

Full length Research paper

Evaluation of the Liverpool Cardiac Phase-4 Rehabilitation Programme: A service user-led community-based investigation

Norman J. Heritage^{2*}, Edward Barnes¹, Brian Perry¹, Belinda Nelson², Matthew Shaw²
and Bashir M. Matata²

¹Heart Support Network, Liverpool, United Kingdom.

²Liverpool Heart and Chest Hospital, Liverpool, United Kingdom.

Accepted 20 April, 2010

In Liverpool, standard Cardiac Phase-4 Rehabilitation Programme varied from 3 - 9 months depending on centre attended. Evidence for setting the duration and patient contact frequency for community-based cardiac rehabilitation is uncertain. This study was carried out to explore how participants rated the 3 months Cardiac Phase-4 Rehabilitation Programme, whether it was long enough and whether it changed their lifestyle for the better. Questionnaires were administered at the end of the Cardiac Phase-4 Rehabilitation Programme and during 3 and 6 months follow-up in the community. The results indicated that about 90% of responders rated the programme to be excellent or good and that the score remained similar even when participants were followed-up at 3 and 6 months after discharge from the Cardiac Phase-4 Rehabilitation Programme. A similar pattern of response was observed for active lifestyle and duration of the Cardiac Phase-4 Programme. Interestingly, the MacNew Heart disease health-related quality of life scores remained similar even at 3 and 6 months after rehabilitation was completed. The result of this study indicates that a 3-months Cardiac Phase-4 Rehabilitation Programme in Liverpool was sufficiently long and that service users rated the programme very highly.

Key words: Cardiac, phase-4 rehabilitation, lifestyle changes.

INTRODUCTION

Cardiac rehabilitation is a process of supporting people with heart disease to understand their illness and its treatment, to achieve the lifestyle changes they need to make, and to regain their confidence so that they can enjoy the best physical, mental and emotional health and so return to as full and as normal a life as possible (Agency for Health Care Policy and Research, 1995.) Secondary prevention through cardiac rehabilitation has been recommended for most patients with coronary artery disease (CAD) Agency for Health Care Policy and Research, 1995 and cardiac rehabilitation programmes typically include medical evaluation, prescribed exercise, behavioural change, cardiac risk factor modification,

education, counselling, and psychosocial support Agency for Health Care Policy and Research, 1995. Participation in cardiac rehabilitation programme is known to result in positive changes in health-related quality of life (HRQL) and cardiac risk factors such as blood lipids, cigarette smoking, and cardio-respiratory fitness (Agency for Health Care Policy and Research, 1995; Morrin et al., 1990). It has been suggested that cardiac rehabilitation outcomes might be improved by extending patient contact over longer periods Brubaker et al. (1996); Oldridge, 1991. This would allow more time to establish and consolidate new lifestyle patterns (e.g., smoking cessation, healthy eating, regular physical activity), to address patient-specific issues (e.g., stress management, vocational counselling), and to maximise medical management with cardiovascular risk-reducing medications (e.g., antiplatelet agents, beta-blockers, lipid lowering agents, angiotensin-converting enzyme inhibitors).

Several studies have reported on the benefits of Cardiac Rehabilitation Programmes ranging from phase 2 – 4

*Corresponding author. Email: nheritage2000@yahoo.co.uk.

Abbreviations: CAD, Coronary artery disease; HRQL, health-related quality of life; SURE, service users research endeavour.

on clinical outcomes Yoshida et al. (1999); Brizida et al. (1996); Milani et al. (1996); Milani and Lavie (1996), and quality of life changes Seki et al. (2003); Kardis et al. (2005); Yu et al. (2004); Bettencourt et al. (2005). Currently, in Liverpool, community-based phase-4 cardiac rehabilitation programmes recruit approximately 20 patients a month. Patients undergoing cardiac phase-4 rehabilitation are given information and encouragement to move into programmes that support life long activity and independence, e.g. walking schemes, cycling schemes, and construct an action plan to maintain health and well being. Evidence for setting the duration and patient contact frequency for community-based cardiac rehabilitation is uncertain and so far only one such evidence has been reported in the medical literature worldwide Reid et al. (2005).

In 2005, members of the local "Heart Support Network", including members of the Liverpool Heart and Chest Hospital Service Users Research Endeavour (SURE) group, wished to know what determines the length of phase-4 cardiac rehabilitation programme. At this time three local centres offered phase-4 cardiac rehabilitation programmes, one lasting for 9 months, while the other two offered 3 months. A satisfactory answer could not be given by senior members of the Liverpool Primary Care Trust service commissioning team, which prompted the need for this study.

PARTICIPANTS AND METHODS

The study was approved by the Liverpool Adult Research Ethics Committee and the Local Institutional Research Committee (R&D Directorate) in accordance with current Research Governance requirements. This study was conducted between September 2006 and June 2009, and was designed and conducted by service users (SURE group) within the Liverpool Heart and Chest Hospital NHS Trust in collaboration with existing patient support networks within the Liverpool area.

Study aims

The investigators had a primary aim of establishing whether or not the standard Cardiac Phase-4 Rehabilitation Programme (12-weeks) was adequate for preparing attendees to have an independent life in the community after hospital discharge.

The research team

This was comprised of former patients, members of the Heart Support Network, and the SURE group at the Liverpool Heart and Chest Hospital NHS Trust. The team was supported by an administrative assistant for data collation and input into a database.

Cardiac Rehabilitation Phase-4 Programme

The patients followed an existing programme of twelve sessions, once weekly, typically lasting three months, in a local leisure centre. Each session lasts approximately two hours and is jointly led by leisure services staff (that is, sports physiologists with appropriate

qualifications) and nursing staff. The sessions included health talks of interest and relevance to patients (e.g. managing medication, depression and management of anxiety, welfare benefits etc) and a structured exercise programme. Patients undertook joint warm up sessions, then moved on into the main gymnasium, where they undertook individual exercise upon the advice of the physiologist, followed by group relaxations.

Study design and plan

This was a community-based prospective, quantitative evaluation (using study surveys) of efficacy of the phase-4 cardiac rehabilitation programme in the Liverpool area to assess whether it meets the needs for participants in achieving independent life in the community. Patients referred to services at local Leisure Centres were assessed for Cardiac Phase-4 Rehabilitation Programme study eligibility. The leisure services would alert the study administrator at Liverpool Heart and Chest Hospital on a weekly basis when eligible patients were referred to the programme. The investigators and/or community leisure services staff involved in the rehabilitation programme then handed out patient's information sheets to all potential participants on the day of induction to the programme and explained the purpose of research.

On the first day of attendance for supervised programmes at the rehabilitation centre (before session starts), the investigators obtained patient consent to participate, and documented the participants details which were returned to the study administrator at Liverpool Heart and Chest Hospital. At the end of Cardiac Phase-4 Rehabilitation Programme, investigators asked the participants to rate the cardiac rehabilitation service and quality of life by completing a "Lifestyle Questionnaire" and a MacNew Heart-related quality of life questionnaire. These completed documents were returned to the study administrator at Liverpool Heart and Chest Hospital. Participants were also asked to complete the study questionnaires at 3 and 6 months after the completion of the rehabilitation programme and were asked to return completed forms in stamp-addressed envelopes to the administrator for collation and entry of information into the database. The administrator sent follow-up reminder letters to the participants not responding at the first request and a telephone enquiry would then follow in cases where participants failed to respond in both instances.

Inclusion criteria

Patients of all ages (> 18 years) were included if they had recently undergone cardiac revascularisation or surgical intervention for cardiac disease and were scheduled for cardiac phase-4 rehabilitation.

Exclusion criteria

All non-cardiac patients that attended rehabilitation.

Data analysis method

All data were presented as percentages or total counts. Response to lifestyle questionnaire domains was compared using the ANOVA single-factor test at the end of Cardiac Phase-4 Rehabilitation, 3 and 6 months follow-up data for each questionnaire domain to assess for variations. MacNew domain scores were presented as mean \pm and median plus interquartile range. MacNew heart disease health-related quality of life scores domains (emotional, physical, and social) obtained at the end of Cardiac Phase-4 Rehabilitation Programme, then at 3 and 6 months after the end of the

Table 1. Patients demographics. n=100.

Patient information	Values
Female	19* (20%)
Age (years)	64.8 ± 8.9
Operation type	
PCI	37 *(37%)
CABG	30 *(30%)
Valve	8 *(8%)
Other	14* (14%)
Angiography	12 *(12%)
Pacing	1 *(1%)
Thoracic surgery	1 *(1%)

Continuous variables shown as mean ± standard deviation, * values expressed in numbers, PCI= percutaneous coronary interventions; CABG= coronary artery bypass graft surgery.

Table 2. The percentage of participants that rated the rehabilitation programme domains as being “good or excellent”.

	At the end of cardiac phase-4 rehabilitation n = 56	3 months after cardiac phase-4 rehabilitation n = 45	6 months after cardiac phase-4 rehabilitation n = 33
1. Information on life style change	100	100	97
2. Staff knowledge	100	100	100
3. Facilities	98	98	94
4. Personal attention	100	100	94

Table 3. The percentage of participants that answered “Yes” to the following questions.

	At the end of cardiac phase-4 rehabilitation n= 45 (%)	3 months after cardiac phase-4 rehabilitation n = 45 (%)	6 months after cardiac phase-4 rehabilitation n = 33 (%)
Did you receive enough information on Life style change?	91	93	97
Did you receive enough personal attention?	96	95	100
Do you think the programme was long enough?	61	55	94

Cardiac Phase-4 Rehabilitation Programme were compared using Wilcoxon ranked test.

RESULTS

Participants (100) that met the inclusion criteria scheduled to begin the Cardiac Phase-4 Rehabilitation

Programme were approached at random and 99 gave written informed consent Table 1. At the end of the Cardiac Phase-4 Rehabilitation Programme, almost all the participants (98 - 100%) that completed the lifestyle questionnaire reported that they rated the programme to be excellent or good (Table 2 - 4). In addition, over 90% of participants agreed that they received sufficient information on “life style change” and had adequate

Table 4. Percentage of participants who responded as “Yes” to the following questions.

	At the end of cardiac phase-4 rehabilitation n = 45 (%)	3 months after cardiac phase-4 rehabilitation n = 45 (%)	6 months after cardiac phase-4 rehabilitation n = 33 (%)
Compared to before you started on this programme do you think you are more active?	76	76	88
Compared to before you started on this programme do you think you eat more healthily?	89	90	88
Compared to before you started on this programme do you think that you are generally fitter?	84	84	88

Table 5. Summary of MacNew domain scores.

	End of cardiac phase-4 rehabilitation (n = 96)	3 months after cardiac phase-4 rehabilitation (n = 39)	6 months after cardiac phase-4 rehabilitation (n = 36)	P-values
Emotional	5.5 ± 1.2	5.7 ± 1.2	5.5 ± 1.3	0.76
Physical	5.7 ± 1.0	5.9 ± 1.1	5.5 ± 1.2	0.36
Social	5.8 ± 1.1	5.9 ± 1.2	5.7 ± 1.3	0.74
Global Score	5.6 ± 1.0	5.8 ± 1.1	5.6 ± 1.2	0.55

Continuous variables shown as mean ± standard deviation. Global domain scores rated at 1-7, reflecting the range from lowest to the highest score.

personal attention (Table 2 - 4). Over 75% of participants that completed the questionnaire reported that they were more active, ate more, healthily and were generally fitter (Table 2 - 4). The follow-up questionnaires results also indicated a similar pattern at 3 months and 6 months (Tables 2 - 4). MacNew heart disease health-related quality of life questionnaire data indicated no significant difference in overall global scores between those at the end of the Cardiac Phase-4 Rehabilitation Programme and those at the study follow-up period (Table 5).

DISCUSSION

The results indicate that the majority of the study participants rated their experience as either as excellent or good and were satisfied with the delivery of the programme in terms of information and staff knowledge. The only significant shift is the observation that those study participants that completed the follow-up lifestyle questionnaire at 6 months after the completion of the programme felt that, they were just as active as they were immediately at the end of the Cardiac Phase-4 Rehabilitation Programme or at the follow-up period of 3 months. In addition, over three quarters of the participants at 6 months follow-up indicated that the

programme was long enough as compared with only just over half of the participants in the former. This may suggest that many participants who choose to attend the 3 months Cardiac Phase-4 Rehabilitation Programme are strongly motivated and that those that remain in the programme do derive some benefits. In general they are satisfied with the rehabilitation experience and also gain sufficient knowledge to change their lifestyle. The results may indicate that perhaps the current cardiac phase-4 programme of 3 months is adequate without running the risk of turning the rehabilitation programme into a social networking club.

In contrast, the MacNew heart-disease related quality of life questionnaire scores were identical at the end of the Cardiac Phase-4 Rehabilitation Programme with the follow-up periods. These findings are consistent with previous studies that demonstrated that, a short course of cardiac rehabilitation programme is highly cost-effective in improving long-term quality of life in patients with recent myocardial infarction or percutaneous coronary intervention Yu et al. (2004). A previous study had shown that cardiac rehabilitation programme in patients with coronary heart disease prevented progression of resting diastolic dysfunction and enhanced exercise capacity Yu et al. (2004) and therefore, this would seem to be the basis for the improved MacNew heart disease

health-related quality of life scores.

Limitations of the study

These findings are highly limited in generalisability because of the significantly reduced response rate at the follow-up period. To some extent this was partly perpetuated by administrative shortcomings (maternity leave and inability to communicate with the investigators at the rehabilitation centres) where some participants could not be followed up after they had been discharged from cardiac rehabilitation because of incomplete contact details being entered into the database and therefore lost to the system.

In addition, since the study was conducted by service users as the principal investigators, there was a distinct learning curve associated with data collection as they had to be trained on study procedures at the start. For example some of the investigators failed to explain to the study participants how to complete the questionnaires and as a consequence many were partially completed. In addition, quality assurance was not vigorously enforced due to a failure in communication between the administrator and the principal investigators. The majority of the investigators dropped out as they felt it was too much hard work and also time commitment was excessive. At the end, only 2 investigators out of 8 stayed the course till the end of the study. The other factor that limits the interpretation of the data is the fact that only about 50% of the participants completed the follow-up questionnaires. However, there is clear evidence that most participants that stay the course of the programme derive significant benefits but they cannot state categorically whether an extended programme beyond the first 3 months is warranted or more beneficial.

Conclusion

In summary, although there were a number of systematic failures that limited the collection of data, the study has shown that just over half of the participants who complete the cardiac phase-4 rehabilitation course felt that the programme was long enough. In addition, the majority of participants by far rated the Liverpool Cardiac Phase-4 Rehabilitation Programme content and experience as excellent or good. Overall, the results of this study suggest that service user's networks as groups can successfully conduct independent research in this area at institutions where provision of adequate administrative and training support is unrestricted.

ACKNOWLEDGEMENTS

The staff at the Millennium Centre, Garston and Peter Lloyd Sports Centres in Liverpool, and the Cardiac Rehabilitation Unit at the Liverpool Heart and Chest

Hospital. The authors also wish to thank Kelly Banks for managing the database.

REFERENCES

- Agency for Health Care Policy and Research (1995). Clinical Practice guideline: cardiac rehabilitation. Rockville (MD): US Department of Health and Human Services.
- Bettencourt N, Dias C, Mateus P, Sampaio F, Santos L, Adao L, Mateus C, Salome N, Miranda F, Teixeira M, Simoes L, Ribeiro VG (2005). Impact of cardiac rehabilitation on quality of life and depression after acute coronary syndrome. *Rev. Port. Cardiol.* 24: 687-696.
- Brizida L, Mendes M, Adegas A, Seabra-Gomes (1996). Modification of the lipid profile in coronary patients undergoing cardiac rehabilitation. *Rev. Port. Cardiol.* 15: 877-883.
- Brubaker PH, Warner JG, Rejeski WJ, Edwards DG, Matrazzo BA, Ribisl PM, Miller HS Jr, Herrington DM (1996). Comparison of standard and extended-length participation in cardiac rehabilitation on body composition, functional capacity, and blood lipids. *Am. J. Cardiol.* 78: 769-773.
- Hofer S, Lim L, Guyatt G, Oldridge N (2004). The MacNew heart disease health-related quality of life instrument: a summary. *Health Qual. Life Outcomes.* 2(3):1-8.
- Kardis P, Bruce A, Michaels J, Barnett SD (2005). Quality-of-life changes following the completion of phase II cardiac rehabilitation. *J. Nurs. Care Qual.* 20: 161-166.
- Milani RV, Lavie CJ (1996). Behavioural differences and effects of cardiac rehabilitation in diabetic patients following cardiac events. *Am. J. Med.* 100: 517-523.
- Milani RV, Lavie CJ, Cassidy MM (1996). Effects of cardiac rehabilitation and exercise training programs on depression in patients after major coronary events. *Am. Heart J.* 132: 726-732.
- Morrin L, Black S, Reid R (1990). Impact of duration in a cardiac rehabilitation program on coronary risk profile and health-related quality of life outcomes. *J. Cardiopulm. Rehabil.* 10: 130-140.
- Oldridge N (1991). Compliance with cardiac rehabilitation services. *J. Cardiopulm Rehabil.* 11: 115-127.
- Reid RD, Dafoe WA, Morrin L, Mayhew A, Papadakis S, Beaton L, Oldridge NB, Coyle D, Wells GA (2005). Impact of program duration and contact frequency on efficacy and cost of cardiac rehabilitation: results of a randomized trial. *Am. Heart J.* 149: 862-868.
- Seki E, Watanabe Y, Sunayama S, Iwama Y, Shimada K, Kawakami K, Sato M, Sato H, Mokuno H, Daida H (2003). Effects of phase III cardiac rehabilitation programs on health-related quality of life in elderly patients with coronary artery disease: Juntendo Cardiac Rehabilitation Program (J-CARP). *Circ. J.* 67: 73-77.
- Yoshida T, Kohzaki M, Yoshida K, Hiwatari M, Kamimoto M, Yamamoto C, Meguro S, Endo N, Kato A, Kanazawa M, Sato T (1999). Physical and psychological improvements after phase II cardiac rehabilitation in patients with myocardial infarction. *Nurs. Health Sci.* 1: 163-170.
- Yu CM, Lam MF, Siu DC, Miu RK, Lau CP (2004). Effect of a cardiac rehabilitation program on left ventricular diastolic function and its relationship to exercise capacity in patients with coronary heart disease: experience from a randomized controlled study. *Am. Heart J.* 147(5): e24.
- Yu CM, Lau CP, Chau J, McGhee S, Kong SL, Cheung BM, Li LS (2004). A short course of cardiac rehabilitation program is highly cost effective in improving long-term quality of life in patients with recent myocardial infarction or percutaneous coronary intervention. *Arch. Phys. Med. Rehabil.* 85: 1915-1922.

STUDY QUESTIONNAIRE

A "Lifestyle Questionnaire" (shown below) addressing the issue of delivery, outcome and identification of problems associated with the implementation of a Cardiac Phase-4 Rehabilitation Programme was completed. Heart disease health-related quality of life (HRQL) was measured using the 28-item MacNew Instrument Hofer et al. (2004), which measures 3 quality of life domains (emotional, physical, and social). A global heart disease HRQL score was calculated as the average response across all questions.

(1) How would you rate the rehabilitation Programme you have attended?

	Excellent	Good	Fair	Poor
Information on Life style change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staff Knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal Attention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(2) Looking back do you think you received enough?

Information about lifestyle	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Personal attention	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Do you think the programme was long enough	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

(3) Compared to before you started on this programme do you think you?

Are more active	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Eat more healthily	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Are generally fitter	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>