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Quality of life on chronic dialysis: comparison between haemodialysis and peritoneal dialysis

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Abstract

Background. Quality of life (QOL) assessment in patients on chronic haemodialysis (HD) or peritoneal dialysis (PD) has only rarely been carried out with the generic Euroqol-5D® questionnaire.

Methods. All chronic HD and PD patients in the 19 centres of western Switzerland were requested to fill in the validated Euroqol-5D® generic QOL questionnaire, assessing health status in five dimensions and on a visual analogue scale, allowing computation of a predicted QOL value, to be compared with the value measured on the visual analogue scale.

Results. Of the 558 questionnaires distributed to chronic HD patients, 455 were returned (response rate 82%). Fifty of 64 PD patients (78%) returned the questionnaire. The two groups were similar in age, gender and duration of dialysis treatment. Mean QOL was rated at $60 \pm 18\%$ for HD and $61 \pm 19\%$ for PD, for a mean predicted QOL value of 62 ± 30 and $58 \pm 32\%$ respectively. Results of the five dimensions were similar in both groups, except for a greater restriction in usual activities for PD patients ($P = 0.007$). The highest scores were recorded for self-care, with 71% HD and 74% PD patients reporting no limitation, and the lowest scores for usual activities, with 14% HD and 23% PD patients reporting severe limitation. Experiencing pain/discomfort (for HD and PD) or anxiety/depression (for PD) had the highest impact on QOL.

Conclusions. QOL was equally diminished in HD and PD patients. The questionnaire was well accepted and performed well. Improvement could be achievable in both groups if pain/discomfort and anxiety/depression could be more effectively treated.

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Introduction

Chronic dialysis imposes a considerable burden on patients [1] and families. Handicaps linked with co-morbidities may worsen the situation. While previous interest focused mostly on medical and technical aspects of dialysis care, psychosocial aspects are now increasingly explored, among them quality of life (QOL) and satisfaction with care.

Many different generic and disease-specific questionnaires or interview techniques have been used for assessing the QOL of patients with advanced kidney disease [2]. Overall, studies have shown that global QOL is severely impaired. Results were not always consistent, because they were used at different stages of the disease and in different settings. Comparisons of QOL between haemodialysis (HD) and peritoneal dialysis (PD) have also been performed at different stages of the disease and in different settings. Results were not always consistent in the first place because many different instruments were used: the generic SF-36 questionnaire [3–7], the quality index score developed by Spitzer [8], the generic EORTC-30 questionnaire [9], or specific instruments such as the KDQOL-SF [6], or the CHOICE instrument [7]. All these instruments give multidimensional results, have few dimensions in common and do not allow comparison between them, nor a simple interpretation, or a linkage with economic assessments.

So far, only two studies used the EuroQol-5D® (EQ-5D) generic questionnaire. One of them compared it with the SF-36 [3] and the other used it along with two other patient preference measurement tools, the time trade-off and the standard gamble [10]. Despite its infrequent use, the EQ-5D instrument has many

advantages: it is very easy to use, has been translated and validated in many languages, and its five questions and visual analogue scale impose a minimal burden on patients. In addition, it allows comparisons of QOL as measured in individual patients with predicted values derived from a sample general population, thus confronting two different perspectives for the same health states. Finally, the global score is a numeric figure that can be used as a utility measure and incorporated into economic evaluations. The primary aims of this study were to assess predicted and measured QOL values, and performance of the EQ-5D instrument in chronic HD and PD patients in the 19 dialysis centres of western Switzerland.

Subjects and methods

Western Switzerland has a population of ~1.8 million inhabitants. The prevalence of dialysis treatment for end-stage renal failure (ESRF) is ~329–476/million. Nineteen dialysis units (16 in the French-speaking area and three in the German-speaking area) and nine PD centres, treat patients with ESRF. Four units are privately owned, 15 are in the public sector and two belong to tertiary care hospitals.

Eligible subjects were all dialysis patients treated in these centres, as part of a study assessing quality of care in chronic dialysis. Each patient was asked to complete the EQ-5D generic QOL questionnaire. The EQ-5D was developed by the international EuroQol group as a standardized generic measure for description of health status [11]. This questionnaire is self-administered and composed of five items addressing: mobility (problem in walking about), self-care (problem with washing or dressing self), usual activities (problem with performing usual activities), pain/discomfort and anxiety/depression. Each item offers three response categories including 'no problem', 'some problems' and 'extreme problems'. In addition, the EQ-5D asks the patient whether his/her health status has improved, has been stable or has deteriorated over the last 12 months. Finally, each patient is requested to evaluate his/her own overall health on a visual analogue scale (EQ-VAS, or thermometer scale) ranging from 0 (worst imaginable health state) to 100 (best imaginable health state), leading to a 'measured' QOL score.

The combination of the three different levels of responses recorded for each of the five items defines 243 possible health states (3^5 possible combinations). Administration of the EQ-5D to a sample of the general population allowed defining a value for each of these health states (health utility). These values are provided with the instrument [12] and are used as a weight for computing a 'predicted' QOL value, reflecting the preference of the general population for these health states. Measured scores on the visual analogue scale can then be compared with the predicted scores. At the beginning of the questionnaire, data about age, gender and duration of dialysis treatment were requested, but the patient was not obliged to provide his/her name, although space was left to do so.

Questionnaires were distributed by the nursing staff and the patients were asked to respond to the questions at home and return the questionnaire to the dialysis centre, if preferred anonymously, by dropping them into a drop box. When patients had trouble reading, writing or understanding the questionnaires, a dedicated nurse could provide assistance. No recall procedure was carried out to increase the response rate.

Results were analysed by dialysis treatment modality and by centre. Analysis was repeated after restricting HD data to the centres that also offered PD. Further analysis compared the results by centre size (number of patients <25 or not), by response rate (<90% or not), by teaching status and by type of financing (public *vs* private). Categorical variables were compared with the χ^2 test and continuous variables with Mann–Whitney *U*-tests or Student's *t*-tests, as appropriate. The relationship between the five items and the measured QOL was assessed by linear regression, as were the relationships with age, duration of treatment and health state over the prior 12 months.

Quality performance of the questionnaire was assessed as response rate to the different items and to the scale, and distribution of responses over the different responses categories.

Differences between measured and predicted QOL were computed for each patient and means were computed for each dialysis modality and centre. Differences in QOL and differences between measured and predicted QOL by evolution of health state were compared with a two-way ANOVA. Statistical significance was assumed for P values <0.05.

Results

Centres treated a median of 24 HD patients (range 6–68), and were equipped with a median of 10 dialysis beds (range 3–26, total 190). In the nine units performing PD, a median of six PD patients (1–20, total 64) were treated per centre.

Of the 558 questionnaires distributed to chronic HD patients, 455 were returned (response rate 82%). The centre-specific response rate ranged from 55.6 to 100%, with a median of 92.9%. For PD patients, 50 of the 64 questionnaires were returned (response rate 78%). The centre-specific response rate ranged from 50 to 100%, with a median of 90%. Responders used the help of dialysis nurses to complete the questionnaire only in a few cases. Almost all patients (98%) were Caucasians. HD and PD patients were not statistically different in age (64 ± 15 *vs* 60 ± 17 years), gender (male gender 63 *vs* 55%) and duration of dialysis treatment (4.0 ± 4.5 *vs* 3.2 ± 4.9 years). Only 7.5% of HD and 8% of PD patients had started dialysis in the year of the study, and their health status assessment was not different from the other patients. Responders were also similar to the whole dialysis population treated in the different dialysis centres, and no differences were observed between the different centres. The corresponding values when analysis was repeated by centre size (> or <25 patients), response rate (> or <90%), teaching status (teaching or not) and type of financing (public or private) are displayed in Table 1. Only three statistically significant differences were observed, for which no obvious explanation exists: centres offering both HD and PD had more male patients; PD centres with high response rates were younger; and PD patients

Table 1. Patient's characteristics and response rate by centre

	Number of patients	Number of respondents	Mean response rate (%)	Male gender (%)	Mean age (years)	Mean duration of dialysis (years)
HD centres ($n=19$)						
Total (all centres)	558	455				
Median of centre means	24	19	92.9	67.4	64.4	3.8
Minimum mean	6	6	55.6	31.6	59.2	2.9
Maximum mean	68	56	100.0	83.9	69.9	6.4
HD + PD centre, $n=9$	359	285	81.4	67.3[a]	64.9	4.4
HD only centre, $n=10$	199	170	86.9	56.1	62.6	3.4
Large centre (>25 patients), $n=8$	369	296	81.8	64.6	64.1	4.4
Small centre (<25 patients), $n=11$	189	159	86.1	60.2	63.7	3.4
High response rate (>90%), $n=9$	189	184	97.0[b]	59.4	63.4	4.2
Low response rate (<90%), $n=10$	369	271	72.9	67.6	64.7	3.8
Teaching hospital, $n=2$	127	99	77.6	68.4	63.2	5.4
Non-teaching hospital, $n=17$	431	356	85.1	61.6	64.2	3.7
Public, $n=15$	460	372	83.5	63.8	64.3	4.3
Private, $n=4$	98	83	87.4	59.8	62.3	2.6
PD centres ($n=9$)						
Total (all centres)	64	50				
Median of centre means	6	4	90.0	50.0	57.0	1.9
Minimum	1	1	50.0	0.0	21.0	1.3
Maximum	20	18	100.0	100.0	72.9	5.0
High response rate (>90%), $n=5$	30	28	98.0[b]	46.4	55.6[a]	3.6
Low response rate (<90%), $n=4$	34	22	60.4	68.2	67.1	2.5
Teaching hospital, $n=2$	30	23	70.0	52.2	54.4	4.5[a]
Non-teaching hospital, $n=7$	34	27	84.5	59.3	64.6	1.7

[a] $P<0.05$.
[b] $P<0.001$.

Table 2. Distribution of responses to EQ-5D, by type of dialysis

	HD				PD				
	(n, %)	1 (%)	2 (%)	3 (%)	(n, %)	1 (%)	2 (%)	3 (%)	P value
Euroqol dimension[a]									
Mobility	(452, 99)	50	49	1	(50, 100)	42	56	2	0.295
Self-care	(451, 99)	71	24	5	(50, 100)	74	16	10	0.246
Usual activity	(443, 97)	36	50	14	(49, 98)	14	63	23	0.007
Pain/discomfort	(439, 96)	30	64	6	(49, 98)	39	53	8	0.351
Anxiety/depression	(442, 97)	52	42	6	(50, 100)	48	46	6	0.873
Health status evolution[b]	(445, 97)	34	51	15	(49, 98)	31	55	14	0.873
Predicted QOL value[c] (Mean ± SD)	(419, 92)	62.1 ± 29.9			(49, 98)	58.1 ± 32.3			0.378
Measured QOL value[d] (Mean ± SD)	(409, 90)	60.4 ± 18.0			(46, 92)	61.2 ± 18.9			0.787

[a] 1 = no problem, 2 = some problem, 3 = extreme problem.
[b] Over the last 12 months: 1 = improved, 2 = same, 3 = deteriorated.
[c] As computed from the five dimensions.
[d] As measured on the visual analogue scale.

in teaching hospitals had been on dialysis for a longer time.

Response rates to the five dimensions of the questionnaire were very high, and responses were distributed over all response categories. Detailed distribution is displayed in Table 2. These results were similar in the two groups, except for a greater restriction in usual activities reported by PD patients ($P=0.007$, compared with HD patients). The highest QOL scores were recorded for the dimension assessing limitations in self-care, with >70% of both HD and PD patients reporting no limitation, and the lowest scores were recorded for limitation in usual activities, with 14% HD and 23% PD patients reporting severe limitations (Table 2).

Mean predicted and measured QOL values were similar in both dialysis groups and not different between centres. However, individual correlation between predicted and measured QOL values was low ($r=0.197$). The distribution of the recorded difference is provided in Table 3. There was no association between the direction or the magnitude of this

Table 3. Stratification of the magnitude of differences between measured and predicted QOL values

Difference (points, scale 0–100)	HD (%) ($n=383$)		PD (%) ($n=45$)		P value
>30	33	8.7	1	2.2	
–21 to 30	46	12.2	4	8.9	
–11 to 20	72	19.0	7	15.6	
–10 to +10	142	37.6	20	44.4	0.197
+11 to +20	23	6.1	3	6.7	
+21 to +30	12	3.2	0	0.0	
>+30	50	13.2	10	22.2	

Table 4. Importance of the self-rated handicap in the five EQ-5D dimensions and of the evolution of health state over the last 12 months on the QOL measured on the thermometer scale

	HD				PD			
	Value	95% Confidence interval		P value	Value	95% Confidence interval		P value
[a] Change of mean QOL as a consequence of a change in Euroqol dimensions (1)								
Dimension								
Mobility	−5.32	−9.08	−1.56	0.006	−8.87	−18.78	1.04	0.078
Self-care	−3.44	−6.98	0.10	0.056	−1.27	−9.05	6.51	0.743
Usual activity	−5.94	−8.91	−2.97	<0.001	−4.42	−14.29	5.45	0.371
Pain/discomfort	−6.75	−9.77	−3.72	<0.001	−10.35	−17.55	−3.16	0.006
Anxiety/depression	−3.51	−6.11	−0.92	0.008	−10.39	−17.67	−3.11	0.006
Constant	101.02	94.75	107.28	<0.001	120.71	101.80	139.62	<0.001
R square	0.33				0.54			
[b] Mean QOL value by health state evolution over the last 12 months (2)								
Health state								
Improved	68.36	65.59	71.12	<0.001	71.86	64.58	79.14	<0.001
Stable	59.40	57.02	61.78		60.70	53.87	67.54	
Deteriorated	47.69	43.47	51.91		34.00	15.17	52.83	
Average	60.68	58.91	62.46		61.20	55.59	66.80	

[a] Linear regression analysis: these results mean that a change from no problem to some problem with pain or discomfort would result in an average 6.75% decrease in QOL for HD patients and an average 10.35% decrease in PD patients.
[b] Comparison of means by two-way ANOVA.

difference and age, gender, duration of dialysis treatment or evolution of heath state over the last 12 months. However, for the different health states associated with no or little limitation in the five dimensions, measured scores from our patients tended to be lower than those predicted as derived from the general population, while the contrary was true for health states associated with moderate or severe limitations.

Measured QOL was not influenced by age, gender duration of dialysis treatment, but was statistically significantly associated with the evolution of health state over the previous 12 months (Table 4). Health status over the prior 12 months was rated as stable in approximately half of the patients and improved in about a third. This finding was consistent for both HD and PD patients.

The five items determining the predicted QOL explained 33% of the variance observed in measured QOL in HD patients, and 54.4% in PD patients. The details of these results are displayed in Table 4. Four out of five items were statistically significant for HD patients, and only two out of five for PD patients. Pain/discomfort and anxiety/depression were associated with very high regression coefficients, although the 95% confidence interval was wide, indicating substantial individual variations. However, these results mean that, for example in PD patients, moving from the stage of 'no problem' with pain/discomfort or anxiety/depression to the stage of 'some problem' would be associated on average with a 10% decrease in QOL, whereas the same move in HD patients would on average decrease QOL by 6.8% for pain/discomfort, but only by 3.5% for anxiety/depression.

Altogether, there was no statistically significant difference in response distribution between the 19 different HD centres or the nine PD centres, nor when analysis was restricted to HD centres offering PD. When analysis was repeated by centre size, response rate, teaching status or type of financing, only two statistically significant differences were observed: HD patients in centres with low response rate reported more pain/discomfort than HD patients in centres with high response rates ($P=0.007$); and HD patients in larger centres reported more anxiety/discomfort than HD patients in smaller centres ($P=0.032$).

Discussion

This study showed that the generic QOL instrument EQ-5D applied to chronic dialysis was well-accepted, easy to use and responsive for both HD and PD

patients. QOL was substantially diminished in both dialysis modalities, to a degree similar to that described in prior studies [3,8,10]. Patients' characteristics, such as gender, age and duration of treatment had no impact on these results. On the other hand, health status change over the last 12 months explained 14 and 29% of the variation in measured QOL for HD and PD patients, respectively. There was a 10 and a 16% decrease in QOL for HD and PD patients for a decrease of one level in the health status over the prior 12 months. Centres' characteristics such as size, response rate, teaching status or type of funding were not related to the results either in HD or PD patients.

The EQ-5D instrument measures health states along five components reflecting physical, functional and mental dimensions. Altogether, these five dimensions explained a third and half of the observed variance in QOL in HD and PD patients, respectively. Four of these five dimensions were statistically significant in HD patients, and two of them in PD patients. Interestingly, the dimensions associated with the highest variation in QOL dealt with pain/discomfort and anxiety/depression in both treatment modalities. The prevalence of depression in our population of dialysis patients was similar to the one described in prior studies [1]. Although substantial individual variation exist, as reflected by the wide 95% confidence interval, this finding is of particular interest and should attract the attention of physicians because a specific treatment is available. If successful, it would, on average, improve QOL of these patients by 10–20%. This finding might also explain why a study using the index score of Spitzer [8] found that variance in responses was not explained by case-mix variations only, which usually do not include these variables. Thus, pain/discomfort and anxiety/depression might deserve special attention, because they are not always part of routine clinical assessment.

PD is often presented as the easier and less cumbersome dialysis modality, but is used for a minority of patients. Even if the majority of our PD patients performed automated PD, our results showed that they reported a severe impairment in their usual activities, which was greater than the one described by HD patients. This surprising factor should be kept in mind when information about dialysis modalities is presented to patients with ESRF.

Another interesting finding was that no major difference was recorded between the different dialysis centres, in measured or predicted QOL, or even in the differences between these two measures. This result is not consistent with the findings by Mozes *et al.* [8], who noted differences between dialysis centres, which were not explained by differences in case-mix only. The small size of our centres might explain these discrepant results.

Although mean measured and predicted values were similar for the whole population, individual correlation between them was low ($r = 0.197$). This finding has already been described when the EQ-5D was used in other settings, such as chronic disorders (rheumatoid arthritis, osteoarthritis of the knee) or intensive care stays, or acute conditions such as AIDS. Several explanations have been proposed: first, different raters assign different values to the same health state, and consequently have different preferences for these health states [13]; secondly, the predicted values are derived from studies on the general population, whereas the values measured on 'thermometer' scale reflect the opinion of the patient. If they suffer from chronic diseases, they are likely to alter their expectations and goals to cope with their limitations [14]. This might explain why results on patients with chronic diseases are consistent between them and not with those observed on survivors of intensive care hospitalization. Finally, the EQ-5D dimensions are recorded on a three-point scale, which might force responses to the mid-range category, as few patients endorse the 'severe' value, and some limitation is often present, which diverts the answer away from the 'no limitation' value [15]. A comparison of the EQ-5D 'thermometer' scale results with those obtained on a five-point rating scale showed results consistent with this hypothesis [16]. On the other hand, such a limitation of the EQ-5D instrument can be viewed as an advantage in itself, as it allows deriving preferences of both the patients and the general population at the same time, and thus offers the two most useful perspectives to incorporate into other studies assessing the impact of diagnostic or therapeutic procedures, such as economic analysis for example.

Our study has also limitations. First, its cross-sectional design precludes comparison with QOL before dialysis, which has been shown to have an important impact [3–5]. Secondly, as it was designed to be anonymous, no systematic link could be made with a case-mix variable or with adequacy of dialysis [17], which was found to have an impact on physical and emotional dimensions in a study using the SF-36 questionnaire or on satisfaction with care [18]. Thirdly, any comparison between HD and PD should be made with caution, because we did not exclude therapy selection, or differences in QOL before dialysis [3]. Therefore, our findings of a similar decrease in QOL within the two groups should be put in perspective with the findings of other studies using the SF-36 questionnaire. Merkus *et al.* showed a favourable effect on physical QOL over time in HD patients, as compared with PD patients [4], whereas Diaz-Buxo *et al.* described no difference in HD patients in this dimension, but a higher score for mental processes in PD patients, after adjustment for laboratory tests results [5].

Further studies should assess how the EQ-5D compares with other generic or disease-specific instruments such as the SF-36 or the KD-QOL [6], or be used as a predictor of poor outcomes [19], mortality and hospitalization [20], as was shown for the SF-36 questionnaire.

In conclusion, the EQ-5D appeared to be a promising surveillance instrument for HD and PD patients. It showed that ESRF patients experience low levels of QOL with both dialysis modalities, but that some

characteristics could be better targeted to improve their QOL. In addition, the very high response rate observed in this study was encouraging: it indicated that patients were willing to participate in this kind of survey. As a consequence, EQ-5D could be used more frequently by other dialysis centres in our country or abroad, as it is simpler to administer compared with the more widely used SF-36 questionnaire, and can be linked with other kinds of studies, including economic analyses.

Participating nephrologists

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