intervention and to meet the individualized needs of patients and families.

Therefore, health psychologists could use this information to plan, improve and implement additional interventions. Indeed, we highly recommend an intensive focus on preventive pre-dialysis interventions in order to promote patient adherence and wellbeing prior to embarking upon such a highly demanding treatment as renal replacement therapies. We should not forget that when we make efforts to improve adherence and wellbeing in renal patients, we allow for a more rational use of resources. When healthcare teams take into account the work of professionals who develop programs such as this, it represents an investment that can improve health outcomes and reduce costs.

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**Ethical Standards** All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

**Conflict of interest** The authors declare that they have no conflict of interest.

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