Acute coronary syndromes: cardiac rehabilitation programmes and quality of life

ISSUES AND INNOVATIONS IN NURSING PRACTICE

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Aims. This paper reports a study examining the quality of life of clients following hospital admission with acute coronary syndrome in Hong Kong and their use of cardiac rehabilitation.

Background. Coronary heart disease is a major source of mortality and morbidity in Hong Kong. Western studies have suggested that participation in cardiac rehabilitation improves the quality of life of clients with coronary heart disease yet the use of cardiac rehabilitation has been reported to be low. Better understanding is needed of the psychosocial status of these clients in Hong Kong and their use of cardiac rehabilitation services.

Methods. A prospective, pretestpost-test study was carried out, with data collected over a period of 6 months with convenience sample of 182 participants. Baseline data were obtained within one week after hospital admission for individuals experiencing ACS. The second phase of data collection commenced at 6 months after hospital discharge. Total period of data collection took over 12 months between 2002 and 2003. The Chinese version of the SF-36 was used to assess quality of life, and demographic data and the extent to which clients participated in the cardiac rehabilitation programme were assessed.

Results. Only 25% of the participants attended at least one session of the cardiac rehabilitation programme. Significant improvement occurred in all clients' perceived quality of life 6 months following initial hospital admission. No significant group differences in perceived quality of life were found according to whether or not clients used the cardiac rehabilitation services.

Conclusion. Improvement in perceived health-related quality of life was evident over a 6-month period. Yet our findings suggested that participation in the cardiac rehabilitation programme did not have any apparent effects in subjects' perceived quality of life. Further studies using both generic and disease-specific health-related quality of life instruments, as well as the inclusion of control group, are

recommended. Continual improvement in cardiac rehabilitation programmes, and consideration of alternative modes of delivery other than the traditional attendance at hospital outpatient services, are also recommended.

What is already known about this topic
Uptake of cardiac rehabilitation by eligible clients in western countries is low, at 1530%.

 There are conflicting claims for the effects of cardiac rehabilitation on perceived quality of life of clients.

What this paper adds
Uptake rates of cardiac rehabilitation by Chinese clients in Hong Kong are also low.

 Significant improvement in clients' perceived quality of life was evident over a 6-month period following an acute coronary event.

 There was no apparent group difference in perceived quality of life according to uptake of cardiac rehabilitation.

Introduction
Coronary heart disease is a major source of mortality and morbidity in many developed countries (American Heart Association 2000). While there has been a steady decline in the coronary heart disease mortality rate in the past 20 years in many Western countries, such as the United States and the United Kingdom (Daly et al. 2002, Dalal & Evans 2003), the morbidity and mortality rates have remained relatively static in Hong Kong (Department of Health 2002). Acute coronary syndrome (ACS) refers to a range of acute myocardial ischaemic states, and ranges from unstable angina to frank acute myocardial infarction (Grech & Ramsdale 2003).

An overall reduction in the quality of life of those with coronary heart disease is likely, given the physical, psychological, social and occupational restrictions imposed by this disease. The goal of treatment of clients with ACS is therefore not only to prolong life, but also to relieve symptoms and improve function. In the management and care of these clients there is increasing recognition that merely focusing on assessment of physical outcomes is not sufficient. Accordingly, assessment of the well-being and health-related quality of life is to be important (Mayou et al. 2000). In the study reported here, we addressed perceived quality of life over a 6-month period following hospital admission of Hong Kong Chinese clients diagnosed with ACS. In addition, we investigated their uptake of a cardiac rehabilitation programme.

 Background
The aims of cardiac rehabilitation are to promote secondary prevention and improve both the quantity and quality of life by attempting to alleviate the physiological and psychological toll by reducing risks of re-infarction, managing symptoms, and allowing clients to regain control of their lives (Daly et al. 2002, Tod et al. 2002). Although cardiac rehabilitation is an intrinsic part of the management of all cardiac diseases, a significant proportion of eligible clients do not participate in cardiac

rehabilitation (Evenson et al. 1998, Bunker et al. 1999). It is estimated that only 1530% eligible clients complete these programmes (Thompson & Bowman 1998, King et al. 2001, Daly et al. 2002). Other studies have given more conservative estimates of the dropout rates, ranging from 10% to 36% (Oldridge & Rogowski 1990, Schuster & Waldron 1991, Balady et al. 1996). Pasquali et al. (2001) suggested that the reasons for the poor uptake of cardiac rehabilitation programmes are multiple, and physician recommendation and referral are considered to be the most important factor for better use. Social support is another influencing factor (Pasquali et al. 2001). Yates et al. (1994) suggested that clients who have family support are more likely to adhere to the programme than those who do not. King et al. (2001) reported that women and older people are regularly reported to have low social support. This is in accordance with findings that there is lower rate of cardiac rehabilitation uptake among women, older people, the unemployed, and those with less education (Evenson et al. 1998). Numerous studies have suggested that convenience factors, such as distance and availability of transport, influence participation (Ades et al. 1995, Moore & Kramer 1996, Johnson & Heller 1998, Tod et al. 2002).

Recent research studies have suggested that participation in cardiac rehabilitation improves the quality of life of patients with coronary artery disease (Belardinell et al. 2001, Pasquali et al. 2003). In America, Pasquali et al. (2003) obtained the rehabilitation status of 730 patients and reported 23·6% cardiac rehabilitation participation. Participants had a significant improvement in perceived quality of life over a 6-month period, as assessed by the Medical Outcomes Study Short Form-36 (SF-36). In a similar but small-scale study of 149 clients conducted in Australia, Hawkes et al. (2003) reported 26% cardiac rehabilitation participation. However, in contrast to Pasquali et al.'s (2003) report, Hawkes found no significant improvements in SF-36 scores from baseline to 6 months. However, differences in the model and contents of these rehabilitation programmes between the United States and Australia might have given rise to some variations in the measured outcomes.

More attention is needed to the quality of life of people with ACS, given the prevalence of cardiac disease in Hong Kong and the minimal local research reported on this topic. Greater understanding of the psychosocial status of these clients is needed to complement knowledge of their progress in medical management, to enable further improvement in rehabilitation programmes and greater adherence to the programmes.

The study
Aims

The aims of this study were to examine (1) the quality of life of clients following hospital admission with ACS in Hong Kong, (2) changes in quality of life from admission to 6 months post-discharge, (3) associations between quality of life and sociodemographic characteristics, and (4) uptake of cardiac rehabilitation services.

Design

A prospective, pretestpost-test design was used, with data collected over a period of 6 months. Baseline data were obtained within one week of the hospital admission for

individuals experiencing ACS. The second phase of data collection began at 6 months after hospital discharge. A 6-month follow-up period after the cardiac event was chosen with reference to similar studies conducted in the United States and Australia in which the same outcome measures were used (Hawkes et al. 2003, Pasquali et al. 2003).

Participants

Convenience sampling was used to recruit participants into the study over a 12-month period between 2002 and 2003. Participants included 182 patients admitted with ACS to a major public hospital in Hong Kong who could communicate in Chinese, complete questionnaires, and were haemodynamically stable and free from acute chest pain at the time of interview.

Questionnaire

The Chinese (Hong Kong) version of the 36-item Medical Outcome Study Short-Form General Health Survey, SF-36 (Lam et al. 1998) was used to measure quality of life. The SF-36 was developed by Ware et al. (1993) and has been used extensively with healthy and medical populations and has demonstrated good validity and reliability. It measures eight dimensions: physical functioning (10 items); role limitations caused by physical problems (four items); bodily pain (two items); social functioning (two items); mental health (five items); role limitations caused by emotional problems (three items); vitality-energy/fatigue (four items); and general health perception (five items). Raw scores on each subscale can be transformed to range from 0 to 100, and higher scores represent better health status (Ware et al. 1993). A single item about perception of health changes during the past 12 months provides a useful measure of physical and mental constructs of health (Ware et al. 1994). The Chinese version of the SF-36 has been found to have similar conceptual equivalence to the original English version (Lam et al. 1998), and was used in the current study. The coefficients for the eight scales reported in this study ranged from 0·71 to 0·93, and were similar to those in Lam et al.'s (1998) study.

Demographic data sheet

Demographic information on age, sex, education level, marital status, and health history were recorded on a demographic data form.

Information about use of cardiac rehabilitation programme

In the first phase of data collection, information on patients' intentions and reasons for participating or not in the phase II cardiac rehabilitation programme were obtained. At the 6-month follow-up period, data were collected on the extent to which patients had participated in the cardiac rehabilitation programme and whether they had completed it.

Cardiac rehabilitation programme

The Hospital Authority (2003), a statutory body established under the Hospital Authority Ordinance, manages all public hospitals in Hong Kong, and all Hong Kong major public hospitals offer and manage individual cardiac rehabilitation programmes independently. Eligible clients are often invited to attend outpatient rehabilitation programmes prior to their discharge from the hospital. The 7-week phase II cardiac rehabilitation outpatient programme of the target hospital, scheduled weekly in the afternoon on a particular weekday for 2 hours in the hospital, consists of two components: education and exercise. The programme is managed, coordinated, and monitored by a designated Registered Nurse from the coronary care unit of the target hospital.

The 1-hour weekly education sessions consisted of seven didactic lectures conducted by the multidisciplinary healthcare team, and covered 'Your heart', conducted by the nurse; 'Diet and coronary heart disease', by the dietitian; 'Exercise prescription and stress management', by the physiotherapist; 'Guidelines for self-care and stress management of daily life' by the occupational therapist; 'Emergency management and medication of heart disease', conducted jointly by the nurse and cardiac physician; and 'Back to the community' conducted by community rehabilitation staff.

The weekly exercise session, guided and supervised by a physiotherapist in the presence of the Registered Nurse who assisted with assessing clients, was a 1-hour session that followed each education session. The nurse monitored client tolerance of the prescribed exercises by assessing heart rate, blood pressure, ECG, and any accompanying cardiac symptom during these exercise sessions.

All first time cardiac clients admitted to the coronary care unit were eligible and were invited to attend the educational sessions of the phase II cardiac rehabilitation programme on discharge from the hospital. However, there were some absolute contraindications for entry to exercise training, e.g. acute systemic illness, uncontrolled atrial or ventricular arrhythmia, and physical disability. To reduce complexity in recording attendance at the rehabilitation programme in the current study, only attendance at the educational sessions was recorded, as it was unlikely that a client would attend the exercise session but not the education session which was scheduled on the same day.

Participants in the rehabilitation programme were expected to pay a minimal fee equivalent to the standard outpatient charge of HK$ 45 per visit. However, to assist the three vulnerable groups in the community, i.e. the low income group, chronically ill patients and older patients with little income or assets, the Hospital Authority (2003) has implements a fee waiver mechanism. This arrangement minimizes the chance of preventing clients from using the rehabilitation services because of financial hardship.

Data collection

Baseline data were collected from participants by structured interview within one week of hospital admission. Interviews took approximately 1020 minutes. At 6-month following hospital discharge, the same instrument was used but participants were interviewed by telephone.

Ethical considerations

Ethical approval for the study was obtained through the Research Ethics Committee of the hospital. Written information was given to participants about the purposes of the study, potential risk/benefits, right to confidentiality, and right to withdrawal, and was explained by the research assistant. Written consent was obtained.

Data analysis

Descriptive statistics mean, standard deviations, frequencies and percentages were used to summarize and present the data. Chi-square statistics, independent t-tests and one-way analysis of variance (anova) were used to explore differences between groups for interval and nominal level data. Paired t-tests were used to determine changes in scores over time from baseline to 6 months after discharge for interval level data. The level of significance was set at $P < 0.05$.

Results
Response rate

Over the 12-month baseline data collection period, 325 patients were approached and 182 consented (response rate 56%) to participate and provided baseline data. At the 6-month follow-up period, 145 participants completed the full set of data, representing an attrition rate of 20%.

Demographic characteristics

Frequencies and frequency distributions for demographic characteristics and for the entire study group are presented in Table 1. The mean age of the participants was 62·72 years with a range from 33 to 87 years. The majority were male (69%) and most were aged over 60 years (62%). One hundred and fifteen (80%) participants were married, while 19 (13%) were widowed. Fifty-nine per cent were retirees, and 31·5% reported to be employed full-time. Fifty-two per cent had no formal education or only primary education, 43% had secondary education and 4% had university education. The sociodemographic characteristics are summarized in Table 1. The majority did not receive any financial assistance (65%) and 28% received old age allowance, which was around HK$ 625 each month.

Table 1 Demographic distribution of participants ($n = 145$)
Demographic information n (%)

Sex
  Male   100 (69·0)
  Female   45 (31·0)
Age
                              25 (17·5)
     50
  51–60   30 (20·9)
  61–70   48 (33·3)
  71–80   35 (24·1)
  81–90   6 (4·2)
Marital status
  Single   6 (4·2)
  Married   115 (79·9)
  Divorced/separated   4 (2·8)
  Widow/widower   19 (13·1)
Educational level
  No formal education   32 (22)
  Primary school education   43 (30·1)

Associations between quality of life and sociodemographic characteristics

Gender and quality of life
Comparison of the SF-36 subscales between male and female participants indicated that there were significant differences in their scores ($P < 0.05$) in five of the subscales, namely physical function, role-physical, general health, mental health and vitality. The mean scores of the male participants were comparatively higher than their female counterpart in these five subscales (see Table 2).

Table 2 Quality of life (baseline) and gender difference of clients with acute coronary syndromes

Questionnaire (SF-36)	Male		Female		t-value	P value
	$\bar{x}$	sd	$\bar{x}$	sd		
PF	81·74	14·75	63·95	24·46	–4·42	≤0·001***
RP	47·75	46·07	32·22	41·16	–2·02	0·046*
BP	36·08	21·21	36·18	25·40	0·025	0·980
GH	48·42	17·37	36·87	18·06	–3·65	≤0·001***
VT	51·65	20·20	41·78	19·72	–2·74	0·007**
SF	72·50	26·65	63·61	26·89	–1·85	0·066
RE	57·00	46·49	46·67	47·88	1·23	0·220
MH	64·78	17·65	53·90	20·44	3·18	0·002**

Questionnaire (SF-36)	Male		Female		t-value	P value
	x̄	sd	x̄	sd		

*P < 0·05, **P < 0·01, ***P < 0·001. SF-36: PF, physical functioning; RP, role-physical; BP, bodily pain; GH, general health; VT, vitality; SF, social functioning; RE, role-emotional; MH, mental health.

Education level and quality of life

One-way anova indicated there were no significant differences (P > 0·05) between participants according to level of education (see Table 3).

Table 3 Relationships between educational level and quality of life (n = 145)

	M	sd	F	P value*
PF				
Less than primary	70·32	21·72	2·80	0·06 NS
Primary	74·12	23·04		
Secondary or higher	80·08	16·67		
RP				
Less than primary	30·47	43·87	1·63	0·20 NS
Primary	48·26	41·69		
Secondary or higher	45·22	46·97		
BP				
Less than primary	39·97	20·15	0·72	0·49 NS
Primary	33·71	19·17		
Secondary or higher	35·53	25·14		
GH				
Less than primary	41·71	17·98	0·62	0·54 NS
Primary	45·44	17·63		
Secondary or higher	46·06	19·00		
VT				
Less than primary	47·50	20·36	0·67	0·52 NS
Primary	51·74	18·89		
Secondary or higher	47·35	21·78		
SF				
Less than primary	69·53	22·66	0·23	0·79 NS

	M	sd	*F*	*P* value*
Primary	68·02	25·92		
Secondary or higher	71·51	28·48		
RE				
Less than primary	42·71	46·55	1·23	0·30 NS
Primary	55·04	47·08		
Secondary or higher	58·33	46·92		
MH				
Less than primary	57·16	20·69	2·62	0·076 NS
Primary	66·83	18·27		
Secondary or higher	60·12	18·38		
NS, not significant; PF, physical functioning; RP, role-physical; BP, bodily pain; GH, general health; VT, vitality; SF, social functioning; RE, role-emotional; MH, mental health.				
*All comparisons were based on one-way anova for independent samples, SF-36 at baseline.				

Marital status and quality of life

One-way anova indicated significant differences in the SF-36 scores according to marital status. Post-hoc analyses using the Bonferroni multiple comparison procedures revealed that participants who were married had significantly higher physical functioning scores than those who were widowed ($P < 0.001$).

Utilization of cardiac rehabilitation programme

At baseline, when asked about their intention to attend the phase II cardiac rehabilitation programme, 119 (65·3%) participants expressed an interest in attending. At the 6-month period following hospital discharge, of the 145 participants who had provided follow-up data, 109 (75%) did not use the programme, while 37 (25%) attended at least one session. Only 11 (7·5%) attended and completed the 7-week cardiac rehabilitation programme (see Table 4).

Table 4 Attendance at the phase II rehabilitation programme

	Sessions attended						Total, *n* (%)
	1	2	3	4	5	All 7	
Male	8	1	5	2	2	7	25 (68)
Female	2	2	2	1	1	4	12 (32)

	Sessions attended						Total, *n* (%)
	1	2	3	4	5	All 7	
Total	10	3	7	3	3	11	37

Reasons for non-participation included: busy with work (45%), forgot (13%), too far from the venue (9%), restricted by physically condition (4%), and no one to accompany (4%).

Changes in perceived quality of life over the 6-month period
Significant differences (P < 0·0001) were found in SF-36 scores for all eight subscales: physical functioning, limitations due to physical health problems, bodily pain, general health, vitality, social functioning, limitations due to emotional health problems and mental health. As Table 5 shows, the main differences were higher mean scores on all subscales of the SF-36 at the 6-month period, as compared with baseline data.

Table 5 Participants' perception in quality of life (SF-36), paired comparison over 6 months

SF-36 subscales	Baseline		6 months		*t*-value	*P* value
	$\bar{x}$	sd	$\bar{x}$	sd		
PF	76·44	1·72	85·03	1·56	4·78	≤0·0001*
RP	42·93	45·04	63·28	38·98	4·56	≤0·0001*
BP	35·19	21·45	89·20	18·57	22·80	≤0·0001*
GH	44·78	18·34	52·34	16·54	4·61	≤0·0001*
VT	48·58	20·57	59·27	18·29	5·85	≤0·0001*
SF	70·02	27·08	84·06	25·13	5·23	0·0001*
RE	53·79	47·01	82·30	35·15	6·31	0·0001*
MH	61·57	19·20	72·89	19·20	7·36	0·0001*

*P < 0·0001. PF, physical functioning; RP, role-physical; BP, bodily pain; GH, general health; VT, vitality; SF, social functioning; RE, role-emotional; MH, mental health.

Associations between demographic details and rehabilitation uptake
Significant differences were found in the level of education according to whether participants attended the cardiac rehabilitation programme, in that more people with secondary or tertiary education did not attend (2 = 10·22, P = 0·006). No significant

differences according to age, gender, employment status and martial status were found between groups.

Associations between participation and perceived quality of life
No significant differences were found in quality of life for those who did or did not participate in the cardiac rehabilitation programme.

Discussion
Use of cardiac rehabilitation programme
Similar to Hawkes et al. (2003), we found no significant differences in 6-month follow-up SF-36 scores between those who attended the cardiac rehabilitation programme and those who did not. Nevertheless, the number of participants who had attended was very small relative to those who did not. When the 182 participants were asked about their intention to attend the phase II cardiac rehabilitation programme before they were discharged from the hospital, 119 (65%) indicated their interest in doing so. However, at 6 months, of the 145 participants who provided follow-up data, only 37 (25%) had attended at least one session of the programme. Even more disappointing was the fact that only 11 (7·5%) attended all sessions and completed the rehabilitation programme. This low participation rate is in contrast to King et al.'s (2001) and Thompson and Bowman's (1998) conservative estimation of 1530% uptake.

A large proportion of participants with secondary or tertiary education did not use the cardiac rehabilitation programme. This is contrary to the findings reported by Evenson et al. (1998) that there is a lower rate of use by the unemployed and those with less education. Many of our respondents (45%) claimed that the main reason for non-attendance was that they were 'busy at work'. The fact that 31·5% participants were full-time workers suggests that this more educated group might be genuinely engaged in the work force and unable to utilize the rehabilitation facility, although they might have indicated their interest in participating before discharged from hospital.

'Too far from the venue', 'restricted by physical conditions' and 'no one to accompany' were the other main reasons given for not using cardiac rehabilitation. Previous studies have suggested that convenience factors, such as distance and availability of transport, influence clients' participation (Ades et al. 1995, Moore & Kramer 1996, Johnson & Heller 1998, Tod et al. 2002). These factors, along with work engagement as mentioned above, do not favour uptake. Although these clients could have genuinely expressed their interest in using the service, they might not have taken these factors into consideration when they were asked about their intention to attend.

In view of this poor rate of uptake, alternative strategies for the delivery of cardiac rehabilitation other than the traditional attendance at hospital outpatient services are worth exploring. One recent trend is the development of home-based cardiac rehabilitation programmes, which addresses clients' accessibility problems (Dalal & Evans 2003).

Quality of life following episodes of acute coronary syndrome

From the baseline data, it was noted that men achieved significantly higher scores in five of the eight subscales of the SF-36 (physical function, role-physical, general health, mental health and vitality). This implies the men perceived that they had a higher quality of life than women following their hospital admission. A possible explanation to this is that the female participants were on average, older than the males. Hunt et al. (2000) reported that age was a determinant of outcome in perceived quality of life. Furthermore, it is likely that older women were at or past the usual retirement age or engaged in homemaker duties, in comparison with younger male participants who might still be in full-time work outside the home. This is in accordance with Wingate's (1995) findings that employment status significantly affects quality of life or aspects of quality of life. Furthermore, we also found that married participants had significantly higher physical functioning scores than widows/widowers ($P < 0.001$). This coincides with the findings from Hunt et al.'s (2000) study of a correlation between perceived quality of life and spouse relationships.

Compared with baseline, at the 6-month follow-up significant improvements were noted in all participants' perceived health-related quality of life. The mean score for the bodily pain subscale was understandingly low at baseline 35·19 (sd 21·45), as participants were likely to have been recovering from episodes of angina. The large standard deviation implied a wide range in perceptions of bodily pain. While some respondents were still experiencing the effects of angina pain, others might have been recovering from the episode. It is reassuring to note that there was a relatively higher mean score for bodily pain, 89·20 (sd 18·57) 6 months later, because this suggests the successful resolution of angina pain, probably as a result of treatment or recovery over time. The relatively smaller standard deviation in the mean scores suggests that there was relatively smaller variation in perceptions of bodily pain at 6-month follow-up.

Limitations

This study has some limitations. Data were obtained from participants in a single rehabilitation programme at one geographical location; generalization of these findings may thus be limited. Therefore, caution should be taken in extrapolating the results to cardiac rehabilitation participants in other settings. The convenience sampling strategy was another weakness. Furthermore, due to the low rate of use of the rehabilitation service, there was a very uneven distribution of participants between those who did not participate the phase II cardiac rehabilitation and those who completed the programme (7·5%). Thus, it is inappropriate to compare the outcome measures between groups. In view of the doubtful responsiveness of the SF-36 as an outcome measure in cardiac rehabilitation (Hawkes et al. 2003), the use of a disease-specific instrument to assess the perceptions of health-related quality of life might complement and strengthen future studies. Further studies including other rehabilitation centres, and thus enlarging the population of participants, are needed to provide a fuller picture.

Conclusion

Further studies using both generic and disease-specific health-related quality of life instruments and the inclusion of control group are recommended. At the same time,

continual improvement in cardiac rehabilitation services is necessary as it is also possible that the current arrangements are ineffective. Nevertheless, the low attendance and utilization of cardiac rehabilitation service is a general concern. Alternative modes of delivery other than the traditional attendance at hospital outpatient services are also worth exploring.

Author contributions
DC, JC, AC contributed to study conception and design and obtaining funding. DC contributed to data collection, drafting of manuscript, administrative, technical or material support and supervision. DC and JC contributed to data analysis. JC and AC contributed to critical revisions of manuscript for important intellectual content. JC contributed to statistical expertise.

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