

A Quasi-Experiment on the Effectiveness of Cardiac Rehabilitation in Quality of Life of Cardiac Patients with the Caregivers' Involvement

Ruthpackiavathy Rajen Durai¹, Khairuddin Idris², Oteh Maskon³, Muhammad Hibatullah Romli⁴, Najibah Abdul Razak⁵

¹Senior Lecturer, Department of Nursing, Faculty of Medicine and Health Sciences, University Putra Malaysia, Serdang, Selangor, Malaysia

²Associate Professor, Institute of Social Sciences, University Putra Malaysia, Serdang, Selangor, Malaysia

³Professor, An-Nur Specialist Hospital, Selangor, Malaysia

⁴Senior Lecturer, Department of Rehabilitation Medicine, Faculty of Medicine and Health Sciences, University Putra Malaysia, Serdang, Selangor, Malaysia

⁵PhD Student, University Technology MARA, Selangor, Malaysia

*Correspondence

Ruthpackiavathy Rajen Durai

Senior Lecturer, Department of Nursing, Faculty of Medicine and Health Sciences, University Putra Malaysia, Serdang, Selangor, Malaysia.

Email: ruthpackiavaty@upm.edu.my

Abstract

Introduction: Coronary Heart Disease can result in impaired quality of life which can inhibit an early recovery with successful outcomes for cardiac patients. **Objective:** To investigate the effect of a structured cardiac education and early intervention cardiac rehabilitation program on quality of life in cardiac patients involving caregivers. **Method:** A quasi experimental study with a purposive sampling was carried out where 132 acute coronary syndrome patients hospitalized for treatment were recruited and allocated to the experiment and control group with and without caregivers. A structured educational intervention and cardiac rehabilitation was initiated for the experimental group with and without caregivers. The outcome was measured using the World Health Organization Quality Of Life-BREF (WHOQOL-BREF) instrument. **Results:** Data was measured with repeated measures ANOVA between baseline, discharge and follow-up between the intervention and control group with $p < 0.05$. There was a statistically significant difference in QOL in both the groups with and without caregivers in the following domains: psychological health ($F=3.784$, $p=0.002$); social relationship ($F=4.267$, $p=0.000$) and environment ($F=3.578$, $p=0.004$). There was not a statistically significant difference between both the groups in the physical health domain ($F=1.316$, $p=0.266$). **Conclusion:** The results indicated that a structured cardiac educational intervention and cardiac rehabilitation with the involvement of the caregivers have significant effects on the quality of life of cardiac patients. The findings provide useful evidence to improve health outcomes of acute coronary syndrome patients involving the caregivers.

Key words: Cardiac patients, cardiac rehabilitation, quality of life, caregivers.

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Introduction

Cardiovascular disease is the top non-communicable disease worldwide, the leading cause for mortality, and a major contributor to the reduction of quality of life [1]. Furthermore, cardiovascular diseases also impacted the economy and social burden while reducing productivity and increasing disability of the affected individuals, the environment and the country [1, 2]. Problems related to

cardiovascular disease are worse in developing and under-developed countries [1, 2]. For example, in Malaysia, cardiovascular disease is the leading health problem which contributes to 24.7% of total deaths and a major culprit for morbidity. Among the cardiovascular diseases, Acute Coronary Syndrome (ACS) is a life-threatening disease which describes clinical conditions ranging from unstable angina (UA) to non-ST-segment

elevation myocardial infarction (NSTEMI) to ST-segment elevation myocardial infarction (STEMI) [3]. The sudden attack and reduced blood flow to the heart tissue, even if no cell death may alter the cardiac function; this may cause other health and functional issues in the future [3]. With the current advancement of medical knowledge and technology, the number of people surviving and living with cardiovascular diseases is increasing [3, 4-8]. These had made cardiac rehabilitation as warranted in alleviating the functions and quality of life of the cardiac patients.

Cardiac rehabilitation (CR) is a multi-component intervention generally comprising of structured exercise training, psychological support and education to promote positive lifestyle changes [6]. The goal of CR is to promote recovery, maximize the quality of life (QOL) and to overcome the barriers in attending CR [9, 10]. It comprises of risk reduction strategies such as nutritional counseling, management of lipid levels, weight, diabetes, hypertension, smoking cessation, psychological intervention and physical activity, counseling, exercise training and patient education [11, 12]. CR has been found to be effective in reducing the risk of mortality, reducing hospital admission, improving functions and QOL of the patients [5-6, 13-14]. It is a safe and effective way to treat patients who have experienced cardiac events [15-16]. Although the many benefits of CR has been evidenced through research [5, 17], it is still underutilized [18].

CR consists of four phases; (1) clinical, (2) home, (3) outpatient rehabilitation, and (4) post-cardiac rehabilitation for maintenance – however, phase (1) and (2) are considered as the most crucial as this is where the patient is most vulnerable and being introduced to the program [19]. Phase 1 CR, which begins during hospitalization soon after a cardiac event, consists of education and the initiating step to start activity to promote patient understanding of the importance of CR in their recovery process, secondary prevention strategies and compliance. It consists of low-level, supervised activity (i.e., standing up, walking) and initial basic education for the patient and family which includes describing the signs and symptoms, medication regimen, rest and activity, and how to improve the modifiable coronary heart disease (CHD) risk factors [20]. Phase 2 is the interval continuation and advancement of the program of phase 1 before advancing into a more distinctive rehabilitation program in phase 3. The Phase 1 rehabilitation program may begin as soon as 3-4 days while in hospital [21].

Although the cardiac rehabilitation program (CRP) was found to be effective, there are several issues identified. Certain cardiac rehabilitation programs (CRPs) are not comprehensive-focused but on unifactorial intervention such as education-only or exercise only intervention [5, 14]. Guidelines on CR are also criticized [8]. Multifactorial CR has greater effectiveness and should be considered when planning for such module. However, CR was found to be costly, requires high manpower and resources [19]. This has become a burden for low and limited resources countries to conduct a comprehensive CRP. For example in Malaysia, clinical facilities are overcrowded, inadequate number of healthcare staff, overburdened staff and high financial burden on healthcare expenditure due to subsidized health has made high-intensive, high-resources CR as a challenge [22]. In addition, CRP usually focused on the individual patients and the healthcare providers. Most CRP utilized clinical setting and facilities while home-based program is potential, however under explored [23]. Furthermore, many CRPs do not include the caregivers as one important party although they can play an important role. With the shortened hospital stays and earlier discharge of patients, there has been an increased need for family caregivers in the home and these informal caregivers are among the nation's most valuable resources. [24, 25]. Family members who are caregivers also perceived cardiac event as a serious condition and are impacted by it. The active involvement of caregivers in CR present an opportunity to employ factors of family dynamics, motivation, monitoring and support as they come together to influence the cardiac patient's participation in and compliance with cardiac education and rehabilitation [26]. This view was also supported by some of the health professionals who stated that active cooperation of family members was an essential component in such services especially when the patient cannot be directly educated due to their health condition.[27, 28].

Studies included in the review by Shepherd & While (2012) utilized health-related QOL instruments [13]. QOL is understood as a broader ranging concept which affected in a complex way the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of their environment [29]. As cardiovascular disease has wider impact than only on health, therefore it is beneficial to investigate if intervention may also affect other domains of QOL. In Malaysia, a clinical practice guideline on cardiovascular management including CR gives attention on smoking cessation, diet, encourage physical activities and regular exercise, and comorbidity management [30]. However, there are not many negligible experimental studies

available on CR in Malaysia. Only a longitudinal observation study and case report were found [31, 32]. Thus, it is a gap to develop and investigate the effectiveness of a CRP that is relevant to local context, cost-effective, is able to be performed at home, involve the caregivers and examine its outcome on the general aspect of QOL. The aim of this research is to examine the effect of a structured early intervention CRP among CHD patients with ACS admitted to the hospital for treatment with the involvement of caregivers.

Methodology

Study Design

This was a quasi-experimental design with control (n=70) and experimental (n=70) groups to examine the effectiveness of an early CRP in QOL among ACS patients with and without caregivers. The experimental group received a structured early CRP and routine care and control group received only routine care. The study was conducted with the approval of the Ethics Committee (FPSK(EXP15)P075 / FF-2015-249) in one tertiary teaching hospital situated in Kuala Lumpur, Malaysia.

Participants and Data Collection Procedure

The study was conducted between June 2015 and December 2015. Potential participants were recruited from the Coronary Care Unit (CCU), Coronary Rehabilitation Ward (CRW) and two medical wards which admitted cardiac patients for treatment. The purposive sampling method was chosen to ensure equal and balanced characteristic representation of the participants. The inclusion criteria were: (1) patients diagnosed with CHD and hospitalized for Acute Coronary Syndrome, (2) patients between the age of 25 and 75 years old, (3) those who understood either the Malay language or the English language. The exclusion criteria were: (1) not getting clearance by the medical physician or consultant due to very ill or high risk to participate in rehabilitation, (2) patients who refused to participate and (3) surgical patients. An informed consent was obtained prior to conducting the study and the potential participants were explained about the study. Data were collected in three phases: the first phase was before commencing cardiac care and intervention (averagely between 3-4 days); the second phase was on discharge from the hospital (averagely on the 8th day); and the third phase was when these participants came for follow up to the clinic (averagely on the 10th week). Data was collected from the control group first to prevent contamination until the targeted sample was reached [33] and was completed during the first three months of the

study. Data collection from the experimental group commenced after completion of the control group and when the cardiologist in charge had referred the participant for early CR intervention.

The cardiologists in charge, nurses, dieticians, pharmacists and physiotherapists provided the routine care which was more generic in nature and consisted of professional-centered services on self-management at home, instructions on medication and information leaflets about cardiac risk factors, healthy diet and smoking cessation. It was made sure that the caregiver, if available, accompanied the participant during cardiac care each time. For the participants in the experimental group, client-empowerment approach with more specific, individualized instruction and education was provided with the use of a comprehensive CR manual regarding the heart and its conditions, diet, exercise and activity, risk factors modification, treatment and management, and the importance of CR. Since early CR intervention is the initiating process, the researcher had made all efforts possible to make the participants and caregivers understand the educational intervention with simple and clear instructions and explanations referring to the manual. All questions by either the participants or caregiver were answered. The researcher together with the caregiver started the initial phase with the participants sitting up in bed followed by standing at the bedside with assistance and continued with progressive activities of daily living sessions and walking exercises, and reinforcements based on the patient's condition during the patient's length of stay in the hospital. The participants were advised to do self-care activities while the caregiver was monitoring with the researcher observing the activities. It was made sure that the caregiver was involved throughout the CR session with the respective participants and the daily activities performed were recorded in a log-book. The recording in the log-book will be continued at home and will be collected upon follow-up in the cardiology clinic. As for the group without caregiver the participants did their self-care activities on their own but called the nurses for assistance when needed. Cardiac self-management and adopting a healthy lifestyle was emphasized throughout the program and before discharge, and clear explanations were given to both parties regarding the activities the participants had to follow according to the CR manual.

Data on demographic information was collected during baseline while on QOL the WHOQOL-BREF instrument was used on each time point that is baseline, on discharge and during follow-up in the clinic. The reliability and validity of the WHOQOL-BREF was Cronbach's alpha 0.66 to 0.84 and this instrument has

been used with coronary diseases. [34, 35]. WHOQOL-BREF is a 26 item self-report instrument addressing four 4 domains of QOL: physical health, psychological health, social relationships and environment. Each item is scored by a five-point likert scale where higher rating indicates positive outcome except on three items (item 3, 4, and 26) which have reverse rating (i.e. higher rating indicates negative outcome). Total score was calculated by adding the rating of each item according to the domains and corrected with the rating score for the reverse item. The raw score was then converted into a transformed score of 100 where higher score indicates better QOL. [34-36]. Prior to the third phase of data collection, a discussion session was held with these participants and caregivers in a room in the clinic and the log-book was collected. This was to have a better

understanding about the participants' and caregivers' compliance to all that had been taught with regards to their cardiac condition and CR.

Statistical Analysis

The SPSS version 22 was used to analyze the data. Chi Square and percentages were used to measure the descriptive data. Repeated-measures Analysis of variance (ANOVA) were carried out whereby the mean differences between baselines, discharge and follow-up measurements were analyzed for QOL for both the experimental and control groups.

Results

The flow of the research is illustrated in figure 1.

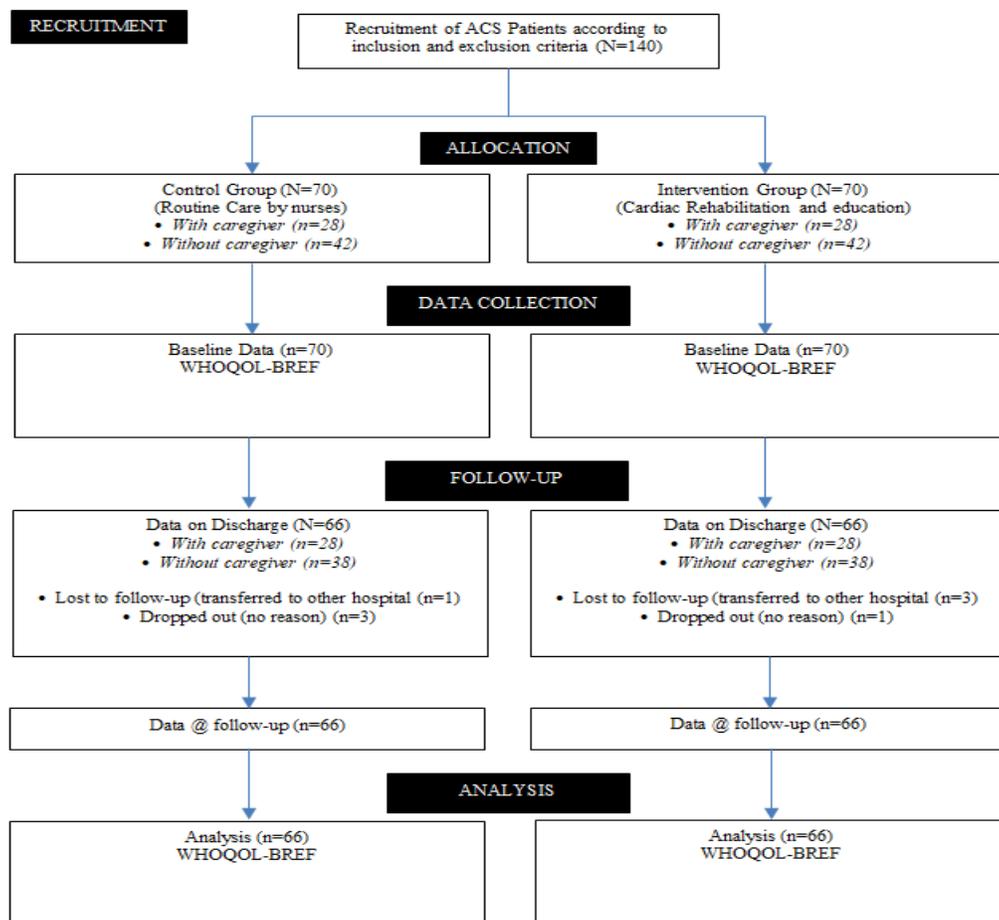


Fig. 1: Flow of the study

There was no significant difference found on the demographic characteristics on the participants between

both groups. Both groups were balanced in terms of caregiver attendance. Majority of the participants were

male (68.2%) for both the groups. The different ethnic participants were nearly the same in both groups. Majority of the participants were married (intervention=93.9%; control=89.4%) and had obtained secondary level education (63.6%) in both groups. However, majority of the participants in the control group were not employed (62.1%) compared to the intervention group (51.5%) where majority were

employed. Around one-third of the participants in the control and experimental group had history of CHD but higher for family history with such diseases. Majority of the participants (intervention=89.4%; control=80.3%) had other illnesses. Less than half of the participants smoked in both groups. Detailed description of the demographic information of the participants can be found in Table 1.

Table 1: Socio demographic variables of participants

		Group		χ^2	P
		Intervention (n=66)	Control (n=66)		
Caregiver	Caregiver	28 (42.4%)	28 (42.4%)	0.000	1.000
	No Caregiver	38 (57.6%)	38 (57.6%)		
Diagnosis	UA	25 (37.9%)	25 (37.9%)	0.000	1.000
	STEMI	16 (24.2%)	16 (24.2%)		
	NSTEMI	25 (37.9%)	25 (37.9%)		
Gender	Male	45 (68.2%)	45 (68.2%)	0.000	1.000
	Female	21 (31.8%)	21 (31.8%)		
Age	< 39	6 (9.1%)	1 (1.5%)	4.670	0.097
	40-59	24 (36.4%)	22 (33.3%)		
	> 60	36 (54.5%)	43 (65.2%)		
Ethnicity	Malay	32 (48.5%)	30 (45.5%)	0.133	0.936
	Chinese	24 (36.4%)	25 (37.9%)		
	Indian	10 (15.2%)	11 (16.7%)		
Marital Status	Married	62 (93.9%)	59 (89.4%)	5.763	0.124
	Not Married	4 (6.1%)	3 (4.5%)		
	Separated	0 (0.0%)	2 (3.0%)		
	Widowed	0 (0.0%)	2 (3.0%)		
Education Level	Primary	14 (21.2%)	18 (27.3%)	1.531	0.675
	Secondary	42 (63.6%)	42 (63.6%)		
	Diploma	7 (10.6%)	4 (6.1%)		
	Graduate	3 (4.5%)	2 (3.0%)		
Employment Status	Employed	34 (51.5%)	25 (37.9%)	2.482	0.115
	Not Employed	32 (48.5%)	41 (62.1%)		
History of CHD	Yes	24 (36.4%)	22 (33.3%)	0.133	0.715
	No	42 (63.6%)	44 (66.7%)		
Family History	Yes	34 (51.5%)	32 (48.5%)	0.121	0.728
	No	32 (48.5%)	34 (51.5%)		
Smoking	Yes	30 (45.5%)	30 (45.5%)	0.000	1.000
	No	36 (54.5%)	36 (54.5%)		
Other Illness History	Yes	59 (89.4%)	53 (80.3%)	2.121	0.145
	No	7 (10.6%)	13 (19.7%)		

Table 2 reveals the results by multifactorial repeated-measures ANOVA according to the domains in WHOQOL-BREF between the experimental and control group with and without caregiver. There was a statistically significant difference in the psychological health ($F=3.784$, $p=0.002$), social relationship ($F=4.267$,

$p=0.000$) and environment ($F=3.578$, $p=0.004$) domains between the experimental group with and without caregiver and control group with and without caregiver over the three times. However, there was no statistically significant difference in the physical health domain ($F=1.316$, $p=0.266$) between the experimental group

with and without caregiver and control group with and without caregiver over the three times that is baseline, discharge and follow-up.

Table 2: Within-between group analysis on WHOQOL-Bref outcome using multi-factor repeated-measures ANOVA

WHOQOL-Bref Domain	Group / Time		Baseline		Discharge		Follow-up		Multi-factor repeated-measures ANOVA	
			Mean	SD	Mean	SD	Mean	SD	F	Sig.
Physical	Intervention	Overall (n=66)	44.70	17.21	47.39	10.67	63.36	9.29	1.316	0.266
		Caregiver (n=28)	44.64	20.177	43.250	8.951	64.464	9.856		
		No Caregiver (n=38)	44.74	14.950	50.447	10.912	62.553	8.901		
	Control	Overall (n=66)	42.23	21.66	45.11	8.68	59.35	10.14		
		Caregiver (n=28)	45.43	24.835	45.679	7.503	59.000	9.568		
		No Caregiver (n=38)	39.87	18.992	44.684	9.533	59.605	10.658		
Psychological	Intervention	Overall (n=66)	56.71	16.48	56.74	12.25	70.85	12.10	3.784	0.002*
		Caregiver (n=28)	55.286	19.121	51.714	11.941	71.107	12.294		
		No Caregiver (n=38)	57.763	14.404	60.447	1.234	70.658	12.124		
	Control	Overall (n=66)	59.21	14.54	58.45	9.85	66.36	10.33		
		Caregiver (n=28)	61.929	16.303	58.143	8.877	65.500	9.935		
		No Caregiver (n=38)	57.211	12.949	58.684	10.619	67.000	10.702		
Social Relationship	Intervention	Overall (n=66)	57.50	12.67	61.80	10.43	69.91	10.67	4.267	0.000*
		Caregiver (n=28)	59.393	13.814	62.321	10.729	72.964	10.039		
		No Caregiver (n=38)	56.105	11.754	61.421	10.324	67.658	10.688		
	Control	Overall (n=66)	59.86	12.48	57.48	12.40	64.44	12.12		
		Caregiver (n=28)	62.321	13.236	58.071	10.708	63.250	11.034		
		No Caregiver (n=38)	58.053	11.743	57.053	13.632	65.316	12.930		
Environment	Intervention	Overall (n=66)	54.64	12.01	57.83	8.2	67.41	8.41	3.578	0.004*
		Caregiver (n=28)	53.536	13.209	55.036	9.228	67.536	9.739		
		No Caregiver (n=38)	55.447	11.159	59.895	6.758	67.316	7.411		
	Control	Overall (n=66)	55.09	10.83	55.58	7.62	62.61	8.49		
		Caregiver (n=28)	57.321	11.892	55.643	6.778	62.071	6.949		
		No Caregiver (n=38)	53.447	9.819	55.526	8.278	63.000	9.546		

Although there was a steady increase in mean in all the groups, the experimental group had a higher increase compared to the control group and the experimental group with caregiver scored the highest compared to all the groups. This suggested that the experimental group with caregiver experienced better QOL followed by the experimental group without caregiver than the control group. This means that there is a difference in the QOL between the experimental group and the control group and can be concluded that the structured educational early intervention and cardiac rehabilitation with the caregiver was effective.

Discussion

This study may be generalized to the Malaysian context as it represents the proportion of the population on three main ethnicities. Malaysia is a multiracial country with three major ethnic groups; the Malays (68.6%), followed by the Chinese (23.4%) and the Indians (7.0%) [37]. The different ethnic participants were nearly the same in both groups and ACS remains a disease that affects all the three races in Malaysia [38]. The low number of

withdrawal and high adherence on the program as evidenced by the log-book indicates that this CRP as feasible. Majority of the participants had obtained secondary level education which made it possible for the CRP to take place in a complacent and reliable manner. More male participants were available in this study which denotes that male participants are at a higher risk of cardiovascular diseases compared to the female participants [39, 40]. It is also noted that the male to female ratio in this study is 2:1 which is similar to Zuhaid et al. [41] but not congruent with other studies which recorded the ratio as 3:1 [42]. This is acceptable as the results differ between countries. Older participants were available in this study and this is in concordance with the cardiac population in the country [37] which is more common among older age group people [43, 44].

Overall, early cardiac rehabilitation program helps to improve the QOL of the cardiac patients. This is in concordance with other studies investigating cardiac rehabilitation effect on QOL in the review by Shepherd & While [13]. Experiencing a cardiac event can be difficult times and support during this time is very

important, especially emotional support as it provides the feeling of being loved and cared for [24, 45, 46] and it helps with physical activity, nutritional and smoking cessation programs [4]. With the involvement of the caregiver, healthy lifestyle behaviors after CR may be maintained [47-49]. Lack of family support is associated with a significantly lower level of health related QOL [50]. It can be confirmed that early CR intervention improves QOL and functional status of coronary artery disease patients [51, 52]. On the other hand, a study conducted on female participants in an experimental and control group did not find any significant differences in the improvement in QOL between the experimental and control group [53].

The findings of this study may be influenced by the structured educational early intervention with the involvement of the caregivers, and understanding of the participants regarding CR and its objectives. Only a few studies have looked at the component of CR [54, 55, 56] while some studies revealed that educational interventions increased knowledge and behavior changes [42, 55, 57], and that it is imperative to provide informational, psychological and social support in enabling patients to recover from ACS [31, 45]. When patients understood the benefits, together with the caregivers, they appreciated the fact that they were involved in the structured educational early intervention and initiation of cardiac rehabilitation. CR has shown to decrease risk factors of coronary artery disease in reducing the mortality rate to about 20-31% [27, 32]. Most importantly, the results revealed that the impact of an educational early intervention and CR on QOL was positive in that it was capable of demonstrating its effectiveness in enhancing the QOL of ACS patients. When the participants have a better understanding of their condition and the benefits of cardiac rehabilitation, they tend to comply, continue to the next phases of CR and practice healthy lifestyle behaviors. Seeing the result, it may also motivate the caregivers to practice healthy lifestyle behaviors and in doing so the morbidity and mortality rate will reduce leading to a healthy community. The limitation is this study is the study was conducted in one facility in an urban area, therefore generalizability of the study to the whole population in the country is at stake. The use of WHOQOL-BREF has been criticized as less suitable to be used among the cardiac population [58]. However, the WHOQOL-BREF is a self-administered questionnaire thus minimized the involvement of the researcher in tampering the data.

Conclusion

Early intervention of CR during hospitalization provides awareness to the patients and caregivers towards the benefits of CR to achieve optimum health and QOL. The involvement of the caregiver may help to reduce the

financial burden and economic impact on the patient, family, hospital and country. The findings of this study add essence to evidence-based practice for nurses. The goal of CR is to develop a patient's optimum physical, emotional, psychological and social potential.

Abbreviations

CR: Cardiac Rehabilitation; CRP: Cardiac Rehabilitation Program; CRPs: Cardiac Rehabilitation Programs; QOL: Quality of Life; ACS: Acute Coronary Syndrome; WHOQOL-BREF: World Health Organization Quality Of Life – Short Form.

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Ethics approval and consent to participate

The Ethics Committee of University Putra Malaysia and University Kebangsaan Malaysia Medical Center approved the study (FPSK(EXP15)P075 / FF-2015-249). All participants of study gave written informed consent.

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