

CHAPTER 17

ORGANISATIONAL ISSUES

Best practice requires monitoring and continuous improvement of the processes of program delivery, as well as measurement of program outcomes. Earlier chapters examined the scientific evidence for the benefits of cardiac rehabilitation and secondary prevention programs. This chapter deals with the processes for effective organisation and implementation of programs. A number of authoritative bodies recommend that referral procedures and other organisational aspects of cardiac rehabilitation and secondary prevention programs should be formalised^{70,388}. Material in this chapter draws extensively upon health care providers' perceptions of best practice and consumer feedback.

Establishing programs

Recommendation

Organisational aspects of the program should be clearly defined and documented and periodically reviewed.

Strength of evidence = 4

When establishing a cardiac rehabilitation and secondary prevention program, a document should be produced giving details of the following:

- overall business plan
- aims and objectives
- content and program modules
- equipment, equipment maintenance and resources
- venue and space
- patient target groups
- entry and discharge assessments
- program duration and session times
- frequency and length of sessions
- referral procedures
- strategies for handling nonattenders and dropouts
- staffing, team roles

- liaison with doctors and other health care providers
- reporting lines and responsibilities
- staff training and performance reviews
- funding, budgets and budget management
- health and safety responsibilities
- professional and public liability
- promotion of the program
- procedures for recording patient information
- methods of benchmarking and evaluation
- review of program objectives, content and structure

Some of the above matters are covered in more detail elsewhere in these Best Practice Guidelines. Those specifically relating to organisational aspects of programs are dealt with in this chapter.

The process of establishing a program should include consultation with practitioners already working in the field. In Australia, the recently revised manual produced by the National Heart Foundation of Australia entitled "How to plan a cardiac rehabilitation program" should be purchased and used as a guide⁶⁷⁴. Attendance at a short training course⁵¹ is also recommended.

Professional and public liability issues need to be considered and expert advice should be sought regarding these matters.

Eligibility for referral to the program

Recommendation

All eligible patients should be automatically referred to an ambulatory cardiac rehabilitation and secondary prevention program, unless the patient's doctor advises otherwise. Agreement for automatic referral to programs should be sought at each hospital, with provision for veto in individual cases where medical contraindications are considered to exist.

Strength of evidence = 4

Automatic referral to ambulatory programs is practised in over 70% of hospitals and community health centres in Victoria⁵. Elsewhere in Australia, formal referrals are more often required, although automatic referral is becoming increasingly common⁴¹. There may be contraindications on medical grounds to the enrolment of some individual patients. In such cases, the treating doctor should advise the program co-ordinator of the patient's unsuitability for attendance at the outpatient program, together with the reason. This decision should be recorded in the patient's history.

The treating doctor must be consulted about referral of patients whose diagnosis is equivocal, in order to avoid the harmful effects of inaccurate “cardiac” labelling⁶⁷⁵.

Hospital discharge plan

Recommendation

Hospital discharge plans should include clear written procedures for referring patients to an ambulatory group program and for arranging follow-up doctors’ appointments.

Strength of evidence = 4

As discussed in Chapter 3, participation rates in cardiac rehabilitation programs is less than half the eligible patients who have suffered an acute cardiac event attend an ambulatory cardiac rehabilitation program in Victoria⁵³, despite the widespread network of programs⁵. In the United States of America, probably less than one fifth of eligible patients attend^{2,54}. A major factor in such nonattendance is the absence of effective referral procedures^{2,5,6}. Referrals should be arranged before patients are discharged from hospital. Follow-up appointments with the patient’s general practitioner and specialists should also be routinely arranged. After leaving hospital, patients should be contacted by the program co-ordinator who should reinforce the desirability of the patient’s attending the program and provide assistance, if required, to facilitate attendance

Method of invitation to the program

Recommendation

Invitations to attend an ambulatory program should be given to patients in writing, preferably signed by the patient’s treating doctor, together with a simple brochure about the program, and an appointment for first attendance arranged and documented in the patient’s hospital records.

Strength of evidence = 4

Because of patients’ heightened anxiety in hospital and their concern with other issues, invitations to attend a rehabilitation program which are conveyed verbally are commonly forgotten or misunderstood^{6,52}. Therefore, a letter of invitation handed to the patient by the program co-ordinator or other designated person is required. It may be given to the patient together with written details of follow-up medical appointments. The letter should be accompanied by a simple brochure about the program. Information about the program should include a brief description of the

contents of the program and details of the venue, date of first attendance, frequency and duration of the program, clothing requirements and cost, if any. An appointment for first attendance at the program should be negotiated and the benefits of attending should be highlighted. The letter should be signed by the program co-ordinator and, ideally, by the patient's doctor as well. Studies in other settings suggest that invitations to attend a program by letter attracts a higher rate of attendance than verbal invitations, especially if the letters are signed by the patient's doctor or other authoritative person⁶⁷⁶. Participation in an ambulatory program may also be increased if doctors, during their ward rounds, refer to the program and encourage patients to attend.

Invitations in other languages

Recommendation

Patients of non-English speaking backgrounds should be given a letter of invitation and brochure about the program in their own language. An appointment should be arranged for first attendance at the program.

Strength of evidence = 4

Patients of non-English speaking background may not fully understand what the program entails if the invitation is given verbally or if the invitation is written in English. Invitations written in the patient's own language have been shown to increase participation rates at health education programs. The assistance of interpreters should be sought in hospital and when patients of non-English speaking backgrounds first attend the program. Since family members are expected to play an important role in the patient's recovery, it is also desirable for such patients to bring a relative fluent in English to the first, and where possible, subsequent sessions, so that family members can hear and understand the discussion..

Initiating referrals and motivating patients

Recommendation

The program co-ordinator or nominee should personally hand the patient the letter of invitation, explaining its contents, encouraging the patient to attend and arranging the first attendance.

Strength of evidence = 4

Some patients are not sufficiently motivated to attend a cardiac rehabilitation program. Others anticipate problems in attending because of transport, language,

work commitments or other difficulties. It is important for the co-ordinator to determine the level of patients' motivation to attend and to explore possible barriers to attendance before the patient is discharged from hospital. Further explanation and an offer of assistance may encourage such patients to attend. This should be done when handing the patient the letter of invitation to the program. It may be helpful to ask a former patient who has participated in an ambulatory program to talk to patients who appear reluctant to attend. Contacting patients by telephone after discharge from hospital may also increase attendance rates. If the patient does not have a telephone at home, the telephone number of a neighbour or relative should be requested and noted in the program co-ordinator's records in case follow-up is required.

Invitations to spouses

Recommendation

Spouses should receive an individual letter or brochure, inviting them to attend the program and pointing out the potential benefits of their attendance.

Strength of evidence = 4

In most cases, spouses are encouraged to attend the program with the patient. However, the proportion of spouses who actually do attend varies between programs^{5,6}. Spouses who are in the workforce cannot usually attend day-time sessions. Nevertheless, they may appreciate the invitation to attend and to learn about the program and the importance of the patient attending. Some studies have found that spouses who may have been keen to participate in the program were not informed by the patient that they were invited to do so³⁰⁹. Thus, direct contact with the spouse by a team member is desirable. If spouses are unable to attend the entire program, they should be encouraged to attend the initial session when the patient is assessed and rehabilitation plans are made. Spouses who cannot attend personally may be offered the opportunity to discuss any concerns with a team member by telephone.

Selection of program

Recommendation

The program co-ordinator should refer patients to the program at the parent hospital or to another suitable program near the patient's home, whichever is most acceptable to the patient.

Strength of evidence = 4

Patients may attend the program offered at the hospital to which they were admitted or, if discharged from a metropolitan hospital to the country, to the nearest program in the district. Patients in metropolitan areas who live some distance from the parent hospital may also be referred to another program near their home. Program co-ordinators should consult the Directory of Cardiac Rehabilitation Programs produced by the National Heart Foundation of Australia to identify the most appropriate program⁶⁴⁰. Possible options should be discussed with the patient before discharge from hospital. Contact should then be made by telephone with the co-ordinator of the program to which the patient is being referred to make the necessary arrangements. A written referral should then follow, which should be transmitted by facsimile prior to discharge to minimise any delay in enrolling the patient. The co-ordinator of the designated program should be responsible for contacting the patient about a commencement date. Anecdotal evidence suggests that these procedures are not always followed^{5,6}.

Time of commencing the program

Recommendation

Patients should begin attending the program within a few days or a week of leaving hospital, unless there are medical reasons for delaying enrolment.

Strength of evidence = 4

Early enrolment in a program is strongly recommended. Convalescence is a time when patients commonly experience significant psychological problems, especially a depressed mood^{360,499,503,513}. Patients gain significant psychological benefits from attending a group rehabilitation program, through recognising that their problems are not unique and by observing rapid progress in others and themselves^{7,309}. Since the recommended rehabilitation programs are based on light to moderate exercise, there is no need to defer attendance at the program until a greater level of fitness has been attained or an exercise test conducted (see Chapter 10). Patients unable to exercise during early convalescence can benefit psychologically and socially from meeting other patients and from participating in the education sessions. Reports indicate that

some patients are not invited to begin a program for four weeks or more after hospital discharge because of long waiting lists^{5,6}. In such cases, it is preferable to refer patients, if possible, to another program with no waiting list rather than allow an excessive delay before starting the program. If there is a frequent overload of patients, a second parallel program should be introduced.

Entry assessment

Recommendation

Patients should be formally assessed at entry to the program and a mutually acceptable treatment plan devised.

Strength of evidence = 4

Before patients commence the program, they should attend for a pre-program assessment. At this interview, the purpose of the program and its contents should be explained to the patient and, if present, family members. Consent should be obtained from the patient to enter the program. Patients must also be informed that they may withdraw from the program at any time or seek to have the program modified to suit their specific needs.

Patients' perceptions of their illness and their expectations of recovery should be explored. Specific concerns should be discussed and the regimens clearly explained. A plan should be devised and agreed upon, focusing on specific goals of rehabilitation for that patient and addressing potential barriers to lifestyle change²⁹⁰. For patients who need to make several behavioural changes, it is preferable to prioritise the desired changes. Where possible, the patient's spouse or partner should attend and participate in the decision-making process, together with the patient and staff member conducting the assessment. The importance of attending and completing the program should be emphasised to the patient at this stage, and if possible, a commitment to attend should be obtained from the patient. Studies have shown that obtaining a written commitment to attend reduces dropout. The entry assessment may be quite brief, but approximately 30 minutes on average should be set aside for each patient. The entry assessment interview facilitates the establishment of rapport. Fortunately, most patients have relatively few problems and these are commonly readily recognised. Further targeted planning may take place during the first few sessions. The plan may be reviewed and revised, as appropriate, during the course of the program. A provisional time for review and discharge of the patient should be set. Input into the plan from other members of the multidisciplinary team is important, either at the entry assessment or later during team meetings.

At the entry assessment, the patient's medical record should be consulted. The following should be documented on an appropriate form:

- diagnosis
- past medical history
- current medications
- physical and functional status
- risk factor profile
- health behaviours
- occupation, employment status, plans for resuming work, type of work
- most demanding aspect of work or lifestyle
- financial status
- psychosocial issues, including the availability of social support.
- appointments to attend general practitioner, cardiologist or surgeon

Selection of program modules

Recommendation

In addition to group exercise and education sessions, other program modules may be recommended for some patients, if required.

Strength of evidence = 4

Patients should be referred, if required, to specialised programs addressing specific needs or to other health care providers for individual counselling about specific problems. For example, some patients may benefit from vocational retraining or attendance at smoking cessation classes. Others may require individual counselling to help them deal with psychological, social or financial problems. Many patients require separate, additional dietary counselling. The need for such referrals may be identified at the entry assessment, during the rehabilitation program, at weekly team meetings or informally by any team member conducting sessions. Some larger programs provide a range of exercise, education and counselling sessions. Patients should be enrolled in those modules which best suit their individual rehabilitation needs.

Encouraging participation in programs and monitoring attendances

Recommendation

Program staff should document attendances at each session and monitor attendance patterns carefully. Nonattenders and dropouts should be contacted and encouraged to attend the program.

Strength of evidence = 4

Several studies report high rates of nonattendance and dropout at cardiac rehabilitation and secondary prevention programs^{52,53,276,285,288}. Factors commonly associated with nonattendance include distance from the program venue or lack of transport^{276,288}, inconvenient timing of the program⁶²⁴, female gender^{54,55,276,285}, older age^{54,55,277,624}, especially among women^{55,276}, unemployed status and lower socioeconomic status^{52,55,276,285,677}, functional impairment²⁸⁵, presence of complex problems⁵⁶, a perception that the illness is not serious²⁸⁸, lower socioeconomic status and less education^{55,285}, lack of referral^{52,276,286}, especially among patients discharged from a general medical ward⁶⁷⁸, or those who are depressed²⁸⁸; and weak or no recommendation by the doctor^{288,671}. Studies show dropout from programs is more common among smokers⁶⁷⁹, and those of lower socioeconomic status^{677,679}.

A program register should be available to record details of patients who have been referred to the program and of those who have been enrolled. Attendances at sessions should be monitored. Patients who have been referred to the program but who fail to attend, or who drop out after a few sessions, should be contacted to find out their reasons for doing so and to provide assistance to facilitate their attendance. Referral sources could also be examined to identify whether patients from particular hospital units are not attending. Characteristics of nonattenders and dropouts should be documented. A contact name and telephone number should be included in the letter of invitation and in the brochure about the program so that patients can advise staff if they cannot commence on the specified date or if they need to be absent from the program after commencing. As noted previously, local patient “consumer” groups can be helpful in contacting patients to encourage them to attend the program, especially in country areas. Other ways of minimising nonattendance and dropout should be explored. Different approaches may be required to encourage the attendance of specific groups of patients (for example, those who have had coronary angioplasty, older women, patients with limited English or patients who do not drive a car).

Discharge review

Recommendation

Patients should be formally assessed upon discharge from the program.

Strength of evidence = 4

As previously stated, an exercise test towards the end of the program can be an effective way of demonstrating the patient's progress and assessing readiness to resume work and other activities^{39,379}. The exercise test should be coupled with a medical review of the patient's risk factors and medications and discussion of any concerns. Plans for returning to work, if applicable, should be addressed. For some patients, simulated work assessments should also be undertaken before discharge, as noted earlier. Arrangements for medical follow-up should be confirmed and patients should be encouraged to attend their doctors. Patients and spouses should be invited to contact the program co-ordinator in the future, if they have any concerns.

Referral to maintenance programs

Recommendation

All patients should be encouraged to enrol in a maintenance program or another suitable local community program upon completion of the ambulatory program.

Strength of evidence = 4

Because of their short duration, ambulatory programs conducted during convalescence may not produce major changes in lifestyle or achieve significant reduction of risk factors. However, early programs can be effective in motivating patients to adopt healthier lifestyles^{96,171}. To facilitate maintenance of behaviour change and adherence with advice, patients need continuing support^{495,680}. They should be referred to a longterm maintenance program, if one is available, and strongly encouraged to attend. Considerable benefits have been demonstrated from ongoing participation in longterm programs through continued access to expert advice, as well as support from other group members. These benefits include a reduction in hospital admissions, further cardiac events and deaths^{14,17,80,81,185}. If applicable, individual patients should also be referred to a special clinic for ongoing management of specific problems, such as hyperlipidaemia, diabetes, obesity, hypertension or smoking.

Referral to community health services and support groups

Recommendation

Referral to a community health service in the area may also be appropriate.

Strength of evidence = 4

Patients should be advised of other local community services, which commonly provide physical activity programs, behavioural and psychosocial counselling and other relevant services. Patient “consumer” groups also offer ongoing social support for cardiac patients and their family members.

Communication with doctors

Recommendation

The program co-ordinator should communicate in writing with the patient’s general practitioner and specialist, advising them of the patient’s enrolment in the program. The program co-ordinator should also inform the patient’s doctors about any problems which have occurred during the program and forward a brief discharge summary.

Strength of evidence = 4

So that doctors are adequately informed about the rehabilitation program, a brochure should be produced and circulated to them. It should include a brief description of the content of the program and provide details of the co-ordinator’s name and contact details. Doctors must be advised about enrolment of their patients in the rehabilitation program and asked to encourage the patient to attend. Any problems which arise during the program should be communicated to the general practitioner and specialist. A brief summary of the patient’s progress should also be sent to the general practitioner and specialist at the time of the patient’s discharge from the program, including any exercise test results, risk factor measurements, assessments of physical and psychosocial functioning and other outcome data. Patients should also be given a patient held record containing this information which they should take to their doctors and other health care providers to facilitate communication and shared care.

Longterm follow-up of patients

Recommendation

Patients should be invited to initiate contact with team members after their discharge from the ambulatory program. The program co-ordinator or other team member should also contact patients by telephone after three, six and 12 months.

Strength of evidence = 4

In addition to longterm management from the general practitioner and specialist, patients should ideally be contacted by telephone by a member of the rehabilitation team so that patients who are experiencing psychological or work problems or difficulties maintaining recommended lifestyle changes can be identified. Significant problems some months after an acute cardiac event are not uncommon^{309,531}. Such contact with high risk patients is particularly important to identify lapses with regimens, particularly those concerning smoking, diet, medication and medical attendances. Advice and support can be offered and assistance in making medical or other appointments, if necessary. If telephone contacts are not feasible, a postal questionnaire may be sent to assess progress and to offer further support, if required. Appropriate referrals, including medical appointments, should be arranged for those requiring assistance.

Comment

The low attendance rate of patients who are invited to ambulatory programs^{2,5,52-56} raises serious issues of access and equity. Patients who have failed to attend a ambulatory program, for whatever reason, may well be able to attend at a later date. Motivation may change, awareness of need may increase, transportation may become possible later in convalescence, the patient may learn late of the benefits of rehabilitation programs from another patient; a doctor may learn late of the benefits of rehabilitation programs from another patient; a doctor or other health professional may discover that the patient has failed to attend the hospital-based program. The convalescent period may well be over. Such patients should be offered a second chance. This may well be at a program other than at the parent hospital. Community-based maintenance programs recruit many such patients, who need similar education and support as do those in ambulatory programs. Thus, programs designed to be maintenance (phase 3) programs find that they largely also have to function as if they were ambulatory (phase 2) programs. The division of cardiac rehabilitation into "phases" becomes blurred in the face of this reality. Development of community programs designed to cope with both convalescent and maintenance needs of patients seems to be required to offer proper facilities with good access and equity. This is an issue for further research and development.

CHAPTER 18

PROGRAM EVALUATION

As discussed in previous chapters, the benefits of many aspects of cardiac rehabilitation programs have not been adequately substantiated in rigorous scientific studies⁶⁸⁰. More research is required to determine the effectiveness of the various components of cardiac rehabilitation in facilitating recovery of the patient and promoting secondary prevention of the disease.

Further, there is a need for greater uniformity in the outcomes measured and in the tools and methods used to evaluate outcomes of cardiac rehabilitation programs. Discrepancies in the findings of past investigations in this area may be attributable in part to differences in the selection of outcomes, measurement tools and overall research design, rather than to actual differences in the effectiveness of the interventions under examination. Reliable, valid and responsive measures of outcome are essential.

Program evaluation

Recommendation

Evaluation is recommended to monitor and, if necessary, to improve the processes of program delivery and to document outcomes.

Strength of evidence = 4

Careful outcome evaluation is required to determine and compare the costs of interventions in cardiac rehabilitation. Demonstration of the benefits of interventions used in cardiac rehabilitation programs is important for decision-making regarding the allocation of health care resources. There is therefore increasing pressure upon those delivering cardiac rehabilitation services to be accountable in terms of quality and costs⁶⁸¹. As well as documenting outcomes, comprehensive process evaluation is essential to ensure efficient programs and to identify weaknesses requiring attention in the delivery of programs.

This chapter briefly reviews approaches to evaluation and provides guidelines for both outcome and process evaluation for best practice cardiac rehabilitation and secondary prevention programs.

Outcome evaluation

Traditional goals of cardiac rehabilitation have been to promote recovery following the acute illness by improving physical outcomes and functional status of the patient and encouraging early return to work. Reduction of mortality and morbidity have been recognised longterm aims for secondary prevention of the disease. A number of studies referred to in earlier chapters have investigated the effects of cardiac rehabilitation programs upon “hard” endpoints, such as mortality, morbidity (including recurrent events and rehospitalisation) and resumption of work. However, outcome studies of this kind require longterm follow-up of large numbers of patients in controlled studies which are beyond the scope of most programs.

Outcome evaluation of cardiac rehabilitation programs usually involves investigation of short term outcomes including functional capacity, quality of life, risk factor profiles, health behaviours and knowledge.

Instruments assessing functional capacity

While commonly a part of quality of life assessments, functional capacity may be measured independently.

Graded exercise test

Objective evaluation of exercise capacity is commonly measured by performance of a continuous graded exercise test, either on a treadmill or a cycle ergometer. In outcome studies, exercise tests are undertaken before entry to an exercise training program and upon completion of the program. Exercise testing may be undertaken some months later to measure the longterm effects of the program.

6 minute walk test

A less costly and simpler test, the 6 minute walking test, is also used for objective assessment of exercise capacity of cardiac patients⁶⁸²⁻⁶⁸⁴. In this test, patients are asked to walk as hard as they can. The 6 minute walk test is of particular use with older cardiac patients. It has good reliability, especially in patients with heart failure.

Shuttle walk

The shuttle walk is another measure of exercise capacity for use with cardiac patients⁶⁸⁵, which closely mimics a graded exercise test.

Duke Activity Survey Index

A further self-report questionnaire measuring functional status is the 12 item Duke Activity Survey Index⁶⁸⁶.

Specific Activity Questionnaire

A recently developed Australian tool is the Specific Activity Questionnaire (SAQ)⁶⁸⁷. Unlike the New York Heart Association and Canadian Cardiovascular Society classifications, the SAQ provides a measure of functional capacity which is reported to correlate moderately well with peak VO_2 determined by exercise testing and is therefore recommended as a useful tool in cardiac population studies when formal exercise testing is impractical and uneconomical⁶⁸⁷.

Instruments assessing symptoms

New York Heart Association (NYHA)

Despite some flaws, the functional classification of the New York Heart Association (NYHA)⁶⁸⁸ is a commonly used observer rated classification for quantifying the degree to which symptoms limit the performance of everyday physical activities.

Canadian Cardiovascular Society (CCS)

The Canadian Cardiovascular Society (CCS)⁶⁸⁹ has produced an improved modified version of the NYHA criteria for anginal symptoms.

Seattle Angina Questionnaire

Another tool for assessing symptoms is the Seattle Angina Questionnaire, a 19-item self-administered questionnaire designed for cardiac patients who have chest pain, chest tightness or angina⁶⁹⁰.

Minnesota Living with Heart Failure Questionnaire (LihFE)

The LihFE is a valid, reliable and responsive instrument containing 21 items⁶⁹¹.

Quality of life

While there is no universal agreement regarding the definition of quality of life, it is accepted that it is a multidimensional phenomenon, embracing psychological wellbeing and social functioning as well as physical functioning. Improvement in quality of life has been widely recognised as an important goal of cardiac rehabilitation. However, quality of life has only recently been used as an outcome measure in major studies.

Generic measures and disease specific measures represent the two basic approaches to assessing health related quality of life (HRQL). Generic instruments include health profiles and utility measures. Health profiles are single instruments which measure different aspects of HRQL, while utility measures basically require patients to

estimate their HRQL along a single continuum from death to full health⁶⁹². Generic HRQL instruments are designed as outcome measures to allow comparisons across populations and interventions, while disease specific HRQL instruments focus on symptoms and problems relating to a particular disease and are thus used as outcome measures in specific populations.

Generic measures of health related quality of life (HRQL)

The following generic HRQL tools have been used in previous studies of cardiac patients.

Medical Outcomes Study Short Form 36 (SF-36)

The Medical Outcomes Study Short Form 36 (MOS SF-36)⁶⁹³ is a shortened version of the Medical Outcome Survey (MOS)⁶⁹⁴. It has 36 items measuring eight health concepts, namely: physical functioning, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems and mental health. The different scales in the SF-36 show adequate internal consistency. Construct validity has been demonstrated through factor analysis in a study with patients experiencing a variety of conditions⁶⁹³. The SF-36 has been used with a range of different illnesses, including coronary heart disease. Some studies of patients undergoing cardiac rehabilitation^{275,695} have used the SF-36. Evaluation of a cardiac rehabilitation sample before and after a 12 week program showed significant improvement on all scales⁶⁹⁵. However, as pointed out by Oldridge, these observational studies were limited by the absence of a control group or longterm follow-up⁶⁹⁶. The SF-36 is being increasingly used in Australian studies. In Victoria, it is being administered to patients attending cardiac rehabilitation programs to establish its suitability and sensitivity in this population⁶⁹⁷. The Australia Bureau of Statistics has released normative data for the Australian population.

Nottingham Health Profile (NHP)

The NHP⁶⁹⁸ is a widely used tool, particularly in the United Kingdom, for measuring perceived health problems and their effects upon activities of daily living. The NHP has been used with cardiac populations^{699,700}. Studies have shown that patients with a poor perceived health status measured by the NHP also have a poorer result using other traditional clinical measures of outcome, such as exercise capacity determined by treadmill test⁷⁰⁰. However, some limitations in scoring the NHP have been identified⁷⁰¹. A study comparing the SF-36 and the NHP in cardiac patients found that the SF-36 was a better measure of quality of life than the NHP, its scales showing more sensitivity, with higher internal consistency coefficients and clearer evidence of discriminant validity⁷⁰¹.

Profile of Moods States (POMS)

The POMS provides 65 adjectives which are self rated to indicate various mood states (eg anger, tension; depression) considered transient and responsive⁷⁰². The POMS has been used in past studies of cardiac patients^{516,703,704} and is simple to administer.

Sickness Impact Profile (SIP)

A longer questionnaire, the SIP, contains 136 items which measure physical functioning, psychosocial domains and five independent factors⁷⁰⁵. It has been used with cardiac patients⁷⁰⁶. The SIP provides more detailed information than the SF36 but it takes 45 minutes to complete.

Psychosocial Adjustment to Illness Scale (PAIS)

The PAIS is an interviewer administered questionnaire, although a self-report version has been developed^{707,708}. It provides an assessment of functioning in a variety of psychological and social domains, including health care orientation, vocational environment, domestic relationships, sexual relations, extended family relations, social and leisure activities and psychological distress.

Specific measures of health related quality of life

Several health related quality of life (HRQL) instruments have been specifically developed for use with cardiac patients. They include the following.

Quality of Life after Myocardial Infarction Questionnaire (QLMI)

The QLMI contains subscales measuring physical symptoms and restrictions (the Limitations domain) and emotional function, confidence and self-esteem (the Emotions domain)⁶⁹⁶. It is reported to be a valid, reliable and responsive specific HRQL instrument. Developed in Canada, it has recently been modified and validated for use in Australia as the MacNew Quality of Life after MI Questionnaire⁷⁰⁹.

Minnesota Living with Heart Failure Questionnaire(LihFE)

The LihFE⁶⁹¹ has 21 items and assesses physical, socioeconomic and psychological impairment in patients with heart failure. It has been widely used, particularly in pharmacological trials.

Heart Patients' Psychological Questionnaire (HPPQ)

The HPPQ⁷¹⁰ has a 12 item Disability Scale and a 12 item Well-Being Scale. It was designed and validated in Belgium to assess changes in feelings of disability and well-being in men with coronary heart disease attending an outpatient cardiac rehabilitation program. Reports indicate that the HPPQ is a reliable and sensitive measure of psychological functioning in cardiac patients⁷¹⁰.

Instruments measuring single psychological states

Several instruments are available to measure specific psychological states, such as anxiety and depression. The following commonly used questionnaires were not specifically developed for cardiac patients, with the exception of the Cardiac Depression Scale⁷¹.

State Trait Anxiety Inventory (STAI)

The STAI is a 40 item questionnaire consisting of a 20 item scale assessing state (current) anxiety and a 20 item scale measuring trait (general) anxiety⁷². It can be completed quite quickly and has been used in previous studies of cardiac patients^{73,74}.

Hospital Anxiety and Depression Scale (HADS)

The HADS is a 14 item scale with separate subscales for anxiety and depression⁷⁵. Developed for use with medically ill patients in hospital, it is commonly used as a screening tool to detect psychological disturbance. While it is brief and has been widely used in past studies of cardiac patients^{76,77}, it has some limitations. For example, the depression subscale omits many items relating to somatic symptoms and thus measures only some aspects of depression⁷¹.

Beck Depression Inventory (BDI)

The BDI is a 21 item scale for measuring depression⁷⁸. A short version has also been produced. Although commonly used to assess depression in cardiac patients^{79,720}, it is less suitable for this population than other scales because, unlike the HADS, it was originally designed for use with psychiatric patients. Thus, many items cover more severe symptoms of a depressive illness (such as suicidal thoughts), rather than milder symptoms of a depressed mood experienced by most cardiac patients. Consequently, many cardiac patients achieve very low scores on the BDI and subtle changes in mood are not detected⁵¹².

Cardiac Depression Scale (CDS)

Developed in Melbourne, the CDS was produced to provide a more sensitive depression scale for cardiac patients. Its 26 items reflect the range of depressive symptoms seen in cardiac patients. The CDS correlates well with the BDI but without the marked skewness of the latter⁷¹.

Other questionnaires

There are a number of other scales which have been used to measure psychological functioning in cardiac patients, including the Zung Self-Rating Depression Scale⁷²¹, the Center for Epidemiological Studies-Depression Inventory (CES-D)⁷²², the IPAT Anxiety Questionnaire⁷²³ and the IPAT Depression Questionnaire⁷²⁴.

Visual Analogue Scales (VAS)

Visual Analogue Scales⁷²⁵ are a simple method of measuring psychological states, such as anxiety, depression and denial. Visual Analogue Scales typically consist of 10 centimetre lines, anchored at both ends with words descriptive of the maximal and minimal extremes of the dimension being measured. The subject is required to indicate his or her feelings by marking the line at the appropriate point between the two extreme statements (for example, “I have never felt happier” to “I have never felt more miserable”). Visual Analogue Scales are also used to assess self efficacy and perceived level of fitness or physical symptoms such as pain level. They are particularly useful in monitoring changes in individuals over time. Like other measures, they have some weaknesses (such as the tendency for scores to cluster) but they are simple and speedy to complete and have been established as valid and reliable in a range of clinical and research applications. They are usually used for self assessment but they can also be useful for observer ratings.

Measures of other psychosocial outcomes

Other outcomes relevant to cardiac rehabilitation include social, occupational, marital and sexual adjustments. Few measures in these areas have been specifically developed for studies of cardiac patients. However, interview-based instruments, such as the Structured and Scaled Interview to Assess Maladjustment (SSIAM)⁷²⁶ and the Social Adjustment Scale (SAS)⁷²⁷ have been modified and administered to cardiac patients to enable a more detailed investigation of these dimensions of recovery⁹⁶. Another instrument used in past research with cardiac patients includes the Life Experience Survey⁷²⁸, which measures perceived stress.

Patients’ perceptions of outcomes can also be quantified without using numerical scales. For example, patients can assess their usual sexual activity as “better than”, “worse than” or “the same as” before their cardiac event. Similarly, patients’ perceptions of their physical, psychological or overall recovery can be classified as “total”, “almost”, “partial” or “not at all”⁹⁶.

Selecting methods of assessing quality of life

Selecting instruments to measure quality of life and other psychological and social outcomes can be difficult. While brevity and ease of administration and scoring are important considerations, other important criteria include the need for instruments to be easy to understand; responsive (sensitive to changes); valid (measuring the characteristics desired); clinically relevant (providing meaningful data) and reproducible (producing the same results when repeated or when administered by different team members). Further, instruments selected must be able to detect any changes in affect or quality of life. Some questionnaires may be unsuitable because they were intended only for screening purposes.

Generic HRQL tools (eg NHP, SIP) are useful in that they enable comparisons to be made between different populations and between interventions so that cost effectiveness of an intervention can be demonstrated. A potential disadvantage of generic tools is that they may be unresponsive to small disease-specific changes in quality of life which might have clinical significance. In this respect, instruments specifically designed for cardiac patients may be more appropriate.

However, according to Oldridge⁶⁹⁶, good outcomes measurement requires the use of both generic and disease specific measures, since a range of information is required. Generic and specific HRQL measures provide complementary types of information. Thus, no single outcome measure will suffice.

The significant limitation of administering psychological questionnaires to cardiac patients which were originally developed for other populations has already been noted. Because instruments such as these were originally standardised on psychiatric patients, many items are unsuitable and address a wide range of psychopathology which is irrelevant to medically ill patients. Cardiac patients do not typically experience problems of psychopathology but feelings of disability and diminished well-being. Nevertheless, instruments such as the BDI⁷¹⁸ and the 567-item Minnesota Multiphasic Personality Inventory (MMPI)⁷²⁹ have been frequently used in the past to investigate outcomes of cardiac patients, possibly because they were well-known questionnaires. The BDI continues to be used to assess depression in cardiac patients. The failure of many studies to demonstrate improvements in quality of life from cardiac rehabilitation may possibly be attributable to the use of inappropriate instruments such as these.

Psychological scales administered to cardiac patients need to measure affective responses commonly experienced after an acute cardiac illness, such as a sense of loss (for example, loss of energy, interest or optimism), and must be able to detect any subtle changes in affect. As discussed in Chapter 13, depression in cardiac patients is more akin to a bereavement reaction than to a depressive illness and is usually subtle and transient. Measures focusing on common problems such as feelings of disability, loss and impaired well-being may be more appropriate than traditional measures to provide evidence for the psychological benefits of cardiac rehabilitation.

An important practical consideration in deciding how best to assess quality of life in cardiac patients is the applicability of the method to various subgroups of patients. Patients with little English find it difficult or impossible to complete many of the above self-report inventories. Few are currently available in other languages. Moreover, many commonly used inventories contain jargon, complex wording and colloquial expressions which can confuse patients with lower levels of education. Even relatively brief questionnaires can be an ordeal for some older patients. Other patients simply do not enjoy completing questionnaires of any kind and consequently

may not answer questions properly. Thus, outcome assessment based on self-report questionnaires may exclude many patients.

Although more time-consuming, a brief interview may be a more suitable method of assessing quality of life in such patients. Responses to open-ended questions asked during interviews can provide important insights into patient attitudes and add meaning to the quantifiable responses collected via structured self-report questionnaires.

While quality of life instruments are becoming increasingly accepted as useful assessment tools and suitable outcome measures in cardiac rehabilitation, further research is needed to provide guidance regarding the suitability of particular questionnaires. Further, data are required to determine whether the instruments outlined above are valid and reliable measures in specific groups of patients, such as older patients, those who have undergone coronary angioplasty and those with multiple diseases.

It is most important to explain the purpose of the questionnaires to patients and to establish rapport with them beforehand to increase their motivation to complete the questionnaires satisfactorily. Staff training in administering questionnaires and checking responses is essential.

Knowledge

While increased knowledge may not lead to favourable behaviour change, it can decrease anxiety and give patients a greater sense of control over their progress. Knowledge has been used as an outcome measure of cardiac rehabilitation in several studies, as discussed in Chapter 12. However, few studies have used validated instruments to assess knowledge. Two such knowledge questionnaires are the Cardiac Health Knowledge Questionnaire³⁸⁹ and the Coronary Angioplasty Risk Factor Inventory (CARFI)⁷³⁰. Both questionnaires have been used in recent studies of cardiac patients^{731,732}. The Victorian Cardiac Rehabilitation Questionnaire (VCRQ)⁷³³ includes items which assess knowledge, as well as behaviour change and attitudes towards behaviour change.

Cardiac Health Knowledge Questionnaire

The Cardiac Health Knowledge Questionnaire³⁸⁹ comprises three subscales: the Basic Cardiac Health Knowledge scale (30 items) investigating knowledge of the functions of the cardiovascular system and the pathogenesis and manifestations of coronary heart disease; the Cardiac Lifestyle Knowledge scale (15 items) covering behavioural aspects in the aetiology of coronary heart disease and in rehabilitation; and the Cardiac Misconceptions scale (10 items), which assesses awareness of common misconceptions about the consequences of a heart attack.

Coronary Angioplasty Risk Factor Inventory (CARFI)

The CARFI⁷³⁰ consists of 25 true-false, multiple choice or fill-in items and has three different forms for use before coronary angioplasty and at two follow-up assessments. The questionnaire provides two scores assessing knowledge of PTCA procedures and cardiac risk factors, together with an overall score totalling the two scores. The third form measures risk factor knowledge only.

Victorian Cardiac Rehabilitation Questionnaire

The Victorian Cardiac Rehabilitation Questionnaire⁷³³ provides multiple choice items to assess knowledge, health behaviours and symptom management. It is currently undergoing further development.

Open-ended questions

It is asserted by some that questionnaires containing multiple choice items provide a measure of recognition rather than recall. They may therefore be a less reliable method of measuring actual knowledge than open-ended questions which may be asked via self-report questionnaire or interview.

Risk factors and health behaviours

Achieving a reduction in modifiable risk factors (smoking, high cholesterol, high blood pressure, obesity and physical inactivity) is a primary goal of cardiac rehabilitation and secondary prevention programs.

Smoking

Current smoking status should be recorded for all patients who have been smokers in the past. Measurement for the purposes of program evaluation is usually by patient self-report. Years of cigarette smoking, frequency of smoking and number of cigarettes smoked should be recorded. Because deception among smokers is not uncommon, confirmation may be sought from a family member. In rigorous studies, objective assessments of smoking status are usually obtained to corroborate self report, using physiological or biochemical measures of serum thiocyanate, expired carbon monoxide or salivary, urine or plasma cotinine levels.

Cholesterol

A fasting blood sample should be taken after the patient has rested for five minutes to provide a lipid profile (including total cholesterol, HDL cholesterol, LDL cholesterol and triglyceride levels). The cholesterol level recorded immediately upon admission to hospital is regarded as the most accurate baseline measure. Measurements made soon after the acute event may not accurately reflect the patient's lipid profile because of the effect of the event upon lipid levels. A further measurement should be made after three months. Total cholesterol levels of patients may be grouped as follows: <4.5 mmol/L (desirable); 4.5 to 5.4 mmol/L (acceptable); 5.5 to 6.4 mmol/L (raised);

>6.5 mmol/L (high). The aim for all patients should be to achieve a lower level of cholesterol.

Blood pressure

Systolic and diastolic blood pressures should be measured while the patient is seated after resting for five minutes. This should suffice for routine measurements.

Ambulatory monitoring of blood pressure may be utilised for special purposes.

Systolic blood pressure may be categorised as follows: <130 MmHg (normal); 130–139 MmHg (acceptable); 140–149 MmHg (borderline); and >150 MmHg (raised).

Body weight

Body mass index (BMI) is calculated by dividing the patient's weight (kgs) by height (metres) squared. Abdominal girth and hip waist ratio should also be measured. A BMI < 20 is classified as underweight; 20–25 as normal; >25–30 as overweight; and > 30 as obese⁷³⁴.

Physical activity

Physical activity is typically assessed by self-report because of the impracticality of monitoring patients' leisure time activities. Physical activity may be investigated by assessing the frequency of walking, including the duration and time taken for each walk⁷³⁵ and other activities such as gardening, housework and dancing. Categories such as "very active", "moderately active", and "inactive" may then be assigned. Scales designed to measure physical activity in the general community are usually unsuitable for older cardiac patients. An appropriate instrument to assess and quantify physical activity in such cardiac patients needs to be produced. The Specific Activity Questionnaire⁶⁸⁷ is a useful measure of perceived ability to undertake specific physical activities.

Dietary habit

Commonly used tools for measuring dietary intake are diet histories, weighed food intake records and 24 hour dietary recall. However, these methods can be time consuming. Questionnaires recording the frequency with which the listed foods are eaten are preferable. The Short Fat Questionnaire⁷³⁶ is a brief 17 item self-report questionnaire developed in Australia which measures dietary saturated and unsaturated fat intake and provides a total score. However, no questions are included to assess consumption of low fat alternatives. Additional questions may be asked to assess the consumption of other foods.

Adherence to medication and advice

As previously noted in Chapter 13, nonadherence to medication is associated with higher death rates^{497,498} and is thus an important marker of adverse outcomes.

Methods used in clinical trials to monitor adherence to medication regimens, such as pill counts, are usually not feasible in a rehabilitation setting. Thus, it is necessary to

rely on patient self-report. However, satisfactory correlation has been shown between self-reports of adherence and pill counts⁷³⁷. Patients may be asked, either during interviews or via self report questionnaires, whether they always take their medication exactly as prescribed, or whether they occasionally or regularly fail to follow the prescribed advice. However, the manner in which patients are asked about adherence to advice will largely determine the validity of their responses. More valid responses are likely to be obtained during semistructured interviews with a trained interviewer. Patients may be broadly classified as “totally compliant”, “partially compliant” or “not at all compliant” with advice regarding their medication. Adherence to other regimens (such as advice to lose weight, stop smoking or increase physical activity) can be similarly classified. Nevertheless, it should be emphasised that it is difficult, if not impossible, to give global measures of adherence or nonadherence. Most cardiac patients are placed on a number of regimens, adhering to some but not to others. Further, they may adhere for some, but not all, of the time to particular regimens³⁰⁹. Patients should always be asked to explain their reasons for not adhering to advice.

Attitudes towards behaviour change

Behaviour change is a process, as emphasised in earlier chapters. A four to six week program of cardiac rehabilitation may not be sufficient to achieve actual changes in health behaviours. A longer follow-up (for example, after three, six and 12 months) is usually required to assess behavioural outcomes. Nevertheless, it is important to assess the effectiveness of cardiac rehabilitation upon intention to change, attitudes towards change and self-efficacy (or confidence) in making changes. A number of studies of cardiac patients have measured these outcomes in relation to behaviours such as smoking, making dietary changes, losing weight and becoming more physically active, although the relationship between patient attitudes and such behaviours is not yet well defined.

Intention to change

The strength of intention to adopt a new health behaviour, such as starting a regular walking program, may be simply measured using a self rating scale containing several points ranging from “extremely likely” to “extremely unlikely”⁷³⁸.

Attitude towards change

A similar approach may be used in assessing which stage of change the patient has reached in changing a particular behaviour, such as stopping smoking. Using statements based upon the Prochaska and diClemente model of behaviour change⁴⁸⁵, patients may be offered a choice of five statements ranging from “I have no thought of stopping” to “I’m definitely taking action to stop” smoking.

Self efficacy regarding change

A similar approach may be used to measuring how confident or certain the patient is about stopping smoking by asking whether the patient is “very confident”, “quite confident”, “not very confident” or “not at all confident”⁷³⁹.

Work

It is important to record occupational outcomes of patients who were in the workforce before their cardiac event. Patients should be contacted after six and 12 months to determine whether or not they have resumed work, changed or modified their jobs and remained in the workforce. Time of return to work (number of weeks since the acute illness or entry to the program) should also be recorded. A more comprehensive evaluation of occupational outcomes should include investigation of how well the patient has adapted to work after resuming. Occupational adjustment is best assessed by interview, using semistructured questions such as those contained in a modified version of the SSIAM⁷²⁶ which was recently used in an Australian trial involving cardiac patients⁹⁶.

Outcome indicators

The following are suggested outcomes and outcome indicators to use in evaluation of cardiac rehabilitation and secondary prevention programs. However, it must be emphasised that it would be difficult, and indeed unnecessary, to attempt to assess all these outcomes and outcome indicators for all patients attending programs. The extent of assessment will depend upon the particular population of patients, the purpose of the evaluation and the resources available to conduct the evaluation. It may be considered appropriate to assess outcomes of a consecutive series of patients attending over a specified period. Given the complex issues involved in comprehensive program evaluation, advice from experienced researchers should be sought regarding sample size, methods of data collection and data analysis.

The following outcome indicators apply to patient evaluation at the end of the program. However, they may also be used for longterm evaluation after six or 12 months. These indicators need to be tested and modified in the light of their usefulness.

It should be noted that the recommended cutpoints for cholesterol and blood pressure change with time, with lower levels now being recommended than in the past. They are currently under review by many bodies. Appropriate levels depend to some extent on the age and gender of the patient.

Functional capacity

- Number (%) of patients whose functional capacity is assessed
- Number (%) of patients with increased functional capacity

Activities of daily living

- Number (%) of former drivers who resume car driving
- Number (%) of patients who resume their usual sexual activity
- Number (%) of patients who resume appropriate daily activities as specified at entry assessment

Physical status

- Number (%) reporting reduced angina/dyspnoea or other physical symptoms
- Number (%) reporting improved physical health

Quality of life

- Number (%) of patients whose quality of life is assessed
- Number (%) of patients reporting satisfactory physical functioning
- Number (%) of patients reporting satisfactory psychological functioning
- Number (%) of patients reporting satisfactory social functioning
- Number (%) of patients reporting satisfactory marital functioning
- Number (%) of patients requiring additional support referred for counselling

Knowledge

- Number (%) of patients whose knowledge level is assessed
- Number (%) of patients with improved knowledge

Risk factors, health behaviours and attitudes

Smoking

- Number (%) of smokers who stop smoking
- Number (%) of smokers who maintain nonsmoking status
- Number (%) of smokers who strengthen their intention to stop smoking
- Number (%) of smokers who are more confident about stopping smoking
- Number (%) of smokers who are more confident about maintaining nonsmoking status
- Number (%) of smokers taking active steps to stop smoking

Cholesterol

- Number (%) of patients who know their total cholesterol level
- Number (%) of patients whose cholesterol is measured by the GP or program staff
- Number (%) of patients with high cholesterol on cholesterol lowering diet
- Number (%) of patients with high cholesterol on medication

Blood pressure

- Number (%) of patients who know their blood pressure
- Number (%) of patients whose blood pressure is measured
- Number (%) of patients with high blood pressure on medication
- Number (%) of patients with high blood pressure whose blood pressure is reduced

Body weight

- Number (%) of patients who know their weight
- Number (%) of patients whose weight is measured
- Number (%) of obese or overweight patients who reduce their weight by >2 kgs
- Number (%) of patients who strengthen their intention to lose weight
- Number (%) of patients who are more confident about losing weight
- Number (%) of patients who are more confident about maintaining weight loss
- Number (%) of obese or overweight patients taking active steps to reduce weight

Physical activity

- Number (%) of patients whose level of physical activity is assessed
- Number (%) of patients who walk or who are physically active 30 minutes daily or on most days
- Number (%) of patients who strengthen their intention to increase physical activity
- Number (%) of patients who are more confident about increasing their level of physical activity
- Number (%) of patients who are more confident about maintaining their level of physical activity
- Number (%) taking active steps to increase their physical activity

Dietary habits

- Number (%) of patients whose dietary habits are assessed
- Number (%) of patients consuming less saturated fat
- Number (%) of overweight or obese patients who reduce their total daily caloric intake
- Number (%) of patients who strengthen their intention to change their dietary habits
- Number (%) of patients who are more confident about changing/ maintaining improved dietary habits
- Number (%) of patients taking active steps to change their dietary habits

Adherence to medication and advice

- Number (%) of patients whose adherence to each defined regimen is assessed
- Number (%) of patients defined as totally, partially or not at all compliant with each regimen

Work (paid employment)

- Number (%) of patients formerly in the workforce who resume work
- Number (%) of patients formerly in the workforce who resume within 3 months of the event or program entry
- Number (%) of patients with work difficulties who receive additional assistance from occupational therapist and/or receive a work visit after resuming work
- Number (%) of patients working at one year
- Number (%) reporting satisfactory occupational adaptation at work

Hospital readmissions

- Number of hospital readmissions during the 12 months since entry to the program
- Number of days spent in hospital during the 12 months since entry to the program

Process evaluation

It is essential to assess patient satisfaction with the program and to monitor the efficiency with which the cardiac rehabilitation program is delivered to patients.

Patient satisfaction

Patients should be asked whether they found the program beneficial and in which ways. Criticism of the program should also be sought, although it is most important that patients should be invited to make suggestions for improving the program, rather than soliciting criticisms per se. Most patients feel a sense of gratitude towards members of the rehabilitation team and will be reluctant to make open criticisms, even via a self-report questionnaire. Comments about specific components of the program should be sought, including the adequacy of information given and the areas where more information is desired. Feedback about the program duration, time of the program and other structural issues should also be requested. Patients should be asked for their feedback at the time of their discharge from the program. In addition, patients may be invited to comment about individual education sessions upon completion of the session.

Patient evaluation of programs is usually sought via an anonymous self-report questionnaire, because this method is considered to be both time efficient and conducive to more honest appraisals. Such questionnaires are generally produced inhouse and tailored to suit the particular program. The usual format is for boxes to be provided which patients are requested to mark to indicate their response. It is important to provide extra space so that patients can add any additional comments if they wish.

However, as already emphasised, many patients dislike filling in questionnaires or find them difficult to complete. An effective alternative approach is to conduct exit satisfaction surveys by telephone. Ideally, these should be carried out by a health

professional not closely involved in delivering the program. A questionnaire can be completed by the interviewer, which should include open-ended questions and probing questions to elicit as much information as possible about the patient's attitude towards the program. It is useful to seek feedback from patients after about three months following their discharge from the program when they are commonly more responsive and forthcoming about which of their needs were not adequately met by the program.

It is essential to obtain feedback from patients and to implement suggested improvements, where feasible. Feedback from patients who have dropped out of programs may be especially valuable. Patient evaluation of programs constitutes possibly the most important aspect of program evaluation.

Delivery of the program

Several recommendations regarding processes for program delivery were made in Chapter 17. In this chapter, process indicators are suggested which should demonstrate how well an individual cardiac rehabilitation program has achieved its goals in relation to program delivery.

Process indicators

Efficient delivery of cardiac rehabilitation services is reflected by careful attention to discharge plans and the timely completion of tasks concerning referral of patients to the program, entry and discharge assessments, attendance patterns, consumer input into evaluation, communication with doctors and documentation of the program content and staffing requirements. Other recommended practices, including making a range of modules available to suit the needs of particular patients, should also be assessed as part of program evaluation. The following are suggested as potentially useful quantifiable indicators. They are grouped according to whether they concern communication, patient management or program evaluation.

Communication

Program referrals

Timely forwarding of referral to program co-ordinator

Time between patient's discharge from hospital and receipt by program co-ordinator of referral by telephone and confirmed by facsimile or mail (timely = within three working days).

Indicator: Number (%) of patients whose referrals are received within three working days of patients' discharge from hospital

Timely response by co-ordinator to referrals:

Time between receipt of referral and initial contact with patient (by telephone/ facsimile/ mail or personal contact) to inform the patient that the referral has been received and to arrange initial assessment (timely = within three working days).

Indicator: Number (%) of patients for whom attempts to contact have been made within three working days of receipt of referral.

Timely documentation of entry assessment and agreed rehabilitation plan

Time from entry assessment to placing documented assessment and plan in the patient's rehabilitation file and forwarding hospital medical record (timely = within two working days).

Indicator: Number (%) of patients with a documented entry assessment and plan in the patient's rehabilitation file within two working days from the entry assessment, with a copy forwarded to the hospital medical record.

Timely documentation of discharge summary

Time between discharge review and placing of written discharge summary in the patient's rehabilitation file and forwarding the summary to the hospital medical record, documenting outcomes of the cardiac rehabilitation program and follow-up arrangements (timely = five working days).

Indicator: Number (%) of patients with documented discharge summary in the patient's rehabilitation file within five working days from discharge review, with a copy forwarded to the hospital medical record.

Liaison with general practitioners

Good communication between the cardiac rehabilitation program co-ordinator and the patient's general practitioners (GP) is essential. The following indicators of effective communication with GPs are recommended:

Timely forwarding of entry assessment and plan to GP

Time from entry assessment to forwarding of entry assessment and plan to the GP (timely = within two working days).

Indicator: Number (%) of patients whose entry assessment and plan are forwarded to the GP within two working days from the entry assessment.

Timely forwarding of discharge summary to GP

Time from discharge review to forwarding of discharge summary to the GP (timely = five working days).

Indicator: Number (%) of patients whose discharge summary is forwarded to the GP within five working days from the discharge review.

Patient management

Assessment of patients

Timely entry assessment of referred patients

Time from receipt of written referral by program co-ordinator to the first meeting with the patient (and family member) for entry assessment (timely = within seven working days).

Indicator: Number (%) of patients assessed within seven working days of receipt of referral

Completion of discharge review

Completion of a discharge review including review of risk factors, medication, work plans, psychosocial functioning and, where possible, a graded exercise test. Follow-up arrangements should include details of medical appointments, advice regarding a maintenance program, community supports, plans for a review phone call and a telephone number the patient can call for further assistance.

Indicator: Number (%) of patients formally reviewed at discharge from the program

General practitioner follow-up

Patients should be encouraged to see their GP at appropriate intervals for follow-up after discharge from the rehabilitation program.

Timely follow-up by GP

Time between discharge review and appointment with GP (timely = within four weeks of the discharge review).

Indicator: Number (%) of patients who consult their GP within four weeks of completing the rehabilitation program.

Program evaluation

Program attendance

Every program should endeavour to improve its attendance and completion rates and to reach all its target groups. Patients should receive a written referral to the program and should attend soon after hospital discharge. The following indicators may be used to evaluate the effectiveness of the program in these respects.

- Number (%) of patients for whom a written referral to the program has been received before hospital discharge
- Number (%) of patients who first attend the program within 10 days of hospital discharge
- Number (%) of patients referred to the program who attend the program

- Number (%) of patients who complete the program (attending > two-thirds of available sessions)
- Number (%) of female patients referred to the program who attend the program
- Number (%) of female patients who complete the program (attending > two-thirds of available sessions)
- Number (%) of patients with limited English who attend the program or an ethno-specific program
- Number (%) of patients with limited English who complete the program (attending > two-thirds of available sessions)

Program modules

The characteristics of patients attending a program will depend on the location and size of the program and the availability of other services in the area. It has been recommended that programs contain separate modules to cater for the needs of different subgroups, particularly those who often fail to attend available programs, such as those who have undergone coronary angioplasty, younger patients and those with a limited command of English. It is also desirable to provide separate spouse groups. Recommended indicators in relation to program modules are as follows:

- Availability of appropriate sessions for patients who have undergone coronary angioplasty
- Availability of appropriate sessions for younger patients
- Availability of appropriate sessions for patients with limited English
- Availability of appropriate sessions for spouses or other family members

Consumer input

As discussed above, it is important to obtain feedback from patients about the program so that any weakness can be overcome. Indicators of consumer input may include the following:

- Number (%) given a patient satisfaction survey or participating in a telephone interview
- Number (%) completing a patient satisfaction survey or participating in a telephone interview
- Number (%) of dropouts who are contacted and asked for feedback

Participation of general practitioners

GP referrals to programs should also be encouraged and, where possible, participation of the GP in the rehabilitation program itself (for example, by facilitating one of the education sessions). The following indicators are recommended:

- Number (%) of patients referred to the program by GPs
- Number (%) of sessions in which GPs have participated

Documentation

Recommendations for best practice have been made regarding the availability of documented emergency procedures, program protocols and GP referral procedures. The following indicators should be used for benchmarking purposes:

- Availability of written emergency procedures
- Availability of written program protocol
- Availability of written referral procedures
- Systematic documentation of attenders, nonattenders and dropouts
- Written protocols for follow-up of attenders, nonattenders and dropouts

Staff issues

The following indicators pertain to recommendations made regarding the desirability of holding regular team meetings, employing appropriately qualified staff and encouraging further training:

- Occurrence of regular team meetings
- Employment of staff who have recognised professional qualifications
- Availability of opportunities for further training

Minimum data sets

Whereas evaluation may involve assessment of only some of the indicators listed above, all cardiac rehabilitation program co-ordinators should record a certain amount of basic information about all patients attending the programs. The development of a common minimum data set is important for the process of comparing programs, both for reporting requirements for funding and the future use of clinical indicators. The minimum data sets developed by the National Heart Foundation³⁸⁸ should be routinely collected. Additionally, the following should be recorded for each patient: employment status (ie whether the patient is in the workforce or not); current or most recent occupation (last paid occupation of those who have retired should be recorded so that occupation (either current or past) can be used as an indicator of socioeconomic status); and living arrangements (whether the patient lives alone - an indicator of possible social isolation).

- program ID
- date of birth
- home address postcode
- preferred language
- aboriginality
- country of birth
- date of entry to program
- principal diagnosis (ICD-9-CM)
- reason for dropout
- living arrangements
- patient ID (eg Medicare number or other unique identifier)
- gender
- marital status
- occupation (current or last)
- employment status
- date of hospital discharge
- additional diagnosis (ICD-9-CM)
- date completed program

The name of a relative or close friend not living with the patient may also be noted to facilitate later follow-up of patients who change their place of residence.

The following data concerning program delivery should also be collected:

- number of referrals
- number of patients who attend
- number of family members who attend
- number of major cardiac complications during the program
- number of minor cardiac complications during the program.

External audit or peer review

External audit or peer review of cardiac rehabilitation and secondary prevention programs is not yet practised in Australia but it is undertaken in some countries such as Germany⁷²¹. Such assessments involve benchmarking a selected program against other programs which represent best practice in the field. Process and outcome indicators such as those listed above are used to evaluate the adequacy of the program. The audit also involves investigating records of individual patients, whose identities remain anonymous to the review team, to confirm that the nominated patients have attended the stated number of sessions and undergone the rehabilitation program and assessments claimed. Results of such audits conducted in Germany are required by the health insurance commission.

Conclusion

This chapter has discussed several of the major issues involved in undertaking process and outcome evaluation. While program evaluation is critically important to achieve best practice, it should not consume a disproportionate amount of staff time. Expert advice should be obtained regarding appropriate methods of evaluation which best suit the needs of particular programs or the specific purpose of the proposed evaluation.

CHAPTER 19

COST, COST SAVING AND COST EFFECTIVENESS

Cardiac rehabilitation program costs vary throughout the world. Costs in Australia, New Zealand and the United Kingdom are similar, as the programs are similar. Canadian programs are somewhat more costly because of the greater exercise component. Programs in the USA are markedly more expensive because frequent sessions of high intensity exercise are the basis for the program, with consequent monitoring costs and prior exercise stress testing.

Victorian public hospitals

A costing has been undertaken at a major metropolitan teaching hospital in Melbourne, with a large medical and surgical throughput. At this hospital, the patient attendance rate after myocardial infarction and coronary bypass surgery is less than 50% of those eligible. This is a common feature worldwide. The exercise component of the program is of low to moderate intensity. Monitoring is by perceived exertion or heart rate without ECG or telemetry. Exercise stress tests and other tests undertaken upon patients enrolled in the program are not costed to the program, as they are not primarily undertaken to guide the rehabilitation program.

The cost of this cardiac rehabilitation program was calculated to be \$A44,784 overall in 1997 (personal communication). This cost covered the costs of 216 attending patients during the year. The program was based upon six weeks of group exercise and education, conducted once per week, with each session lasting for two hours (45 to 60 minutes of exercise, 45 to 60 minutes of discussion). There were 20 to 30 patients attending each group session, with an average of 24 patients, together with some family members. The cost was \$A207.33 per patient who attends the program, a cost of \$34.56 per session. However, the costing is for program delivery. It does not fully cover the costs of co-ordination, patient assessment and communication. The weekly mean program costs were calculated to be \$5,598.

It is not possible for this program to handle more patients without setting up a second parallel program. A second parallel program could be achieved at a lesser cost per patient, but at a significantly greater cost overall. It would, however, permit greater individual attention to patients. If the same number of patients were to attend twice

weekly for six weeks, again the cost per patient would be significantly increased, but it would be less than double the current cost.

The survey of model programs undertaken for these Best Practice Guidelines included the program at the above hospital⁷. The survey showed a similar degree of patient satisfaction with programs which were attended once, twice or three or more sessions per week. However, more patients who attended this once per week program considered that they would benefit from more contact with staff, more discussion time, more education, more social support and more exercise during the six week program. The implication is that the number of patients in each group was too great or, possibly, that a twice weekly program may achieve better satisfaction and, one assumes, greater benefits. In consequence, it may be reasonable to divide the single program into two parallel programs to reduce the number of patients attending each group session or to change to a twice weekly program. Either change would increase the overall cost towards \$400 per patient. Further research into costing, cost benefit and cost effectiveness is required in these details of program planning, content and implementation.

The possibility of extending the overall duration of the program to eight weeks or more remains open. However, the great majority of patients claim satisfaction with six weeks. Extending the program duration to eight weeks could lead to possible adverse effects for some patients (for example, reduced perception of recovery, financial stress, job loss). Longer duration of the program does not appear to be a preferred option.

Costs per patient in other programs vary from those discussed above. The major difference in cost per patient depends upon the number of patients attending each class, while salary costs per hour remain similar for the conduct of each class. Thus, an education class of 10 patients may lead to costs per patient approaching twice that in a program where there are 20 patients per class. Another factor influencing cost is the time spent by the program co-ordinator assuring patient referral and attendance and the entry and discharge assessments of each patient.

In one hospital-based program, patients attend for six weeks twice weekly for both exercise and education groups (personal communication). Between 300 to 360 patients attend this program each year. There are usually up to 20 patients in each of two exercise classes, who come together as a group of up to 40 patients for the education group session. While patients are thereby offered twice as much education time, the number of patients in the education group may reduce the desired interactive nature of the presentation. The overall cost of the program has been calculated at approximately \$90,000 per year, a cost of approximately \$300 per patient or \$25 per session per patient. This is likely to be as low a cost per patient as could be achieved, but this is because exercise groups are large and education groups are excessively large.

It appears reasonable to suggest a cost of \$250 to \$300 per patient for a six week program once per week, with two hour sessions (one hour of exercise, one hour of education), allowing for adequate time to be devoted to each patient at entry assessment and during the program. Similarly, it would seem reasonable to suggest a cost of \$450 to \$500 per patient for a six week program, conducted twice per week for two hours, without sessions being overloaded by numbers.

As indicated above and in Chapter 8, there is good evidence that rehabilitation exercise programs conducted twice per week are as effective as those conducted thrice per week. Once per week rehabilitation exercise classes may be as effective as twice or thrice per week, provided a suitable home walking program is advised²⁰⁵.

There is no evidence to form an opinion regarding education classes being better conducted once per week or twice per week. There is a need for both sufficient exposure to information and sufficient opportunity for patient participation and understanding. As pointed out in Chapter 13, the benefits of interactive learning are greatest through small education groups. The size of the group and the skills of the facilitator may be more important for learning than the number and duration of classes made available to patients.

Thus, while smaller classes indicate greater cost per patient, it seems smaller classes may lead to better outcomes and consequent cost effectiveness than attempting to minimise costs per patient by having large numbers of patients per class.

Victorian private hospitals

Some private hospitals in Victoria conduct cardiac rehabilitation programs, each somewhat different from the others, but all meeting National Heart Foundation Minimal Standards (six sessions of exercise, six sessions of group education and discussion)⁷⁹. Patients who belong to appropriate health funds have cardiac rehabilitation included in the contract agreement between the fund and the hospital reimbursement for management of their acute myocardial infarction, coronary bypass surgery or percutaneous transluminal coronary angioplasty. If not covered in this way, patients may pay on a sessional (up to 2 hours per session) basis without reimbursement.

Incorporating all possible expenditure at one such hospital for eight two hour sessions gave a calculated cost (excluding return on investment) of \$347.06 per patient or \$43.38 per patient per session.

Canada

The 1997 Victorian public hospital cost (\$A34.56 per patient per attendance) and private hospital cost (\$A43.38 per patient per attendance) parallels the cost of a Canadian program in 1991 terms of \$Can 30.00 per patient per attendance⁷⁴⁰. In this

Canadian program, patients attend twice weekly for eight weeks, with a somewhat higher level of exercise and consequent additional monitoring but with significantly less educational component. The overall cost for that program was calculated to be \$Can 480.00 per patient.

United States of America

Programs in the USA are usually conducted at a higher intensity of exercise and are considered to necessitate electrocardiographic or telemetered monitoring, together with closer supervision of the exercise. Hence costs are greater. Cardiac rehabilitation programs classically involve three exercise sessions per week and extend over 12 weeks (a total of 36 sessions per patient). Additionally, exercise tests are usually undertaken to determine training heart rate. The cost of the 36 session cardiac rehabilitation program in USA has been well reported^{741,742}. The cost per patient has risen, together with other medical costs, from \$US 1,280.00 in 1985 to \$US 2,810.00 in 1995. (This cost includes the pre-requisite cost for an exercise stress test of \$180.00 in 1985 with equivalent rise in costs to 1995). The addition of cardiac rehabilitation to standard hospital and post hospital care of patients with myocardial infarction or coronary bypass surgery increases the overall episode cost by only 2 to 3%^{741,743}.

United Kingdom

A survey of a sample of cardiac rehabilitation programs in the United Kingdom undertaken in 1997 reported an overall mean program cost of £33,000, a mean cost per patient of £360 and a mean cost per patient per session of £47 (but with a median cost of £26)⁷⁴⁴. The wide range of costing was largely related to patient throughput and hours of patient contact time. Most programs provided were, in general, similar to those in Australia⁴⁹ with services provided primarily by physiotherapists and nurses, with relatively little input from physicians and psychologists. It has been noted that, while guidelines and audit standards have been recommended⁷³, there remain significant deficiencies in attendance patterns, procedures, process and program audit⁷⁴⁵. In particular, there appeared to be insufficient attention to patient education and knowledge, psychological, social, occupational issues and outcomes. Further attention to these issues would somewhat increase program costs. It is accepted that hospital-based outpatient ambulatory cardiac rehabilitation programs are desirable to achieve seamless rehabilitation, extending from acute hospital care into long term community follow-up⁷⁴⁶. It is also recognised that the community aspect of cardiac rehabilitation and follow-up requires development and testing to determine which types of programs are most likely to prove effective in maintaining longterm care, patient quality of life and secondary prevention⁷⁴⁶.

Comment

Costs of ambulatory cardiac rehabilitation programs conducted during convalescence vary between countries and between individual programs. The cost per patient clearly depends upon several factors. The most important of these are as follows:

- the number of sessions, each of approximately one hour of exercise and one hour of education (optimal 12 sessions in six weeks);
- the number of patients in each exercise group (optimal number 10–20 patients);
- the intensity of exercise and degree of monitoring (optimal monitoring by heart rate and rate of perceived exertion, not by technology);
- the number of patients in each education group (optimal number 10–20 patients plus family members);
- the cost of entry assessment (optimal duration half hour per patient);
- the cost of discharge assessment and program discharge review (optimal half hour duration excluding discharge exercise stress test which is optional);
- costs of co-ordination, referral, organisation and documentation.

Assessment of costs of programs similar to the above “optimal” program indicates approximately \$40 per patient per session. That would mean a cost per patient of \$480 for the 12 sessions extending over six weeks, each session lasting two hours in total.

These costs do not include the costs of the venue, equipment and overheads which are insignificant when compared with the above salary-based components. They also do not include costs for review of outcomes for patients, either by recall and face to face interview and checking or by telephone.

Further, the costing does not take into account the need for maintenance (phase 3) programs which should follow the ambulatory convalescent (phase 2) program. It should be noted that those programs showing the greatest cost savings have included both early ambulatory and maintenance programs. The cost of such maintenance programs is not adequately documented anywhere. Some model programs need to be established and evaluated. The evaluation should include a careful cost analysis.

Cost saving

Recommendation

Cardiac rehabilitation is recommended to produce significant direct cost saving through reduced hospital readmissions, hospital costs, disability pensions and support services, while improving quality and duration of life.

Strength of evidence = 2

The established benefits impinging on cost include reduced hospital readmissions^{160,740,743,747} and reduced death rates in the ensuing one to 10 years^{14,81,91}

greater work resumption with persistence in work for those in the workforce^{121,174,182,748} improved independent functioning and overall quality of life¹²¹.

Reduced hospital readmissions for heart failure and avoidance of transplantation amongst patients with congestive heart failure through participation in a cardiac rehabilitation program is definite²¹⁸. Removal of patients with stable angina pectoris from waiting lists for coronary artery bypass surgery is possible¹⁴⁷. Amongst patients after acute myocardial infarction, it is reasonable to accept the findings of multiple trials and of meta analyses^{80,81} that a mortality reduction of approximately 20% occurs over the next three years following participation in a cardiac rehabilitation program.

The most favourable assessment of cost saving through cardiac rehabilitation has been the careful economic analysis of the controlled study from Sweden¹⁶⁰. The saving in direct costs over the period of five years amongst men enrolled in the cardiac rehabilitation program was equivalent to \$US 12,000.00 per patient (in 1988 terms). There were significant savings in hospital costs through reduced recurrent events, hospital attendances and hospital readmissions. A greater number of men in the rehabilitation group remained in employment, reducing the payment of disability and unemployment benefits, with great savings to the national insurance fund. Additionally, there was a significant reduction in mortality, statistically significant after 10 years⁹¹. Indirect cost benefits, social benefits and quality of life were not analysed.

Cost effectiveness

Recommendation

Multifactorial cardiac rehabilitation is recommended as a cost effective use of medical care resources.

Strength of evidence = 2

The dollar cost per year of life saved (\$/LYS) has been calculated to be \$US 2,130/YLS in 1985, rising to \$US 4,950/YLS in 1995, the difference being driven by rising hospital and rehabilitation costs⁷⁴¹. Such a low level of \$/YLS places cardiac rehabilitation in the range of benefits similar to the \$/YLS achieved through coronary angioplasty for severe angina in patients with single vessel disease⁷⁴⁹ and conferring possibly greater benefits than coronary bypass surgery⁷⁴⁹, or treatment with simvastatin for secondary prevention for patients with coronary artery disease^{750,751}, while being inferior in cost effectiveness to counselling in smoking cessation^{749,752}.

An economic evaluation based upon cost utility in terms of dollars/quality adjusted life years saved (\$/QALYS) has been reported⁷⁴⁰. This study showed gains in \$/QALYS similar to other major accepted interventions in patients with cardiovascular disease.

CHAPTER 20

RECOMMENDATIONS FOR FUTURE RESEARCH

As indicated throughout these Guidelines, further research is needed in many areas, including the following:

Exercise training

- Comparison of outcomes of outpatient exercise rehabilitation programs with frequency once, twice or three times per week.
- Investigation of outcomes of outpatient exercise rehabilitation programs of different durations (eg 4,6,8,12 weeks)
- Further investigation of the safety and efficacy of resistance training in higher risk and other cardiac groups

Education, counselling and behavioural interventions

- Comparison of different educational and counselling interventions to increase knowledge in cardiac patients
- Investigation of the efficacy of education groups in cardiac rehabilitation of different sizes, frequency, duration and structure
- Development and evaluation of interventions to reduce weight in overweight and obese cardiac patients
- Evaluation of interventions to promote maintenance of physical activity and fitness in cardiac patients
- Evaluation of the effectiveness of behavioural interventions in improving health behaviours of patients who have undergone coronary angioplasty (including reducing smoking and weight and increasing physical activity)
- Investigation of relapse prevention methods for smoking cessation and weight reduction in cardiac patients
- Investigation of the determinants and patterns of non-adherence in different cardiac patient groups and the evaluation of interventions to increase adherence

Psychosocial interventions

- Development of interventions to support spouses of cardiac patients in hospital and during convalescence
- Investigation of the effects upon cardiac patients and their families of very early discharge of patients from hospital

- Evaluation of stress management programs in cardiac rehabilitation
- The development of effective interventions to improve psychosocial functioning of patients and spouses

Vocational rehabilitation

- Development and evaluation of interventions to increase return to work and improve occupational adjustment following acute cardiac events

Programs for specific groups

- Development and evaluation of cardiac rehabilitation programs for patients of non-English speaking backgrounds
- Development and evaluation of cardiac rehabilitation programs for Aboriginal patients
- Further development and evaluation of cardiac rehabilitation programs for rural and remote patients
- Development and evaluation of cardiac rehabilitation programs for patients who have undergone coronary angioplasty and stent implantation
- Development and evaluation of cardiac rehabilitation programs for patients with stable angina
- Development and evaluation of cardiac rehabilitation programs for patients with unstable angina
- Development and evaluation of cardiac rehabilitation programs for patients with significant co-morbidity
- Investigation of the processes of recovery and outcomes of female cardiac patients
- Investigation of the needs of children with congenital heart disease and their carers
- Investigation of outcomes of group exercise, education and counselling programs in heart failure patients
- Investigation of outcomes of group exercise, education and counselling programs for elderly patients
- Investigation of outcomes of group exercise, education and counselling programs in patients with implantable defibrillators
- Investigation of the effectiveness of cardiac rehabilitation programs in patients with congenital heart disease, rheumatic heart disease and other forms of heart disease

Organisational issues

- Development and assessment of the effectiveness of cardiac rehabilitation programs based upon modules
- Development and evaluation of strategies to increase participation of patients and spouses in cardiac rehabilitation programs

- Investigation of patterns of attendance at programs and identification of predictors of nonattenders and dropouts
- Development of community-based programs to meet the needs of patients at different stages of recovery
- Comparison of costs and cost effectiveness of different models for cardiac rehabilitation programs
- Investigation of shared care approaches to secondary prevention in cardiac patients
- Development and evaluation of strategies to improve communication with general practitioners following the discharge of cardiac patients from hospital and from cardiac rehabilitation programs
- Comparison of the effectiveness of cardiac rehabilitation group programs conducted through general medical practice with those conducted by multidisciplinary teams
- Investigation and definition of core competencies of members of cardiac rehabilitation teams

Evaluation

- Development of sensitive instruments to assess psychological, social, occupational and interpersonal functioning in cardiac patients
- Development of more sensitive physical activity scales for cardiac patients
- Development of more sensitive dietary scales for cardiac patients
- Development of instruments to assess compliance in cardiac patients
- Development of predictors of outcomes of cardiac patients, using in-hospital and convalescent data
- Development of multidimensional measures of quality of life in cardiac patients
- Investigation of the applicability of generic tools in cardiac populations
- Development and testing of key process and outcome indicators

Cost, cost saving and cost effectiveness

- Investigation of detailed current program costs
- Investigation of costs of suggested optimal program components
- Investigation of costs of suggested additional program modules
- Further study of cost savings and cost saving estimates, based upon computer modelled outcomes, determined by changed risk factor profiles, upon discharge from programs
- Cost effectiveness measures (\$/YLS and \$/QALYS) related to the effects of low cost, low technology programs of cardiac rehabilitation.

Others studies

- Investigation of the role of telephone follow-up and the use of telephonic networks to support cardiac patients, spouses and health professionals, especially in rural and remote areas
- Identification of effective components of multifactorial programs
- Further evaluation of simple low cost models of cardiac rehabilitation and secondary prevention applicable to Australia and other countries.

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GLOSSARY

ACE inhibitor (angiotensin-converting enzyme inhibitor)

A drug used in treatment of hypertension and heart failure.

Acute myocardial infarction (AMI)

A heart attack in which there occurs death of heart muscle due to blockage of a coronary artery.

Adherence

The continued maintenance of a prescribed or recommended behaviour, regimen or medication.

Aerobic exercise

Exercise in which there is repetitive movement of large muscle groups. This exercise leads to increase in the uptake of oxygen. Hence the term “aerobic”. The term has in the past been applied to high intensity exercise, but it has now been broadened to include any exercise that leads to increased oxygen uptake.

Ambulatory ECG (Holter recording)

A continuous record of the electrocardiograph during normal daily living, usually through a day or more.

Ambulatory cardiac rehabilitation program

An outpatient program conducted during early convalescence up to about three months after discharge from hospital. “Ambulatory” is preferable to the term “phase 2” to describe programs conducted during convalescence.

Aneurysm

A sac formed due to weakness in the wall of an artery, a vein or a heart chamber in which bulging or dilatation occurs.

Angina pectoris

Pain or discomfort in the chest due to inadequacy of blood supply to meet the demands of the heart muscle commonly during effort or emotion and which is eased by rest.

Angiography

The process whereby blood vessels are outlined using X-ray examination after injection of fluid which is opaque to X-rays.

Arrhythmia

Abnormal heart rhythm which may be permanent, intermittent or transient.

Atherosclerosis

The condition in which there occur plaques containing cholesterol and other materials which form in the inner linings of large and medium sized arteries, leading to localised thickening.

Behavioural intervention

Systematic instruction and learning of techniques and methods to modify health-related behaviours.

Best practice

Best practice refers to optimal standards of care, reflected in the achievement of the best possible outcomes, processes and structures. Best practice guidelines identify benchmarks for providing optimal health services, thus contributing to quality assurance. Implicit in the concept of best practice is the requirement that the recommended practices should be cost effective.

Beta blocker (b-adrenergic receptor blocking agent)

A drug which antagonises the effects of sympathetic stimulation, thereby producing a slower heart rate, lower blood pressure and reduced heart muscle contraction, leading to lessened oxygen demands of the heart muscle and, hence, decreasing angina pectoris.

Blood pressure

Pressure generated in the arterial system when the blood is driven by force from the main pumping chamber of the heart (the left ventricle). The systolic blood pressure is the highest pressure at the peak of ventricular contraction. The diastolic blood pressure is the lowest pressure when the ventricular muscle is most relaxed prior to the next contraction.

Cardiac arrest

Cessation of heart action due to ventricular fibrillation or ventricular standstill (cessation of all heart pumping activity and failed ventricular activity).

Cardiac catheterisation

Passage of a catheter into the heart through an artery or vein under X-ray control, used for cardiac diagnosis.

Cardiac mortality

Death due to heart disease, often expressed as percentage of death rates or rate of deaths per 100,000 of population.

Cardiomyopathy

Disease of the heart muscle commonly of unknown or obscure origin, not due to coronary heart disease, high blood pressure or valvular disease. The term, however, is sometimes used to explain heart muscle disease secondary to these known causes.

Cardiovascular disease (CVD)

All diseases of the heart and blood vessels. These include coronary heart disease, rheumatic heart disease, cardiomyopathy, hypertensive and other forms of heart disease and of blood vessel disease, including stroke.

Cardiovascular mortality

Death due to any disease of the heart and blood vessels.

Cholesterol

A fatty substance found in all animal tissue. It is a normal ingredient of all cells. It is transported in the blood, linked to a protein which makes it soluble in the blood (lipoprotein). High levels of cholesterol lead to deposition within the linings of the arteries, thereby producing atherosclerosis.

Chronotropic dysfunction

Reduced response of the heart rate to exercise or other stress. This impaired increment in heart rate response is most commonly found in patients after acute myocardial infarction and in elderly patients.

Client

A person receiving attention or advice from a professional practitioner. Thus, a physician's patient may also be a social worker's client. A term preferred by many when referring to a patient who has been discharged from hospital and is receiving attention or advice in a community setting.

Cognitive behaviour therapy

A psychotherapeutic approach used to change maladaptive behaviour through replacing dysfunctional and negative thoughts and beliefs with adaptive ones.

Comorbidity

A disease, disorder or disability which co-exists with other diseases or disabilities.

Compliance

Acceptance of, and adherence to, a prescribed or advised behaviour, regimen or medication. The terms "compliance" and "adherence" are sometimes used interchangeably.

Convalescence

The period of recovery from an illness, usually considered to be from hospital discharge to resumption of normal or acceptable functioning. In cardiac rehabilitation programs this has traditionally been between six to 12 weeks.

Coronary angiography

Technique whereby the coronary arteries are outlined by fluid which is opaque to X-rays.

Coronary artery bypass graft surgery (CABGS)

The bypassing of a narrowing or obstruction in a coronary artery. This may be by using a portion of a vein removed from the leg or elsewhere, by using an artery from within the chest wall (an internal mammary artery) or by using an artery from the forearm or elsewhere (a free arterial graft).

Coronary artery disease (CAD)

The condition in which there is atherosclerotic irregularity and narrowing within the coronary arteries due to atherosclerosis.

Coronary heart disease (CHD)

Heart disease resulting from the atherosclerotic narrowings of coronary artery disease.

Coronary occlusion

The process of obstruction or blocking of a coronary artery, usually by a blood clot (coronary thrombosis).

Cost benefit

The gain (by some measure of outcome) arising from a defined expenditure.

Cost effectiveness

The relative gain (by some measure of outcome) whereby the cost benefit of one form of intervention may be compared with another.

Counselling

Providing advice, support and consultation.

Didactic

An adjective describing the delivery of information in a formal lecture format.

Diuretic

A drug which leads to the passing of additional urine via the kidneys, used in the treatment of hypertension and heart failure.

Dyspnoea

Awareness of difficulty in breathing or the noticing of laboured breathing.

Echocardiography

The use of ultrasound to detect and record the structures and the motion of those structures and to measure cardiac chamber size, shape and wall thickness while also being used to assess movement of blood in the heart.

Education

Systematic instruction. This may be by free discussion, by structured interactive group work, by lecture or by visualisation or reading of information.

Ejection fraction

Measure of the pumping capacity of the left ventricle of the heart. It is the difference between the end-diastolic volume and the end-systolic volume of the left ventricle divided by the left ventricular end-diastolic volume.

Electrocardiogram (ECG or EKG)

A graphic record of the electrical activity of the heart obtained with an electrocardiograph.

Ergometer

Equipment such as a stationary cycle, treadmill or steps used to measure the amount and physiological effects of exercise.

Ergometry

The process of measuring the physiological effect of exercise.

Exercise test (stress test)

A test in which the patient exercises on a treadmill, cycle or other equipment for monitoring of heart rate, blood pressure, electrocardiogram or consumption of oxygen.

Exercise training

A program of repeated exercise undertaken at a guided or prescribed intensity and frequency over a period of time, usually several weeks. The exercise training is based upon so-called aerobic or dynamic exercise, designed to improve physical performance at both maximal and submaximal levels. Such exercise may be of low, moderate or high intensity. Exercise training may also include resistance training involving the use of muscular effort against resistance, with the aim of increasing muscular strength

Fibrillation

Extremely rapid irregular twitching of muscle resulting in atrial fibrillation or ventricular fibrillation.

Heart failure (congestive heart failure)

Failure of the heart to maintain adequate blood flow to the tissues, with retention of fluid and congestion of the lungs, legs or other parts of the body.

Heart rate

Number of heart beats per minute.

High density lipoprotein (HDL cholesterol)

A lipid and protein complex for transport of cholesterol, triglycerides and other fats from the tissues to the liver. (High levels are protective against atherosclerosis.)

Hypercholesterolaemia

Excessive elevation of the cholesterol level in the blood.

Hyperlipidaemia

Excessive level of cholesterol, triglycerides or other lipid fractions in the blood.

Hypertension

Abnormally raised blood pressure within the arteries (high blood pressure) .

Hypotension

Abnormally low blood pressure.

Implantable cardiac defibrillator

An electronic device which senses rapid ventricular tachycardia or ventricular fibrillation and then delivers an electric countershock to the heart to break the potentially lethal arrhythmia.

Interactive education

A process of teaching and learning through discussion and bidirectional questions and answers.

Ischaemic heart disease (IHD)

Commonly used as an alternative term to coronary heart disease implying that the coronary heart disease is symptomatic or overt, through angina pectoris, unstable angina pectoris, myocardial infarction or other measures of myocardial ischaemia.

Kilocalorie

A unit of energy. The energy required to raise the temperature of one litre of water by one degree Centigrade (also referred to as one Calorie which equals 1000 lesser calories).

Kilojoule

Unit of energy used as a measure alternative to Kilocalorie. One Kilojoule = 1000 Joules. One Joule is derived from an electrical unit- the amount of heat generated by a current of one ampère acting for one second against a resistance of one ohm. Used as a unit of available food energy or expended energy one Kilocalorie is approximately 4.2 Kilojoules.

Left ventricular function

The pumping function of the left ventricle, that being the high pressure chamber which pumps blood into the arterial circulation.

Lipid

Fatty substances, normally water insoluble, but made soluble through combination with protein molecules.

Lipoprotein

Complex of lipid and protein molecules which transport lipids (cholesterol and triglycerides) being soluble within the blood.

Low density lipoprotein (LDL)

Complex of lipid and protein molecules transporting cholesterol from the liver to the tissues. (High levels contribute to and worsen atherosclerosis.)

Maintenance program

A program which provides longterm support from the time of discharge from an ambulatory program. "Maintenance" program is preferable to the term "phase 3" program.

MET

Metabolic equivalent. A measure of oxygen uptake through the lungs. Levels of activity may be categorised in METs. One MET is the amount of oxygen taken up by a normal adult sitting at rest. It is equivalent to approximately 3.5mL of oxygen/kg/min.

Meta-analysis

The process whereby results of randomised clinical trials using similar design, with similar outcome measures from a similar intervention (or the same intervention) are aggregated to permit statistical analysis of large number of subjects.

Multidisciplinary

The application of, or pertaining to, or arising through, many professional disciplines.

Multifactorial

The application of, or pertaining to, or arising through more than one intervention conducted during the same period.

Myocardial infarction

The process of death or of damage to heart muscle, arising through coronary artery occlusion.

Myocardium

Heart muscle.

Myocardial ischaemia

Inadequate blood supply to the heart muscle.

Pacemaker

An electronic device which senses cessation of cardiac electrical impulse and introduces an alternative electrical impulse to induce cardiac muscle contraction.

Percutaneous transluminal coronary angioplasty (PTCA)

A procedure whereby a coronary artery stenosis is opened to enlarge the lumen in the artery through pressure applied from a balloon attached to an angioplasty catheter inserted into the coronary artery.

Radionuclide ventriculography (RNVG)

The assessment of chamber size (usually left ventricle) and performance by intravenous radioisotope injection.

Rate pressure product (double product)

The product of systolic blood pressure multiplied by heart rate. An index of cardiac work which is an indirect index of myocardial oxygen requirement.

Resuscitation

The process of restoration of consciousness or life in an unconscious or dying person. This is usually in the form of cardiopulmonary resuscitation (CPR).

Restenosis

The recurrence of narrowing of an artery occurring after the correction of the narrowing.

Revascularisation

The restoration of adequate blood flow usually to heart muscle. The commonest techniques for revascularisation are CABGS and PTCA.

Rheumatic heart disease

Diseases of the heart valves and heart muscle caused by rheumatic fever. Rheumatic fever occurs, in susceptible persons, through an abnormal response to infection, usually of the throat, with a particular bacterium (Group A, beta haemolytic streptococcus).

Risk factors

These are variables or states which are characteristically associated with an increased rate of subsequent disease.

Self-efficacy

Self-confidence or a belief that one is competent and able to achieve a desired goal.

Shared care

The delivery of co-ordinated health care by more than one health professional or group of professionals (eg physician, nurse practitioner and dietitian).

Stenosis

A narrowing within a blood vessel or other tube.

Stent

The open mesh tube inserted into an artery to hold the artery open following, or as part of, PTCA or other angioplasty.

ST segment displacement

A shift from the normal baseline of the ST segment in the electrocardiogram. This occurs during the period of repolarisation and is often an indication of ischaemia.

Tachycardia

Rapid heart action. This may be regular and normal (sinus tachycardia), arise from the atrium (atrial tachycardia, flutter or fibrillation), from the conducting system (supraventricular tachycardia) or from the ventricles (ventricular tachycardia).

Target heart rate

The heart rate to which one may aim during exercise training. It is usually derived from the peak rate achieved during a symptom limited maximal exercise test.

Thrombolytic therapy

Pharmacological intervention to dissolve blood clots within the vascular system. Streptokinase (SK) and tissue type plasminogen activator (TPA) are commonly used.

Triglyceride

Fat consisting of glycerol and three fatty acids.

Unstable angina

Chest pain which occurs at rest, is prolonged or appears abruptly for the first time, but which does not denote the occurrence of acute myocardial infarction.

Ventricular dysfunction

Abnormality of the pumping function of (usually) the left ventricle of the heart.

Ventricular fibrillation

Rapid irregular, totally inefficient chaotic contractions resulting in cardiac arrest (apparent cessation of heart action).

Ventricular tachycardia

Rapid heart action due to an abnormal rapid contraction pattern arising within the ventricles.

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CONSULTATIVE COMMITTEE

Mr Garth Birdsey

Pharmacy Department, Geelong Hospital, Geelong

Ms Therese Bowden

Castlemaine Community Health Centre, Castlemaine

Mr Tom Briffa

Exercise physiologist, NHMRC Clinical Trials Centre, Sydney, New South Wales

Mr Steve Bunker

Rehabilitation Manager, National Heart Foundation (Vic Div), Melbourne

Ms Peta Cadd

Co-ordinator, Community Care, Epworth Hospital, Melbourne

Ms Janet Compton

Manager, Physiotherapy Department, Alfred Health Care Group, Melbourne

Mr Raoul Copolov

Heartbeat Victoria Inc, Melbourne

Mrs Anne Cross

Cardiac Rehabilitation Co-ordinator, Bairnsdale Regional Health Service, Bairnsdale

Professor Peter Disler

Medical Director of Rehabilitation, Essendon & District Memorial Hospital,
Melbourne

Mr Don Ewart

Heartbeat Victoria Inc, Melbourne

Dr Elton Fagan

Cardiologist, Alfred Health Care Group, Melbourne

Dr Alan Goble

Cardiologist, Heart Research Centre, Melbourne

The positions listed are those held during the early stages of the project when meetings took place.

Mrs Suzanne Hooper

Cardiac Rehabilitation Co-ordinator, Knox Private Hospital, Melbourne

Dr Michael Jelinek

Cardiologist, St Vincent's Hospital, Melbourne

Dr Dianne Keenan

General practitioner, Northland Shopping Centre Medical Clinic, Melbourne

Ms Kathryn Kelly

Cardiac Rehabilitation Co-ordinator, The Royal Melbourne Hospital, Melbourne

Mr Leigh Kinsman

Clinical nurse educator, Bendigo Health Care Group, Bendigo

Dr Helen McBurney

Manager, Physiotherapy Department, La Trobe University, Melbourne

Dr Ian McDonald

Director, Centre for the Study of Clinical Practice, St Vincent's Hospital, Melbourne

Mrs Elaine Race

Research Co-ordinator, Heart Research Centre, Melbourne

Mr Robert Roe

Department of Learning Assessment and Special Education, Faculty of Education, The University of Melbourne, Melbourne

Ms Sally Stewart

Social Worker, Royal Melbourne Hospital, Melbourne

Ms Margarite Vale

Dietitian, St Vincent's Hospital, Melbourne

Ms Lynda Vamvoukis

Public Health Unit, Victorian Department of Human Services, Melbourne

Mr Bill Whitehead

National Director, Heart Support Australia, Echuca

Ms Paula Williams

Cardiac Rehabilitation Co-ordinator, Donvale Rehabilitation Hospital, Melbourne

Dr Marian Worcester

Director, Heart Research Centre, Melbourne

The positions listed are those held during the early stages of the project when meetings took place.