

Measurement properties of Japanese HUI3 in cognitive retarded elderly samples

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Abstract

In Japan, health utility was assessed in a community with cognitively disordered elderly subjects using two generic, Health-Related Quality of Life (HRQOL) assessments. The instruments we used were HUI23SU15Q, HUI23PU15Q and EQ5D. All of these instruments were self- or proxy-administered questionnaire surveys in which Japanese language versions became available recently. We conducted the coincidence measurement in 44 subjects and assessed the measurement properties of these instruments, and evaluated the subjects' health related quality of life. While the mean of the multi-attribute utility score using the proxy version of HUI was 0.17 ± 0.23 , in the self-administered version, it was 0.22 ± 0.29 . A significant relation was seen between the two scores of the self-administered and proxy version. The EQ-5D tariff score was higher than that of either version of HUI. The utility scores of HUI proxy version correlated with EQ-5D tariff score significantly, with simple correlation coefficient; $r=0.472$ ($p=0.002$), while HUI self administered version did not correlated with EQ-5D tariff score. In single attribute utility scores, cognition score was significantly correlated with MMSE score and it showed the construct validity of HUI. Our result showed the measurement properties of two Japanese version instruments of HRQOL assessment and the psychometric characteristics of the elderly with cognitive disorders.

Introduction

Preservation and improvement of Quality of Life (QOL) are the ultimate goals for human beings and the final aim of rehabilitation in medicine, as well. Nowadays, the index of QOL has become one of the most important measures in medicine.

The QOL measurements, which are used in medicine, are called Health-Related QOL (HRQOL) (Guyatt, G.H., et al., 1993), and can be divided into the comprehensive measure and the disease specific measure. The former, in particular, can be sub-divided into i) the utility, the measurement based on preference that measures the degree of health, the utility of daily living, and others, from the viewpoint of patients, and ii) the profile-type measurement that measures health multidimensionally. Among other things, the measurement that is based on preference has been placed, not only as the outcome in clinical tests, but also as a measurement in clinical economic research. As the clinical decision analysis that compares alternatives to treatments, the importance of economic analysis had been referred in the Evidence-based medicine paradigm (Sackett, D.L., et al, 2000) that was propounded in the 1990's, and the index used there is nothing but utility.

Utility was developed by von Neumann & Morgenstein (Patrick, D.L., et al, 1973) and is regarded as the model for decision-making under

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uncertainty. It is registered using an interval scale where 0 means death and 1 means perfect health. Based on that utility, Quality-Adjusted Life Years (QALYs) are calculated and used to do Cost Utility Analysis (CUA) (Torrance, G.W. and Feeny, D., 1989). CUA is widely used as a standard in clinical decision making and it is thought that it will play an increasingly important role in the future amid calls for better utilization of medical resources.

The standard gamble, the time trade-off, the rating scale, and others are known as direct measurement methods of utility. However, all of these are difficult to apply in a clinical scene. Therefore preference-based measures and the utility scale of which consist of various items, have been developed. They are Health Utilities Index, EuroQol (EQ-5D) and others, and they are in common use centering in Europe and the United States. In Japan, as a result of vigorous research by Ikeda et al. (1999) Uemura et al. (2000), and Tsuchiya et al. (2002), these methods have become practical in recent years. EQ-5D is a measurement that assesses on a scale of 1 to 3, using 5 items. While EQ-5D is simple and easy-to-use, it has been remarked that it is hard to use it to outline changes, due to the ceiling effect (Uemura, T., et al., 2003).

On the other hand, HUI is a measuring method that was developed at McMaster University in Canada and three versions, named Mark I, II and III have been produced so far. In HUI Mark III, a staggering 972,000 kinds of concrete health conditions can be described, and it is said that HUI Mark III can assess in greater detail compared with EQ-5D. In addition, HUI has a self-administered version that is used by the subject personally and a proxy-administered version that is used by a proxy. This is the point on which their reliability and practicality have been tested, and it can be considered that HUI needs more consideration especially in the subject of cognitive disorders.

Under such circumstances, in this research, using elderly subjects with cognitive disorders, in addition to exploring HRQOL in both proxy and self versions and examining their relationship, we conducted research to consider their validity by exploring their relationship with EQ-5D and the impact of cognitive level.

Method

Participants

The subjects were 44 elderly people with cognitive disorders of some kind, in a geriatric health-care facility in Niigata prefecture. Table 1 shows their demographic characteristics. The ratio of males to females was 10 to 34, and the average length of stay for the subject population was 25.2 months. In addition, as a result of conducting neuropsychological tests on the entire subject population, an average score of the Mini Mental State Examination (MMSE) was established at 15.7 and an average score of SPS of the Rivermead Behavioral Memory Test (RBMT) was established at 3.8. Further, as a result of measurements using the Paracheck Geriatrics Rating Scale (PGS), the activity level of the subject's in daily living was 36.6 on a scale in which 50 is perfect.

Table 1. Demographic Characteristics (n=44)

age (years)	83.3 ± 8.5
sex (male/female)	11/32
education (years)	6.8 ± 2.7
Length of Stay (months)	26.5 ± 15.2
MMSE	15.7 ± 5.4
RBMT	3.8 ± 4.2
Digit span	3.8 ± 1.2
PGS	36.6 ± 6.7

MMSE=Mini Mental State Examination;
RBMT=Rivermead Behavioral Memory Test;
PGS=Paracheck Geriatrics Rating Scale,
Values represent the arithmetic mean ± SD

Materials

Health Utilities Index Mark3 (HUI3)

HUI is a family of generic health profiles and preference-based systems for the purposes of measuring health status, reporting health-related QOL, and producing utility scores. In HUI, there are two main approaches to measuring utilities, direct measurement and the use of multi-attribute systems (Horsman, J. et al., 2003). HUI currently consists of two systems, HUI2 and HUI3, which together describe almost 1,000,000 unique health status classification markers and provides a generic HRQOL utility scoring system (Furlong, W. J., et al., 2001; Torrance, G. W., 1996).

HUI3 was developed to address some concerns about the definitions of HUI2, and has specified five or six levels per attribute (vision, hearing, speech, ambulation, dexterity, emotion, cognition, pain), and describes 972,000 unique health status markers. The 15-item questionnaire formats of HUI are available in two versions: a self assessment version (HUI23SU15Q), to collect information from people about their own health; and a proxy-assessment version (HUI23PU15Q), to collect information about the health status of study subjects from people other than the subjects themselves. Proxy versions are useful when study subjects are unable, by virtue of age (too young), mental incapacity (e.g., senile), or health status (unconscious), to answer for them. A parent, a spouse, healthcare professionals and others are regarded as possible proxies. At this time, an occupational therapist of this facility was the proxy.

EuroQol (EQ-5D)

The EQ-5D questionnaire is a generic instrument to evaluate health, developed by the EuroQol Group (The EuroQol Group, 1990). The EQ-5D defines health according to five dimensions: mobility, self-care, normal activities, pain/discomfort, and anxiety/depression. The current descriptive system is made up of these five

dimensions each of three levels, defining 243 health states. In addition to these states defined in terms of the five dimensions of the EuroQol descriptive system, two further states have been specified - death and unconsciousness - so that the final tally rises to 245 states (Kind, P., 1996). Though EQ-5D also a self-administered and proxy system of response, we used the proxy answering method at this time.

Statistical Analyses

We explored the correlations between HUI proxy-version utilities and HUI self-version utilities and between HUI utilities and EQ-5D utilities respectively, in order to confirm the relationship between the results using two versions in HUI and using the HUI utilities and EQ-5D utilities.

Further, we calculated a partial correlation in order to regulate the age, educational years, the length of stay, MMSE and PGS.

We used Statview 5.0 as a statistical software package and a significance level of 5%.

Informed Consent

With regard to the informed consent of the subjects, we made an oral or written explanation to all of them about this research's aim and method based on "the ethical guidelines on epidemiological studies (the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Health, Labor and Welfare, 2002 June.)", and obtained their agreement. In addition, we submitted the documentation for the research program to the facility concerned and obtained their approval.

Results

Table 2 shows the results of HUI and EQ-5D. Firstly, while the average of the proxy version was 0.17 ± 0.23 in HUI, the self-administered version was 0.22 ± 0.28 and the total score of self-administered version was higher. In a com-

parison of the minimum values, the proxy version and the self-administered version were -0.16 and -0.19 respectively. However, the maximum value of the proxy version was 0.69, while there was one subject who scored 1 in the self-administered version. On the other hand, EQ-5D was 0.38 ± 0.26 and this was higher than either version of

HUI. As Table3 shows, with respect to a single attribute of HUI in the proxy version, speech, at 0.92, was the highest and ambulation, at 0.52, was the lowest.

With respect to the correlation of the three utilities, in the proxy version and the self-administered version of HUI, $r=0.314$ ($p=0.039$) and a

Table 2. Mean Utilities Scores (n=44)

HUI	
proxy version	0.17 ± 0.23
self version	0.22 ± 0.29
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EQ-5D	0.38 ± 0.26

HUI=Health Utilities Index; EQ-5D=EuroQol;
Values represent the arithmetic mean \pm SD

Table 3. Single Attribute Health Utilities Index Scores (proxy version)

Vision	0.78 ± 0.27
Hearing	0.86 ± 0.23
Speech	0.90 ± 0.16
Ambulation	0.39 ± 0.35
Dexterity	0.76 ± 0.32
Emotion	0.87 ± 0.11
Cognition	0.59 ± 0.27
Pain	0.89 ± 0.13

Values represent the arithmetic mean \pm SD

Figure 1. Relationship between HUI proxy version and EQ-5D

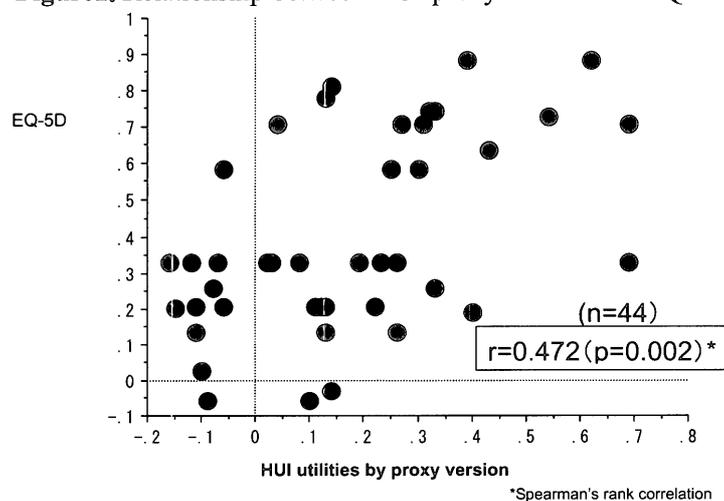


Table 4. Partial Correlation Functions of MMSE and Three Utilities

	MMSE	HUI p	HUI s	EQ-5D
MMSE	1.000			
HUI p	0.180	1.000		
HUI s	-0.193	-0.016	1.000	
EQ-5D	0.314	0.514	0.253	1.00

MMSE=Mini Mental State Examination; HUI p=Health Utilities Index proxy version;
HUI s=Health Utilities Index self version; EQ-5D=EuroQol

significant correlation was seen, although it was weak. Meanwhile, regarding the correlation between HUI and EQ-5D, the correlation to the proxy version was $r=0.472$ ($p=0.002$) and a correlation was seen as Figure 1 shows. However, with the self-administered version, the result was that $r=0.072$ ($p=0.638$) and a correlation was not seen. In addition, when calculating the partial correlation that regulates cognitive level (Table 4), the relationship between the HUI proxy version and EQ-5D was that $r=0.514$ and became high, the HUI self-administered version and EQ-5D was $r=-0.016$ and was a minus value. With regard to the relationship between respective utility and MMSE, only a correlation with the HUI proxy version was seen. The single score of Cognition and the MMSE was $r=0.649$ ($p<0.0001$) and a significant correlation was seen.

Discussion

As a review of Anell & Norinder (2000) has stated, in recent years the use of CUA has increased rapidly in clinical research on clinical decision-making. This is attributed to the ease of comparisons with the CUA's of other treatment programs. In fact, CUA attachment is mandatory in the case of new-drug applications in the United States. Under such circumstances, the role of HRQOL used in CUA, especially the utility, has been enhanced significantly, and we are in urgent need of confirmation of its availability by recognizing the characteristics of the preference-based measure. In Europe and the United States, HUI and EQ-5D are the most widely used as a preference-based measure and it can be considered that the examination of these characteristics by Japanese people is significant. In our country, which is facing an unprecedented aging of society, there is a particular interest in how the elderly with cognitive disorders assess the utility.

Firstly, the utilities that were measured by the two methods, HUI and the EQ-5D, were different. In particular, there is a significant dif-

ference between HUI and EQ-5D. Until now, reports conducting a comparison by calculating utilities in HUI and EQ-5D on various health conditions have been sporadic. While there are a lot of reports that HUI and EQ-5D showed similar results (Rizzo, J.A., et al., 1999; Hawthorne, G., et al., 2001; Schlz, M. W., et al., 2002; Luo, N., 2003), there are quite a few reports in which significant statistical differences were seen. In particular, in Siderowf (2002)'s research that assessed utility as the subject of Parkinson's disease, the results were that HUI was 0.74 and EQ-5D was 0.58. Further, according to Suarez-Almazor (2000) et al. who conducted various QOL assessments in back pain patients, HUI was 0.49 and EQ-5D was 0.38. Although an easy comparison cannot be made, in the report in which a difference was seen in two methods, the HRQOL by EQ-5D was lower than the HRQOL by HUI. Although this report's result showed the opposite of these reports, it is considered to be in part because both of the two above-mentioned treatises used HUI Mark2. With regard to other factors, it was considered that, if the score of the utility is low, there is a possibility that there may be downward rigidity in EQ-5D itself, or it reflects the fact that the sensitivity of HUI is higher than EQ-5D.

With regard to the assessment of HRQOL in patients with dementia, Neumann et al. (1999, 2000) have examined this in detail. They explored with the subject of the proxies being 679 Alzheimer's disease patients, using Mark2 and Mark 3 of HUI, and reported that HUI3 was 0.22 and HUI2 was 0.53 and therefore HUI3 was lower. It is very interesting that these two points approximates our findings, and the score of HRQOL assessed by them was very similar. In addition, according to Neumann et al., it was shown that the difference was also dependent on the stage of Alzheimer's disease, and the more serious the cognitive disorders became the less HRQOL resulted. Therefore, it can be said that

HUI is a significant measure regarding the idea that HUI can reflect cognitive disorders to HRQOL. This also appears to be the result of our research.

As above, in the case of evaluating HRQOL with subjects being elderly with cognitive disorders, HUI is significant and it is considered that the assessment used by the proxy version is especially important. We consider it important to conduct examinations, in detail, regarding the relationship between cognitive disorders and HRQOL by increasing the number of subject in the future.

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