The Validation of the EQ-5D in Malaysian Dialysis Patients

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SUMMARY

The EQ-5D is a quality of life instrument that measures five dimensions of health. This study investigated the reliability and validity of its use in the Malaysian dialysis population. Test-retest reliability, convergent and discriminant validity were assessed. Responses of 86 subjects who completed both surveys were used in analysis. Test-retest reliability using Cohen's kappa was acceptable in four out of five dimensions, with the exception of self-care. Convergent validity was present. Discriminant validity was found in only two out of six hypotheses tested. In conclusion, the EQ-5D has potential in this population but further study is required.

KEY WORDS:
Validation, Quality of Life, EQ-5D, Haemodialysis, Continuous ambulatory peritoneal dialysis.

INTRODUCTION

Health Related Quality of Life (HRQoL) research has been extensively studied and utilised in healthcare decision making in many developed countries. As escalating costs place greater pressure on limited budget resources, developing countries such as Malaysia, have made progress in this field of research. The last decade has seen a small but increasing number of studies that quantify improvements in patient outcomes and costs in following different treatment options among various conditions, both acute and chronic [1-9]. One of the conditions considered resource intensive is chronic renal failure, and this has generated studies investigating the cost-effectiveness of dialysis modalities in Malaysia [1, 2]. Quality of life can be measured using existing instruments such as, the SF-36, SF-12, HRQoL-20, the Nottingham Health Profile (NHP) or the Quality of Well-being (QWB) Scale [10]. However, for the purposes of economic evaluation, the quality of life should be measured using a preference based utility measure such as the EQ-5D or the Health Utilities Index Mark III (HUI) [11]. The EQ-5D has an advantage where the questionnaire is relatively short and therefore simpler to administer while information obtained can be converted into a single utility index. The instrument has thus been used in many studies around the world [12-21].

Prior to formal usage in economic evaluation studies, methodological rigor requires that validity and reliability is established in the specific study population. To the best of our knowledge, this has not yet been performed in Malaysia. In neighbouring Singapore, the EQ-5D has been validated among English and Chinese-speaking rheumatic disease patient populations and used in other patient populations such as knee osteoarthritis and cancer [22-25]. These studies are of interest because Singapore and Malaysia share social, historical and demographic similarities such that the languages spoken in both countries are very similar, including English, Malay and Chinese [26]. From a practical standpoint, the languages spoken in these two countries cannot be differentiated easily. We had utilised a composite version of the EQ-5D, available in three languages; Malaysian Malay, Singaporean English and Singaporean Chinese as these were the closest approximation in terms of language requirements available at the time of the study. However, after the conduct of our study, the EuroQol group made available a Malaysian Chinese and Malaysian English versions of the instrument.

This study was undertaken with a view to conduct an economic evaluation using the EQ-5D in the near future. The objective of this study was to validate the use of EQ-5D in Malaysian dialysis patients. This study looked into the

1) Reliability of the EQ-5D as measured through test-retest reliability.
2) Convergent validity of the EQ-5D.
3) Discriminant validity of the EQ-5D.

MATERIALS AND METHODS

Subjects and data collection

Patients undergoing dialysis at selected dialysis centers in Ministry of Health hospitals were recruited (Table I). Those included were patients undergoing both haemodialysis (HD) or Continuous Ambulatory Peritoneal Dialysis (CAPD). Convenience sampling was conducted at selected study sites. During visits by the study team, patients who were present were approached and recruited, if they agreed. Eligibility criteria were defined as clinically stable patients receiving dialysis, HD or CAPD for more than 12 months, aged 18 years and above, the ability to read and willingness to participate.

The data used in this study were collected in two concurrent surveys administered to patients at the selected centres from December 2004 to April 2005. The surveys were conducted as part of a study on the cost-effectiveness of erythropoietin therapy in the dialysis programme which was funded by a research grant from the Ministry of Health. The first survey was conducted from December 2004 to April 2005 to obtain data on quality of life. Responses were obtained from 686 dialysis patients through self-administration or nurse-assisted

administration. The second survey was conducted during the same time period intended to obtain health preference data from dialysis patients, carers and dialysis staff at the same hospitals. A total of 153 face-to-face interviews were conducted with dialysis patients, their carers and staff. During these two separate surveys, a total of 86 dialysis patients were independently recruited into both surveys and were used to assess test-retest reliability.

Study procedures and instruments were subjected to an ethical review process by the Malaysian Ethics Review Committee and approval was obtained. Verbal consent was obtained from subjects prior to administration of the questionnaire. Most subjects independently completed questionnaires while those who had difficulty, reading, writing or understanding, were assisted by dialysis centre nurses.

Health status measurement
The study utilised a trilingual questionnaire which was a combination of three different validated versions of EQ5D, namely Malaysian Malay, Singaporean Chinese and Singaporean English. The Singapore Chinese and Singapore English versions were used as Malaysian versions were not yet available from Euroqol at the time the study. Subjects completed the EQ-5D questionnaire in any one of the three languages. Linguistic validation was not part of the current study.

The EQ-5D includes an assessment of five dimensions of health which are mobility, self-care, usual activities, pain/discomfort and anxiety/depression. The EQ-5D uses a three-level scale for each dimension that describes whether a patient reports difficulty ranging from none, some, to extreme levels of problems. These represent a score of 1, 2, or 3 respectively. A higher score describes a greater level of impairment. The health states can be described as numeric codes with one digit representing each of the five dimensions. Thus, code 11111 represents no problem in all dimensions, and 33333 represent severe problems in all dimensions. As an example, 11231 represents no problem in mobility or self care, some problems in usual activity, severe problems in pain/discomfort and no problems with anxiety/depression. A total of 243 different health state permutations are possible.

The thermometer line on the second page is the Visual Analog Scale (EQ-VAS) which is to be marked by the subject to reflect his or her health status on that particular day. The subject grades their answer by drawing a line from the box labeled "Your own health state today" to a point on the scale between 0 as "Worst imaginable health state" and 100 which describes "Best imaginable health state". Thus the health status of each patient is associated with a EQ-VAS score with a higher score indicating a better health status.

Statistical analysis
Reliability was tested through demonstration of test-retest reliability. This was performed by calculating Cohen's Kappa comparing the results of the first survey administration with the results of the second survey. We hypothesized that results of the first and second test would correlate well with each other. The higher the Kappa value, the better the correlation. Kappa values that range from 0.21 to 0.40 are considered fair, 0.41 to 0.60 moderate, 0.61 or more are considered substantial correlation [27].

Validity testing was performed by assessing convergent and discriminant validity. Convergent validity was assessed using EQ-VAS values from the study population compared to health state valuations obtained from the UK general population known as the York Utility Index. Since general population utility values are not available for the Malaysian population, this was considered as a reasonable alternative[14]. We hypothesized that the utility values obtained from Malaysian renal dialysis population would be correlated with the UK general population. The relationship between the Malaysian EQ-VAS and the UK general population was examined using Spearman's correlation coefficient. A correlation between 0.3 and 0.5 is considered a moderate correlation while a correlation of greater than 0.5 is considered strong [28].

Discriminant validity was assessed by comparing the following groups: (i) Age groups and mobility (ii) Gender and anxiety/depression (iii) Modality and usual activity (iv) Age groups and EQ-VAS scores (v) Gender and EQ-VAS scores (vi) Modality and EQ-VAS scores.

Statistical analysis was conducted using Stata version 9.0. The results of respondents who completed the EQ-5D were included in the analysis. Descriptive statistics was used to summarise demographic, clinical and health status characteristics. All possible permutations of health status were ranked by frequency. The mean and standard deviation for EQ-VAS scores for each health status was calculated. The numerical and ordinal scale comparisons were made using the Kruskal-Wallis test while the categorical data was compared using the Chi-square test. A p-value of less than 0.05 was considered significant.

RESULTS

Subject characteristics
A total of 686 completed questionnaires were obtained. Of these, 32 subjects were excluded from analysis due to incomplete responses. The results of 654 subjects were available for analysis, 311 on CAPD and 343 on HD. Eighty-six subjects completed the second survey to enable assessment of test-retest reliability.

The population studied consisted of 354 male and 300 female subjects, aged between 18 to 86 years old. The mean age of patients was 47.8 years old (SD=14.1), (Table II). As shown in Table III, the majority of subjects reported no problems with their health in terms of mobility (80.12%), self-care (95.11%), usual activities (82.42%), pain/discomfort (64.53%) and anxiety/depression (77.22%). The domain which was most disruptive was pain/discomfort with a third of subjects (34.71%) reporting "moderate problems", followed by a fifth (21.41%) of subjects reporting "moderate problems" with anxiety/depression. Very few subjects reported "extreme problems" in any of the domains mobility, self-care, usual activity and pain/discomfort as reported by approximately 1% or less of subjects. Relative to the other dimensions, the dimension of anxiety/depression had the most reports of extreme problems (1.38%).

Table I: Participating Hospitals

Hospital	N
Hospital Putrajaya	19
Hospital Kajang	17
Hospital Seremban	91
Hospital Pulau Pinang	113
Hospital Kota Bharu	59
Hospital Tuanku Ampuan Rahimah	82
Hospital Kuala Lumpur	165
Hospital Ipoh	29
Hospital Selayang	79
Total	654

Table II: Participant demographics

	N (%)
Mean age (SD, range)	47.8 (14.1, 18-86)
Female	300 (45.9)
Ethnicity:	
Malay	403 (61.6)
Chinese	167 (25.5)
Indian	77 (11.8)
Iban	1 (0.2)
Other Malaysian	5 (0.8)
Foreigner	1 (0.2)
Education level:	
No schooling	33 (5.1)
Primary	200 (30.6)
Secondary	318 (48.6)
University/College	103 (15.8)
Dialysis modality:	
HD	343 (52.4)
CAPD	311 (47.6)

Table III: Distribution of responses

EQ-5D dimension	Response (%)			Kappa value	p-value
	No problems	Moderate	Extreme		
Mobility	80.12	19.42	0.46	0.30	0.00*
Self-care	95.11	4.28	0.61	-0.02	0.59
Usual activities	82.42	16.51	1.07	0.18	0.03*
Pain/discomfort	64.53	34.71	0.76	0.43	0.00*
Anxiety/depression	77.22	21.41	1.38	0.38	0.00*

*significant at p<0.05

Table IV: Top 10 Most commonly reported Health Status and Mean Vas Score

Rank	Health Status	Mean VAS Score	Std. Dev.	Freq.
1	11111	81.8	11.9	325
2	11121	74.3	12.8	85
3	11112	75.6	13.4	45
4	11122	68.7	13.1	.35
5	21111	75.8	12.1	21
6	21221	64.5	15.3	19
7	21121	73.3	11.4	17
8	21222	59.4	13.2	17
9	11211	77.9	5.8	11
10	11222	72.4	15.8	10

Table V: Discriminant validity among known group

EQ-5D dimension vs. other variable	N			p-value
Age group vs. mobility	<50	50-65	>65	
Percentage reporting some problem	12.8	24.5	42.9	0.00*
Gender vs. anxiety and depression	Male	Female		
Percentage reporting some problem	20.6	25.3		0.15
Modality vs. Usual Activity	HD	CAPD		
Percentage reporting some problem	21.3	13.5		0.01*
Age group vs. VAS	<50	50-65	>65	
Mean VAS score (N)	76.8 (358)	75.5 (233)	73.0 (63)	0.09
Gender vs. VAS	Male	Female		
Mean VAS score (N)	74.91 (354)	77.24 (300)		0.07
Modality vs. VAS	HD	CAPD		
Mean VAS score (N)	74.86 (343)	77.21 (311)		0.06

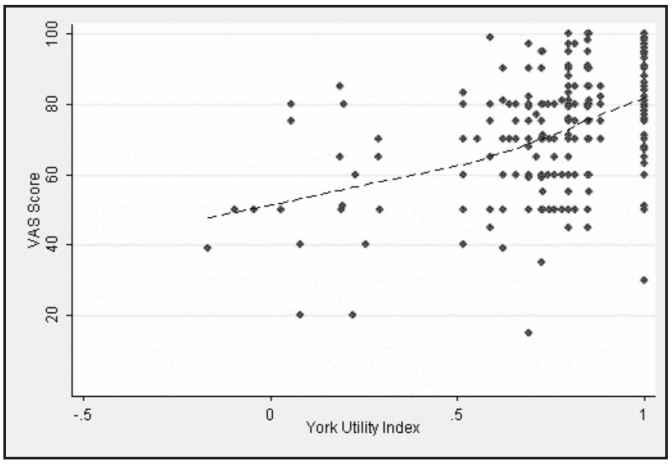

Fig. 1: Correlation between EQ-VAS score of Malaysian dialysis patients and UK general population utility tariff, the York Utility index

In terms of each respondents overall experience, most reported no problems in any of the dimensions, thus the health status code 11111 was reported by 325 respondents. The mean EQ-VAS score associated with this code was 81.8 with a standard deviation of 11.9. A description of the top 10 most commonly reported health status is shown in Table IV.

Reliability and Validity

In terms of test-retest reliability, the results varied with agreement in all but one dimension. Dimensions of mobility, pain/discomfort and anxiety/depression demonstrated fair agreement between the two tests (κ=0.30, $p<0.05$; κ=0.43, $p<0.05$, κ=0.38, $p<0.05$, respectively) while the usual activities dimension demonstrated a smaller agreement (κ=0.18, $p<0.05$). The self-care dimension was the exception showing no agreement between the two tests (κ= -0.02, p=0.59) (Table III).

The EQ-5D was able to demonstrate moderate convergent validity between the study population's EQ-VAS score and the York Utility Index with a Spearman's rho of 0.45 ($p<0.05$) (Figure 1). Discriminant validity was demonstrated with differences found between known groups in two out of six of the stated hypotheses. Age groups vs mobility was found to be statistically significant at the $p<0.05$ level. Similarly a statistically significant difference was found comparing modality vs usual activity, $p<0.05$. The remaining four comparisons were not found to be statistically significant (Table V).

DISCUSSION

The results of our study showed that the EQ-5D has acceptable psychometric properties in the Malaysian dialysis patient population. Test-retest reliability showed that the instrument is moderately reliable for almost all dimensions. There was fair agreement between test and re-test results in four out of five dimensions. The only exception to this was the self-care dimension, where there was absence of agreement in the two tests. This rather unexpected result may have been caused by an actual change in subjects' ability to "self-care" in that time period. The kappa values obtained in this study were not as high as in other studies[24,25] perhaps due to the stability of the health status of dialysis patients compared to rheumatic disease and other patient groups. Reliability, as measured by internal consistency of the instrument, was not tested in this study as there is only one item in the EQ-5D per dimension. Hence comparing internal consistency to items within dimensions would not be helpful.

Convergent validity of the EQ-5D instrument has been shown to be high in prior studies [12, 13, 29]. This study also demonstrated good correlation through a comparison between the EQ-VAS scores of the study population compared to the York Utility Index from the UK population. However, discriminant validity of the instrument was present in only two out of the six hypotheses tested, which were age group vs. mobility and modality vs. usual activity. These were perhaps the strongest known discriminators for this patient population. As age increases, for most people, difficulty with mobility also increases due to aches and pains resulting from wear and tear of the joints. Dialysis patients are not an exception, and are at greater risk of impaired mobility due to likelihood of fracture and loss of bone mass [30, 31]. Thus, the instrument was able to show changes in mobility status with varying age. Differences between subjects on HD or CAPD treatment were also shown with regard to satisfaction with health status, similar to a previous study [15]. Those on CAPD tended to report higher VAS scores than those on HD. This may have been due to the convenience of CAPD for the patient compared to HD, as CAPD patients have a higher degree of autonomy in their treatment and may undergo dialysis at home. Unlike CAPD patients, those on HD require regular and frequent visits to dialysis centres several times a week. Severity of their condition may also have had an influence on patients' perception of their health status. Since HD patients are usually more severely ill than CAPD patients, their perception of health may consequently be less optimistic.

The study was unable to conclude the other four hypotheses tested. This is inconsistent with the findings of prior studies that showed good discriminant validity of the EQ-5D in other populations [12, 24, 25, 29]. Regarding the influence of gender on health status reporting, some previous studies demonstrated differences in anxiety/depression among males vs females using the EQ-5D, such as in a population health study in the UK which showed women reporting higher rates in the anxiety/depression dimension than men [14]. However, a study in Malaysia among the mobility impaired found the opposite effect [32]. Yet other studies have shown no differences found between women and men. In particular, the Quality of Life study using EQ-5D conducted among Swiss dialysis patients did not show gender differences [15, 16].

We had also expected to see differences in EQ-VAS scores comparing age groups [33], men and women[34] as well as modality. However, none of these comparisons successfully showed differences between the groups. As the EQ-VAS score is intended to measure the subjects' perception of their own health, we attribute this to subjects having a positive view of their own overall health, despite possible limitations in any specific dimension. Adaptation to change in lifestyle is

especially true of dialysis patients who have been undergoing treatment for longer than 12 months compared to those who have been on dialysis for six months or less.

As mentioned earlier, since the completion of this study, Malaysian English and Malaysian Chinese versions of the EQ-5D have been made available by the EuroQol group. The differences between the phrases used in these two Malaysian versions compared to the Singapore English and Singapore Chinese version that we used in our composite questionnaire are relatively minor and are not thought by the authors to have had significant impact on the results of this validation study. Nonetheless future studies utilising the EQ-5D in Malaysia should use the Malaysian language versions since it is now available.

For more than a decade, EQ-5D has established its usefulness as a HRQoL instrument in many developed countries. However, in Malaysia and the region, interest in the instrument has begun to take-off in recent years due to new focus on cost-effectiveness research. Thus far, in Singapore, the EQ-5D has been validated in the target patient populations with rheumatic disease [24, 25]. This study adds to the existing literature by providing some evidence for the usefulness of this instrument in Malaysian renal dialysis patients. Strengths of this study are the high total number of subjects and the diverse geographical locations involved. The study was able to demonstrate overall test-retest reliability in almost all dimensions and convergent validity. The study was also able to partially demonstrate known-groups validity.

Recommendations for future study include further demonstration of the ability of EQ-5D to show known-groups validity. Despite its limitations, given the paucity of primary data establishing base-line HRQoL of the Malaysian population, as well as lack of research particularly using the EQ-5D in the region, this study offers limited but useful additional insight into the characteristics and health status perception within this population.

CONCLUSION

This preliminary study tentatively establishes that the EQ-5D is a valid and reliable tool to be used assessing HRQoL in the Malaysian renal dialysis population. Acceptable level of reliability was shown with respect to test-retest reliability. Validity as shown through convergent validity was good, and discriminant validity was narrowly demonstrated. Although the study has limitations, it forms a basis for recommending the use of EQ-5D in Malaysian dialysis patients. Further research into test-retest validity and linguistic equivalence is warranted to strengthen the findings of this study.

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