Quality of life before and after start of dialysis in older patients

Running head: Dialysis and quality of life

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Abstract

Background and objectives. In older people with kidney failure, improving health-related quality of life (HRQoL) is often more important than solely prolonging life. However, little is known about the effect of dialysis initiation on HRQoL in older patients. Therefore, we investigated the evolution of HRQoL before and after starting dialysis in older kidney failure patients.

Design, setting, participants and measurements. The European Quality (EQUAL) study is an ongoing prospective multicenter study in patients aged ≥65 years with an incident eGFR ≤20 mL/min/1.73m^2. Between April 2012 and December 2021, HRQoL was assessed every 3-6 months using the 36-item Short-Form Health Survey (SF-36), providing a mental component summary (MCS) and physical component summary (PCS). Scores range from 0-100, with higher scores indicating better HRQoL. With linear mixed models we explored the course of HRQoL during the year preceding and following dialysis initiation.

Results. In total, 457 incident dialysis patients were included who filled out at least one SF-36 during follow-up. At dialysis initiation, mean±SD age was 76±6 years, eGFR was 8±3 ml/min/1.73m^2, 75% were men, 9% smoked, 45% had diabetes, and 46% had cardiovascular disease. Median (IQR) MCS was 53 (38-73) and PCS was 39 (27-58). During the year preceding dialysis, estimated mean change in MCS was -13 (95%CI:-17;-9) and in PCS was -11 (95%CI:-15;-7). In the year following dialysis, estimated mean change in MCS was +2 (95%CI:-7;+11) and in PCS was -2 (95%CI:-11;+7). HRQoL patterns were similar for most mental (mental health, role emotional, social functioning, vitality) and physical domains (physical functioning, bodily pain, role physical).

Conclusions. Patients experienced a clinically relevant decline of both mental and physical HRQoL before dialysis initiation, which stabilized thereafter. These results may help inform older kidney failure patients who decided to start dialysis.

Introduction

Globally, the number of older (≥65 years) patients with kidney failure increases, driven mainly by increasing prevalence of diabetes and hypertension.[1] Because older patients are often ineligible for kidney transplantation, dialysis is the most common kidney replacement therapy. Considering the large comorbidity burden, limited functional status, and limited future perspectives in older kidney failure patients, improving health-related quality of life (HRQoL) after the start of dialysis is deemed more important than solely the prolongation of life.[2,3]

HRQoL is known to worsen considerably over time in the chronic kidney disease (CKD) stage 4/5 population.[4] In dialysis patients, HRQoL has also been found lower than in the general population.[5,6] Patient-reported outcome measures (PROMs), among which questionnaires measuring HRQoL, are becoming more frequently incorporated in routine nephrology clinical care.[7] However, to adequately interpret HRQoL outcomes for an individual kidney failure patient, information on HRQoL levels and patterns in larger kidney failure patient groups is needed.

Nevertheless, there are very few studies addressing how HRQoL changes in the period before and after dialysis initiation and, as far as we know, none in older patients. Knowledge on the evolution of HRQoL could aid nephrologists in informing kidney failure patients who consider starting dialysis and improve the shared decision-making process. This would especially be relevant for older kidney failure patients, considering their often limited life expectancy and treatment options. Therefore, our aim is to investigate the evolution of

mental and physical HRQoL and the individual HRQoL domains in the year before and after starting dialysis in kidney failure patients aged ≥65 years.

Methods

Study design and population

The European Quality (EQUAL) study on treatment in advanced CKD, starting April 2012, is an ongoing prospective multicenter follow-up study in six European countries: Germany, Italy, Poland, Sweden, The Netherlands and The United Kingdom, as previously described in detail.[8] Briefly, patients ≥65 years with advanced CKD followed in a nephrology clinic were included at an incident estimated GFR (eGFR) drop to or below 20 mL/min/1.73m^2 in the last six months. Patients were excluded when the eGFR drop was the result of an acute event or when a history of kidney replacement therapy (i.e. dialysis initiation or kidney transplantation) was present. Identified patients who met the eligibility criteria were consecutively approached. Patients were followed every 3 to 6 months until kidney transplantation, death, refusal of further participation, transfer to a non-participating center, loss to follow-up, or end of follow-up, whichever came first. For the present analyses, we included all patients who started hemodialysis or peritoneal dialysis and completed at least one HRQoL assessment during the year before or after dialysis. End of follow-up was at December 2021, when the data were extracted. All patients gave written informed consent, and all local medical ethics committees or corresponding institutional review boards approved the study.

Data collection

In the EQUAL study, patients are followed while receiving routine medical care as provided by their nephrology clinic. Data were collected every 3 to 6 months and entered into a web-based clinical record form that was developed for this specific purpose. Extra follow-up visits were conducted at the start of dialysis and after the eGFR dropped below 10

mL/min/1.73m^2 for the first time. The collected data included patients' demographics, ethnicity, primary kidney disease, comorbid conditions, physical examination and laboratory data. All laboratory investigations and physical examinations were performed through standard protocols and procedures according to routine care at the local participating centers. In order to standardize these data, all participating centers completed a questionnaire to capture details on local laboratory methods, units of measurement and normal ranges. Subsequently, all data were recalculated into one uniform unit of choice. The eGFR was calculated according to the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation.[9] Primary kidney disease was classified by the treating nephrologist according to the codes of the European Renal Association.[10] History of cardiovascular disease was defined as any history of cerebrovascular disease, myocardial infarction or peripheral vascular disease.

HRQoL was assessed every 3-6 months using the 36-item Short Form Health Survey (SF-36), a 36-item questionnaire measuring HRQoL on eight domains, resulting in a mental component summary (MCS) and a physical component summary (PCS) score. Component scores range from 0-100 with higher scores indicating better HRQoL. The four domains of the MCS are mental health, role limitations due to emotional problems, social functioning and vitality. The four domains of the PCS are physical functioning, bodily pain, role limitations due to physical problems and general health. Following the SF-36 instructions, at least half of the items in a domain had to be completed to calculate a domain score.[11] Patients could ask assistance of family, friends or acquaintances for answering the questionnaires.

Statistical analysis

For the present study, baseline was defined as the date of the first dialysis treatment. Baseline characteristics are presented as mean ± standard deviation (SD), median (interquartile range), or number (proportion) where appropriate. With life tables we calculated the cumulative mortality risk during the year after dialysis initiation.

First, for our main analyses, patients were included when at least one MCS or PCS score was available in the year before or after start of dialysis. We used linear mixed models to explore the evolution of MCS and PCS during the year preceding and the year following dialysis initiation. A random intercept and a random slope for time were used to account for repeated measurements, allowing the trajectory over time to vary between individuals. We assumed the relation between HRQoL and time to be non-linear around the start of dialysis. Therefore, we modelled time in a three-knot restricted cubic spline function with 95% confidence intervals (95%CI) to allow for more flexibility. The knots were chosen at start of dialysis, 0.5 year before and 0.5 year after. We repeated this analysis with additional knots at 1 or 3 months before and after dialysis initiation. Finally, we repeated this model with adjustments for age, sex, diabetes and cardiovascular disease, in order to correct for HRQoL data missing at random.[12]

Second, we compared linear change in HRQoL during the year before and after start of dialysis. We used three fixed variables in these linear mixed models: 1) time; 2) indicator whether dialysis was already started (yes or no); and 3) interaction between time and the indicator. In this model the interaction term estimates the difference in change before and after dialysis initiation.

Third, in order to identify differences in outcome within subgroups, we studied the linear change of MCS and PCS before and after start of dialysis, after stratification at baseline for age (≥65 to <75 *vs* ≥75 years), sex (men *vs* women), smoking status (never, ex or current smoker), history of diabetes (yes/no), history of cardiovascular disease (yes/no), Charlson comorbidity index (<7 or ≥7), eGFR at start of dialysis (<10 *vs* ≥10 ml/min/1.73m^2) and dialysis modality (hemodialysis *vs* peritoneal dialysis). Within these subgroups, we adjusted for the potential confounders age, sex, smoking, history of diabetes, history of cardiovascular disease, eGFR at dialysis initiation and dialysis modality when appropriate.

Fourth, we assessed the linear evolution of the eight individual HRQoL domains (i.e. physical functioning, role-physical, pain, general health, vitality, social function, role-emotional, and mental health) in the year before and after dialysis initiation using linear mixed effect models.

Finally, we conducted three sensitivity analyses. First, we restricted our follow-up time to 6 months after dialysis initiation, because patients who died in the year after did no longer fill out questionnaires after their death. Since these patients are more likely to have experienced worse HRQoL than patients who survived, informative dropout due to death should be considered. Second, we extended follow-up time to 3 years before and after dialysis initiation. Within this analysis, time was modelled as a four-knot restricted cubic spline with the knots chosen at start of dialysis, 2 and 1 year before and 0.5 year after. All patients with at least one MCS or PCS within this extended period were included in this analysis. This, since we might have missed patients who only filled an SF-36 outside the

window of one year before dialysis initiation in our main analysis. Third, we restricted our analysis to patients who filled questionnaires both before and after dialysis initiation. All analyses were performed using R version 4.0.3 (R Core Team, Vienna, Austria). This manuscript is in accordance with the STROBE guidelines for reporting observational studies.[13]

Results

Baseline characteristics and follow-up

Of all EQUAL participants who started dialysis, defined as baseline, 457 patients completed an SF-36 questionnaire during our follow-up period and were thus included in the analysis.[Supplemental Figure 1] Baseline characteristics are presented in Table 1. At the start of dialysis, mean±SD age was 76±6 years, 75% were men, 96% were white, 45% had diabetes, 9% were current smokers, 46% had a history of cardiovascular disease and the mean (SD) eGFR was 8±3 ml/min/1.73m^2. Median (IQR) MCS was 53 (38-73) and PCS was 39 (27-58). During 1 year after dialysis initiation, 74 patients died, of whom 24 and 41 within 3 and 6 months of follow-up, respectively. The cumulative mortality risk at 1 year after dialysis initiation was 0.19.[Figure 1] Of the patients who died, 64% completed at least one SF-36 after dialysis initiation. Of all EQUAL dialysis patients, 133 (23%) were excluded for not sufficiently completing any questionnaires during our follow-up period. No relevant differences in baseline characteristics were observed between in- and excluded patients.[Supplemental Table 1]

Questionnaires

In total, 1497 questionnaires were available during the follow-up period, with an average of 3.3 questionnaires per patient.[Supplemental Figure 2] On average, questionnaires were missing in 18% and 35% of the follow-up visits in the year before or after dialysis initiation, respectively. Of all patients, 320 (70%) completed an SF-36 both before and after dialysis initiation, with a median (IQR) of 135 (90-184) days between questionnaires. Of the remaining 137 (30%) patients, 121 only filled SF-36 questionnaires before and 16 only after

dialysis initiation. Missing follow-up visits and questionnaires are shown in Supplemental Table 2 and Supplemental Figure 3, respectively. Patients answering ≥4 compared to <4 SF-36 questionnaires during follow-up had a somewhat higher mean (SD) Charlson comorbidity score of 7.2±2.1.[Supplemental Table 3]

Evolution of HRQoL

When modelling time in a restricted cubic spline function, we observed a clear decline in HRQoL during the year before dialysis, which stabilized after dialysis initiation.[Figure 1] Modelling time with knots closer to dialysis initiation, or adjustments for age, sex, diabetes and cardiovascular disease showed similar results.[Supplemental Figure 4,5]

When assessing linear change in HRQoL during the year preceding dialysis we observed a mean MCS decline of -13 (95%CI:-17;-9) and PCS decline of -11 (95%CI:-15;-7).[Table 2,Supplemental Figure 6] All 4 individual mental HRQoL domains decreased in the year before dialysis, ranging from -9 (95%CI:-12;-6; mental health) to -17 (95%CI:-26;-8; role functioning emotional). The individual physical HRQoL domains physical functioning, bodily pain and role functioning physical, decreased considerably in the year before dialysis, with scores of -11 (95%CI:-15;-7), -9 (95%CI:-14;-3) and -18 (95%CI:-25;-10), respectively, while the change in general health was less with -2 (95%CI:-5;+1).

In the year following dialysis, the mean MCS change was +2 (95%CI:-7;+11) and PCS change was -2 (95%CI:-11;+7).[Table 2,Supplemental Figure 6] As for the individual mental HRQoL domains, mental health, social functioning and vitality increased with +3 (95%CI:-5;+11), +5 (95%CI:-7;+17) and +6 (95%CI:-3;+15), respectively, while role functioning emotional

decreased with -2 (95%CI:-11;+7). The individual physical HRQoL domains physical functioning, general health and bodily pain decreased with -1 (95%CI:-11;+10), -1 (95%CI:-9;+6) and -4.4 (95%CI:-17;+9), whereas role functioning physical increased with +4 (95%CI:-16;+23) in the year after dialysis.[Table 2]

Subgroup analyses

In all subgroup analyses, MCS and PCS declined in the year before start of dialysis and stabilized in the year after.[Supplemental Table 4]. Supplemental Table 5 shows median MCS and PCS at start of dialysis for each subgroup. In patients ≥75 years compared to patients ≥65 and <75 years, adjusted MCS and PCS decreased more in the year before dialysis and increased less in the year after. At baseline, median MCS and PCS were lower in women compared to men. However, there was a faster decline of MCS and PCS in men compared to women in the year preceding dialysis, whereas this decline stabilized more in women than men after starting dialysis. Furthermore, in current smokers compared to former or never smokers, adjusted MCS and PCS declined considerably faster before and after dialysis in current smokers when compared to former or never smokers. In patients with higher compared to lower Charlson comorbidity scores, PCS declined less in the year before start of dialysis, whereas MCS improved less in the year after start of dialysis.

Sensitivity analyses

First, with follow-up restricted to 6 months after start of dialysis, MCS and PCS increased with +11 (95%CI:+3;+19) and +6 (95%CI:-8;+20), indicating a larger improvement after dialysis initiation than in our main analysis.[Supplemental Table 6, Supplemental Figure 7] Second, by extending follow-up time from 1 to 3 years before dialysis, we included 39

additional patients and observed similar results compared to our main analysis, namely that mean MCS and PCS scores decreased with -20 (95%CI:-23;-16) and -19 (95%CI:-23;-15) during the 3 years before dialysis initiation.[Supplemental Table 7] Especially for MCS, this decrease was fastest in the year before dialysis.[Supplemental Figure 7] Third, when restricting our analysis to those who filled questionnaires both before and after dialysis initiation (n=320) we found similar results: MCS decreased with -14 (95%CI:-18;-10) and PCS with -9 (95%CI:-14;-5) in the year before dialysis, which stabilized in the year after with scores of +2 (95%CI:-9;+12) and -3 (95%CI:-12;+7), respectively.

Discussion

In this large European multicenter study of patients who started dialysis, we found a clinically relevant worsening of mental and physical HRQoL of -13 and -11, respectively, during the year preceding dialysis initiation, that stabilized with scores of +2 and -2 in the year after dialysis initiation.

Our results are in line with the findings of previous studies. Most studies assessing HRQoL in predialysis and dialysis patients did so cross-sectionally.[14-19] For example, in a cross-sectional analysis of the Dialysis Outcomes and Practice Patterns Study (DOPPS), 7378 prevalent hemodialysis patients with a mean age of 59 years had much lower scores in all generic HRQoL subscales compared to their population norm values.[2] Only few studies investigated the evolution of HRQoL in predialysis or dialysis patients.[4,5,20-24] The Dutch prospective PREPARE-2 cohort, including 502 incident CKD stage 4/5 (non-dialysis) patients with a mean age of 65 years and eGFR of 14 ml/min/1.73m^2, showed that both mental and physical HRQoL decreased with 8.9 and 7.4 points up until death or KRT, respectively.[4] Furthermore, every 3-point lower MCS or PCS score was associated with a hazard ratio of 1.04 (95%CI:1.02;1.06) for reaching a combined poor health outcome of KRT and death.[4] In 585 dialysis patients who completed an HRQoL assessment at start of dialysis and 12 months thereafter, HRQoL improved slightly but not clinically relevant, namely +1.4 and +1.4 for MCS and +0.7 and -1.0 for PCS in hemodialysis and peritoneal dialysis patients, respectively.[18] In dialysis patients, lower mental and physical HRQoL have also been shown to be associated with hospitalization and mortality.[25] The clinical relevance of changes in HRQoL depends on the type of population and intervention studied.[26] In the general population, with no specific intervention, clinically important differences in SF-36

scores vary from 2 to 3 points.[27] In cohorts of various chronic conditions, clinically important differences range from 3 to 5 points.[28] Therefore, the decline of -13 and -11 we observed in mental and physical HRQoL during the year preceding dialysis is substantial, and thus clinically relevant for patients.

We studied the development of HRQoL before and after dialysis initiation in more detail by assessing the eight individual domains. Seven out of the 8 individual HRQoL domains showed a clinically relevant decline in the year before dialysis, which stabilized or improved in the year after. For example, we found a decline in the individual domain mental health of -9 points in the year before dialysis, that stabilized with +3 points in the year after. This result is in line with previous studies showing that depression and depressive symptoms are highly common among dialysis patients, with a prevalence of 23% and 43%, respectively.[29,30] In contrast, the domain general health only declined with -2 points in the year before start of dialysis. For this individual domain patients are asked to rate their general health, which is a broad concept compared to the other individual domains, thus leaving more room for personal interpretation.[31] On a population level, this makes it more difficult to detect changes in the domain general health over time.

The steep decline of HRQOL before dialysis initiation and stabilization thereafter can be explained as follows. First, the number of uremic symptoms is known to increase considerably as kidney function declines prior to dialysis initiation.[4] Assuming that dialysis treatment may alleviate uremic symptoms, this could explain the halt of the decline in mental and physical HRQoL after dialysis initiation. Second, interventions to prepare for dialysis initiation, such as vascular access creation, may also negatively affect HRQoL in the

year preceding dialysis initiation.[32] Third, differences in patient management before and after dialysis initiation, e.g. due to closer monitoring nearing or after starting dialysis, may have influenced HRQoL. Lastly, as with any study on patient-reported outcomes (PROs), especially before and after an index-event such as dialysis initiation, response shift needs to be considered. Response shift is defined as a change in the meaning of one's evaluation of a self-reported outcome, such as HRQoL, over time.[26] In other words, certain experiences, such as dialysis initiation, can change someone's frame of reference and thus their perception of HRQoL. To some extent, response shift may have contributed to the stabilization of the decrease in mental and physical HRQoL we observed after dialysis initiation.

There are several strengths to our study. First, we used a validated questionnaire to assess mental and physical HRQoL longitudinally, both before and after start of dialysis in a large cohort. This allowed us, for the first time, to describe the evolution of these important PROs before and after dialysis initiation in older individuals. Second, we included patients from six European countries, whereas previous studies were often restricted to a single nation. Since the perception of HRQoL can vary by country and nationality, our broad patient sample will allow for better generalizability of our results.[33] However, our study also has some limitations. First, we could not include all EQUAL dialysis patients in the present analysis since questionnaires were only available in 77%. However, there were no relevant differences in clinical characteristics at start of dialysis between in- and excluded EQUAL dialysis patients. Second, for 18% of the follow-up visits in the year before dialysis and 35% in the year after an SF-36 was missing. By using linear mixed effects models, we could take into account HRQoL data missing at random (e.g. a study coordinator forgot to send out an

SF-36), but not data missing not at random (e.g. an SF-36 not completed because a patient feels too sick). The latter may have resulted in an overestimation of HRQoL scores. However, an additional analysis in which we adjusted for age, sex, diabetes and cardiovascular disease, showed similar results. Third, 16% of the older dialysis patients in our study died in the year after dialysis initiation. The one-year mortality rate of 16% that we found is comparable to the value of 15% established in 65- to 75-year-old European dialysis patients and somewhat lower than the value of 24% of European dialysis patients >75 years old.[34] After restriction of the follow-up to 6 months after starting dialysis, MCS and PCS increased slightly more. Therefore, our findings do not support the assumption that patients who died were more likely to have experienced worse HRQoL than those who remained in the study. If anything, the informative dropout due to death did not result in overestimation of the HRQoL scores that we calculated one year after dialysis initiation. Fourth, we did not collect data about the social support of our older population. Most likely, social support provided by for example families and neighbours varies between European countries and influences HRQoL. Lastly, since we only assessed patients starting dialysis, we could not investigate the evolution of HRQoL in patients not starting dialysis, e.g. those treated with conservative care or those who died before dialysis initiation. Therefore, our results are only applicable for informing kidney failure patients who chose dialysis treatment and will survive up to dialysis initiation. As conservative care is becoming increasingly considered as an alternative to dialysis initiation in frail or older patients, assessing the effect on HRQoL of this conservative treatment would be of great value.[18,35]

In conclusion, our results indicate that mental and physical HRQoL worsened considerably during the year preceding dialysis, but this decline stabilized at dialysis initiation. However,

mental and physical HRQoL did not completely recover during the year after dialysis initiation. These results could help informing older kidney failure patients who decided to start dialysis on what to expect in change of HRQoL.

Disclosure

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Table of Contents for the Supplemental Material

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Figure Legends

Figure 1. Evolution of mental (blue) and physical (green) health-related quality of life (HRQoL) in the year before and after start of dialysis in 457 older patients, with a graph indicating the cumulative mortality risk and table indicating the absolute mortality rates after dialysis initiation.

Tables and Figures

Table 1. Characteristics of 457 participants in the European Quality (EQUAL) study on treatment of older people with advanced chronic kidney disease at start of dialysis.

Demographics	
Age (yr)	76 (6)
Men, *n* (%)	344 (75)
Country, *n* (%)	
Germany	77 (17)
Italy	91 (20)
The Netherlands	69 (15)
Poland	35 (8)
Sweden	94 (21)
United Kingdom	91 (20)
Marital status, *n* (%)	
Married	318 (71)
Divorced	27 (6)
Widowed	82 (18)
Never married	19 (4)
Education, *n* (%)	
Low	105 (25)
Intermediate	226 (54)
High	90 (21)
Clinical characteristics	
Primary kidney disease, *n* (%)	
Diabetes	111 (24)
Hypertension	124 (27)
Systemic / glomerular / tubule-interstitial	116 (25)
Other / unknown	106 (23)
Dialysis modality, *n* (%)	
Hemodialysis	315 (74)
Peritoneal dialysis	110 (26)
Diabetes, *n* (%)	199 (45)
Cardiovascular disease, *n* (%)[a]	200 (46)
Chronic lung disease, *n* (%)	53 (12)
Malignancy, *n* (%)	95 (22)
Current smoking, *n* (%)	40 (9)
BMI (kg/m^2) [b]	27 (6)
Systolic BP (mmHg) [b]	146 (24)
Diastolic BP (mmHg) [b]	74 (12)
Blood chemistry [b]	
Creatinine (mg/dL)[c]	6.6 (2.3)
eGFR (ml/min/1.73m^2)[d]	8 (3)
Urea nitrogen (mg/dL)[e]	92 (42)
Albumin (g/dL)	3.5 (0.6)
Cholesterol (mg/dL)[f]	159 (54)

HRQoL [b]	
Mental component summary score	53 (38-73)
Mental health	64 (52-80)
Role functioning emotional	33 (0-100)
Social functioning	63 (30)
Vitality	40 (25-53)
Physical component summary score	39 (27-58)
Physical functioning	44 (20-66)
Bodily pain	52 (31-100)
Role functioning physical	0 (0-75)
General health	40 (30-52)

Data are expressed as number (%), mean (± standard deviation) or median (interquartile range) when appropriate.

[a]Cardiovascular disease was defined as any history of a cerebral vascular accident, a myocardial infarction or peripheral vascular disease

[b]Measured at start of dialysis or within 30 days before start of dialysis

[c]To convert the values for creatinine to micromoles per liter, multiply by 88.40.

[d]eGFR, was estimated based on serum creatinine using the CKD-EPI formula

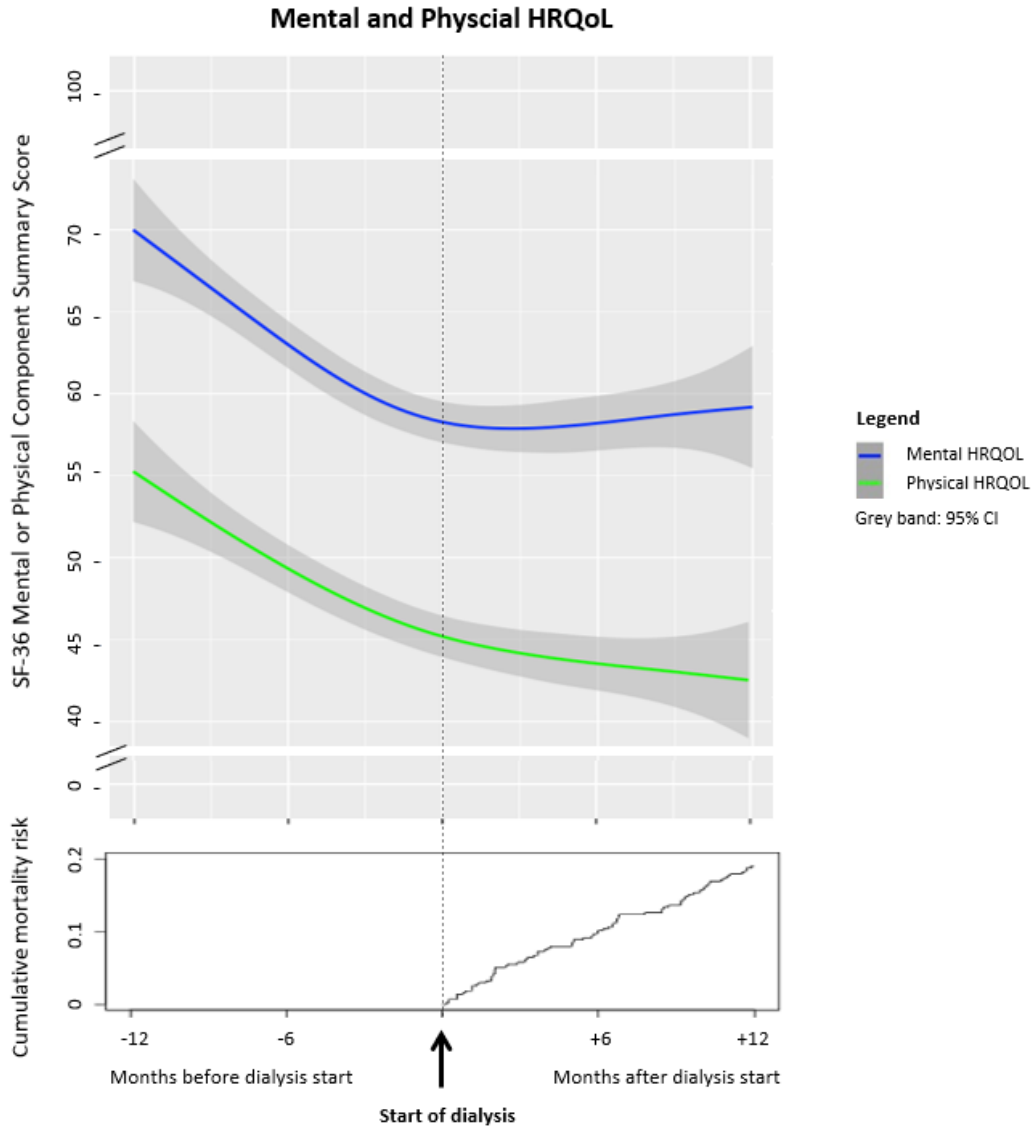
[e]To convert the values for urea nitrogen to millimoles per liter, multiply by 0.3571.

[f]To convert the values for cholesterol to millimoles per liter, multiply by 0.02586.

Table 2. Evolution of individual health-related quality of life (HRQoL) component summary scores and individual domain scores in the year before and after start of dialysis in 457 older patients.

	Change per year (95%CI)		**Difference in change (95% CI)**
HRQoL	**Year before start of dialysis**	**Year after start of dialysis**	**Year after vs before start of dialysis**
Mental component summary	-13 (-17 to -9)	+2 (-7 to +11)	+15 (+10 to +20)
Mental health	-9 (-12 to -6)	+3 (-5 to +11)	+12 (+7 to +17)
Role functioning emotional	-17 (-26 to -8)	-3 (-24 to +17)	+14 (+2 to +25)
Social functioning	-14 (-19 to -9)	+5 (-7 to +17)	+19 (+12 to +26)
Vitality	-12 (-16 to -8)	+6 (-3 to +15)	-18 (+13 to +23)
Physical component summary	-11 (-15 to -7)	-2 (-11 to +7)	+9 (+4 to +14)
Physical functioning	-11 (-15 to -7)	-1 (-11 to +10)	+10 (-4 to +13)
Bodily pain	-9 (-14 to -3)	-4 (-17 to +9)	+5 (+3 to +9)
Role functioning physical	-18 (-25 to -10)	+4 (-16 to +23)	+22 (+9 to +33)
General health	-2 (-5 to +1)	-1 (-9 to +6)	+1 (-4 to +5)

Figure 1. Evolution of mental (blue) and physical (green) health-related quality of life (HRQoL) in the year before and after start of dialysis in 457 older patients, with a graph indicating the cumulative mortality risk and table indicating the absolute mortality rates after dialysis initiation.



	Absolute mortality rates			
Months after dialysis start	0 to 3	3 to 6	6 to 9	9 to 12
Person-years	105	95	89	81
Deaths from all causes	24	17	14	19
Deaths from all causes / 100 person-years (95% CI)	23 (15-34)	18 (10-29)	16 (9-26)	23 (14-37)

HRQOL: health-related quality of life, SF-36: 36-item Short-Form Health Survey