# Self-rated health and functioning in patients with chronic renal disease

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## ABSTRACT

**INTRODUCTION:** Chronic renal disease is associated with high morbidity and mortality and with considerable economic costs, and it has an extensive influence on patients' everyday lives. The aim of this study was to investigate self-rated health and functioning in patients with chronic renal disease which may serve as a baseline for continuous monitoring of self-rated health and functioning.

**MATERIAL AND METHODS:** A total of 227 patients aged 18 years or older with chronic renal disease in predialysis and haemodialysis treatment participated in a cross-sectional study. The study included a questionnaire and data from hospital records, a laboratory register and the Danish National Patient Registry.

**RESULTS:** Self-rated health and functioning were lower among study participants than in the general Danish population. Among patients below the age of 65 years, 57% of those who were in predialysis and 16% of those receiving haemodialysis treatment were employed. Predictors of disability were haemodialysis, being diagnosed with diabetes, and increasing age. A total of 33% received community home help services, 25% primary nursing and 10% community rehabilitation services.

**CONCLUSION:** In this study information about self-rated health and functioning was collected among patients with chronic renal disease; this information may supplement continuously collected clinical data on patients who are in active treatment for chronic renal failure. Data from this study can form the basis for planning and for quality control intervention aimed at maintaining or improving functioning in patients with chronic renal disease.


A patient with chronic renal disease can develop renal failure which is a life-threatening disease requiring renal dialysis for the rest of the patient's life or renal transplantation. During the past ten years, the number of patients in Denmark requiring dialysis treatment has increased by 77% from nearly 1,500 to more than 2,500 [1]. The growing number of elderly people will lead to a continued increase in the number of patients with renal failure requiring dialysis treatment. The disease is a serious public health problem characterized by substantial morbidity, high mortality and considerable economic costs. Moreover, the disease extensively affects the patients' daily lives due to loss of physical and social functions, including the ability to work and participate in social activities [3, 4].

It is important to collect data that may form the basis for planning and for quality control to ensure appropriate and effective intervention for patients with such chronic disease [5]. Clinical data on mortality and morbidity among patients undergoing dialysis are continuously being monitored. However, there is no continuous monitoring of the general health and functioning of patients with chronic renal disease, even though self-rated health and functioning are important predictors of hospitalization and mortality [1, 6].

The aim of this study was to investigate self-rated health and functioning in patients with chronic renal disease in predialysis or haemodialysis treatment. Furthermore, the aim was to quantify the use of community home help, nursing and rehabilitation services. Overall, the study should contribute to the planning of interventions aiming at maintaining or improving the functioning of patients with chronic renal disease.

## MATERIAL AND METHODS

A total of 327 patients were enrolled into the study. Patients were 18 years of age or older, they had chronic renal disease and had received predialysis or haemodialysis treatment for more than three months at the Department of Renal Medicine, Aarhus University Hospital, Skejby. We excluded 59 patients who did not understand Danish, who suffered from mental disorders including dementia, and patients for whom participation would be difficult. Among the invited patients, 41 (15%) did not want to participate, and the present analysis thus includes 227 patients.

The study ran from May to October 2007. It included a questionnaire and data from hospital records, a laboratory register and The Danish National Patient Registry. Informed consent was obtained from all patients and they were guaranteed-confidentiality. The study was approved by the Danish Data Protection Agency (Datatilsynet).

The questionnaire covers key aspects of functioning and disability, as defined in the International Classification of Functioning, Disability and Health (ICF), in which

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functioning and disability are described as a person's ability to perform the acts associated with living a balanced life and fulfilling social roles. Aspects of functioning and disability may comprise the body's functions such as experience of pain or the patient's cognitive status; activities such as taking a bath, walking, standing or doing housework; and participation such as performing more complex actions including the ability to work or form part of organized social life outside the home [7].

**TABLE 1**

Demographic, social and disease-related conditions in 227 patients, 98 in predialysis and 129 in haemodialysis treatment.

| | Predialysis | | Haemodialysis | |
|---|---|---|---|---|
| | n | % | n | % |
| *Sex* | | | | |
| Females | 40 | 41 | 42 | 33 |
| Males | 58 | 59 | 87 | 67 |
| Age | | | | |
| 18-54 years | 16 | 16 | 38 | 30 |
| 55-64 years | 21 | 21 | 25 | 19 |
| 65-74 years | 30 | 31 | 36 | 28 |
| 75+ | 31 | 32 | 30 | 23 |
| *Marital status* | | | | |
| Married or cohabitating | 72 | 74 | 66 | 51 |
| *Housing* | | | | |
| Independent apartment or house | 92 | 94 | 101 | 78 |
| Nursing home | 0 | 0 | 4 | 3 |
| Housing for the elderly or disabled | 5 | 5 | 19 | 15 |
| Other | 1 | 1 | 5 | 4 |
| *Education* | | | | |
| 7 or fewer years of schooling | 33 | 34 | 48 | 37 |
| 8-9 years of schooling | 17 | 17 | 23 | 18 |
| 10-11 years of schooling | 24 | 25 | 27 | 21 |
| High school or equivalent | 11 | 11 | 20 | 16 |
| Other | 8 | 8 | 10 | 8 |
| No answers | 5 | 5 | 1 | 1 |
| *Social benefits* | | | | |
| Early retirement pension | 13 | 13 | 51 | 40 |
| Other early retirement | 4 | 4 | 4 | 3 |
| Retirement pension | 55 | 56 | 57 | 44 |
| Other benefits | 8 | 8 | 10 | 8 |
| No benefits | 16 | 16 | 7 | 5 |
| No answers | 2 | 2 | 0 | 0 |
| *Primary disease* | | | | |
| Diabetes type 1 or 2 | 17 | 17 | 20 | 16 |
| Glomerulonephritis | 11 | 11 | 23 | 18 |
| Hypertension | 10 | 10 | 12 | 9 |
| Other | 19 | 19 | 32 | 25 |
| Unknown | 41 | 43 | 42 | 33 |
| *Days in hospital*[a] | | | | |
| 0 | 66 | 67 | 39 | 30 |
| 1-15 | 25 | 26 | 45 | 35 |
| 16-30 | 4 | 4 | 22 | 17 |
| 31-45 | 1 | 1 | 11 | 9 |
| 46-217 | 2 | 2 | 12 | 9 |

a) Days admitted to a hospital during the past year.

We chose the SF-36 questionnaire which measures physical functioning, social functioning, role limitations attributed to physical problems, role limitations attributed to emotional problems, bodily pain, vitality, mental health and general health [8]. Each of the eight dimensions is described on a scale from zero to 100, where zero indicates the worst possible health and 100 indicates the best possible health. Additional questions were collected for background information, including employment status and use of community services.

The eight dimensions of the SF-36 were the dependent variables, while the independent variables included the following: the stage of chronic renal disease, demographic variables, disease-related variables, laboratory variables and social variables. Linear regression was used for continuous dependent variables. A significance level of 5% was chosen.

## RESULTS

Among the 227 participants in the study, 43% were in predialysis and 57% were receiving haemodialysis treatment. Non-participation was most frequent among women (22% versus 11%) and patients older than 74 years (20% versus 14%). Non-response or inconsistent response combinations made it impossible to calculate one or more SF-36 scores for 9% of the participants.

**Table 1** shows the demographics and the social and disease-related conditions among the participants. The mean age of the predialysis patients was 67 years (standard deviation (SD) 14.8 years), while haemodialysis patients were 62 years on average (SD 16.0 years). In most participants, the cause of chronic renal disease was unknown or categorized under "other"; a category which included malignant, congenital, obstructive or traumatic causes. In patients undergoing haemodialysis treatment, the median time on dialysis was 43 months (range 3-346 months). **Table 2** shows clinical characteristics of the participants.

In total, 40% of participants in predialysis and 51% in haemodialysis treatment rated their health as poor. This is considerably more than the 16% prevalence recorded among citizens aged 65-74 in the Central Denmark Region (Region Midtjylland) [9]. Unlike the general population, the prevalence in the study population was not associated with age.

The study participants scored lower than Danish men and women aged 65 to 74 years on all aspects of functioning recorded by the SF-36 (**Figure 1**). General health and functioning were particularly poor among participants with diabetes. Poor functioning was also frequent among patients on haemodialysis and among the oldest participants (**Table 3**).

Among participants under the age of 65, a total of 57% in predialysis and 16% in haemodialysis were em-

ployed. The median number of working hours was 29.5 hours (range 5-50 hours), and more than half (58%) of the employed participants in haemodialysis treatment received additional social welfare payments (wage subsidies in the form of flexible contracts, rehabilitation payment or light duty jobs) compared with 17% of the predialysis participants. The majority of the unemployed haemodialysis patients indicated poor health as a reason for not being employed (77%) compared with 39% of the predialysis patients.

A total of 74 participants (33%) had received a mean of 2.1 hours of community home help during the previous four weeks. A total of 56 participants (25%) had received community nursing services within the previous four weeks. The median use was four visits (range 1-84). Twenty-two participants (10%) had received community rehabilitation services from an occupational therapist or physiotherapist with an average of 4.4 visits during the previous four weeks. Six percent reported an unmet need for community home care and home nursing services, while 10% reported an unmet need for community rehabilitation services. There was a significant correlation between the use of community home care and home nursing services and the following factors: high age, living alone, hospitalization within the past year and a low level of physical functioning. No significant correlations were identified between these factors and the use of community rehabilitation services.

## DISCUSSION

This study shows that patients with late-stage chronic renal disease assess their health and functioning as markedly worse than does the general population. Similar results have been reported by other studies [3, 4, 10].

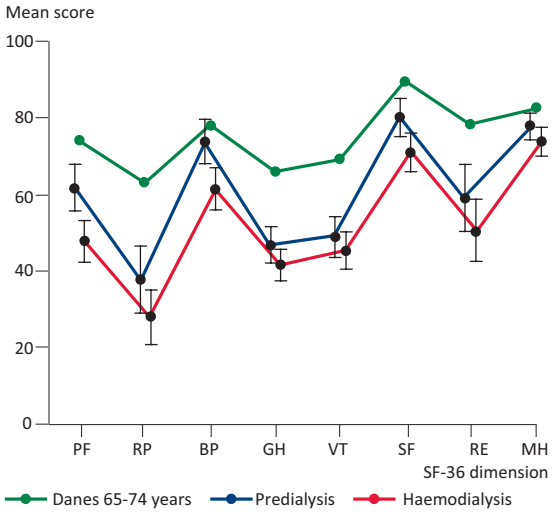
Diabetes and high age were identified as significant predictors of disability. These results are also found in other studies [13, 14]. Haemodialysis was identified as a significant predictor of disability. Unlike other studies, we found no correlation between disability and the following factors: education, haemoglobin, albumin levels and time on dialysis [11-13]. No studies have found a correlation between dialysis efficiency, clearance multiplied by time/volume (Kt/V) and disability; nor did we find such a relationship in the present study [13, 14].

No other Danish studies have examined the use of community services among patients in predialysis and patients receiving haemodialysis treatment. A British study examined the total use of services among haemodialysis patients above the age of 69 years [15], but their findings cannot be compared with our findings due to differences in the organisation of the health and social services of the two countries.

Participation in our study was high (85%); highest among younger patients and among males. To identify predictors of disability, many tests were undertaken, which invites a risk of mass significance. This risk was, however, taken into account when the results were interpreted.

### FIGURE 1

Mean scores with 95% confidence intervals of the eight dimensions of functioning and the general health of 98 predialysis and 129 haemodialysis patients and the 427 Danish men and women aged 65-74 years[a].




BP = bodily pain; CI = confidence interval; GH = general health; MH = mental health; PF = physical function; RE = role – emotionel; RP = role – physical; SF = social function; VT = vitality.
a) A higher score indicates better funtionning and general health [8].

### TABLE 2

Laboratory values in 227 patients, 98 in predialysis and 129 in haemodialysis treatment.

| | Predialysis | | | | Haemodialysis treatment | | | |
|---|---|---|---|---|---|---|---|---|
| | n | % | mean | SD | n | % | mean | SD |
| Creatinine clearance[a], ml/min | 97[b] | | 20 | 6.0 | | | | |
| Creatinine clearance < 15 ml/min | 20 | 21 | | | | | | |
| Creatinine clearance 15-29 ml/min | 77 | 79 | | | | | | |
| Serum haemoglobin, mmol/l | 98 | | 7.7 | 0.8 | 129 | | 7.4 | 0.7 |
| Serum haemoglobin < 7 mmol/l | 14 | 14 | | | 24 | 19 | | |
| Serum haemoglobin ≥ 7 mmol/l | 84 | 86 | | | 105 | 81 | | |
| Serum albumin, µmol/l | 98 | | 616 | 58 | 129 | | 576 | 60 |
| Serum albumin < 550 µmol/l | 14 | 14 | | | 39 | 30 | | |
| Serum albumin ≥ 550 µmol/l | 84 | 86 | | | 90 | 70 | | |
| Kt/V[c] | | | | | 127[d] | | 1.5 | 0.4 |
| Kt/V < 1,2 | | | | | 21 | 17 | | |
| Kt/V ≥ 1,2 | | | | | 106 | 83 | | |

SD = standard deviation.
a) Creatinine clearance corresponds theoretically to the amount of blood per unit time which is completely cleansed of creatinine. b) One was not available. c) Kt/V is a measure of the effectiveness of dialysis treatment. K denotes carbamid clearance and t stands for time. Kt is an expression of clearance over time and represents the amount of urea which is being removed from the body during dialysis. V denotes the patient's fluid volume. d) Two were not available.

TABLE 3

Predictors of self-rated health and functioning among patients in predialysis and haemodialysis treatment[a]

| | Haemodialysis | | Male gender | | Age (per 10 years) | | Diabetes | |
|---|---|---|---|---|---|---|---|---|
| | coefficient (95% CI) | p | coefficient (95% CI) | p | coefficient (95% CI) | p | coefficient (95% CI) | p |
| Physical functioning | –17.9 (–25.4; –10.5) | < 0.001 | –2.8 (–10.4; 4.8) | 0.46 | –7.8 (–10.3; –5.2) | < 0.001 | –19.9 (–30.1; –9.7) | < 0.001 |
| Role – physical | –12.7 (–23.7; –1.7) | 0.02 | –5.0 (–16.1; 6.2) | 0.38 | –5.7 (–9.5; –2.0) | 0.003 | –10.0 (–24.9; 5.0) | 0.19 |
| Bodily pain | –14.4 (–22.2; –6.5) | < 0.001 | 8.7 (0.8; 16.7) | 0.03 | –1.3 (–4.0; 1.3) | 0.33 | –19.3 (–29.9; –8.8) | < 0.001 |
| General health | –4.5 (–10.6; 1.7) | 0.16 | –5.0 (–11.3; 1.2) | 0.12 | 0.9 (–1.2; 3.0) | 0.40 | –12,3 (–20.5; –4.1) | 0.004 |
| Vitality | –3.9 (–11.1; 3.1) | 0.27 | –4.6 (–11.8; 2.7) | 0.22 | –1.4 (–3.8; 1.1) | 0.27 | –6.6 (–16.2; 2.9) | 0.17 |
| Social functioning | –9.2 (–16.3; –2.2) | 0.01 | 1.2 (–5.9; 8.4) | 0.74 | –0.1 (–2.5; 2.3) | 0.92 | –8.4 (–17.8; –1.1) | 0.08 |
| Role – emotional | –10.5 (–22.5; 1.5) | 0.09 | 0.9 (–11.3; 13.2) | 0.88 | –3.6 (–7.7; 0.46) | 0.08 | –11.2 (–27.4; 5.1) | 0.18 |
| Mental health | –3.9 (–8.9; 1.2) | 0.14 | 2.7 (–2.5; 7.9) | 0.31 | 0.9 (-0.9; 2.6) | 0.32 | –8.1 (–14.9; –1.3) | 0.02 |

CI = confidence interval.

a) Linear regression with SF-36 scores (range 0-100) as dependent variables.

We were not surprised that the participants in the present study had a lower self-rated health than the general population, as the study population represents a subgroup with a diagnosed disease which is usually accompanied by numerous complications. There was no evident increase in indicated poor self-rated health with age. This stands in contrast to the trend in the general population. One of the many elements involved in health perception is comparison on oneself with a reference group. It is therefore likely that the younger participants in the study tended to assess their health as being poorer than that of the relatively older participants.

Many factors influence functioning, and the predictors identified in the present study represent only a small fraction of possible predictors of limited functioning. One of the three identified predictors was diabetes as underlying disease, which together with haemodialysis treatment had a limited effect on many aspects of functioning and general health. Renal disease, together with complications of the eyes, nerves and heart are some of the diabetes complications occurring later in the disease course. Patients diagnosed with diabetes constitute the group of chronic renal disease patients with most symptoms and the greatest risk of cardiovascular disease, especially in the last stage of their disease [16].

Ten percent indicated an unmet need for community rehabilitation services. We expected that poor physical functioning would be a predictor of the reception of rehabilitation services, but this was not the case. The question is therefore whether the allocation of rehabilitation services for this group is based on well-defined and systematic criteria.

Patients not only expect to survive, they also have expectations regarding their quality of life [17]. The focus on high-tech treatment of chronic renal disease should therefore be supplemented by a focus on the patient's functioning. General knowledge about functioning is of great importance in the education of patients, relatives and staff. Data on functioning can elucidate factors that affect how well patients are doing in their daily lives. This knowledge may also contribute to improve cooperation between hospitals and the community with a view to arriving at a better assessment of the patient's rehabilitation needs. In addition to the efforts made to reduce mortality and morbidity, efforts aimed at optimizing performance in the patient's daily life should be given priority. Systematic and targeted health efforts are essential. It is important to estimate the effects of health efforts on hospitalizations, on the need for community services and on employment and participation in social activities. These effects should be analysed in the context of a high level of information about relevant socio-economic factors.

From 1987 to 2005, the proportion of elderly people with good physical mobility increased from 51% to 68% in the general Danish population [18]. Studies have not yet thoroughly analysed whether patients with chronic renal disease can achieve an improvement in their functioning level, but studies have found effects on quality of life, different aspects of function, exercise capacity and depression [19].

In order to successfully implement systematic monitoring of functioning and general health, it is important to have validated and reliable tools for collecting, storing and analyzing data. The tools, e.g. questionnaires, for collecting data must be acceptable to patients and be easy to understand and complete. Systematic monitoring needs to be an element in the organization's strategic efforts and it should form part of the health professional culture.

## CONCLUSION

In this study we collected information on self-rated health and functioning among patients with chronic renal disease. The patients' assessments of their health

and functioning were described and predictors of disability were identified. Furthermore, information on the use of community home help, nursing and rehabilitation services was collected. Information was obtained that may be used to form the basis for ongoing monitoring of the development of self-rated health, functioning and the associated use of community services. Such information may therefore form the basis for the planning of interventions to maintain or improve functioning.

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