

Brief communication (Original)

Assessment of health-related quality of life in Thai patients after heart surgery

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Background: Little is known about health-related quality of life (HRQoL) of Thai patients after heart surgery. The Thai government initiated a cardiac surgery project to celebrate the 80th birthday anniversary of His Majesty The King.

Objectives: To evaluate the HRQoL of Thai patients after heart surgery, as part of the Thai government's cardiac surgery project, and to investigate the association of HRQoL instruments and patient characteristics.

Methods: Of 7,863 patients in the project, 386 were randomly selected for a telephone interview by trained researchers during June–November 2008. The HRQoL of Thai patients was measured using 12-item Short Form version 2 and EuroQoL (EQ-5D) plus an EQ-5D visual analog scale (EQ-VAS).

Results: The mean age of patient participants was 50.4 ± 13.7 years (range 17–82) and 49.5% were male. The Physical Component Summary (PCS) and Mental Component Summary (MCS) scores were reported as 46.91 and 54.44, respectively, compared with the US norm scores of 50. The EQ-5D and EQ-VAS utility scores of 0.81 and 0.84 were comparable to those of Thai general population (0.77–0.84), but higher than those of Thai patients with heart disease (0.73–0.75). Patients with older age, female sex, unemployment, and presence of comorbidity rated a lower HRQoL. The multiple linear regression models showed that both EQ-5D and EQ-VAS were associated with PCS and MCS and could be predicted by 40%–50%.

Conclusion: Overall, the HRQoL of patients after the heart surgery was satisfactory. The QoL in patients with a specific types of heart surgery warrants further study.

Keywords: EQ-5D, health-related quality of life, health utility, heart surgery, SF-12, Thailand

Heart disease is a crucial cause of death worldwide and one of the top three causes of mortality in Thailand after cancers, and accidents including poisoning [1]. Therefore, the prevention of heart disease, its medical management, or surgery is of paramount importance. Additionally, patients who have undergone cardiac surgery usually experience various quality of life postoperatively depending on their medical conditions before or after the surgery. A patient's health-related quality of life (HRQoL) is defined as not only the absence of disease, but also the presence of physical, mental, and social well-being from a patient perspective [2, 3]. Two common

approaches to measuring HRQoL include generic and disease specific health status instruments. The generic instrument can provide a single outcome score, e.g., health utility (HU), or a profile of domain scores, such as health profile (HP). The HU approach can incorporate HRQoL into a cost-effectiveness analysis or cost-utility analysis, of which commonly used outcomes are quality-adjusted life years (QALYs) gained [4, 5]. The QALY is a measure of life expectancy weighted by a HU score that is usually between 0 (death) and 1 (full health).

In 2007, the Thai government initiated a heart surgery project to celebrate the 80th birthday anniversary of His Majesty the King that was funded by the National Health Security Office. The purpose of this project was to provide the patients with a holistic and continuous care in order to improve their quality of life. It was therefore necessary to investigate the

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HRQoL of patients after their heart surgery. Some evidence of HRQoL has been reported in patients after heart surgery in western countries [6-8], but little was known about HRQoL in Thai patients after heart surgery. This study was therefore intended to assess the HRQoL of patients after heart surgery using health profile (HP) and health utility (HU) as measures, and to examine the relationships between HP, HU, and patient characteristics.

Methods

This quality of life study was approved by the Ethics Committee of Ramathibodi Hospital (MURA2008/962). It was conducted in patients joining the heart surgery project during June–November 2008.

Patients and sampling

In the heart surgery project, 7,863 children and adult Thai patients living across the country were

chosen without payment for cardiac surgery, i.e., the valve replacement/repair, operation of atrial and/or ventricular septa, or coronary artery bypass graft (CABG), as shown in **Figure 1**. Patients were included in this study if they were 15 years old or more and underwent the heart surgery during the previous one year, thus leaving 5,255 patients in the sample pool. Half of the patients were randomly selected by a systematic sampling technique (i.e., patients with even hospital numbers) and invited via mail to participate in the study and provide their telephone numbers. Only 901 patients were willing to take part in the study and half of them were further systemically sampled for a telephone interview. After excluding patients for various reasons, only 386 patients completed the study. All of them provided written informed consent to participate in this study.

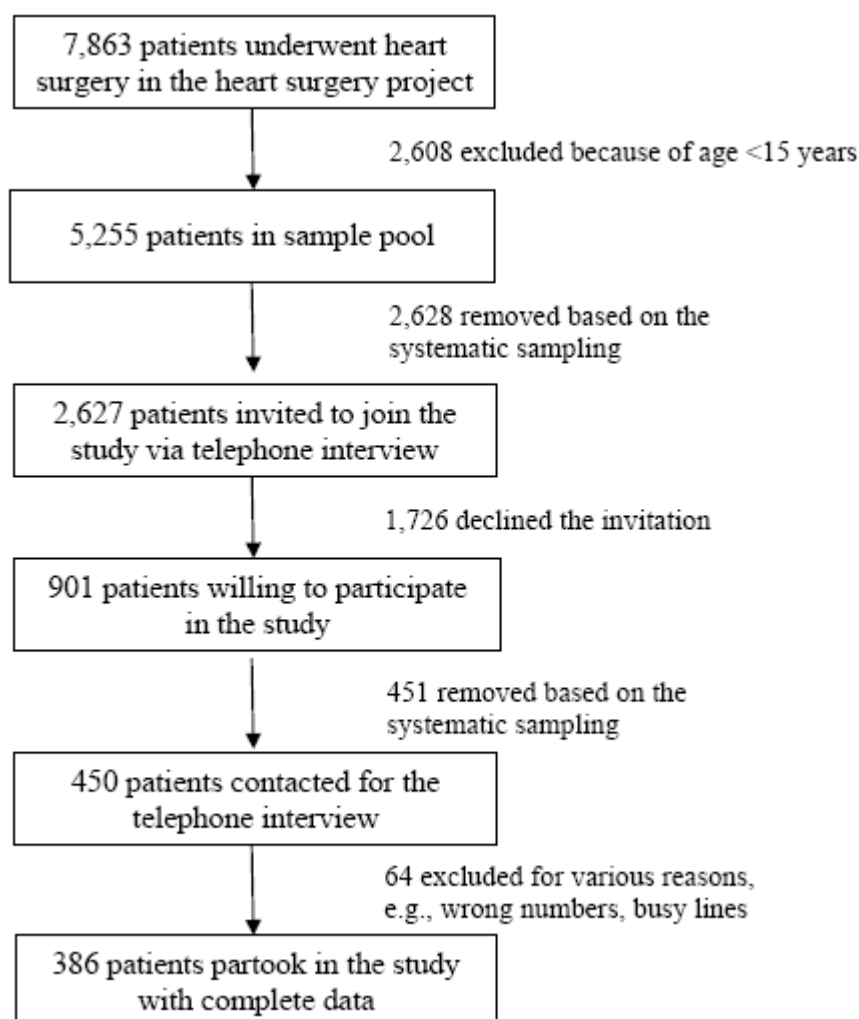


Figure 1. Study flow

Study instruments

Two generic instruments were used because, unlike disease specific tools, they are more flexible in terms of patient population and interventions. The first one was the health profile measure “12-item Short Form, version 2” (SF-12v2; Quality Metric Inc, Lincoln, RI, USA). This health survey, which is the short form of the widely used SF-36, is a brief and reliable measure of overall health status [9]. The Thai version of SF-12v2 was used with the permission from the Quality Metric Inc. It measures eight health domains: physical functioning (PF), role limitations because of physical health (role-physical: RP), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), role limitations because of emotional problems (role-emotional: RE) and mental health (MH). To complete the tool, the recall period for the SF-12v2 was within the past four weeks. The SF-12v2 responses were scored from 0 to 100 on each of the domains, together with the Physical Component Summary (PCS) scale and Mental Component Summary (MCS) scale. Higher scores indicated a better HRQoL. To simplify comparisons with the general population, the norm-based scoring was used, i.e., scores being linearly transformed to a scale with the mean of 50 and standard deviation (SD) of 10 for the general US population [10]. In this study, Cronbach’s alpha values for PCS and MCS were 0.73 and 0.77, respectively. Values >0.7 indicate that the SF-12v2 has an acceptable internal consistency reliability [11].

The second instrument was a measure of HU, i.e., EuroQoL (EQ-5D) and Visual Analog Scale (EQ-VAS). The EQ-5D consists of five attributes: mobility, self-care, usual activity, pain/discomfort, and anxiety/depression [12]. Each attribute has three levels: no problem, some problems, and major problems. Its Thai version was obtained from the EuroQoL Group and the Thai value set was employed to calculate EQ-5D utility scores [13]. A resulting EQ-5D score is usually between -0.45 and 1.00 , where 1.00 and 0 represent perfect health and death, respectively. Higher EQ-5D scores indicate better health, but negative values signify the states worse than death. In this study, the Cronbach’s alpha value of the EQ-5D was 0.61 , which is considered moderately reliable. The second part of EQ-5D is a visual analog scale (EQ-VAS) that asks respondents to rate their current health states with scores starting from 0 (worst imaginable health) to 100 (best imaginable health). EQ-VAS scores were

obtained by dividing the number rated on the scale by 100 .

Data collection

All 386 patients with postoperative heart surgery were interviewed on the phone by trained research assistants using the two generic measures. The telephone interview was conducted for approximately half an hour for each patient in the academic office at the Ramathibodi Hospital. The data gathered were entered into Microsoft Excel and SPSS version 17.0 (SPSS Inc., Chicago, IL, USA) for analysis.

Statistical analysis

The characteristics of patients were analyzed using descriptive statistics, e.g. percentages, means, and standard deviations (SD). A one-sample t test was used to test the differences between the eight domains of SF-12v2 of the Thai heart surgery sample and those of the U.S. general population, whereas a Chi-squared test was to determine the differences between EQ-5D scores of the heart surgery sample and those of the Thai general population. A paired t test was also conducted to test the difference in EQ-VAS before (patients being asked to recall their health prior to the operation) and after the heart surgery. Moreover, an independent t test was performed, as part of a subgroup analysis based on age cut off by median, sex, work status (employed or unemployed), and presence of commodity (yes or no), to compare the differences for EQ-5D, EQ-VAS, PCS, and MCS. To determine the relationships of EQ-5D and EQ-VAS with eight SF-12v2 domains plus two summary scores, a multiple linear regression analysis using the ‘enter’ method was also performed. A difference with $P < 0.05$ was considered significant.

Results

Characteristics of the patients and their health profile

Patient characteristics are summarized in **Table 1**. Of 386 patients, with a mean age was 50.4 ± 13.7 years and nearly half were male (49.5%), which is comparable with that of the entire cohort excluding children ($n = 5,225$; mean age = 50.3 ± 15.2 years, 50.1% male). Slightly more than half were employed with low monthly wages. As shown in **Table 2**, high scores for both health profile and health utility measures were revealed in this patient group, as evidenced by the means or medians. Additionally,

most SF-12v2 domain scores except 'General Health', EQ-5D, and EQ-VAS had high ceiling effects, i.e. being greater than the limit of 15% [14]. In **Table 3**, compared with general Americans [9], the Thai patients had higher VT, SF, MH and MCS scores, but

lower RP, BP, GH, and PCS scores (all $P < 0.01$ except BP with $P < 0.05$). No statistical difference in domain scores for PF or RE was found in this group of patients.

Table 1. Patients' characteristics (n = 386)

Characteristics	Value
Age (years)	
mean \pm SD	50.4 \pm 13.7
median	52
range	17–82
Sex, male; n (%)	191 (49.5)
Employment status, employed; n (%)	230 (59.6)
Monthly income (US\$)	
mean \pm SD	226 \pm 352
median	121
range	3–3,030
Underlying diseases ^a	
hypertension; n (%)	90 (23.3)
hyperlipidemia; n (%)	43 (11.1)
diabetes; n (%)	40 (10.4)
stroke; n (%)	7 (1.8)
kidney disease; n (%)	5 (1.3)
asthma; n (%)	5 (1.3)
other diseases; n (%)	84 (21.8)
Number of comorbidities	
mean \pm SD	0.7 \pm 1.0
median	0
range	0–5

^aPatients may have more than one underlying disease

Table 2. Descriptive statistics of SF-12v2, EQ-5D, and EQ-VAS

Domain/instrument	Mean	SD	Median	Range	% Floor	% Ceiling
SF-12 Domain/Summary Scores						
Physical functioning	80.96	24.38	100.00	0.00–100.00	2.3	51.8
Role physical	70.01	25.10	75.00	0.00–100.00	1.6	26.2
Bodily pain	79.40	21.92	75.00	0.00–100.00	0.5	44.6
General health	62.30	24.88	60.00	0.00–100.00	0.3	8.5
Vitality	75.52	23.28	75.00	25.00–100.00	0.0	39.9
Social functioning	90.35	19.63	100.00	0.00–100.00	0.8	76.4
Role emotional	85.17	19.31	100.00	0.00–100.00	0.3	51.0
Mental health	76.17	19.08	75.00	25.00–100.00	2.1	21.8
Physical component summary	46.91	7.99	47.83	17.41–69.88	0	0
Mental component summary	54.44	8.41	55.68	20.04–68.89	0	0
Health Utility Scores						
EQ-5D	0.81	0.19	0.74	0.10–1.00	0	43.0
EQ-VAS	0.84	0.13	0.80	0.50–1.00	0	23.3

Table 3. Comparison of 8 domains and 2 summary scores of SF-12v2 between the Thai sample and the US general population [ref. 9]

Domain/summary component	Thai sample after heart surgery	U.S. general population	Difference (Thai – US)
Physical functioning	80.96 ± 24.38	81.18 ± 29.10	-0.22
Role physical	70.01 ± 25.10	80.53 ± 27.13	-10.52**
Bodily pain	79.40 ± 21.92	81.74 ± 24.53	-2.34*
General health	62.31 ± 24.89	72.20 ± 23.19	-9.89**
Vitality	75.51 ± 23.28	55.59 ± 24.84	19.92**
Social functioning	90.35 ± 19.63	83.74 ± 24.76	6.61**
Role emotional	85.17 ± 19.31	86.41 ± 22.35	-1.24
Mental health	76.17 ± 19.08	70.18 ± 20.50	5.99**
Physical component summary	46.91 ± 7.99	50 ± 10	-3.09**
Mental component summary	54.44 ± 8.41	50 ± 10	4.44**

Bold values indicate Thai patients had higher scores than people in the U.S. general population.

* $P < 0.05$, ** $P < 0.01$ (one-sample t test)

Health utility

Thai patients after heart surgery possessed a higher EQ-5D score (0.81 in **Table 2**) than that of Thai patients with ischemic heart diseases (0.75) [15] and with heart failure (0.73) [16], but lower than the Thai general population (0.84) [13] (all $P < 0.01$; data not shown in the Table). Nevertheless, higher percentages of the patients reported ‘no problems’ in every domain of EQ-5D except for ‘Usual activities’ compared with those of Thais in general (**Table 4**). For EQ-VAS, the patients reported a great deal of improvement in their health after heart surgery, i.e. from 0.54 to 0.84 ($P < 0.01$; data not shown in the Table). The EQ-VAS of Thai patients after heart surgery (0.84 in **Table 2**) was higher than that of the Thai general population (0.77) [13] ($P < 0.01$). However, it should be noted that the mean age of the general Thai population (44.6 years) and the percentage of males (45.7%) [13] were lower than those of the Thai patients after heart surgery (mean age = 50.4 ± 13.7 and male = 49.5%). Generally, younger male people tended to have a higher HRQoL than older women. Thus, the HU values of the Thai patients measured by the EQ-5D and the EQ-VAS were overall comparable with those of the Thai general population.

Relationships among health profile, health utility, and patients’ characteristics

As for the subgroup analysis in **Table 5**, younger patients (≤ 52 years old) had higher EQ-VAS and PCS scores than older patients (both $P < 0.01$). Female

patients had lower EQ-5D and PCS scores than their male counterparts (both $P < 0.01$). In addition, patients with employment or no comorbidity tended to have higher HP and HU scores (all $P < 0.05$). For the relationships between HP and HU (**Table 6**), the multiple regression models showed that EQ-5D was significantly associated with all domains of SF-12v2, except for SF and RE, and could be predicted by approximately 50%. EQ-VAS was predicted by about 40% using with PF, BP, GH and VT. Both EQ-5D and EQ-VAS were also significantly associated with PCS and MCS.

Discussion

To our knowledge this is the first reported study of the health-related quality of life of Thai patients after the heart surgery for diverse heart diseases. The findings reflect the responses of mostly middle-aged Thai patients with some underlying heart diseases. After the heart surgery, the patients asserted their quality of life was improved, as explained by the high percentages of ceiling effects ($>15\%$) in most domains of SF-12v2 and EQ-5D and EQ-VAS. Compared with the U.S. general population [9], the Thai patients seemed to have higher mental health, but lower physical health. A possible explanation may be that the survey was made just one year after their surgery; and they might feel better, but needed more time to recover fully and gain their physical health. This is consistent with findings that indicated the mental and emotional health of patients after CABG appeared to gradually improve over time [6].

Table 4. Comparison of EQ-5D domains between Thai patients after the heart surgery and the Thai general population [ref. 13]

Domain	Thai patients after heart surgery (n = 386)	Thai general population (n = 1,409)	<i>P</i> ^a
1. Mobility			
No problem walking	349 (90.4%)	1038 (73.6%)	0.000*
Some problem walking	37 (9.6%)	364 (25.8%)	
Confined to bed	0	7 (0.6%)	
2. Self-care			
No problem	371 (96.1%)	1287 (91.4%)	0.002*
Some problems washing or dressing self	14 (3.6%)	104 (7.4%)	
Unable to wash or dress self	1 (0.3%)	18 (1.3%)	
3. Usual activities (e.g. work, study, housework, family or leisure activities)			
No problem	242 (62.7%)	1089 (77.3%)	0.000*
Some problem	137 (35.5%)	281 (19.9%)	
Unable to perform	7 (1.8%)	39 (2.8%)	
4. Pain/discomfort			
No pain or discomfort	245 (63.5%)	493 (35.0%)	0.000*
Moderate	140 (36.3%)	885 (62.8%)	
Extreme	1 (0.3%)	31 (2.2%)	
5. Anxiety/depression			
Not anxious or depressed	310 (80.3%)	741 (52.6%)	0.000*
Moderate	73 (18.9%)	633 (44.9%)	
Extreme	3 (0.8%)	35 (2.5%)	

^aCalculated by collapsing cells to compare 'no problems' vs. 'with problems'. **P* < 0.01 (Chi-squared test)

Table 5. Analysis of EQ-5D, EQ-VAS, Physical and Mental Component Summary scores based on patient characteristics

Characteristic	n = 386	EQ-5D mean ± SD	EQ-VAS mean ± SD	PCS mean ± SD	MCS mean ± SD
Age (median)					
≤52 years	201	0.81 ± 0.17	0.86 ± 0.12**	48.73 ± 7.08**	54.15 ± 8.35
>52 years	185	0.80 ± 0.20	0.81 ± 0.14	44.94 ± 8.46	54.75 ± 8.49
Sex					
female	195	0.77 ± 0.18**	0.84 ± 0.14	45.81 ± 8.34**	53.72 ± 8.18
male	191	0.84 ± 0.19	0.83 ± 0.13	48.03 ± 7.47	55.17 ± 8.61
Work status					
unemployed	156	0.76 ± 0.21**	0.79 ± 0.14**	44.31 ± 8.87**	53.20 ± 8.83*
employed	230	0.84 ± 0.16	0.86 ± 0.12	48.68 ± 6.81	55.28 ± 8.03
Comorbidity					
no	215	0.84 ± 0.17**	0.86 ± 0.13**	48.15 ± 7.82**	55.31 ± 8.22*
yes	171	0.77 ± 0.19	0.81 ± 0.14	45.35 ± 7.95	53.33 ± 8.54

PCS = Physical Component Summary, MCS = Mental Component Summary, **P* < 0.05, ***P* < 0.01 (independent *t* test)

Table 6. Relationships between eight domains and two component summary scores of SF-12v2 and EQ-5D and EQ-VAS

Predictor	EQ-5D		EQ-VAS	
	Unstandardized coefficient	P	Unstandardized coefficient	P
Constant	0.156	0.000**	0.432	0.000**
Physical functioning	0.001	0.000**	0.002	0.001**
Role physical	0.001	0.000**	0.000	0.296
Bodily pain	0.002	0.000**	0.001	0.048*
General health	0.002	0.004**	0.001	0.000**
Vitality	0.001	0.020*	0.001	0.000**
Social functioning	0.000	0.795	0.000	0.190
Role emotional	0.001	0.062	0.001	0.135
Mental health	0.001	0.006**	0.000	0.626
Adjusted R²	49.1%	0.000**	39.7%	0.000**
Constant	-0.317	0.000**	0.118	0.015*
PCS	0.014	0.000**	0.009	0.000**
MCS	0.009	0.000**	0.006	0.000**
Adjusted R²	48.3%	0.000**	37.8%	0.000**

PCS = Physical Component Summary, MCS = Mental Component Summary. * $P < 0.05$, ** $P < 0.01$ (multiple linear regression analysis using the 'enter' method)

The patients had the marginally lower EQ-5D utility score, but slightly higher EQ-VAS score than those of the Thai general population [13]. This finding confirmed that their HRQoL corresponded to those of the general Thai population. Moreover, when compared with Thai patients with heart diseases [15, 16], this patient group showed significantly higher EQ-5D scores. Although the EQ-5D was not measured before the heart surgery, the EQ-VAS scores did imply that the health of patients was improved after their heart surgery. The results of this study were consistent with other studies that reported patients' HRQoL after coronary artery bypass surgery [7] or transcatheter aortic valve implantation [8] was considerably improved.

When considering the characteristics of patients, lower physical health and health utility were found in patients with older age (>52 years), female sex, unemployment, or some comorbidity. Both physical and mental health was rather decreased in patients who were unemployed or who had some comorbidity. These findings were in accordance with those of Terashima et al. [17] and Kurlansky et al. [18] who determined the four main variables affecting patients' HRQoL. These determinants might be useful for healthcare providers to pay more attention to patients after heart surgery. Furthermore, the present study

delineated the relationships between SF-12v2 and EQ-5D and EQ-VAS with 50% of prediction. It was likely that EQ-5D and EQ-VAS utility scores could be derived from SF-12v2 for use in health economics. The present study also demonstrated the validity of SF-12v2 and EQ-5D instruments in Thai patients, which is evidence for the quality of life study.

The present study has some limitations. First, HRQoL of patients with a specific type of heart surgery could not be reported because of the unavailability of such data. Second, the telephone interview possibly caused more social desirability with some 'Hawthorn effects' than other methods, i.e., the face-to-face interview or self-administration [19], thus partly affecting the favorable results. Third, a recall bias might occur when the patients were questioned about the EQ-VAS before the heart surgery. And further, this study measured HRQoL for just one point in time after the operation, but in reality postoperative HRQoL may fluctuate over time.

Conclusion

Overall, the HRQoL of Thai patients after the heart surgery was satisfactory. EQ-5D and EQ-VAS scores can be predicted by SF-12v2 data up to 50% that would be of help for further analysis. Further studies should be conducted to assess the outcomes

of specific types of heart surgery and apply a pre- and post-intervention study design or a consecutive longitudinal study as appropriate.

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