Journal of Kerman University of Medical Sciences

JKMU

Journal of Kerman University of Medical Sciences, 2017; 24 (6): 505-514

Validity of the Iranian Version of Health Utility Index Mark 3 Quality of Life Questionnaire

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Received: 18 April, 2017 Accepted: 24 November, 2017

ARTICLE INFO

Article type:
Original article

Keywords:
Standardization
Reliability
Quality of life
Health Utility Index 3
Iran

Abstract

Background: The aim of this study was to standardize and develop the health utility index III (HUI3); quality of life questionnaire. This study was conducted for the first time in Iran.

Method: Forward-backward translation method was applied in order to translate the Canadian version into Persian. The final version was developed after modifications. Double stage cluster sampling and simple random sampling were respectively used for population and patients. A total of 511 healthy people in 15 regions of Esfahan/Iran and 51 patients suffering from cardiovascular disease completed the questionnaire. Cronbach's alpha and interclass correlation coefficient were used for testing the reliability of the questionnaire.

Results: The mean age of population was 32.8 ± 11.3 years and the mean age of patients was 48.8 ± 6.2 years. The assessment of Interclass Correlation Coefficient of the tool in patients after two weeks in all eight questions ranged from 0.76 to 1 (ICC=0/91) that shows its high reliability. In addition, the average score in Alfa Cronbach was 0.68. Content validity of the questionnaire was 0.82. Differentiability of the test shows that a higher quality of life can be affected by male gender, higher education, low age, and employment In addition, the utility result of quality of life indicates a significant difference in the quality of life of patients compared with the general population ($p = 0.004$)

Conclusion: The results showed a translated version is valid, reliable and applicable in medical sciences studies and can be used to Persian language.

Introduction

In recent years, the issue of patients' quality of life has been of particular importance. In this regard, attention to standard tools for its measurement is necessary. The growing trend in measuring health-related quality of life is a result of the demand for common measurement techniques (1). Physical, mental, emotional, and social functions are all parts of Health-related quality of life (HRQoL) (2). Quantification of human behavior is one of the subsets of social measuring. Statistics and research methodology play a fundamental role in current experimental analysis. Different quantitative instruments have been designed to measure human behavior. Today, the use of questionnaires is a national and international practice for data collection in health care services in developing countries. Questionnaires are used to measure emotion, motivation, behavior, attitude and the knowledge level. The common

feature of all these questionnaires is studying the behavior of subjects (3). According to the definition of World Health Organization (WHO), health is not just "the absence of disease or infirmity" but" a state of complete physical, mental and social well-being" (4).

Everyone's quality of life is different and cannot be explained by others because quality of life is an individual's perception of his/her goals, expectations, standards and concerns based on culture and social value system (5). Since quality of life includes both quality (quality of life (QOL)) and quantity of life (length of life (LOL)), assessing the validity of tools is important in health studies. Some questionnaires only report the score of quality of life and others measure the utility score with both quality and quantity of life. WHOQOL-BREF, SF-36 and EQ-5D are some standard and accepted questionnaires that have been translated into several languages as well as Persian language. Evaluation of utility outcome has been the aim of many health and health economic studies in recent years. Implementing the standardization as well as the design of questionnaires with positive outcomes of quality of life is necessary. The Health Utilities Index (HUI) is a rating scale which is used to measure the general health-related quality of life (HRQoL). The HUI questionnaires have been designed with two marker classification systems, HUI-2 and HUI-3, which they include measuring 24,000 preference survey and 972,000 unique health statuses. A range of health domains such as vision, hearing, sensation, mobility, pain, cognition, ambulation, and emotion are measured by HUI. The method of determining the quality of life score is based on standard gamble (SG) that contains both time and individual preferences. The health utility score obtained from HUI questionnaire is one of the common factor measurement of quality-adjusted life years (QALY) in medical science studies, clinical interventions, epidemiological and economic assessments (6-10). HUI is translated into 15 world languages (11, 12) and it is used in different studies such as Alzheimer disease, AIDS, hepatitis, cancer, heart disease, diabetes, vaccines, stroke, and arthritis (13-17). The purpose of this study was to localize, assess the psychometrics and standardize the Canadian version of health utility index questionnaire mark 3 for the Persian-speaking population.

Method

The forward-backward method was applied in translating the Canadian version of the questionnaire into Persian by two interpreters. An interpreter translated the final Persian version of the questionnaire independently and the final version was applied after some modifications. Random cluster sampling was used to select samples among the general population of clusters. 511 samples, aged 15 to 65, were selected in each 15 regions according to

age, sex, and their health status (without chronic illness). Literate population completed the questionnaire by themselves and illiterate population was interviewed in order to complete the questionnaire. This study was approved by the research ethics committees of Cardiovascular Research Center of Isfahan University of Medical Sciences. Patients' consent was obtained as well. Mark 3 is designed to examine the health status of older age groups over 15 years of age. HUI3 examines the overall health status with eight attributes: vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain. HUI 3 is designed for self-completion and it takes approximately 7–10 minutes to be completed. There are five multiple-choice options for speech, emotion and pain domains and there are six multiple-choice options for vision, hearing, ambulation and dexterity domains. In some studies, there is a need to calculate the utility score instead of the quality of life score. The HUI 3 scoring function is based on

the utility to assess HRQL. For each attribute in HUI 3 system, the single-attribute utility score is assigned a score of 1.00 and the lowest level for that attribute is assigned a score of 0.00 (18). The amount of Intra Class Correlation (ICC) reports the power of the elements in relation to each other. Random sampling for 51 samples from 300 participants in the age range of 15 to 65 who suffered from cardiovascular diseases and get angiography intervention in Chamran hospital (specialist heart hospital) was performed. Face to face interviews were applied for determining of ICC in two weeks interval. Content validity ratio (CVR) and content validity index (CVI) of different questions determined the necessity, relevance, clarity, and simplicity of each item. Evidence shows that there is a need for the presence of at least 9 experts in three groups to measure the construct validity (19-21). Construct validity was determined by 10 panel members. They included three methodologists (those who worked on the design of the questionnaire), four content specialists (those familiar with content and had clinical experience), and three knowledgeable persons (the target population that the questionnaire is designed for them). Inter Rater Agreement (IRA), Item Content Validity Index (I-CVI) and Scale Content Validity Index (S-CVI) are standard methods that can be used to approach relevancy, transparency, overall transparency and comprehensiveness of each item of the instrument. Each question contains three sub questions with multiple sub-questions related to suitability and necessity. In addition, one general question was about the comprehensive and the practical tool.. Our results according to the formula were adjusted by a standard table (22, 23). The total points of agreement had been obtained from three criteria which are simplicity, relevance and clarity or transparency for each item of CVR and CVI.

$$CVR = \frac{Ne - \frac{N}{2}}{\frac{N}{2}}$$

$$CVI = \frac{\sum_{n}^{1} CVR}{\text{numbers Retained}}$$

Ne: some members of the panel that recognized the question is "essential"

N: represents the total number of members

Independent t-test and linear regression examined discriminant validity. The correlation between each question with overall quality of life score was achieved by construct validity. Pearson correlation number should be at least 0.4 for standard structure (3). Cronbach's alpha reliability coefficient and interclass correlation coefficient were two methods used to determine the reliability with a confidence interval of 95%. In addition, test–retest reliability after a 2-week interval was used to determine the consistency and reliability. SPSS software version 20 was used for data analysis.

Results

The mean age of the general sample was 32.8 ± 11.3 and the mean age of the cardiovascular sample was 48.8 ± 6.2. The average time to answer the questionnaire was 8-10 minutes. Table 1 shows scores of quality of life for each item and demographics of participants. QoL showed significant correlations for education in both groups and age in the general population.

The higher quality of life in people with higher education shows the power of the tool in expressing differences among items. Structural construct validity shows a significant difference between the quality of life among different groups (p=0.004).

Table 2 depicts descriptive statistics for reliability and quality of life in each separate eight questions. The highest score (0.99) was related to hearing, ambulation and dexterity domains and the lowest score (0.94) was related to emotion. The highest score (0.99) in cardiovascular group belonged to hearing and speech and the lowest score (0.94) belonged to the pain and emotion domains. The overall score for Alpha was 0.7 and Alpha was reduced if an item was removed. According to minimum standard number of Alpha (0.62), our results show that essential and important questions have been used in this tool (23). Test–Retest Reliability concerning stability and repeatability was from 0.76 to 1 in eight questions (table3). Divergent correlations were used to assess the construct validity of each region among each other. Pearson's correlation results indicate that the questionnaire has power to assess various aspects of quality of life. (table4).

Table 1. Demographic information and the relationship between scores of quality of life for each group (n = 562)

p-value	Average quality of life score		The patient population n=51		p-value	Average quality of life score	General population n=511		
	first time	After two weeks	Percent	Number			Percent	Number	
0.108					0.574				**sex**
	0.65	0.63	74.5	38		0.78	51.1	261	**Male**
	0.57	0.57	25.5	13		0.77	48.9	250	**Female**
					0.68				**marital status**
	0.63	0.62	100	51		0.77	58.9	301	**Married**
			0	0		0.78	41.1	210	**Single**
0.005					0.000				**education**
	0.68	0.65	11.8	6		0.51	1.5	8	**illiterate**
	0.82	0.83	74.5	38		0.75	52.1	266	**Diploma**
	0.82	0.83	13.7	7		0.82	37.8	193	**BS**
			0	0		0.83	8.6	44	**Higher Education**
0.134					0.002				**age**
			0	0		0.80	53.4	277	**15-30**
	0.71	0.69	19.6	10		0.77	32.5	166	**30-45**
	0.62	0.60	80.4	41		0.71	14.1	72	**45-65**
0.07					0.124				**Employment status**
	0.68	0.67	68.6	35		0.79	63.3	325	**Employed**
	0.55	0.55	31.4	16		0.76	36.4	186	**Unemployed**
0.004									**Total score of quality of life**
						0.74			**The general population**
	0.64	0.61							**Patient**

Table 2. Descriptive statistics and reliability of the scale HUI3

minimum score of quality of life		maximum score of quality of life		Cronbach's alpha for deleted items	Mean ± SD		questions	
After two weeks	First time	After two weeks	First time		After two weeks	First time		
	0.89		1	0.56		0.98±0.02	Vision	General Population
	0.80		1	0.54		0.99 ± 0.014	Hearing	
	0.81		1	0.58		0.98±0.03	Speech	
	0.86		1	0.64		0.99±0.014	Ambulation	
	0.88		1	0.59		0.99±0.07	Dexterity	
	0.64		1	0.61		0.94±0.7	Emotion	
	0.60		1	0.57		0.95±0.6	Cognition	
	0.77		1	0.60		0.98±0.34	Pain	
			1	0.68			Alpha-General	
0.84	0.84	1	1	0.60	0.95±0.06	0.95±0.06	Vision	Patient
0.95	0.95	1	1	0.50	0.99±0.021	0.99±0.02	Hearing	
0.94	0.94	1	1	0.56	0.99±0.014	0.99±0.14	Speech	
0.93	0.93	1	1	0.52	0.98±0.02	0.98±0.043	Ambulation	
0.95	0.95	1	1	0.55	0.97±0.02	0.97±0.02	Dexterity	
0.64	0.64	1	1	0.49	0.89±0.07	0.94±0.06	Emotion	
0.83	0.83	1	1	0.45	0.95±0.6	0.95±0.06	Cognition	
0.90	0.90	1	1	0.47	0.94±0.04	0.94±0.04	Pain	
				0.66			Alpha-General	

Scores range is from zero to one

Table 3. Content validity of the questionnaire by content validity ratio CVR and content validity index CVI and stability assessment of the health utility index ICC

CVR	CVI	maximum	minimum	ICC	Dimension
0.71	0.88	0.97	0.92	0.94	Vision
0.71	0.81	0.94	0.81	0.87	Hearing
0.86	0.88	1	1	1	Speech
0.99	0.94	0.95	0.84	0.89	Ambulation
0.71	0.78	0.92	0.76	0.84	Dexterity
0.86	0.79	0.87	0.64	0.76	Emotion
0.86	0.81	0.98	0.94	0.96	Cognition
0.86	0.88	0.94	0.83	0.88	Pain
0.82	0.83	0.98	0.84	0.91	Overall

[95% Conf. Interval]

Table 4. Correlation matrix questions with each other

Pain	Cognition	Emotion	Dexterity	Ambulation	Speech	Hearing	Vision	
							1	Vision
						1	0.188	Hearing
					1	0.259	0.150	Speech
				1	0.152	0.392	0.093	Ambulation
			1	0.175	0.079	0.179	0.176	Dexterity
		1	0.216	0.049	0.119	0.017	0.052	Emotion
	1	0.277	0.175	0.011	0.158	0.063	0.139	Cognition
1	0.237	0.165	0.335	0.036	0.059	0.079	0.157	Pain

Discussion

The motivation for translating the questionnaires is the access to appropriate tools for further research in different languages. Translation, validity and reliability are the most common methods to convert an international questionnaire into native languages (24, 25). Translation, validity and reliability of international HUI3 questionnaire into Persian language in order to evaluate HRQoL in healthcare research was the aim of this study. Utility outcome is one of the major advantages of this questionnaire that make it operational in many health and health economic researches (6, 26- 27). Some studies have used this questionnaire. For instance, Nickfar et al. for cost-effectiveness of different interferon beta products (28), cost effectiveness reduction of chlamydia by Deogan and et al. in Sweden (29), a study by Poku on the health utility in diabetic patients in UK (30) And Kaplan in California compared five preference-based indexes in cataract and heart failure patients (31).

The results of this study show that HUI3 instruments can assess quality of life in a variety of situations and in Iranian population. The reasons for obtaining the average score of Cronbach's alpha can be related to the low number of questions less than ten) or different domains of the questionnaire or different number of sub-questions (3, 32, 33). Test-retest results revealed stability, repeatability and high reliability (ICC =0.91). According to studies ICC less than 0.4 is weak, between 0.4 to 0.6 is average, higher than 0.7 is perfect and above 0.8 is excellent (34-35).

HUI has been shown to be a valid and reliable tool for pediatric patient's quality of life in Russia by Baranov et al (36). Previous research has validated HUI for use among general Canadian population with reliability of 0.77 (37).

Maximum Differentiation (0.39) by correlation test gives the unreliability of questions to each other and the power of questionnaire in assessing different concepts. The results of quality of life assessment in the two groups showed that the differential power of the tool was based on factors such as age, gender and education. Several studies have been conducted to compare different tools with HUI. For example Stolk and Colleagues reported that HUI seemed more appropriate than the EQ-5D index (38) whereas some studies have shown no difference between questionnaires. Others believe that the quality of life related to health can be influenced by culture and type of diseases. Some researchers recommend using these tools in eeconomics evaluation studies. (38-44).

Conclusion

One of the reasons behind the assessment of quality of life (QoL) is to measure the impact of healthcare interventions on patients' lives although its impact on health is undeniable. The instrumentation of psychometrics is the standardization of tools in a specific population by validity and reliability (45). The results of this study for validity and reliability measurement of the tool can be generalized to the Persian language population because Isfahan is one of the top five metropolitan cities based on Persian language in Iran. From an analytical perspective, the HUI 3 has advantages because it has utility score result, easy to be used and few number of questions. We suggest that HUI can be validated for the Persian language population as well as evaluating the quality of life in various diseases.

Acknowledgments

We express our thanks to all participants who cooperated in completing the questionnaire. Special thanks go to Health Management and Economics Research Center of Isfahan University of Medical Sciences for supporting this research.

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