'Five determinants explained variance in Self-management Capacity in Patients with Chronic Kidney Disease: A cross sectional study'

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Contents

1. *INTRODUCTION*

Two of the most common chronic diseases are diabetes and hypertension, and these in turn are the most ordinary causes of chronic kidney disease (CKD)(6). CKD is a slow progressive loss of renal function and can be classified into five stages, which are defined by means of the estimated glomerular filtration rate (GFR). Stages three and four are classified as moderate (29-59 mL min/1.73 m2) and severe (15-29 mL min/1.73 m2) kidney problems. Untreated CKD progresses leads to stage five CKD and is called end stage renal disease (ESRD)(1). Patients with ESRD have an established kidney failure of <15 mL/min/1.73 m2, and renal replacement therapy is required(2). ESRD is the failure of the kidneys to clear the body of wastes and fluid and a complex disease associated with decreased quality of life (QoL), unplanned hospital admissions, high mortality and a high burden of illness(3,4,5). In the Netherlands, there are over 40.000 patients with CKD, including 28.000 people who suffer from severe kidney damage. 15.958 patients receive renal replacement therapy, consisting of dialysis or renal transplantation(6).

To delay or avoid the deterioration of CKD, patients must be able to self-manage their disease(7). Self-management (SM) is defined as the individual's ability to manage the symptoms, treatment, physical and psychological consequences and lifestyle changes inherent to living with a chronic condition(8). Effective self-management capacity (SMC) encompasses a patient's ability to monitor his or her condition and to affect the cognitive, behavioural and emotional responses necessary to maintain a satisfactory Qol. As a result, a dynamic and continuous process of self-regulation is established(8). Furthermore, to be self-reliant, it is important for the patient to monitor signs and symptoms of (potential) complications and to seek medical attention when needed(10).

Kidney Disease Outcomes Quality Initiative (KDOQI) recommend clinical guidelines of the strict blood pressure control and reduction of proteinuria to reduce CKD progression for patients with mild to moderate CKD(9). For severe CKD patients self-care encompasses many dimensions, such as following the prescribed medical regime (including fluid and dietary restrictions), medications, haemodialysis treatment, communication and being a self-advocate, monitoring for signs and symptoms of potential complications, seeking out medical attention, kidney disease knowledge, and enjoying a lifestyle that provides an acceptable QoL for the patient(7)(10).

There is growing evidence that SM interventions and programmes improve healthcare outcomes for CKD patients, which translates into a lower creatinine level(11,12,13) and higher self-efficacy(12), improved knowledge and self-care practice(13,14), a higher GFR and fewer hospitalisation events(15). However, a large proportion of patients do not respond to or comply with SM interventions(15,16,17), and the large variance seen in effect size between patients indicates that a SM intervention is not a matter of 'one size fits all'.

1.1 Problem statement

Research on patients undergoing haemodialysis showed that there are associations between patient SMC and patient determinants, such as socio-economic status, demographic and psychosocial factors(18), wellbeing and depression(19). Also relationships were seen between self-care ability and QoL(20), depression(21), educational level, work status, income level and frequency of HD application(22). In chronic illness SM social-support was an influencing factor(23). Based on clinical experience smoking status, living status, ethnicity and illness perception are also expected to be related with SMC.
So far, little is known about patient determinants associated with SMC. To provide effective SM interventions, it is necessary to understand the underlying reason why some patients do not comply to SM interventions by increasing knowledge on which patients are competent of SMC and which patients encounter difficulties in performing sufficient SM.

2. *AIM & RESEARCH QUESTIONS*

The primary objective of this study was to identify key determinants associated with SMC in patients with CKD. The secondary objective was to explain the variance in SMC in patients with CKD. This knowledge will enable healthcare providers to further develop targeted and tailored interventions, adapted to the requirements of individual patients which should lead to higher effect sizes of SM interventions in patients with CKD.

Primary research question:

- Which key determinants are associated with SMC in adult patients with CKD?

Secondary research question:

- Which set of patient determinants can explain the variance in SMC in adult patients with CKD?

3. METHODS

3.1 Study design

This is a quantitative, prospective, observational, questionnaire based study with a cross-sectional design embedded in the TAilored Self-managemenT & E-health (TASTE) research line. The TASTE research line aims at increasing efficiency and (cost)-effectiveness of SM interventions in chronically ill by developing a robust and sustainable nursing research programme(24). This study was conducted four times at the four major chronically ill (congestive heart failure, chronic obstructive pulmonary disease and diabetes mellitus), where our study focuses on patients with CKD.
The local medical ethical review board (METC) of the University Medical Centre Utrecht (UMCU) approved this study (protocol number: 12-568/C), and all included patients provided written Informed Consent (IC).

3.2 Setting and participants

The researcher selected patients by means of a chart review of one regional hospital and one collaborative centre for dialysis. The inclusion period was January and February 2013. Patients were included if they fulfilled the inclusion criteria. The inclusion criteria were a minimum age of 18 years with a clinical diagnosis of CKD (GFR<60) receiving support in the hospital outpatient clinic, the predialysis outpatient clinic or treated by dialysis. Patients were excluded from the study if they were unable to speak, write and read Dutch, or unable to give IC because of impaired cognition, if they had a limited life expectancy, a comorbid illness (malignancy), or if invasive interventions were planned within one month's time.
Sample size was calculated using the ratio of predictor variables to total number of cases to determine the number of patients required. Since a multiple regression measurement was suitable for the second research question and the model consisted of 19 variables, the number of required patients was calculated to be 202. For each variable, eight patients plus 50 were needed to obtain sufficient power(25). Because the response rate of recent cross-sectional study with a similar questionnaire-based approach in chronically ill patients was 53%(26), the minimal number of patients to approach was set at 400.

3.3 Data collection

In February 2013, all eligible patients received an envelope containing: an invitation letter (signed and dated by their attending physician), an information letter, an IC form and a questionnaire with a freepost envelope. Haemodialysis patients were recruited by a nurse to participate in the study by means of a face-to-face information session during the haemodialysis treatment in the first week of February. Predialysis patients were recruited face-to-face by the nephrologist while attending routine clinical appointments in the predialyis outpatient clinic of the DCB in February. Outpatients who were known by the nephrologists in the hospital received the questionnaire by mail.
Patients gave written IC, filled in the questionnaire at home, and returned it by mail. If the questionnaire and IC were not received within three weeks, the researcher sent a second envelope by post containing a reminder letter, study information, IC, questionnaire and a freepost envelope. If the questionnaire was received without the IC after the first or second mailing, an extra information letter and IC form were sent.
In March and April 2013, the researcher conducted a chart review on patients who consented and delivered the requested data and the IC form to the research team. (Figure 1, Appendix)

3.4 Measurements

Self-report questionnaires were used to assess the dependent variable SMC and the independent variables QoL, anxiety, depression, illness perception, social support and demographic data. The following data was examined by chart review: treatment modality, comorbidities, disease severity (GFR) and duration of illness (years). The determinants and questionnaires were chosen collectively based on published studies of chronically ill patients.

SMC was measured by the American short form Patient Activation Measure-13 (PAM-13), Dutch version. This instrument assesses self-reported knowledge, skills and confidence in SM of one's health in chronic patients. The PAM-13 indicates the extent to which patients are willing to take an active share in their own healthcare through SM(27). The instrument consists of 13-items and answers were given on a 5-point Likert scale. The total score is then converted into a theoretical score on a scale of 0-100 and a higher score indicates better SM(27). Patients were divided into four levels of SMC based on cut-off points for the PAM scores. PAM-13 is a reliable and valid instrument(28). (Figure 2, Appendix).

QoL was measured using the 12 item Short-Form Health Survey (SF-12), Dutch version. The SF-12 measures physical and mental health by means of a physical component summary and a mental component summary. The instrument was validated in Dutch and SF-12 summary scores correlated highly with SF-36 summary scores(29). The scale was transformed into a scale from 0-100, with higher scores indicating better health.

Anxiety and depression were measured by means of the Hospital Anxiety and Depression Scale (HADS), Dutch version. The instrument is a twofold14-item self-report screening scale(30), one for anxiety and one for depression, with7-items answered on a 4-point scale with a score range of 0-21. The HADS is a reliable and valid instrument(31). A score>8 on anxiety or depression indicates a psychiatric state(30).

Illness perception was measured by means of the Brief Illness Perception Questionnaire (B-IPQ), Dutch version. The questionnaire consists of 8-items, and each item assesses one dimension of illness perception(32). The B-IPQ uses a single-item scale approach to assess perceptions on a continuous linear 0–10 point scale. The B-IPQ is a reliable and valid instrument(33). In this study, we will compute an overall score which represents the degree to which the illness is perceived as threatening or benign. The scores range from 0-80, and a higher score reflected a more threatening view of the illness(32).

Social support was measured by means of the Multidimensional Scale of Perceived Social Support (MSPSS), Dutch version. The MSPSS is a 12-item scale that assesses social support. Each item is answered on a 7-point Likert scale. The scale yields three subscale scores, for Family, Friends, and Significant Others, and a Total score(34). The validity and reliability of the MSPSS were confirmed(35). The scores range from 12-84 and were divided into three groups of acuity(34).

Demographic data were measured by a demographic data form (DDF) in the questionnaire, using open questions and multiple choice questions, included: gender, age, body mass index (BMI), living status, educational level by highest completed education, working status, ethnicity, financial status, smoking status and self-reported duration of illness.

For comorbidity, the International Classification of Disease-10 (ICD-10) version of the Charlson Comorbidity Index (CCI) was used(36). The CCI is a highly statistically significant predictor of mortality ($P<0.0001$)(37) and encompasses 19 medical conditions, with a total

score ranging from 0–37. The CCI seems to be sufficient and has good reliability and is easy adaptable(36). A sum score was measured to yield the total comorbidity score.

Severity of the disease was classified into three groups by GFR according to the international classification of CKD stages established by the KDOQI(9).

3.5 Statistical analysis

The statistical package SPSS Windows Version 20 (Chicago, IL) was used to analyse the data. The data were first screened to ensure that scores approximated a normal distribution. For the description of nominal and ordinal variables frequency tables, mode and median were used. Continuous variables were described in terms of means, standard deviations and confidence intervals.

A series of regression analysis were performed to answer the two research questions. In advance dummy variables were created for education, working status and comorbidities. Histograms of the standardised residuals were conducted to test for normality, and scatter plots were used to picture the correlations for outliers and multicollinearity. Univariate linear regression procedures were conducted to examine associations between SMC (PAM-13) and the patients' determinants. A manual backward multiple regression analysis with a stepwise exclusion method was conducted and dummy variables were entered by a separate block using a stepwise inclusion method. Determinants that were relevant for the prediction of SMC were kept in the model ($p<.10$). The square of the correlation coefficient (R^2) represented the percentage of the total variance in the PAM scores that is explained by the predictor variables(24,25,37).

4. RESULTS

The questionnaire was sent to 432 patients and a total of 230 patients agreed to participate by IC, constituting a response rate of 53.2% presented in Figure 3. Missing data were most often due to missing information in medical files and insufficient responses of the participants, because 2% (<10%) of the variables was missing, complete case analysis (CCA) was conducted(38).

The clinical characteristics of the sample are displayed in Table 1. The sample consisted of 60.7% men, with a mean age of 71.9 years and 31.7% were living alone. Most were low educated (66.3%), 87.2% were not working and 63.3% received health care benefits. The majority (93.8%) were native.
According to the classification of CKD severity, our sample showed mean GFR by ml/min of 29.7±13.4 with 50.7% in stage 3, 34.1% in stage 4 and 15.3% in stage 5, of whom 10.9% were treated with dialysis. Most patients (82.5%) had one or more comorbidities.

According to the SMC, our sample showed a mean of 52±11.4 with 79 (35.1%) in stage 1, 63 (28%) in stage 2, 64 (28.4%) in stage 3, 19 (8.3%) in the last stage (Figure 4). Patients scored a mean of 58.8±24.8 on QoL, 5±3.8 on the HADS depression scale and 4.4±3.5 on the HADS anxiety scale. The B-IPQ was fulfilled by 217 patients with a mean score of 37.7±12.5. On social support almost half of the sample (45.9%) scored high acuity.

Table 2 shows the results of the univariate and multivariate linear regression analysis with SMC (PAM-13) as dependent variable in relation to all independent variables.
Within the univariate analysis employment was seen significant in relation with SMC (β=-.252, p=.000). Five more determinants were related significantly with SMC: receiving health care benefits (β=.155, p=.026), QoL (β=.272, p=.000), depression (β=-.732, p=.000), anxiety (β=-.219, p=.001) and illness perception (β=-.282, p=.000). Education was significantly related between secondary education and high education (β=.217, p=.008). Because of the high mean age of the sample (71.8=9), the determinant age was tested as a confounder for employment status. The regression coefficient (β) changed >10% with age included in the linear regression model, so age is a confounder for the relationship between SMC and employment(39).

Results of the multiple regression analysis can be summarised as follows. Anxiety, receiving health care benefits, QoL and education were no longer significant in the final model, and were removed stepwise from the model in this order. The final model included severity of the disease (β=-.118, p=.040), employment (β=-7.899, p=.000), ethnicity (β= 6.772, p=.029), depression (β=-.463, p=.048) and illness perception (β=-.223, p=.001) and explained 18.4% of variance in SMC (adjusted R_2=.164, F= 9.115, P=.000).

5. *DISCUSSION*

The primary objective of this study was to identify key determinants associated with SMC in patients with CKD. This study has shown insight in the patients key determinants associated with SMC (PAM-13). Because patients who scored more worse for self management capacity ($p<.05$) were more frequently unemployed, did receive health care benefits more frequently, scored lower on the QoL and illness perception questionnaire, and higher on the depression and anxiety instrument (HADS). Our results showed that these determinants are separately associated with SMC and having one of these determinants seems to hinder good SMC.
The secondary objective was to explain the variance in SMC in patients with CKD with a set of patient determinants. Multiple regression analysis revealed that a set of the following determinants best explained the variance within SMC in adult patients with CKD: severity of the disease (>GFR), employment, ethnicity, depression and illness perception. The overall model explained the variance in SMC for 18.4%, which is a adequate percentage in observational research(39). Our results showed that these determinants as a set seem to hinder good SMC.

These results are in line with previous studies, which have found relationships between SMC and socio-economic status, demographic, psychosocial factors(18) and depression(19) in patients undergoing haemodialysis. Also relationships were seen between self-care ability and QoL(20), depression(21), work status and income level(22). SM was associated with depressive symptoms in young CKD patients from China(40). However, our results are not in line with other determinants found associated with SMC such as educational level(22) and gender(40). The low mean PAM-13 score of 52 was remarkable and not in line with a study in multimorbid older adults (56.6)(41). Moreover, little comparative research has been conducted on patients with CKD.

This study has several limitations. The most important limitation is the cross-sectional method of the data collection, which implied that causal relationships could not be inferred between SMC and patient determinants in patients with CKD. Although associations have been found, knowledge on causality is needed to be able to use the results in practice. Selection bias may have occurred because one researcher selected the patients, also chart review in the setting and entering data was done by one researcher without controlling. The questionnaires were self-reported, so there might have been given social-accepted answers that could lead to response bias. Duration of illness was inconsistently registered in

charts and questionnaires and therefore was decided not to include the duration of illness in the analysis. Bias due to missing values was negligible, because missings were well distributed, 2% of the total was missing, and 5.2% was the highest percentage of missing value in one variable.

Because CKD is mostly a comorbidity that patients develop besides their primary chronic illness, it could be that the SMC is more influenced by the primary illness (or comorbidity) and not by CKD and this may have biased the results of SMC. Even though comorbidity was not found to be a significant determinant in the analysis, an increase in SMC was associated with having one comorbidity, compared to a decrease in SMC, in patients who had more than one comorbidity. It may be that patients with more than one comorbidity receive more attention and information from their nephrologist or nurse.

From the included 18 variables, the most important are determined. However, other determinants not included in this study could also be important and possibly increase the explained variance for SMC in CKD patients. Previous support through a SM intervention was not included in the questionnaire and there was not corrected for in the analysis. Because of the high age of the sample, age was checked as a confounder for employment, but it can be assumed that other confounders or effect modifications might exist.

A low percentage of immigrants were included in the study (6.2%), which is not representative for the Dutch population (21%) based on the National Public Health Compass, and limits generalisability of our study findings(42). The study sample consisted of patients from one regional hospital and dialysis centre in a medium sized city with an important industry in the Randstad area in the Netherlands, which also can limit the generalisability.

Finally, although our study demonstrated associations between SMC and patient determinants, we did not investigate whether interventions aiming to enhance these abilities (where possible) actually led to improved self-management capacity in patients with CKD.

6. *CONCLUSION*

We conclude that there is shown insight in the most important determinants associated with SMC in CKD patients. We found indications that CKD patients who report worse levels of

QoL, illness perception, depression and anxiety, and patients who received health care abilities and patients who were unemployed independently are worse self-managers.
In addition, a part of the variance was explained by five key determinants: more severe CKD, worse levels of illness perception and depression, being unemployed and immigrant. This has not been established before, and it may offer explanations of the variance in effect size after SM interventions. More attention is needed for patients with poor SMC and interventions to improve SMC may help patients with CKD deal better with their chronic disease. SMC in patients with CKD was relatively poor and therefore a lot of improvement is achievable. We feel that these results provide a useful basis for the design of effective tailored interventions for successful CKD SM.

7. *RECOMMENDATIONS*

The results of this study might suggest that when patients' determinants are being improved, SMC will increase. In practice, caregivers must focus more on patients who have one or more of key determinants associated with SMC. However, further research on causality is necessary to explore ways in which SMC in patients with CKD can be improved and may include strategies to confirm our study findings in a prospective study. Inclusion of more determinants might increase the knowledge on key determinants of SMC and might increase the percentage in explained variance. It is desirable to identify CKD patients with high risk for poor SMC by means of developing a prediction model and develop tailored interventions based on patients' profiles and preferences. Tailoring programs to the individual and identify determinants of SM capacity and determinants of change following SM interventions might increase the effect size significantly.

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9. *TABLES*

Table 1. Demographic and clinical characteristics

Characteristics	Total study population		
Variabele	Total n	n (%)	Mean/ sd *
Male gender	229	139 (60.7)	
Age, years	229		71.9±11.5
Body mass index, kg/m2 mean/sd	219		27.8±4.9
Living status	224		
Living alone		71 (31.7)	
Living not alone		153 (68.3)	
Education	223		
Lowest		42 (18.8)	
Low		106 (47.5)	
Secondary		47 (21.1)	
High		28 (12.6)	
Employment	226		
Working		29 (12.8)	
Not working		197 (87.2)	
Ethnicity	225		
Native		211 (93.8)	
Immigrant		14 (6.2)	
Financial situation	219		
Enough money		107 (48.9)	
Just enough money		100 (45.7)	
Too little money		12 (5.5)	
Receives health care benefits	210		
Yes		133 (63.3)	
No		77 (36.7)	
Smoking status	224		
Non-smoker		195 (86.7)	
Smoker		30 (13.3)	
Treatment modality	229		
HD		25 (10,9)	
CKD		204 (89.1)	
Severity of the disease (GFRml/min)	229		29.7±13.4
Stage 3 (29-59ml/min)		116 (50.7)	
Stage 4 (15-29ml/min)		78 (34.1)	
Stage 5 (<15ml/min)		35 (15.3)	
CCI	229		1.5±1
0		40 (17.5)	
1		80 (34.9)	
>1		109 (47.6)	
PAM-13 (0-100)	225		52±11.4
Level 1 (0-47)		79 (35.1)	
Level 2 (47.1-55.1)		63 (28)	
Level 3 (55.2-67)		64 (28.4)	
Level 4 (67.1-100)		19 (8.4)	
SF12 (0-100)	226		58.8±24.8
HADS-depression (0-21)	225		5±3.8
HADS-anxiety (0-21)	223		4.4±3.6
B-IPQ (0-80)	217		37.7±12.6
MSPSS (12-84)	223		63.7±15.7
Low acuity (12-48)		36 (16.1)	
Medium acuity (49-68)		84 (37.7)	
High acuity (69-84)		103 (46.2)	

**sd= standard deviation*

Table 2. Linear regression

		Univariate linear regression			*Multiple Linear Regression*		
Variable	*n*	*β **	*95% CI***	*p-value*	*B**	*95% CI ***	*p-value*
Gender, female	*225*	*-.122*	*(-5.882,.217)*	*.068*			
Age	*225*	*-.081*	*(-.211,.050)*	*.228*			
BMI	*217*	*-.113*	*(-.576,.048)*	*.096*			
Severity of the disease (GFRml/min)	*225*	*-.027*	*(-.136,.089)*	*.683*	*-.136*	*(-.230,-.005)*	*.040*
Living status, not alone	*220*	*.095*	*(-.923,5.600)*	*.159*			
Education	*219*						
Lowest							
Low		*.086*	*(-2.125,6.055)*	*.345*			
Secondary		*.122*	*(-1.357,8.178)*	*.160*			
High		*.217*	*(1.973,12.873)*	*.008*			
Employment, unemployed	*222*	*-.252*	*(-12.843,-4.173)*	*.000*	*-.237*	*(-12.154,-3.644)*	*.000*
Ethnicity, native	*221*	*.087*	*(-2.154,10.248)*	*.200*	*.142*	*(.700,12.844)*	*.029*
Financial situation	*216*	*-.078*	*(-10.651,2.798)*	*.251*			
Not receiving health care benefits	*206*	.155	*(.441,7.024)*	*.026*			
Smoking status, non smoker	*221*	*.036*	*(-3.270,5.671)*	*.597*			
Treatment modality, undergoing treatment	*225*	*-.033*	*(-6.056,3.652)*	*.626*			
Comorbidities	*225*						
0							
1		*.075*	*(-2.520,6.087)*	*.415*			
>1		*-.119*	*(-6.812,1.418)*	*.198*			
SF-12	*224*	*.272*	*(.067,.184)*	*.000*			
HADS-Depression	*222*	*-.732*	*(-1.118,-.346)*	*.000*	*-.150*	*(-.920,-.005)*	*.048*
HADS-Anxiety*	*220*	*-.219*	*(-1.103,-.281)*	*.001*			
B-IPQ	*214*	*-.282*	*(-.375,-.138)*	*.000*	*-.245*	*(-.358,-.087)*	*.001*
MSPSS	*220*	*.108*	*(-.018,.176)*	*.110*			
R^2					*.184*		

*R^2 are the total explained variance in the model, * β= standardised beta*, **95% *CI= Confidence Interval of β*

10. *Dutch Summary*

Titel: 'Vijf determinanten verklaren de variantie in zelfmanagement capaciteit bij patiënten met chronische nierinsufficiëntie: een cross-sectioneel onderzoek'
Inleiding: Grote verschillen worden gezien in effectgrootte na zelfmanagement interventies bij patiënten met chronische nierinsufficiëntie (CNI). Dit onderzoek vergroot de kennis over de facilitatoren en barrières van zelfmanagement capaciteit (ZMC).
Doel: Het identificeren van de belangrijkste determinanten die geassocieerd zijn met ZMC en het verklaren van de variantie van ZMC bij patiënten met CNI, zodat zorgverleners de interventies verder kunnen ontwikkelen gericht en afgestemt op de patiënt, leidend tot een hogere effectgrootte na zelfmanagement interventies.
Onderzoeksvragen: Welke belangrijke determinanten zijn geassocieerd met ZMC bij patiënten met CNI? Welke set patiëntdeterminanten kan de variantie in ZMC bij volwassen patiënten met CNI verklaren?
Methode: Ons cross-sectionele onderzoek includeerde patiënten met matige, ernstige, en einstadium CNI vanuit de polikliniek of de dialyseafdeling. Metingen waren de afhankelijke variabele ZMC (Patient Activation Measurement-13) en de onafhankelijke variabelen kwaliteit van leven (KvL), angst, depressie, ziekte perceptie, sociale ondersteuning, demografische gegevens, behandelings status, comorbiditeiten en ernst van de ziekte (GFR).
Resultaten: Het onderzoek includeerde 230 patiënten, respons 53%. ZMC was significant geassociëerd met ernst van de ziekte, zorgtoeslag, KvL, ziekte perceptie, depressie en angst (alle <0,03). Multiple regressie analyse liet zien dat de ernst van de ziekte, werkstatus, etniciteit, depressie en ziekte perceptie (alle $p<0,05$) de variantie verklaarden voor 18,4% ($F9,115$, $p=0,00$).
Conclusie: Aanwijzingen werden gevonden dat patiënten met CNI slechtere niveaus van KvL, ziekte perceptie, depressie en angst raporteerden en patiënten die vaker zorgtoeslag ontvangen en werkloos zijn slechtere zelfmangers zijn. Daarnaast werd een deel van de variantie verklaard door vijf belangrijke determinanten, deze zouden de variantie kunnen verklaren na zelfmanagement interventies.
Aanbevelingen: Verder onderzoek naar causaliteit is noodzakelijk om manieren te onderzoeken om SMC bij patiënten met CNI te verbeteren en zou strategieën moeten bevatten om onze studie bevindingen te bevestigen binnen een prospectieve studie.
Trefwoorden: Zelfmanagement, chronische nierziekte (CKD), determinanten, variantie, associatie.

11. *English Abstract*

Title: 'Five determinants explained variance in Self-management Capacity in Patients with Chronic Kidney Disease: A cross sectional study'

Background: Large variances in effect size between patients with chronic kidney disease (CKD) indicate that self-management intervention is no matter of 'one size fits all'. This study increases knowledge on the facilitators and barriers of self-management capacity (SMC).

Aim: Identify key determinants associated with SMC and explain the variance in SMC in CKD patients. To enable healthcare providers further develop targeted and tailored interventions, which should lead to higher effect sizes of SM interventions.

Research questions: Which key determinants are associated with SMC in adult patients with CKD? Which set of patient determinants can explain the variance in SMC in adult patients with CKD?

Methods: Our cross-sectional research included patients with moderate/severe CKD and end stage renal disease (ESRD) in the outpatient clinic, or dialysis-patients. Measures included dependent variable SMC (patient activation measurement-13) and independent variables quality of life (QoL), anxiety, depression, illness perception, social support, demographic data, treatment modality, comorbidities and disease severity (GFR).

Results: The study included 230 patients, response rate 53%. SMC was significantly associated with severity of the disease, health care benefits, QoL, illness perception, depression and anxiety (all $p<.03$). Multiple regression analysis indicated that severity of the disease, employment, ethnicity, depression and illness perception (all $p<.05$) explained the variance for 18.4%($F= 9.115$, $P=.000$).

Conclusion: We found indications that CKD patients reporting worse levels of QoL, illness perception, depression, anxiety and received health care abilities and were unemployed are worse self-managers. In addition, a part of the variance was explained by five key determinants and this may offer explanations of the variance in effect after SM interventions.

Recommendations: Further research on causality is necessary to explore ways in which SMC in CKD patients can be improved and may include strategies to confirm our study findings in a prospective study.

Keywords: Self-management, chronic kidney disease (CKD), determinants, variance, association.

12. *APPENDIX*

Figure 1: Data collection

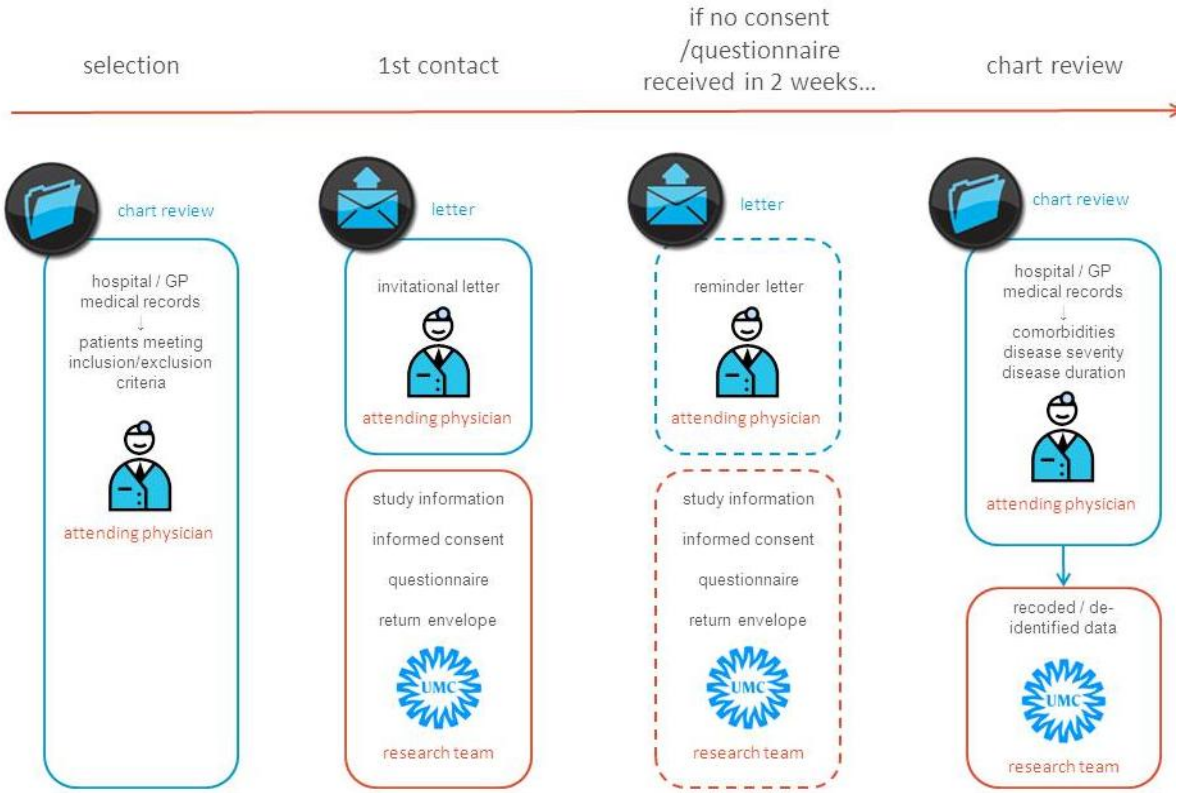

Figure 2: Pam-level score

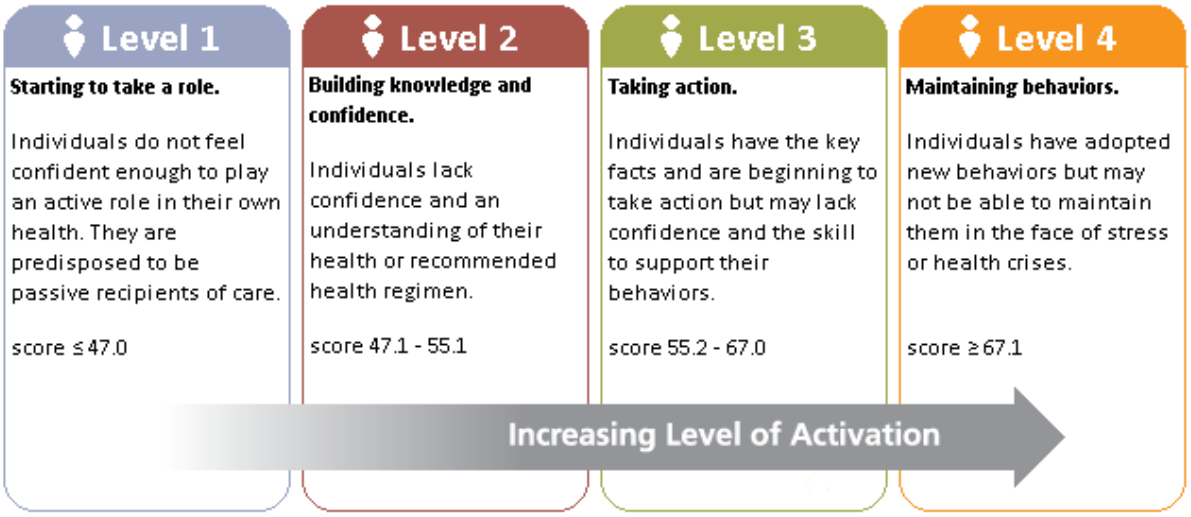

Figure 3: Flowdiagram

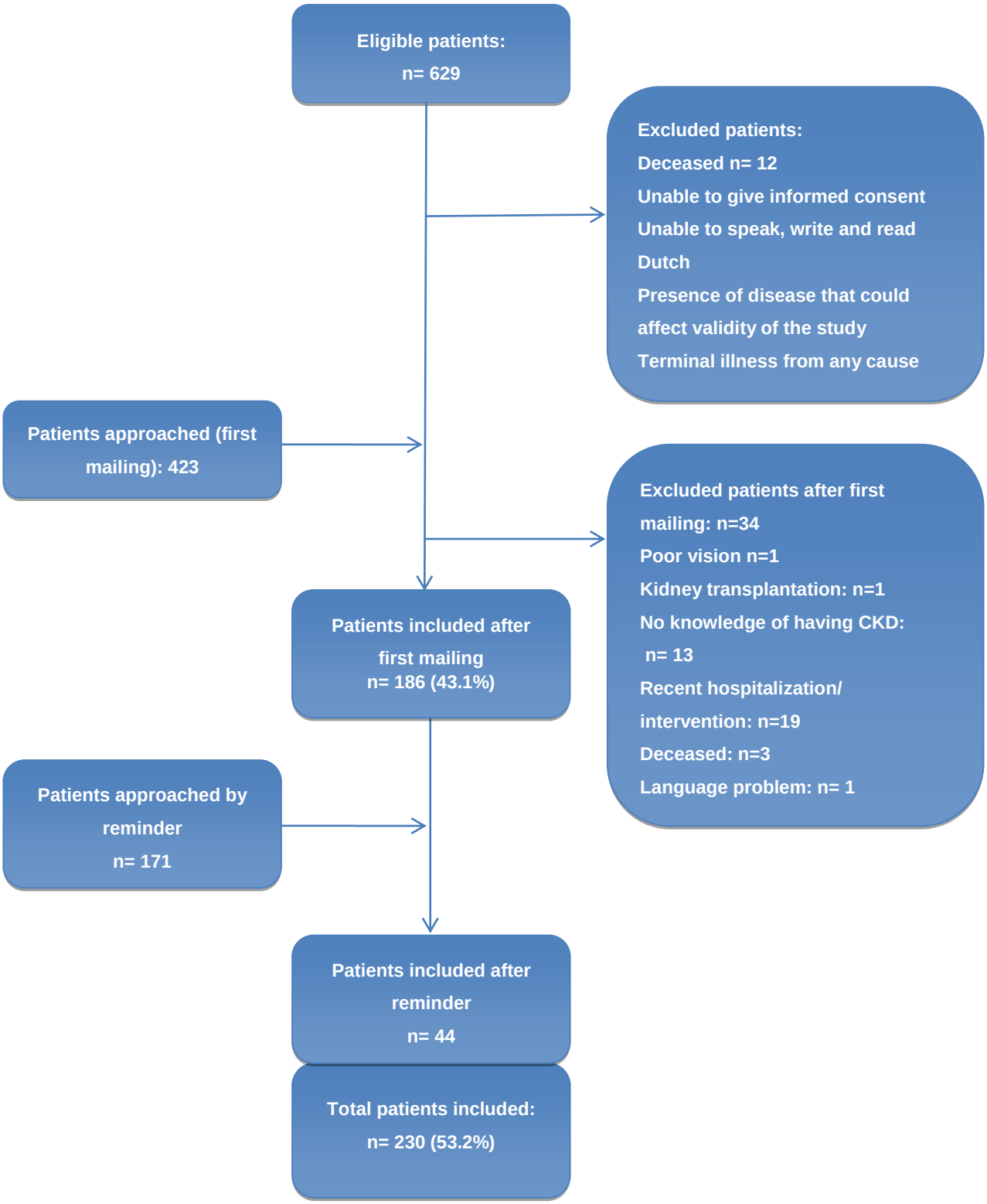

Figure 4 Histogram PAM level score