



## The Quality of Life in Kidney Transplantation

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### Abstract

The health-related quality of life (HRQL) contains many aspects under patients' health as physical, psychological, social function and a general prosperity. Numerous clinical studies have established the importance of quality of life in various diseases. It is extremely popular to assess the quality of life in clinical trials as a measure of the subjective state of health of patients. The HRQL, also gradually recognized as an important measure of outcome after organ transplantation. Along with other indicators related to the improvement of patient and graft survival, quality of life has been assessed as a valid outcome measure. Investigations on the quality of life are aimed to lead to a broader view of subjective health, consider that health is a puzzle of the general welfare. Kidney transplantation is the treatment of choice in end stage renal failure. Progress in renal transplantation and immunosuppressive therapies have increased significantly in recent decades, resulting in allograft survival rates at one year is now over 90%. The main goal of transplantation is to achieve maximum quality and longevity while minimizing the impact of disease and health care costs. In general, the quality of life improved after successful renal transplantation compared with patients on dialysis, and the result was more pronounced in men than in women. In these studies it seems clear that renal transplantation is not only cheaper replacement therapy over time, but also linked to lower mortality and better quality of life for patients.

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### Introduction

As already described in the 80s by Mulley [106], there are many pitfalls in assessing the quality of life. Mulley argues that defining "health" is difficult and can be affected by a large number of variables [4]. The health-related quality of life (HRQL) contains many aspects under patients' health as physical, psychological, social function and a general well-being [11-13]. Numerous clinical studies have established the importance of quality of life in various diseases, and is extremely popular to assess the quality of life in clinical trials as a measure of the subjective state of health of patients. The HRQL also gradually recognized as an

important outcome measure after organ transplantation. Along with other indicators related to the improvement of patient and graft survival, quality of life has been assessed as a valid outcome measure. Investigations on the quality of life are aimed to lead to a broader view of subjective health, consider that health is a puzzle of the general welfare. The pieces of this puzzle consisting of psychological and social aspects of well-being, in addition to physical and mental health. Some of these pieces are evaluated either subjective or objective basis to some of them in two dimensions [1].

Kidney transplantation is the treatment of choice in end stage renal failure. The transplantation may be the focus for increasing survival and to maximize quality of life (Muehrer and Becker 2005). However, there are certain factors that may affect the quality of life after transplantation, such as side effects from highly immunosuppressive drugs, the presence of common disease states and the possibility of rejection. Patients with end stage renal failure have compromised symptomatology (Davison 2006, Murphy 2009) with the most common symptoms are fatigue, sleep disturbances, loss of appetite, itching, pain and impaired well-being. Other symptoms that have been reported are cramping, abdominal pain, palpitations, edema (Murtagh 2007). Symptoms defined by the gravity of the intensity, their duration time and frequency, and the degree of discomfort (Jablonski 2007) [5].

Progress in renal transplantation and immunosuppressive therapies have increased significantly in recent decades, resulting in allograft survival rates at one year is now over 90%. The main goal of transplantation is to achieve maximum quality and longevity while minimizing the impact of disease and health care costs. Examples of such measurements are weighted on the quality of life years gained, years of life without disease, or the equivalent healthy years per unit cost of care. In renal transplantation the cost of care is not limited to

the transplant procedure, and in the treatment of side effects, some of which are caused by the immunosuppressive therapy. After the first successful kidney transplant in the early 1950s, the immunosuppressive therapies significantly improved, as the most revolutionary development was the introduction of cyclosporine in early 1980. Along with better patient care and new immunosuppressive regimens, mean renal survival allografts are constantly increasing. Step by step with these advances, greater attention has been given to long-term QOL. However, so far the HRQL was evaluated only in a limited number of clinical studies, as subjective health status [1].

However, it is generally accepted that patients with a functional renal allograft have improved quality of life, compared to patients on dialysis [14], [15].

To assess the effects of the disease on quality of life, specific evaluation tools. These tools are sensitive enough to identify the disease changes, but are not suitable for comparing different diseases. Special tools to evaluate the quality of life in kidney transplant is the kidney transplant questionnaire (KTQ) [16], the quality of life in renal disease (KDQOL) [17] and the final renal failure in the transplantation center stage symptoms checklist (ESRDSC-TM) [18].

The KTQ contains 26 questions in five areas (somatic symptoms, depression, fatigue, interpersonal relations, frustration) each of which can be rated on a scale from 1 to 7, wherein the lower score represents the lowest quality of life (QOL). For ultimately all points summarize therefore the maximum score is 182 points, and the lower 26 degrees. Also, the questionnaire should be in the mother tongue of the patient [19].

The KDQOL originally developed for patients with chronic renal failure and those undergoing dialysis. However recent documents use this tool to assess patients after transplantation, as well as to compare these patients with patients on dialysis [20]. The original KDQOL covering 11 areas with different number of elements. The symptoms / problems area includes 34 items, the effect of renal disease on daily life contains 20 items, the burden of kidney disease four elements, cognitive function 6 elements, the employment situation four elements, the quality of social interaction 4 data, sleep quality 9 items, social support 4 data and patient satisfaction two elements. The choices of answers is a Likert scale, where higher score represents better quality of life.

ESRDSC-TM [1] specifically developed to assess the effects of immunosuppressive drugs on quality of life. The questions are rated on a five-point Likert scale, where again higher scores representing better quality of life (QOL).

The authors [1] tested over 400 transplant patients and reviewed the retest correlation in a subset of 88 patients in one year and found sufficient validity. So far no method has proven to be ideal for measuring the quality of life in all circumstances. It has been shown that different quality of life results can be obtained in the same population, though different tools used. General tools used for comparisons between groups and studies to evaluate the effects of various diseases in the quality of life (QOL). These tools are used in research and are as follows: the profile of the effects of the disease -Sickness Impact Profile (SIP), the modified data 36 Overview of medical outcomes (36-item short-form of Medical Outcomes Survey, SF-36), and the Nottingham health profile (NHP)

With more than 200 publications, the SF-36 [4] is one of the most widely used tools for evaluating the quality of life. The SF-36 questionnaire is an independent research, contains 36 elements and requires a few minutes to complete. Includes a multidimensional scale that assesses eight health areas: 1) limitations in physical activities because of health

problems, 2) limitations in social activities because of physical or emotional problems, 3) limitations in usual activities due to disruption of physical health, 4) physical pain, 5) general mental health, 6) limitations in usual activities due to emotional problems, 7) vitality, 8) general perceptions of health. It has proven the validity of [28], the sensitivity to changes of therapy [29], and the suitability of patients with end stage renal failure [30].

The health-related quality of life is increasingly important outcome measures, especially in chronic diseases. The quality of life expressed as a quantitative measure of the ability of preference of the person on an outcome, which is also defined as associated with the outcome of the individual utility [4].

When evaluating studies using methods based on preference (preference-based), kidney transplantation is associated with a higher quality of life than dialysis and peritoneal dialysis [81-84].

TTO index (time balancing, time trade-off) [4] originally developed by Torrance and colleagues [85] and tested for reliability and validity in patients with end stage renal failure by Churchill and his associates [81]. The question posed to the patient is thought to renal disease in the last 2-3 weeks and then decide between two hypothetical options: either to remain in his current state of health, with a specific life expectancy, or exchange with a number of years to live in full health.

The SG method (standard risk, standard gamble) [4] from the expected utility and require the patient to take a decision involving either stay in the current mode, or can be subjected to a hypothetical treatment [86]. This therapy has two possible outcomes: 1) there is the possibility of immediate death, and 2) whether the patient will survive cured and live in full health.

The EQ-5D (EuroQoL-5D) [4] consists of two parts. The first part, the EQ-5D profile consists of five elements: mobility, self-care, usual activities, pain / discomfort, and anxiety / depression, each with three levels of functionality: no problem, some problems and extreme problems. The second part of the questionnaire is the EQ-VAS, which ranks health from 0 (worst health state imaginable) to 100 (best health state you can imagine).

The HUI (index usefulness of health) [4], the most recent version of which is HUI3, which identifies health with eight features: ambulation, dexterity, cognition, emotion, pain and discomfort, vision, hearing and speech.

The general quality of life measures [5] is as follows: SF-36, SF-20, SF-12, QWB-SA, SIP. The utilitarian health measurements include the EQ-5D, the SF-6D, and the HUI. Specific measurements of quality of life in renal disease using multidimensional specific questionnaires, such as for life quality clearance Index (QLI-D), the quality of life in kidney hospital Long form (KDQOL-LF), the quality of life in kidney hospital Short form (KDQOL-SF), the questionnaire renal disease (KDQ), Questionnaire renal transplantation (KTQ), the profile of quality of life in renal disease (RQLP), Questionnaire CHOICE health experience (CHEQ) and Survey of quality of life, personalized for renal disease. Evidence response elements the SF-36 was found in a study with patients after renal transplant patients receiving other immunosuppressive drugs (Russ 2007). In measurements the SF-36 as part of KDQOL, patients with renal transplantation showed higher scores in the areas of general health and vitality compared with patients on the waiting list (Sureshkumar 2005).

The SF-20 [5] assesses health in six areas, namely, body pain, general health perception, physical functioning, mental health, social functioning and functionality of the individual's role. Meers and his colleagues (1992) using the SF-20 in patients on hemodialysis,

peritoneal dialysis and renal transplantation were significantly higher rating in all areas for patients with renal transplantation.

The profile of the disease impact<sup>[5]</sup> has 12 sectors, reflecting the focus of disability on quality of life with a total score ranging from 0 to 100. The physical, psychosocial and total score can be calculated.

Statistically significant difference of the scores was observed before and after transplantation in 293 patients as expected (Cetingok and colleagues, 2004)

Indicator D for quality of life (QLI-D)<sup>[5]</sup> developed in the USA during the 1980s as a measure of morbidity (Ferrans and Powers, 1985). A statistically significant difference was observed in patients before and after transplantation, as expected (Cetingok 2004).

The renal transplant Questionnaire (KTQ)<sup>[5]</sup> was developed by Laupacis and coworkers (1993). It includes five areas: physical symptoms, fatigue, uncertainty / fear, appearance and emotions. There were significant differences in the patients' rating before and after transplantation. Scores of KTQ showed great sensitivity in a group of patients with renal transplant receiving other immunosuppressive therapy (Russ et al, 2007).

## Results

In 1998 Matas<sup>[21]</sup> and his colleagues described the QOL and to evaluate used the SF-36. The authors were able to have at their disposal 446 patients evaluated once, 632 twice evaluated and 53 patients evaluated three times. The patients were referred to the time frame between the first and tenth year after transplantation. The rating of the SF-36 was not significantly changed in recent years after transplantation and were consistently lower compared to the normal population of the US. It is interesting to note that diabetic and non-diabetic patients had the same score for mental health scales, while non-diabetics had better score in physical function and general health.

Matas<sup>[22]</sup> and his colleagues recently published a temporal relationship between adverse effects of immunosuppressive drugs in kidney transplant recipients and QOL. In this huge study 4247 patients were enrolled and evaluated by a QOL questionnaire. The authors conducted a multivariate analysis, which showed that emotional problems, reduced sexual interest and headache were the main factors that negatively affected the QOL in these patients. Preliminary data from the self-reported health information program entitled "Transplant Training Centre" published by Hricik<sup>[23]</sup> and his associates. The first results obtained from 3676 patients were similar to those published in the final report a year later than 4247 patients.

Franke<sup>[24]</sup> and his colleagues evaluated the HRQL in patients with end stage renal failure. The study investigated the differences in quality of life in patients on the waiting list for a kidney transplant, while maintained on dialysis, and kidney transplant recipients. The result was evaluated by the SF-36 questionnaire and special tools for disease (End Stage Renal Disease Symptom Checklist-Transplantation Module). In this study, the group of 80 hemodialysis patients at the waiting list for a kidney transplant showed decreased satisfaction with social support, while 222 patients after successful renal transplantation, increased social support. Similarly, psychological distress was higher among patients maintained on dialysis, compared with transplant patients.

In a similar study by Jofre<sup>[14]</sup> and his colleagues also observed improvement in 88 of 93 patients after successful renal transplantation. The authors<sup>[1]</sup> used the Karnovsky scale and the Sickness Impact Profile (in the sickness impact profile) as assessment tools. Note that although each patient after transplantation showed improved rating, particularly the male population showed significant improvement in the global rating. As expected, older patients with more comorbidities

showed less improvement than younger ones.

In a randomized, open-label study in Europe, Australia and Canada, Oberbauer<sup>[25]</sup> and his colleagues investigated the outcomes of quality of life in patients after renal transplantation. In this study, 430 patients with renal transplantation, randomized three months after transplant, or continue the treatment with cyclosporin and sirolimus, or be withdrawn from the cyclosporine in a four week period. Quality of life was measured after randomisation in one and two years after the transplant, using specially tools for disease, such as KTQ and the SF-36 questionnaire. The vitality scores were higher in accordance with the SF-36 questionnaire in free ciclosporin group at two years compared to baseline, but was reduced in the combination group.

In a meta-analysis conducted by Ylian Liem<sup>[2]</sup> and his colleagues included 52 studies (Level 2b evidence according to based on the evidence the medical classification of the Oxford Centre<sup>[18]</sup>) and the quality of life was examined in 92 patient groups with renal replacement therapy, as assessed by the SF-36<sup>[31,32,33,34-80]</sup>, also the quality of life was examined in 44 groups of hemodialysis patients (30 372 patients), 20 groups of patients with peritoneal dialysis (3262 patients) and 28 groups of patients with renal transplantation (2948 patients). The majority of patients were men and so there was no statistically significant difference in the gender distribution among the three treated groups. The prevalence of diabetes was 24% in dialysis group, 17% in the PD group and 7% in the group with renal transplant patients, with a significant difference in the comparison between patients on dialysis and patients with renal transplantation. The average treatment time was 44.1 months for patients on dialysis, 24.3 months for patients on peritoneal dialysis and 63.8 months for patients with renal transplantation. Comparing all treatment groups, dialysis patients and patients with renal transplantation were significantly different average time for treatment. In addition to mental health, quality of life as assessed by the SF-36 questionnaire was higher among patients with renal transplantation compared to dialysis patients.

In a meta-analysis of the emotional distress and psychological well-being in hemodialysis, peritoneal dialysis and after renal transplant patients, the Cameron<sup>[6]</sup> and his colleagues reported comparable differences in quality of life.

Raiesifar<sup>[3]</sup> and his colleagues conducted a descriptive, analytical study, conducted in 220 renal transplant patients in clinical transplantation and nephrology two selected hospitals of Tehran city in the year 2009. A kidney transplant questionnaire (KTQ- 25) was used for data collection. The reliability KTQ-25 was set at 0.93 by Cronbach Alpha method and the questionnaire was completed by patients. The result of the study showed that the level of QOL of renal transplant patients is moderate.

The 27 studies included in the meta-analysis by Ylian Liem<sup>[4]</sup> was at least level 2b evidence in accordance with Based on the evidence medical classification Oxford center<sup>[24]</sup>. Quality of life was assessed by a single measure in most studies: three studies used the VAS (visual analogue scale)<sup>[87,91,92]</sup>, eight studies the TTO index (time balancing, time trade-off)<sup>[82,89,93-98]</sup>, a study of the SG method (standard risk, standard gamble)<sup>[104]</sup>, and nine studies the EQ-5D (EuroQol-5D)<sup>[83,84,88,90,99-103]</sup>

The average utility rate of patients on hemodialysis and peritoneal dialysis was significantly lower than in patients with renal transplantation, when comparing the EQ-5D index. Mean values of the index TTO patients on hemodialysis, peritoneal dialysis and renal transplantation were not statistically significantly different, although the usefulness of in hemodialysis patients tended to be lower compared to peritoneal dialysis patients and renal transplant patients.

The conclusion of a systematic review and meta-analysis of alternative forms of renal replacement therapy is that there are no statistically significant differences, although the quality of life tended to be higher for patients with renal transplantation and lower in hemodialysis patients.

Cameron [105] and his colleagues reported fewer emotional disorders and greater psychological well-being for patients with renal transplantation compared with patients on hemodialysis and peritoneal dialysis.

The Dylan Smith [6] and his colleagues evaluated 307 patients from a waiting list for a cadaveric transplant or kidney-pancreas transplant and 195 patients one year after a successful transplant. A subsample interviewed patients before and after transplantation. The survey included measurements of quality of life, ie a comprehensive assessment and even individual sectors, including health, work and activities.

The results showed that quality of life improved after transplantation, but projections of patients before transplantation overestimated the magnitude of improvement. In addition, patients had predicted great improvements in specific areas of their lives, who have not changed. These results were confirmed by analysis perspective. Further analyzes showed that patients after renal transplantation, when asked to do recall their memory and to rate their quality of life before the transplant received lower scores compared to that were mentioned before transplantation. According to the bias effects, patients greatly overestimated the benefits of a successful kidney transplant, both in terms of the forecasts were made for their life after treatment, and memories preserved for their lives before transplantation.

Shah [7] used a previously validated scale score (QLS), in which patients directly asked about their quality of life, as follows: "Considering all aspects of your life, physical, emotional, social, spiritual and economic in the last two days, the quality of your life is ... ". The QLS ranging from 0 ("very bad") to 10 ("excellent"). Patients came when he was free from serious medical problems. Fifty renal transplant recipients involved. Psychosocial and medical variables included the inventory index of depressed mood (Beck Depression Inventory), the effects questionnaire sickness, the Multidimensional social support scale (Multidimensional Scale of Perceived Social Support), the time of transplantation, age, creatinine, hemoglobin and albumin levels. Of the patients 64% were African-American and 48% were women. The perception of a better quality of life is associated with lower rates of depression and minor effects of the disease and a higher perception of social support and life satisfaction. The life quality perception is not associated with age, the time of transplantation, creatinine, hemoglobin or albumin levels. The conclusion was that the QLS is a quick measurement tool for the subjective quality of life in renal transplant recipients and the correlation with psychosocial factors, interest in this patient group.

The average number of patients after renal transplantation displays an improved quality of life, but this is not the case in all recipients. The purpose of the study, conducted by Bohlke [8] and his colleagues was to identify factors associated with quality of life after renal transplantation. The study population was assessed by the SF-36 were analyzed 272 renal transplant recipients operating. Hypertension, diabetes, high serum creatinine levels and low hematocrit were independently and significantly associated with a lower rating for the SF-36. The rating for the physical component was worse for women, for patients with low income, the unemployed and patients with higher serum creatinine. Among the variables studied, comorbidity and graft function were the main factors associated with the physical component, and socio-demographic variables, and graft function were

the main factors that determine the mental component. Additional factors such as the personality and the environment can affect the quality of life.

In the general population and in patients on dialysis, sleep disorders affect health-related quality of life. Eryilmaz [9] examined the prevalence of these sleep disorders in patients with renal transplantation, and the relationship between sleep quality and related quality of life health. The Pittsburgh Sleep Quality Index (PSQI) for measuring the quality of sleep, the WHOQOL-BREF index for quality of life and the inventory ratio of depressed mood (Beck Depression Inventory) were applied to 100 patients with renal transplantation. Thirty (30%) subjects had severe sleep disorders ("poor sleepers"). Sleep disorders are not so common in renal transplantation compared to dialysis patients, but definitely have a greater rate than the general population. Sleep disorders appear to be part of the symptomatology of depression. The severity of depression and low educational level play a major role in the quality of life of these patients, despite the quality of sleep.

A controlled program live unrelated donors (LURDs) kidney transplant began in 1988 in Iran. Nejatisafa [10] examined the LURDs in order to investigate the size of the stressful situations in which they were patients before donation and their quality of life after donation. Five hundred donors participated. The study included donors, in which the donation was made at least three months before the study. The scale Paykel Life Events and the short version of the global organization quality of life (WHOQOL-Bref) used in the study. Complete data were available for 424 donors. 95% of respondents reported at least a stressful situation during the six months before the kidney donation. The three most common events in their life that trigger the stress experienced in their daily life were rising costs of living, low income and household tasks. The most stressful events were the loss of their job, financial problems and the death of a member of their family. Participants reported more stressful events with an average total score of stress double compared to the findings of a study preceding the normal population. The rating of donors in all four areas of the WHOQOL-BREF was low. The quality of life of the donors may be low and may be at risk of experiencing more stressful events in their lives. For this reason, medical supervision should be continued following the donation, with emphasis on mental health and psychosocial problems.

## Conclusions

There is evidence for the use of the SF-36 [5] in patients with chronic renal failure. Yet more evidence is required before widespread use to evaluate the outcome and quality. The EQ-5D [5] is favored among the preferred measurements, as there is more evidence, but this ratio applicable to the above. Since multidimensional specific renal disease measurements in KDQOL includes most evidence. Given this overlap between the SF-36 and KDQOL, there is some benefit when used in the same survey, unlike the combination of EQ-5D and KDQOL provides additional information about the perception of patients for kidney disease. While the idea of using a short questionnaire based on severity would be very good, the main benefit would only control or recognition of symptoms. The SF-36 [5] is the only general measurement with good properties and functional characteristics. Furthermore psychometric criteria can be reproduced when administered as autonomous as possible, and when used in conjunction with KDQOL questionnaire. The EQ-5D appears to have a favorable use, since three of the four studies that used the EQ-5D were conducted in the UK. The evidence show high response rates.

Although, clinical studies relating to quality of life after kidney transplantation is relatively rare, the few published studies yielded rather similar results. In general, the quality of life improved after

successful renal transplantation compared with patients on dialysis, and the result was more pronounced in men than in women. In these studies it seems clear that renal transplantation is not only cheaper replacement therapy over time, associated with a lower mortality and quality of life of patients. [1,26,27]

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