Healthcare Improvement Scotland

SIGN

SIGN 150 • Cardiac rehabilitation

A national clinical guideline

July 2017

Evidence

KEY TO EVIDENCE STATEMENTS AND RECOMMENDATIONS

LEVELS OF EVIDENCE

1^{++}	High-quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1^{+}	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1^{-}	Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2^{++}	High-quality systematic reviews of case-control or cohort studies High-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2^{+}	Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2^{-}	Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, eg case reports, case series
4	Expert opinion

RECOMMENDATIONS

Some recommendations can be made with more certainty than others. The wording used in the recommendations in this guideline denotes the certainty with which the recommendation is made (the 'strength' of the recommendation).

The 'strength' of a recommendation takes into account the quality (level) of the evidence. Although higher-quality evidence is more likely to be associated with strong recommendations than lower-quality evidence, a particular level of quality does not automatically lead to a particular strength of recommendation.

Other factors that are taken into account when forming recommendations include: relevance to the NHS in Scotland; applicability of published evidence to the target population; consistency of the body of evidence, and the balance of benefits and harms of the options.

R	For '**strong**' recommendations on interventions that '**should**' be used, the guideline development group is confident that, for the vast majority of people, the intervention (or interventions) will do more good than harm. For **'strong'** recommendations on interventions that **'should not'** be used, the guideline development group is confident that, for the vast **majority** of people, the intervention (or interventions) will do more harm than good.
R	For **'conditional'** recommendations on interventions that should be '**considered**', the guideline development group is confident that the intervention will do more good than harm for most patients. The choice of intervention is therefore more likely to vary depending on a person's values and preferences, and so the healthcare professional should spend more time discussing the options with the patient.

GOOD-PRACTICE POINTS

✓	Recommended best practice based on the clinical experience of the guideline development group.

NICE has accredited the process used by Scottish Intercollegiate Guidelines Network to produce clinical guidelines. The accreditation term is valid until 31 March 2020 and is applicable to guidance produced using the processes described in SIGN 50: a guideline developer's handbook, 2015 edition (**www.sign.ac.uk/sign-50.html** More information on accreditation can be viewed at **www.nice.org.uk/accreditation**

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Every care is taken to ensure that this publication is correct in every detail at the time of publication. However, in the event of errors or omissions corrections will be published in the web version of this document, which is the definitive version at all times. This version can be found on our web site **www.sign.ac.uk**

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Scottish Intercollegiate Guidelines Network

Cardiac rehabilitation

A national clinical guideline

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Contents

1 Introduction

1.1 THE NEED FOR A GUIDELINE

Although the incidence of coronary heart disease (CHD) is decreasing in Scotland, it is still a leading cause of illness and mortality, with an incident rate of 375 per 100,000 of the population in 2014/15. Incidence increases with age, with an incidence rate, in 2014/15, of 236 per 100,000 for those under 75 compared to 1,781 per 100,000 for the over-75 age group. In the last ten years there has been an improvement in 30-day survival following hospitalisation for a first heart attack from 85.2% to 92.3%.[1] As a consequence a growing number of people in Scotland are living with heart disease.

The Scottish Government refreshed its agenda for improving the management of heart disease in 2014, and among the priorities listed are the need to modernise cardiac rehabilitation (CR) services to include all diagnostic subgroups, and the development of self-management programmes for patients with heart disease.[2] The 2020 vision statement for cardiac rehabilitation in Scotland is:[3]

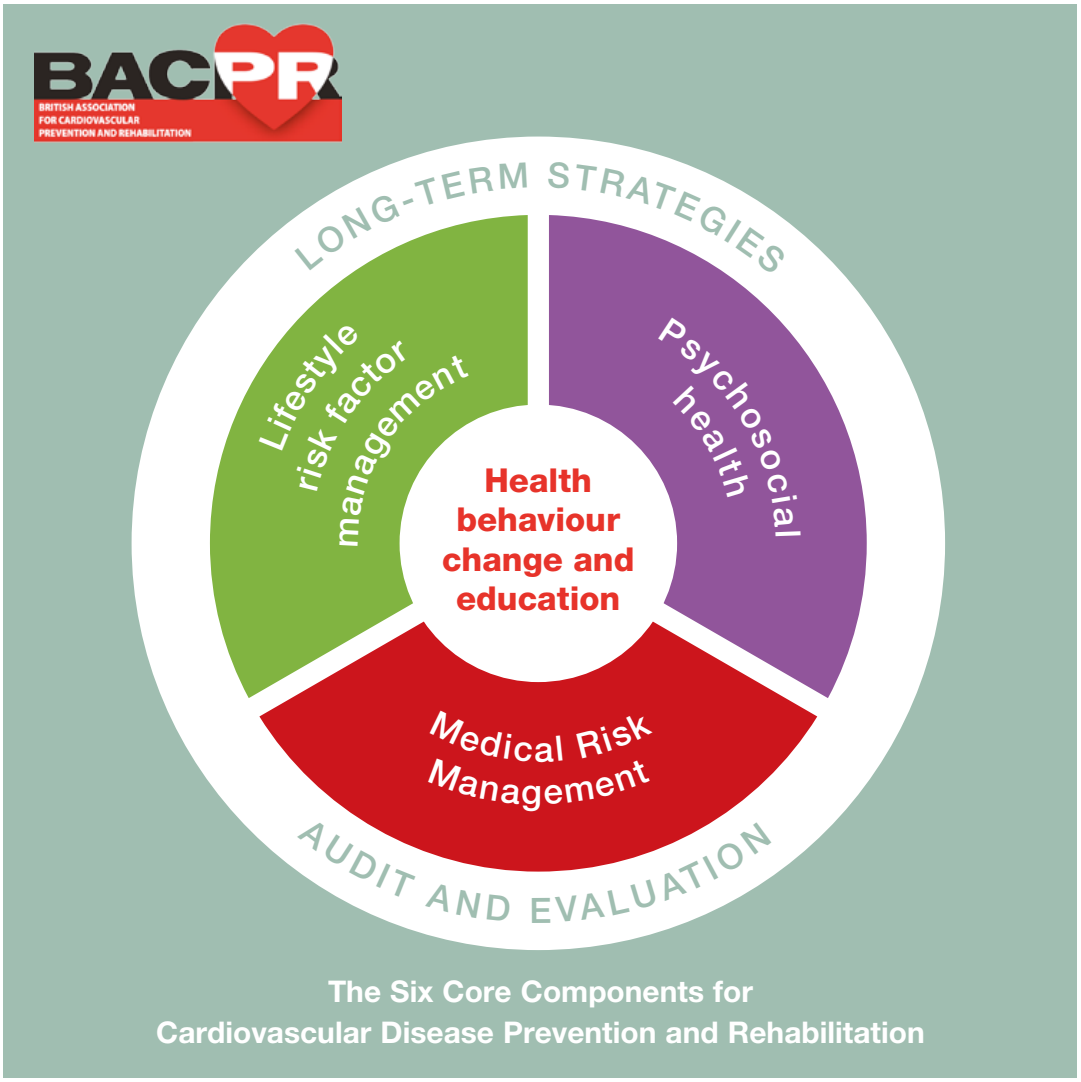
"CR will be delivered by an integrated, clinically competent, multidisciplinary team with a central focus on specialised assessment providing an individualised programme of care to improve patient outcomes."

The vision statement places greater emphasis than before on individual assessment of need by CR specialists and the delivery of a range of interventions tailored to the needs of the individual. It recognises that modern cardiac rehabilitation is primarily concerned with the psychological, behavioural and lifestyle implications of a diagnosis of CHD and how these can be modified with effective interventions. It reflects the CR pathway described in the British Association for Cardiovascular Prevention and Rehabilitation (BACPR) Standards and Core Components which replaces the old four phase model with a 0–6 stage pathway including individualised assessment and care planning.[4] The standards describe a biopsychosocial approach to CR in which the overall aim is to equip the patient with the necessary knowledge and skills to enable them to successfully self manage their condition to live a longer, healthier, and more independent life. The approach is centred on patient education using health behaviour change techniques, which are patient centred and sensitive both to patient need and preference. Identifying health beliefs and correcting misconceptions through patient education is the key to this approach. Three further areas of intervention are highlighted: lifestyle risk factor management, psychosocial health, and medical risk management, with the focus on long-term strategies. The core components are outlined in Figure 1.

SIGN published its first cardiac rehabilitation guideline in 2002 (SIGN 57). The guideline reviewed the evidence for what was then called 'comprehensive rehabilitation'. This term was used to define the prevalent model of cardiac rehabilitation which consisted of two components, exercise and education. The focus was therefore on these two elements and on the evidence for efficacy in various subgroups of patients with CHD. While CR meets the definition of a complex intervention, with studies including some or all of the elements described in the BACPR pathway, systematic reviews have concluded that the reduction in cardiovascular mortality associated with attending CR can be attributed to the exercise component.[5,6] The trials used to reach this conclusion involved predominantly middle-aged men who had sustained a myocardial infarction (MI). Nevertheless, they have led to the view that exercise is a compulsory element of CR. There is no comparable evidence for the efficacy of smoking cessation or dietary intervention within CR. Implicit in an individualised patient-centred approach to CR, however, is that equal importance should be placed on all lifestyle risk factors, based on an individual assessment of need.

The pathway described in the BACPR Standards and Core Components is achievable but aspirational and the concept of individualised assessment and delivery of CR differs significantly from reality as teams struggle to move away from existing delivery models to resource a model which is potentially more complex to implement. It therefore seemed likely that the evidence available for this novel approach within a CR setting would be limited, and that evidence from the wider CHD literature and beyond would need to be considered. Highlighting the need for further research within CR has therefore assumed greater importance in this guideline.

Figure 1: BACPR core components for cardiovascular disease prevention and rehabilitation[4]



Reproduced from: British Association for Cardiovascular Prevention and Rehabilitation (BACPR). The BACPR Standards and Core Components for Cardiovascular Disease Prevention and Rehabilitation London: British Cardiovascular Society; 2017, **www.bacpr.com**

1.2 REMIT OF THE GUIDELINE

1.2.1 OVERALL OBJECTIVES

This guideline provides recommendations based on current evidence for best practice in the rehabilitation of patients with heart disease. It reflects existing standards, recommendations, and practice by including all patients with heart disease regardless of primary diagnosis, clinical condition, comorbidity, or stage of disease.

Therefore the primary objectives of the guideline are to:

- identify evidence-based approaches for the delivery of the model of CR described in the BACPR Standards and Guidelines and the Scottish Government 2020 Vision[4,7]
- identify evidence-based strategies for implementing the recommendations for lifestyle risk factor modification set out in the guideline SIGN 149: Risk estimation and the prevention of cardiovascular disease[8]
- provide greater emphasis on long-term self-management strategies
- promote further research in CR where evidence is lacking.

The group also considered the implications of government policy in relation to greater integration of services and partnership working. The guideline is not only forward looking in relation to the BACPR pathway, but outwardly looking in considering questions such as the role of non-NHS organisations in delivering dietary interventions. The recommendations in the guideline can only reflect the key questions considered *(see Annex 1)* and as such there are inevitably areas where a recommendation cannot be made. For example, the group did not consider the question of timing of the assessment but rather supported the BACPR view that earlier assessment is logical if CR is to impact on hospital readmission rates.[4] It was also considered that this model of CR might be delivered in a range of settings so the evidence comparing one setting with another was not addressed.

1.2.2 DEFINITIONS

The BACPR defines cardiac rehabilitation as:

"The co-ordinated sum of activities required to influence favourably the underlying cause of cardiovascular disease, as well as to provide the best possible physical, mental and social conditions, so that the patients may, by their own efforts, preserve or resume optimal functioning in their community and through improved health behaviour, slow or reverse progression of disease".[4]

The term 'cardiac rehabilitation' is widely accepted to encompass the processes described in this definition, but is itself a dated and potentially misleading term. It was established at a time when patients were hospitalised for long periods after MI or cardiac surgery, advised to rest for several months, and in need of carefully monitored exercise-based rehabilitation to enable them to return to normal activities. The majority of patients with CHD no longer need rehabilitation in the traditional sense of the word, but benefit from a holistic, person-centred approach to their care, which imparts knowledge and understanding of their condition and its implications, and provides lifetime skills to assist in self managing this long-term condition. This guideline is based on such an approach and utilises the available literature on long-term conditions in making its recommendations. It was, however, beyond the remit of the guideline to recommend changing the term 'cardiac rehabilitation' to one which better reflects current practice.

This guideline was developed as part of a programme to review all SIGN CHD guidelines.[8-10] Patients attending CR include many with alternative diagnoses including valvular disease, cardiomyopathy, and dysrhythmias. Where the guideline refers to 'patients with heart disease' or 'patients in cardiac rehabilitation' it reflects the evidence and practice in relation to CR for all diagnostic groups. Specific patient groups are discussed when they are the focus of a trial, however, because the evidence is related to behavioural change, it is feasible to extrapolate interventions to the wider CHD population.

1.2.3 TARGET USERS OF THE GUIDELINE

This guideline will be of interest to cardiologists and physicians, dietitians, exercise professionals, general practitioners, health service managers, primary and secondary care nurses, occupational therapists, patients, pharmacists, physiotherapists, psychologists, specialist nurses, academics, third-sector organisations and other healthcare professionals working with patients with cardiac disease.

1.2.4 PATIENT VERSION

A patient version of this guideline is available from the SIGN website, **www.sign.ac.uk**

1.3 STATEMENT OF INTENT

This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results.

The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at through a process of shared decision making with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient's medical records at the time the relevant decision is taken.

1.3.1 INFLUENCE OF FINANCIAL AND OTHER INTERESTS

It has been recognised that financial interests in, or close working relationships with, pharmaceutical companies may have an influence on the interpretation of evidence from clinical studies.

It is not possible to completely eliminate any possible bias from this source, nor even to quantify the degree of bias with any certainty. SIGN requires that all those involved in the work of guideline development should declare all financial interests, whether direct or indirect, annually for as long as they are actively working with the organisation. By being explicit about the influences to which contributors are subjected, SIGN acknowledges the risk of bias and makes it possible for guideline users or reviewers to assess for themselves how likely it is that the conclusions and guideline recommendations are based on a biased interpretation of the evidence.

Signed copies of declaration of interests forms are retained by the SIGN Executive and a register of interests is available in the supporting material section for this guideline at **www.sign.ac.uk**

1.3.2 HEALTH TECHNOLOGY ASSESSMENT ADVICE FOR NHSSCOTLAND

Specialist teams within Healthcare Improvement Scotland issue a range of advice that focuses on the safe and effective use of medicines and technologies in NHSScotland.

The Scottish Medicines Consortium (SMC) provides advice to NHS boards and their Area Drug and Therapeutics Committees about the status of all newly-licensed medicines and new indications for established products. NHSScotland should take account of this advice and ensure that medicines accepted for use are made available to meet clinical need where appropriate.

In addition, Healthcare Improvement Scotland reviews Multiple Technology Appraisals (MTAs) produced by the National Institute for Health and Care Excellence (NICE) and provides advice about their applicability in NHSScotland. If Healthcare Improvement Scotland advises that MTA guidance is applicable in Scotland, NHSScotland should take account of this and ensure that recommended medicines and treatment are made available to meet clinical need where appropriate.

NICE MTAs deemed valid for NHSScotland supersede extant SMC advice as they are generally underpinned by a larger and more recent evidence base.

2 Key recommendations

The following recommendations were highlighted by the guideline development group as the key clinical recommendations that should be prioritised for implementation.

2.1 ASSESSMENT

✓ All patients referred to cardiac rehabilitation should undergo an individualised assessment leading to a care plan and interventions specific to their needs.

2.2 LIFESTYLE RISK FACTOR MANAGEMENT

R **Patients in cardiac rehabilitation who smoke should be offered smoking cessation interventions which include contact for more than four weeks.**

R **Cardiac rehabilitation services should offer individualised exercise assessments, tailor the exercise component of their programmes to individual choice and deliver them in a range of settings.**

R **A range of strategies, including telephone follow up, educational tools, contracts, nutritional tools and feedback should be considered for patients in cardiac rehabilitation to enhance adherence to dietary advice.**

2.3 LONG-TERM MAINTENANCE OF BEHAVIOUR CHANGE

R **Psychoeducation** (goal setting, self monitoring) **should be considered for patients in cardiac rehabilitation to facilitate adherence to physical activity.**

2.4 PSYCHOSOCIAL HEALTH

R **Cardiac rehabilitation should incorporate a stepped-care pathway to meet the psychological needs of patients.**

R **Cognitive behavioural therapy should be the first choice of psychological intervention for patients in cardiac rehabilitation with clinical depression or anxiety.**

3 Referral, engagement and partner/carer involvement

3.1 REFERRAL

Improvements in treatments for patients with cardiovascular disease in recent years have led to shorter periods of hospitalisation for many patients following an acute cardiovascular event. It is more challenging therefore to ensure all eligible patients are referred to, and access, CR.

The number of people presenting to CR with associated comorbidities across a range of long-term conditions is increasing.[11] These individuals are likely to have increased contact with their general practitioner (GP), practice nurse and others in the primary care team. It would seem beneficial therefore for primary care teams to be able to refer patients to CR. No high-quality studies relevant to Scotland were identified on whether referral from a GP or practice nurse increases patient uptake of CR programmes.[12] Further research is required in this area.

3.2 ENGAGEMENT

Cardiac rehabilitation uptake rates remain suboptimal, and vary between conditions. For example an audit in England, Northern Ireland and Wales, reported uptake rates of 60% of patients following coronary artery bypass grafting (CABG), 58% of patients following percutaneous intervention (PCI) post MI and 39% of patients post MI without PCI.[13]

3.2.1 IMPROVING UPTAKE

A Cochrane review identified studies of various strategies for increasing uptake of CR. All of the included studies were of low quality.[14] The strategies which were associated with increased uptake in at least one trial are:

- structured telephone call/visit by a nurse/therapist after hospital discharge
- early appointments to CR
- motivational letters based on the theory of planned behaviour
- CR programmes tailored for women
- intermediate phase programmes (self management, instruction and exercise monitoring) for older patients.

1++

There is a lack of high-quality trials on improving CR uptake amongst hard to reach, or under-represented groups, such as older women or people from ethnic minorities.[15]

1+

3.2.2 MAINTAINING ENGAGEMENT

Results from trials of strategies to increase adherence to CR programmes are mixed.[14] Eight trials of low quality were identified. The interventions reported to be of benefit were:

- goal setting
- action planning
- using activity monitoring with daily diary entries.

1++

There is little difference between home- and centre-based CR in terms of the number of withdrawals from, or adherence to, the programme.[16]

1++

One randomised controlled trial (RCT) of motivational counselling was identified in patients with acute coronary syndrome (ACS) who were not planning to enrol in CR. The intervention consisted of nine sessions (eight of which were by telephone) with a physiotherapist trained in motivational counselling over the course of 12 months. Participants adhered to the intervention (lowest uptake 83% at 12 months), and there was a small improvement in physical activity (self reported and pedometer readings) compared to usual care.[17]

1+

Small observational studies found that participants who had higher self efficacy, a belief in personal ability to succeed, were more likely to participate in and sustain CR.[18-20] Patients with depression had lower exercise self efficacy at the start of CR than patients without depression, and showed significant declines in exercise after six months, suggesting patients with depression may benefit from self-efficacy training as part of their rehabilitation.[21]

3
2+

An RCT of a three-month CR programme with an additional component which focused on enhancing self regulation for maintenance of lifestyle change (five two-hour group sessions and two two-hour follow-up sessions over 19 weeks) showed improvement in physical activity at six-month follow up.[22] There was no significant difference in dietary behaviour. A further RCT found that sending prompts by text improved self efficacy for leisure time activity by 13% but not for walking.[23] See section 5.3.1 for further information on the use of technologies and section 5.5 for interventions to encourage long-term maintenance of lifestyle change.

1++

R **Interventions to improve self efficacy should be considered for inclusion in a cardiac rehabilitation programme.**

3.3 PARTNER/CARER INVOLVEMENT

Partners or family members can influence rehabilitation participation, provide vital support in everyday life and may need help regarding their own well-being.[24] Qualitative interviews highlighted the need for involving patients in the support system following a cardiac event.[24] Carer and family involvement, however, should be with the patient's permission. Ethnicity and culture, access to information, and the caring responsibilities within households can differ, so CR programmes should be tailored to fit the needs of the individual within the context of their community.[25]

A cohort study reported increased anxiety levels when partners attended CR programmes with patients, particularly for female patients. The authors suggested that it would be more beneficial to design separate educational support groups for partners focusing on the problems they may encounter in coping with their partner's cardiac illness.[26]

2+

✓ Cardiac rehabilitation programmes should consider the contributions family members and carers can make to a patient's cardiac rehabilitation.

✓ Specific carer support groups could be considered to focus on the issues partners or carers may encounter in coping with their family member's cardiac condition.

✓ Cardiac rehabilitation programmes should be tailored to consider equality and diversity issues.

4 Assessment and care planning

4.1 INTRODUCTION

Cardiac rehabilitation programmes focus primarily on the impact of cardiac disease, yet a significant proportion of patients will have multiple health conditions. Cardiac rehabilitation teams are dealing with patients with cardiac disease and a wide range of comorbidities, with 30% of patients having diabetes, almost 20% having pulmonary disease, 18% having arthritis, 10% having chronic back pain, and 9% having cancer.[13]

In recent years rehabilitation programmes for patients with stroke, chronic obstructive pulmonary disease, pain, and cancer have followed the model first developed for patients with CHD. This raises the question as to whether a generic programme for patients with any long-term condition might be as effective as a single condition approach. No studies were identified that compared the outcomes of rehabilitation for patients with CHD enrolled in a generic rehabilitation programme with those enrolled in a programme for CR only. Nevertheless the audit data underlines the need for CR teams to take multimorbidity into account when assessing patients and planning interventions.

✓ Comorbidities should be taken into consideration in the assessment of patients attending cardiac rehabilitation to ensure a treatment plan which addresses all the long-term conditions that may be impacting on the patient's well-being.

4.2 INDIVIDUAL ASSESSMENT AND CASE MANAGEMENT

The BACPR recommends individualised assessment of need as the initial stage of CR.[4] This is also in line with the 2020 Vision for managing patients with long-term conditions.[4,7] Limited evidence was identified on models of individualised assessment.

One Scottish observational study found that individualised assessment and care did not increase initial referral rates but, once referred, attendance rates improved and the likelihood of hospital readmission and length of stay reduced.[27] **2+**

Case management is a collaborative process that assesses, plans, co-ordinates, and monitors the options and services required to develop and implement an individualised personal care plan to meet the patient's health and care needs and aid self management. Multidisciplinary input is required, and patients will have a case manager who is in regular contact with the patient and co-ordinates their care.[28-30]

Systematic reviews of studies using a case-management approach for patients with long-term health conditions, including some with heart disease, did not find case management reduced mortality and had little or no effect on morbidity, compared to usual care.[28,31] There were modest positive results for physical and psychological outcomes and small improvements in quality of life (QoL), satisfaction with care, and some self-management behaviours.[28,29,31] The studies within the reviews were rated as low or moderate quality. **2++ 1+ 1++ 2+**

Effectiveness was greater when the intervention was lengthy, intensive, the patient had regular face-to-face contact with their case manager, and the personalised care plan was integrated with their routine care.[28,31] As the approach involves shared decision making and individualised goal setting, the relationship between the case manager and the patient is likely to have an influence on the success of the self-management interventions.[28,31] **2++ 1+**

No cost-effectiveness evidence relevant to case management in the UK was identified. Further, higher-quality trials on cost and clinical effectiveness are needed before a recommendation can be made on the use of case management.

Models of psychosocial care are covered in section 6.2.

✓ All patients referred to cardiac rehabilitation should undergo an individualised assessment leading to a care plan and interventions specific to their needs.

5 Lifestyle risk factor management

5.1 INTRODUCTION

Supporting an individual to stop smoking, become more physically active, and make positive dietary changes are key components of CR programmes. The SIGN guideline on risk estimation and the prevention of cardiovascular disease highlights the potential benefits of each of these elements.[8] Traditionally CR programmes have been dominated by exercise, and consequently the mortality benefits of CR have been linked to the exercise component. Data regarding smoking status suggests that only 6% of patients are still smoking when recruited to CR, while around 1% stop during CR.[13] Change in dietary habit is not reported, but there is little or no change in the percentage of patients with body mass index (BMI) >30.[13] Only 52% of programmes in England, Wales, and Northern Ireland have access to a dietitian.[13] Data regarding the long-term success of programmes in achieving lifestyle change is lacking.[11]

✓ Cardiac rehabilitation programmes should place equal emphasis on each of the lifestyle risk factors when supporting patients to make lifestyle changes.

5.2 SMOKING CESSATION

A Cochrane review reported that psychosocial interventions have a positive impact on smoking cessation at six months (relative risk (RR) 1.22, 95% confidence interval (CI) 1.13 to 1.32).[32] Behavioural therapy, telephone support, and self help all had similar efficacy, although many trials included in the review used more than one approach. Efficacy was related to the overall duration of the intervention. Initial contact plus follow up of over one month was effective (RR 1.28, 95% CI 1.17 to 1.40) while single or multiple contacts with follow up of less than one month were ineffective (RR 1.01, 95% CI 0.91 to 1.12).[32] Another review reached a similar conclusion and suggested that there was evidence of continuing benefit at 12 months.[33] 1++

Telephone support interventions have also been found to be effective in increasing smoking cessation rates (RR 1.32, 95% CI 1.07 to 1.62) in a review where five of the six studies were in patients in a CR setting and the other was in patients who did not access CR.[34] 1+

In trials of interventions which begin in hospital and continue after discharge, only those with follow up of greater than one month were effective. This review included patients with a variety of conditions, including cardiovascular disease (CVD), and some patients using nicotine replacement therapy (NRT).[35] 1++

A systematic review of nurse-delivered interventions consisting either of advice to quit or of initial contact and additional support addressing benefits and barriers, teaching coping strategies, using self-help materials, and providing follow-up contact suggested a treatment effect even from less intensive interventions, although the confidence intervals were wide and included the possibility of no effect.[36] Studies included patients with CVD. Five trials that included a smoking cessation intervention from a nurse as part of a CR programme showed a significant effect (RR 1.35, 95% CI 1.14 to 1.59). Brief interventions from nurses who combine smoking cessation with other duties are less effective than longer interventions with multiple contacts, delivered by nurses with a role in health promotion and CR.[36] 1+

For patients on NRT, providing behavioural support either face-to-face or by telephone increased the chance of success by 10% to 25%.[37] 1++

R **Patients in cardiac rehabilitation who smoke should be offered smoking cessation interventions which include contact for more than four weeks.**

R **Smoking cessation interventions should include a combination of telephone contact, behavioural support, and self-help materials.**

5.3 PHYSICAL ACTIVITY AND REDUCING SEDENTARY BEHAVIOUR

Regular physical activity has both preventative and therapeutic effects on many chronic conditions including CHD.[38] **4**

The term 'physical activity' is defined as bodily movement which requires energy expenditure.[39] Exercise is a subcategory of physical activity that is planned, structured, repetitive, and aims to improve or maintain one or more components of physical fitness.[39]

All individuals should be advised to minimise the amount of time they spend sedentary, especially over extended periods and should aim to be active daily.[8] This should be in line with UK guidance *(see Annex 2)*.[38] Over one week, activity should add up to 150 minutes (2½ hours) of moderate-intensity activity in bouts of 10 minutes or more, or 75 minutes of vigorous-intensity activity. This can include occupational and leisure time activity and may be accumulated in bouts of activities such as brisk walking.[8] In addition it is recommended that all adults should undertake physical activity to improve muscle strength on at least two days a week.[38] **4**

Those who are moderately active and are able to increase their activity should be encouraged to do so and should incorporate regular exercise sessions.[8] **4**

An exercise component of CR reduces cardiovascular mortality, hospital admissions and improves health-related QoL, regardless of type of CHD, type of CR or setting.[5,40-42] There was no reduction in future MI, CABG or PCI.[40] Dose, intensity and delivery of exercise varied widely across studies. Benefit appears to be independent of a specific frequency, duration or intensity of exercise, or whether it takes place in a hospital, home or community setting.[40,41,43] **1++**

A Cochrane review reported that exercise-based CR for patients with heart failure (HF) reduces readmission rates (RR 0.75, 95% CI 0.62 to 0.92). While it had no short-term (<12 months) impact on mortality (RR 0.93, 95% CI 0.69 to 1.27) it may reduce mortality in the longer term (RR 0.88, 95% CI 0.75 to 1.02). These benefits are irrespective of the patients' age, gender or degree of left ventricular dysfunction.[43] For patients requiring left ventricular remodelling it is beneficial to start early (one week after MI) and maintain programmes for more than three months to improve ejection fraction, end-diastolic volume and end-systolic volume.[44] **1++** **1-**

Exercise training in patients with HF with preserved ejection fraction (HF-PEF) showed benefits in both cardiorespiratory fitness and QoL.[45,46] This was independent of frequency, duration and intensity of the exercise dose. **1+**

Aerobic and resistance exercises are recommended consistently in other evidence-based CR guidelines, with a variety of frequency and duration.[47] **4**

As there is no clear consensus on optimum dose or delivery, physical activity and exercise prescription should be on an individualised basis.

R **Patients should be offered a cardiac rehabilitation programme which includes an exercise component to reduce cardiovascular mortality, reduce hospital readmissions and improve quality of life.**

R **Cardiac rehabilitation services should offer individualised exercise assessments, tailor the exercise component of their programmes to individual choice and deliver them in a range of settings.**

R **Aerobic and resistance exercises should be considered as part of exercise prescription for patients attending cardiac rehabilitation.**

5.3.1 TECHNOLOGY-BASED EXERCISE

Mixed results have been reported for the efficacy of telehealth interventions to encourage exercise.[48,49] A patient-mediated programme based in Australia which included a one-hour initial consultation and multiple follow-up phone calls over three months, showed a significant reduction in total cholesterol (mean 4.0 ± 0.1 *v* 4.7 ± 0.1 mmol p<0.001), systolic blood pressure (mean 131.6 ± 1.8 *v* 143.9 ± 2.3 mmHg p<0.001) and BMI (mean 28.9 ± 0.7 *v* 31.2 ± 0.7 kg/m2 p=0.025).[48] Another Australian multicentre RCT which included telephone calls over a six-month period along with goal setting showed significantly greater reductions in total cholesterol (mean change 21 mg/dl (0.54 mml/l), 95% CI 16 to 25 mg/dl, *v* 7 mg/dl (0.18 mmol/l), 95% CI 3 to 11 mg) along with reduced body weight, BMI, dietary fat intake, saturated fat intake and anxiety levels.[48] The intervention had similar efficacy to traditional CR modalities so may provide an alternative choice for patients who prefer this approach or are unable to attend centre-based rehabilitation.[48,49] **2+**

An RCT of exercise prescription plus behavioural support by internet and text messages (4–6 text messages/ week for 24 weeks) in patients (mean age 60 years) with ischaemic heart disease reported no improvement in exercise capacity, but a significant increase in secondary outcomes of leisure time activity (diff 110 min/ week, 95% CI -0.8 to 221.3 p=0.05) and walking (diff 151.4 min/week, 95% CI 27.6 to 275.2 p=0.02).[50] **1++**

The use of pedometers by patients in CR resulted in improvements at six weeks and six months in total physical activity sessions (p=0.002 and p=0.016, respectively), walking minutes (p=0.013, 6 weeks only), and walking sessions (p=0.001 and p=0.035) in one small RCT.[51] **1+**

Use of exergames or active video games in patients over 50 after a stroke or HF increased physical activity from light to moderate, improved QoL, well-being and reduced depressive symptoms. Exergames are a safe intervention and were reported to be enjoyable by participants. Some technological literacy is required.[52] **2+**

Trials of internet-based interventions, such as online tutorial websites, in patients who were not planning to enrol in CR, or lived in remote and rural settings reported improved step counts and improved exercise capacity.[17,53,54] A community-based RCT in people with angina which offered a web-based rehabilitation programme with six-week follow up showed a mean daily step increase of 497 in the intervention group and a mean daily step decrease of 861 in the control group.[53] **1++** **1+**

The cardiofit internet-based expert system, based on online tutorial and designed to promote physical activity in patients with CHD through individualised physical activity plans showed significantly increased objectively measured physical activity levels compared to usual care at six-month follow up (mean daily steps 7,079 *v* 6,168) and at 12 months (mean daily steps 7,392 *v* 6,750, p=0.023) and significantly increased self reported physical activity levels compared to usual care at six-month follow up (mean moderate/vigorous activity mins/week 201 ± 153.2 *v* 163.4 ± 151.3) and at 12 months (mean moderate/vigorous activity mins/ week 201.4 *v* 169.6, p=0.047).[55] **1++**

In a four-month virtual CR programme in Canada the intervention group showed an increase in maximal time on a treadmill of 45.7 seconds (95% CI 1.04 to 90.48) over the 16 month intervention period compared to usual care. Analysis of secondary outcomes showed reductions in total cholesterol (-0.07%, p=0.026), low-density lipoprotein cholesterol (–11.9%; p=0.022) and dietary saturated fat (–1.4% kcal/d; p=0.018).[54] **1++**

Community-based, telehealth-based and multifactorial models of CR are associated with improvements in cardiovascular disease risk similar to those seen in traditional hospital-based approaches.[48] These models could therefore be integrated into traditional models of care to increase patient choice. **2+**

R **Technology-based interventions should be considered for patients participating in cardiac rehabilitation.**

5.4 DIET

Recommendations for primary and secondary prevention of CVD have evolved from a primary focus of limiting dietary fat and cholesterol to a broader vision of heart-healthy eating. The focus now is for a cardioprotective diet which encompasses healthier dietary choices, correcting misconceptions about diet and health, and balancing energy intakes and body weight maintenance (or reduction if appropriate).[4] **4**

Dietary patterns characterising the traditional Mediterranean diet (diets where the main sources of added fat are olive oil and nuts, which are rich in vegetables and fruits, and low in red meat (with poultry and fish replacing beef and lamb)) are beneficial in the prevention of CHD. This whole diet approach should be used in preference to limiting individual nutrients and the use of dietary supplements including food fortification, to duplicate the cardioprotective benefits of consumption of healthier foods. Studies consistently demonstrate inverse associations between consumption of a traditional Mediterranean diet and reduced risk of CHD, stroke and total mortality.[56,57] Further advice on diet can be found in the guideline SIGN 149: Risk estimation and the prevention of cardiovascular disease.[8,56,57] **1++**

To help support education about and adherence to a Mediterranean type diet it is appropriate to refer to the Eatwell Guide *(see Annex 3)*.[58]

Further advice on weight management can be found in SIGN 115: Management of obesity.[59]

5.4.1 DELIVERY OF DIETARY ADVICE

Studies of interventions to enhance adherence to dietary advice in patients with chronic conditions reported mixed results and used a variety of outcome measures.[56] Telephone follow up, educational tools, contracts between patients and healthcare professionals to agree adherence, feedback, nutritional tools and multiple interventions resulted in statistically significant results for some but not all dietary adherence outcomes. It is not possible to identify an ideal combination of interventions. Patient preference should be taken into consideration when delivering advice. **1++**

Limited evidence was identified to determine whether the advice is more likely to have an impact if delivered by a dietitian compared to other healthcare professionals. Studies showed improved weight loss and improved diet-related outcomes with dietary intervention, but it was not possible to determine whether the effect was directly applicable to the dietitian.[60,61] **1++** **4**

R **A range of strategies, including telephone follow up, educational tools, contracts, nutritional tools and feedback should be considered for patients in cardiac rehabilitation to enhance adherence to dietary advice.**

5.4.2 WEIGHT LOSS PROGRAMMES

No studies of weight loss programmes (WLP) specifically for patients within the CR population were identified. No WLPs identified used the Mediterranean diet model within the intervention. Systematic reviews of trials of WLPs in overweight adults reported efficacy for various types of programme *(see Table 1)*.[57,62] **1++**

Table 1: Comparison of outcomes from studies of WLPs

Intervention	**Comparator**	**Between-group mean difference for weight loss** (95% CI)	**Trial Duration** (months)	**Adverse events/ harms**
Point-based programme (Weight Watchers)[62]	6 RCTs *v* control/education	2.6% >	12	Not included in study
Meal replacement (Jenny Craig)[62]	1 RCT *v* control/ education; 2 RCTs *v* behavioural counselling	4.9% >	12	Harms rarely occurred
Nutrisystem[62]	1 RCT *v* control/education; 2 RCTs *v* behavioural counselling	3.8% > both control/ education and counselling	3	Not included in study
Very low calorie diets: (OPTIFAST)[62]	4 RCTs *v* behavioural counselling	4.2% to 9.2% > behavioural counselling at 4–5 months. 1 trial reported no significant difference at 12 months	4–5 12 (1 trial)	Rare (cholecystectomy, constipation, alopecia)
Very low calorie diets: (Medifast)[62]	1 RCT *v* behavioural counselling	5.6% > behavioural counselling at 4 months. No significant difference at 9 months	9	Not included in study
Self-directed programmes (Atkins)[62]	1 RCT *v* control/ education	6.8% > at 6 months 0.1 to 2.9% > at 12 months	12	Harms rarely occurred
Internet-based programmes[62]	3 RCTs *v* control/ education	2.7% > at 3 months (2 trials) No significant difference at 12 months (1 trial)	3 12	None
Interactive web-based intervention[57]	1 study *v* access to a static website	-0.70 kg (-1.37 to -0.03)	12	Not included in study
Primary care intervention[57]	Pooled results from 5 studies with sessions with primary care staff *v* usual care	-0.45 kg (-1.34 to 0.43)	12	Not significant over 24 month period

Most of the trials were of short duration so long-term follow-up data (>12 months) is unavailable.

Primary care referral to a commercial points-based weight-loss programme, or a programme with weekly meetings, is cost effective compared to no active treatment, in studies based on the general population rather than specifically CR.[63,64] There is limited data comparing costs of commercial programmes, particularly for meal replacement programmes. Interactive web-based weight-loss interventions are the most affordable.[57]

R **Referral to weight-loss programmes delivered by experts should be considered for patients requiring assistance with weight management.**

5.5 LONG-TERM MAINTENANCE OF BEHAVIOUR CHANGE

Studies identified on psychoeducational interventions to promote long-term maintenance of behaviour change found positive effects for physical activity, but limited evidence for smoking or diet.[65] Tailored interventions had no impact on medication concordance, self monitoring, exercise, smoking or diet control.[66]

1++
1=

Psychoeducational interventions, such as behavioural change models, had a positive effect on physical activity levels over 6–12 months compared to exercise and risk factor education (Cohen's d effect size)(=0.62, 95% CI 0.3 to 0.94).[65] Strategies involved were goal setting, problem solving, self monitoring and role modeling.[65] These strategies were also effective in studies in the period following CR, along with developing plans for relapse prevention.[67] Little evidence was identified on the efficacy of problem-based learning, although one study reported no significant difference between the intervention and standard CR at one year in patients with ACS.[68]

1++
2-
1+

A systematic review found only one low-quality RCT on self-efficacy interventions which reported no significant differences at six months between the intervention and standard therapy in patients with ACS.[68] However, a synthesis of qualitative studies reported that activity levels may be related to how individuals responded to their diagnosis and altered physical status, and the degree of encouragement to exercise from family, friends and professionals.[69] It concluded that self efficacy and outcome expectancies can therefore support behavioural change.[69]

1+

Within home-based CR programmes, behaviour-change techniques, such as social support and goal setting were shown to be effective in reducing CVD risk factors, with comparable results to hospital- or centre-based programmes.[70]

1++

The BACPR emphasises the importance of goal setting throughout CR and recommends reassessment after completion of the CR programme to determine achievements of goals during the programme and to formulate plans for transition into long-term management.[4]

4

R **Psychoeducation** (goal setting, self monitoring) **should be considered for patients in cardiac rehabilitation to facilitate adherence to physical activity.**

6 Psychosocial health

6.1 INTRODUCTION

Psychological consequences of cardiovascular disease affect recovery, morbidity, mortality and QoL.[71] Patients with cardiac disease can experience psychological difficulties in relation to adjusting to their diagnosis, living with a new condition and with the impact on their social role and functioning. Although some degree of adjustment is normal, psychological distress following a cardiac event is associated with increased costs due to the requirement for more GP appointments and hospital readmission.[72-74]

Incidence and prevalence rates of depression in patients with cardiac disease are complicated by studies using different diagnostic criteria and because physical symptoms of medical illness such as poor appetite, insomnia and tiredness are similar to the biological symptoms of depression.[75] There is a consensus that some degree of depression affects at least 30% of patients with CHD in hospital.[75] Up to 20% of these patients who have depressive symptoms will develop major depression with associated adverse outcomes including poor health, poor QoL, suicide risk, worse functional status and delayed recovery.[75]

Cardiac disease is associated with an increased risk of cognitive impairment.[76] More specifically there is an increased risk of dementia in patients with atherosclerosis or atrial fibrillation.[77,78] People with both cardiac disease and depression have significantly greater cognitive decline over 12–30 months in attention, executive functioning, learning memory, verbal fluency and global cognition, after adjusting for sociodemographic and clinical factors.[79]

Anxiety in patients with cardiac disease is commonly reported either as a separate disorder or comorbidly with depression. Anxiety has been associated with increased cortisol secretion, heart rate variability, hypertension and risk of ventricular arrhythmias.[80]

Stress is often cited as one of the main perceived causes of a person's heart disease but research shows a lack of consensus about how stress is defined and the causal links between stress and CHD remain unclear.[8,81] Perceived stress can act as a barrier to rehabilitation and efforts to improve lifestyle.[82]

6.2 MODELS OF PSYCHOLOGICAL CARE

A matched stepped-care model is recommended for delivering psychological therapies for patients with depression and a chronic physical health condition.[83,84] In matched stepped care, the least intrusive, most effective intervention is provided first; if a patient does not benefit from the intervention initially offered, or is assessed as having a more severe psychological problem they should be offered an appropriate intervention at the correct level. For example, people with severe depression should be offered step 3 intervention directly *(see Table 2)*. The stepped-care model can be delivered at step 1 and 2 by CR healthcare professionals who have been trained to deliver psychological therapies and receive ongoing case discussion/reflective practice from psychologically-trained supervisors.[84] Step 3 and 4 are delivered by accredited mental health professionals.

4

Table 2: Stepped-care model

Step	Focus of the intervention	Nature of the intervention
1	All known and suspected presentations of depression	Assessment, support, psychoeducation, active monitoring and referral for further assessment and interventions
2	Persistent subthreshold depressive symptoms; mild to moderate depression	Low-intensity psychosocial interventions and referral for further assessment and interventions
3	Persistent subthreshold depressive symptoms or mild to moderate depression with inadequate response to initial interventions; moderate and severe depression	High-intensity psychological interventions, combined treatments and referral for further assessment and interventions
4	Severe and complex depression; risk to life; severe self neglect	High-intensity psychological interventions, crisis service, combined treatments, multiprofessional and inpatient care

Adapted for patients in CR from NICE guideline 91, Depression in adults with a chronic physical health problem: recognition and management, 2009.[83]

R **Cardiac rehabilitation should incorporate a stepped-care pathway to meet the psychological needs of patients.**

✓ To ensure clinical governance and quality, psychological therapies should be evidence based, and delivered by psychologically-trained and supervised healthcare professionals within the context of a locally-defined care pathway.

6.3 MEASUREMENT OF PSYCHOLOGICAL WELL-BEING

There are a number of assessment tools available for assessing anxiety, depression or low mood in patients undergoing CR, such as the Patient Health Questionnaire-9 (PHQ-9), Generalised Anxiety Disorder-7 (GAD-7), or Beck Depression Inventory-II (BDI-II).[85-87] Assessments can be completed on paper or electronically.[88] Although no studies were identified on shared completion compared to self completion of assessment tools it would be good practice to ask patients if they require assistance.

Assessment tools for depression and anxiety should be used by health professionals as part of a clear clinical pathway so that patients with high distress/suicidality receive appropriate and timely risk assessment and monitoring.[83] **4**

✓ Assessment tools for anxiety and depression should be repeated over the course of rehabilitation as part of a clinical pathway to ensure ongoing monitoring of symptoms and provide outcome measures of care.

6.4 PSYCHOLOGICAL THERAPIES AND INTERVENTIONS

A Cochrane review evaluating psychological interventions in patients with CHD found psychological treatments are effective in treating psychological symptoms. However, there are uncertainties regarding which subgroups of patients benefit most from treatment and no direct link was found between psychological therapies and total or cardiac mortality.[89] Previously psychological and psychosocial interventions offered in CR were often not evidence-based treatment interventions conducted by trained staff but were 'add ons' to the physical programme. Their effectiveness and standardisation therefore varied and were likely to adversely influence older research. Recent research is more specific about the definitions and quality of psychological and psychosocial interventions included.[81] **1++**

A meta-analysis comparing mental health interventions (cognitive behavioural therapy, interpersonal psychotherapy, problem solving, stress management, antidepressants) with exercise only CR found that among patients with CHD, mental health interventions did not reduce total mortality, but showed moderate efficacy for reducing CHD events (absolute risk reduction (ARR) 0.029, 95% CI 0.007 to 0.051), and a medium effect size for improving depression (d=0.297, 95% CI 0.16 to 0.43). The results support a continued role for mental health therapy in CR.[90] 1-

6.4.1 COGNITIVE BEHAVIOURAL THERAPIES

Stress management using cognitive behavioural therapies for all patients in CR

In a comparison of stress management training (SMT), consisting of 12 weekly 1.5-hour sessions that provided education, group support, and instruction in cognitive behavioural therapy (CBT) methods for coping more effectively with stress (for example, time management, progressive muscle relaxation training, cognitive restructuring, communication skills) and usual CR, CR combined with SMT achieved greater reductions in stress than CR alone for all patients in CR (p=0.022). Both CR groups had fewer clinical events (all-cause mortality, MI, revascularisation, stroke/transient ischemic attack, and unstable angina requiring hospitalisation) than the matched no CR comparison group (47%, hazard ratio (HR) 0.44, 95% CI, 0.27 to 0.71, p<0.001). The CR-SMT group had a lower rate of clinic events than the group receiving CR alone (18% *v* 33%, HR 0.49, 95% CI, 0.25 to 0.95, p=0.035).[81] 1+

Another study was identified, of an Australian programme which consisted of eight weekly sessions of 1.5 hours each for all patients in CR. Its modules address physical activity, diet, medication concordance, smoking cessation, depression, anxiety, anger, and social support.[91] Within each module, patients undertook exercises that enabled them to review situations in their lives to identify, challenge, and change the unhelpful thoughts and faulty beliefs associated with risk factors and negative emotions. The trial reported a modest positive effect on reducing cardiovascular risk, impact on long-term self management, a reduction in patient two-year recurrent risk score and improvements in dietary fat intake, functional capacity, and waist girth compared to usual care at four- and twelve-month follow up.[91] 1+

R **All patients should be offered a package of psychological care, based on a cognitive behavioural model** (eg stress management, cognitive restructuring, communication skills) **as an integral part of cardiac rehabilitation.**

CBT for patients in CR with clinical depression and/or anxiety

For people with CHD and comorbid adjustment disorder, anxiety and/or depression, CBT is the first choice when considering an individual or group psychological therapy or intervention.[83,84] Other evidence-based psychological therapies for depression, such as interpersonal psychotherapy or problem solving therapy, can be offered if CBT is not appropriate.[92] 4

CBT self management for patients with angina

For patients with angina, individual or group cognitive and behavioural self-management techniques can reduce the frequency of angina symptoms (recorded using the Seattle Angina Questionnaire (SAQ) with or without a symptom diary) across trials, standardised mean difference (SMD) 0.30, 95% CI 0.14 to 0.47), reduce the use of nitrate medication (SMD -0.49, 95% CI -0.77 to -0.20) and improve physical limitation (SAQ SMD 0.38 95% CI 0.20 to 0.55) and depression scores (Hospital Anxiety and Depression Scale (HADS) SMD -1.38, 95% CI -2.46 to -0.30).[93] 1+

CBT for patients with heart failure

Cognitive behavioural therapy, delivered by experienced therapists, in addition to usual care, has been found to improve depression in patients with HF compared to usual care alone after six months of treatment (BDI scores 12.8 *v* 17.3, p=0.008; number needed to treat (NNT) for remission rates 3.76, 95% CI 3.62 to 3.90).[94] Cognitive behavioural therapy did not lead to a statistically significant improvement in HF self care in this RCT, but there were improvements in secondary outcomes of anxiety, fatigue, mental- and HF-related QoL, social functioning and hospitalisations. 1+

Trials of cognitive-behavioural symptom-management strategies in patients with HF vary in quality and have reported mixed findings, but indicate beneficial effects from relaxation, meditation and guided imagery on HF-related symptoms. A systematic review concluded that cognitive-behavioural strategies could be particularly useful for symptom palliation in patients with advanced HF.[95] 1+

CBT for patients with depression who require cardiac surgery

For patients with depression undergoing cardiac surgery a depression-focused CBT intervention improved perceived control (which is linked to quality of life) and decreased postoperative pain after eight weeks of therapy compared to usual care. The findings were based on secondary outcomes from a small RCT.[96] 1-

R **Cognitive behavioural therapy should be the first choice of psychological intervention for patients in cardiac rehabilitation with clinical depression or anxiety.**

R **Cognitive behavioural therapy should be considered for patients assessed to have specific psychological needs such as support with symptom control.**

✓ Cognitive behavioural therapy should only be delivered by healthcare practitioners with accredited relevant competencies and approved clinical supervision.

6.4.2 RELAXATION

A meta-analysis found intensive supervised relaxation practice, with a mean total of nine hours, enhances recovery from an ischemic cardiac event and can contribute to secondary prevention, compared to usual care or exercise therapy alone.[97] Greatest benefit was found in a reduction in resting heart rate (weighted mean difference (WMD) 4 beats per minute (bpm), 95% CI 1.2 to 6.4 bpm), frequency of angina (SMD -0.34, 95% CI -0.53 to -0.15) and anxiety (SMD -0.28, 95% CI -0.47 to -0.10). Results showed improvements regarding return to work and cardiac events, including cardiac death, occurred less frequently. Abbreviated relaxation therapy (three hours or less of instruction is not as beneficial as full relaxation therapy (nine hours of supervised practice and discussion).[97] 2+

Relaxation, meditation and guided imagery (or combinations of these strategies) provided greater relief from dyspnoea and sleep disturbance than usual care and attention control conditions in patients with heart failure. Some patients also reported improvements in pain and fatigue (*see section 6.4.1*).[95] 1+

R **A supervised course of full relaxation therapy should be considered for patients in cardiac rehabilitation to enhance recovery and contribute to secondary prevention.**

6.4.3 MINDFULNESS

Mindfulness is the psychological process of bringing one's attention to internal and external experiences occurring in the present moment and can be developed through the practice of meditation and other training.

A study comparing a four-session mindfulness group intervention versus a minimal mindfulness self-help control group that received a booklet containing identical information, concluded that the group-based stress reduction sessions may improve anxiety, depression, and psychosocial QoL, compared to using the booklet.[98] The results applied to patients under 60 years of age who had undergone PCI. 1-

Further research is needed before a recommendation can be made.

7 Vocational rehabilitation

7.1 INTRODUCTION

Return to work rates after MI are in excess of 50%, but <1% of patients attending CR get any form of vocational assessment.[99] Age, gender, marital status, and type of employment impact on return to work rates with younger (<55 years) married men in office work being more likely to return to work.[100-105] Patient beliefs about their ability to return to work are also important. Patients who feel they have greater latitude or control over their work roles are more likely to return to work.[100,103] Patients who perceive themselves to have poor health or believe that their health will significantly delay their return to work are less likely to return to work or return later.[104,105] While medical sanction can be a positive factor in encouraging return to work, the healthcare professional's perception of the patient's ability to work is less important than that of the patient, who may be influenced by knowledge of the workplace and their role within it.[102] In a qualitative study based on patient interviews, it was reported that medical sanction was important and that perceived employer support positively influenced return to work.[106] Occupational health input was seen as beneficial in planning return to work while CR was seen as of little relevance due to its limited intensity and lack of specificity.[106] In one study attending CR programmes was found to delay return to work.[105]

4
3

7.2 INTERVENTIONS

A small, unblinded RCT of a predischarge intervention designed to alter patients' perceptions about their MI compared to usual care from a CR nurse found that the intervention group had lower levels of belief that their condition would cause serious consequences and last a long time or indefinitely, higher beliefs that it could be controlled, and lower levels of distress due to symptoms. Patients in the intervention group returned to work sooner than those in the control group ($p<0.05$).[107]

1⁻

In a cohort study, all patients who participated in a low-intensity training programme that simulated elements of jobs in the manufacturing and service industries returned to work compared to 60% of patients who took part in a conventional CR exercise training programme ($p<0.01$). Both programmes improved aerobic capacity by equal amounts. This study should be viewed with caution as patients volunteered for the intervention.[108]

2⁺

In a less conventional in-patient rehabilitation programme involving patients who had had PCI or CABG, an additional assessment by an occupational physician who then made recommendations regarding timescales and modality of return to work resulted in 88.5% of patients returning to work with a reduction in psychological distress and no evidence of increased work stress.[109] A similar approach in patients following an acute cardiac event resulted in a return to work rate at three months of 89.7%.[110]

3

No studies were identified on the cost effectiveness of vocational rehabilitation as part of a CR programme.

R **Vocational rehabilitation interventions designed to address illness perceptions relating to the likelihood of return to work should be considered for patients in cardiac rehabilitation who have the potential to continue in employment.**

R **Exercise prescription that includes a range of physical activities designed to simulate those anticipated in the workplace should be considered for patients in cardiac rehabilitation who have the potential to continue in employment.**

✓ Cardiac rehabilitation services should enable appropriate patients to return to work while participating in their rehabilitation programme.

8 Medical risk management

8.1 INTRODUCTION

Patients with CHD are prescribed drugs to reduce cardiovascular risk and modify risk factors.[8-10] Attendance at CR provides an opportunity to monitor risk factors such as blood pressure and cholesterol, prescribing and titrating medication as appropriate, but also encouraging concordance. Medical input to CR programmes is minimal, suggesting that non-medical prescribing may afford the best opportunity to improve medical management of risk. Concordance with prescribed medication is often suboptimal and the reasons are multifactorial but include health beliefs about the disadvantages of drugs and their side effects.[111,112]

8.2 PRESCRIBING PRACTICES

Non-medical prescribing can be an option for enabling patients to have timely access to medicines. No high-quality studies on non-medical prescribing in patients in CR were identified, however, observational studies of nurse prescribing for a range of other conditions reported patient satisfaction and sufficient patient information provided to enable concordance with therapy.[113-115] There were few differences between nurses and physicians in the type and dose of medication prescribed.[115] **2+ 3**

Suitable training and evaluation of practices needs to be in place for non-medical prescribers.[116,117] **3**

R **Non-medical prescribing should be considered within a cardiac rehabilitation setting.**

✓ Appropriate training and evaluation of non-medical prescribers are vital to ensure safe and effective care.

8.3 MEDICATION CONCORDANCE

Many patients stop taking medication shortly after it is started, without discussion with their prescriber. Patients who continue to take their medication often do so inconsistently and concordance rates with longer-term medication average only around 50%.[118]

Little evidence was identified to guide how best to improve concordance with medication in a CR setting. Most trials in other settings are complex and multifaceted, with at best only marginal improvement in medication concordance.[118] **1++**

Evidence from trials of patients with long-term conditions found some benefit from trying to overcome barriers to concordance through tailored ongoing support, for example from pharmacists delivering intense education or counselling (including motivational interviewing or CBT by professionals), daily treatment support and additional support from family or peers.[118] **1++**

9 Provision of information

This section reflects the issues likely to be of most concern to patients and their carers. These points are provided for use by health professionals when discussing CR with patients and carers and in guiding the production of locally-produced information materials.

9.1 CHECKLIST FOR PROVISION OF INFORMATION

This section gives examples of the information patients/carers may find helpful at the key stages of the patient journey. The checklist was designed by members of the guideline development group based on their experience and their understanding of the evidence base. The checklist is neither exhaustive nor exclusive.

The information given to patients following a cardiac event should be provided on an individual basis dependent on need and choice. It should be offered in a timely manner working with the patient throughout the CR journey.

Information appropriate to the individual should be provided in various formats - written and verbally, either through a face-to-face conversation, by telephone, or online.

Involving the patient in all discussions is essential, with the aim of informing, empowering and encouraging the individual to take responsibility to self manage their condition. The involvement of spouses/carers/partners as appropriate, with the patient's consent should be considered.

Throughout cardiac rehabilitation

- Discuss the impact of a cardiac event/coronary heart disease on emotional well-being.
- Advise about the purpose and use of secondary prevention medication and encourage concordance.
- Signpost patients to other information sources, peer support and support groups *(see section 9.2)*.

Prior to hospital discharge following a cardiac event

- Provide verbal and written information on:
  - diagnosis
  - chest pain management, including how to use the glyceryl trinitrate (GTN) spray
  - advice on driving
  - return to work
  - appropriate daily activities.
- Offer further information such as booklets from the British Heart Foundation or Chest, Heart & Stroke Scotland *(see section 9.2)*.
- Discuss any future treatments, interventions and appointments.
- Explain the purpose of CR and provide a contact number for CR unit.
- Discuss the benefits of smoking cessation (if appropriate).

At the cardiac rehabilitation assessment

- Provide information appropriate to the needs and choices of the patient on:
  - activity
  - exercise
  - smoking cessation
  - weight management
  - diet
  - common emotional adjustment reactions to ill health.
- Advise on the benefits of maintaining exercise long term and that it can be undertaken safely and effectively in any setting.
- Provide a contact number for ongoing person-centred advice and/or support.

9.2 SOURCES OF FURTHER INFORMATION

NHS inform
www.nhsinform.scot
Tel: 0800 22 44 88

This is the national health and care information service for Scotland. It includes a section on heart conditions with information and links to resources to support patients with heart disease:
www.nhsinform.scot/illnesses-and-conditions/heart-and-blood-vessels

There is also a section providing advice on healthy living for physical and mental wellbeing:
www.nhsinform.scot/healthy-living

British Association of Cardiovascular Prevention and Rehabilitation
9 Fitzroy Square, London, W1T 5HW
Tel: 020 7380 1919
www.bacpr.com • Email: admin@bcs.com

A national organisation providing support to health professionals, promoting excellence in cardiovascular prevention and rehabilitation through quality education, training and a certification programme (joint with national audit of CR).

British Heart Foundation
Ocean Point 1, 94 Ocean Drive, Edinburgh, EH6 6JH
Tel: 020 7554 0000; Heart Helpline: 0300 330 3311
www.bhf.org.uk • Email: hearthelpline@bhf.org.uk

The British Heart Foundation is a national heart charity and the largest independent funder of cardiovascular research. The BHF provides information for patients and carers.

Chest Heart & Stroke Scotland
Third Floor, Rosebery House, 9 Haymarket Terrace, Edinburgh EH12 5EZ
Tel: 0131 225 6963 • Advice Line Nurses: 0808 801 0899
www.chss.org.uk • Email: admin@chss.org.uk

The Scottish health charity set up to improve the quality of life for people in Scotland affected by chest, heart and stroke illness, through medical research, influencing public policy, advice and information and support in the community.

9.2.1 ADDITIONAL RESOURCES

Action on Depression
21–23 Hill Street, Edinburgh EH2 3JP
www.actionondepression.org • Email: admin@actionondepression.org

This website highlights local support and raises awareness about low mood and depression.

Active Scotland
www.activescotland.org.uk

This website provides information and ideas on a range of indoor and outdoor activities in Scotland.

ALISS (A Local Information System for Scotland)
www.aliss.org

ALISS is a search and collaboration tool for health and wellbeing resources in Scotland which signposts people to useful community support.

Anxiety UK
www.anxietyuk.org.uk

Anxiety UK provides information, support and therapy for people with anxiety.

Blood Pressure UK
Wolfson Institute of Preventive Medicine, Charterhouse Square, London EC1M 6BQ
Tel: 020 7882 6218
www.bloodpressureuk.org • Email: help@bloodpressureuk.org

Blood Pressure UK is a UK charity dedicated to lowering the nation's blood pressure to prevent disability and death from stroke and heart disease.

Breathing Space
www.breathingspace.scot
Tel: 0800 83 85 87

Breathing Space provides a free, confidential telephone and web-based service for any individual who is experiencing low mood or depression, or who is unusually worried and in need of someone to talk to.

Diabetes UK
Careline Scotland, The Venlaw, 349 Bath Street, Glasgow G2 4AA
Tel: (Careline Scotland) 0141 212 8710
www.diabetes.org.uk • Email: careline.scotland@diabetes.org.uk

Diabetes UK provides information, advice and support to help people with diabetes manage the condition well, and bring people together for support.

Drinkaware
Tel: 020 7766 9900
www.drinkaware.co.uk • Email contact@drinkaware.co.uk

Drinkaware is a charity which raises awareness about alcohol misuse and harm and provides advice on alcohol-related health issues, and how to reduce alcohol consumption.

Drink Smarter
www.drinksmarter.org

A national charity working to reduce the harm caused by alcohol, with information on sensible drinking and easy ways to cut back.

Eat Better Feel Better
www.eatbetterfeelbetter.co.uk

This website provides recipes for healthier and cheaper meals and information on improving cooking skills.

Eatwell Guide
www.nhs.uk/Livewell/Goodfood/Pages/the-eatwell-guide.aspx

The Eatwell Guide shows what food portions should come from each food group to achieve a healthy, balanced diet.

Healthtalkonline
www.healthtalk.org/peoples-experiences/heart disease/heart-attack/cardiac-rehabilitation-support

This website provides video clips and text of patients with heart disease talking about their experiences of CR.

HEARTe
www.heartlearning.org

Heart Education Awareness Resource and Training through e-learning (HEARTe) is a heart disease educational resource for health and social care professionals in Scotland, developed by CHSS. The website may also be accessed by patients, carers and other members of the general public.

Living Life cognitive behavioural therapy telephone service
NHS Living Life, 5th Floor, Golden Jubilee National Hospital, Beardmore Street, Clydebank, G81 4HX
Tel: 0800 328 9655 (Mon-Fri 1pm to 9pm)
www.nhs24.com/usefulresources/livinglife

Living Life is a free telephone service available to anyone over the age of 16 who is suffering from low mood, mild to moderate depression and/or anxiety.

Moodjuice
www.moodjuice.scot.nhs.uk

Moodjuice is a website for patients and professionals which provides self-help resources for emotional problems.

Smokeline
Caledonia House, Fifty Pitches Road, Cardonald Park, Glasgow G51 4EB
Tel: 0800 84 84 84
www.canstopsmoking.com • Email: smokeline@nhs24.scot.nhs.uk

Smokeline is Scotland's national stop smoking helpline.

Working Health Services Scotland
Tel: 0800 019 2211

Working Health Services Scotland provides free and confidential advice and health support for the self employed and people working in companies with fewer than 250 employees. The service aims to help workers with a health condition manage the condition to try and avoid an episode of sickness absence or help person return to work if an episode occurs.

10 Implementing the guideline

This section provides advice on the resource implications associated with implementing the key clinical recommendations, and advice on audit as a tool to aid implementation.

10.1 IMPLEMENTATION STRATEGY

Implementation of national clinical guidelines is the responsibility of each NHS board and is an essential part of clinical governance. Mechanisms should be in place to review care provided against the guideline recommendations. The reasons for any differences should be assessed and addressed where appropriate. Local arrangements should then be made to implement the national guideline in individual hospitals, units and practices.

Implementation of this guideline will be encouraged and supported by SIGN. The implementation strategy for this guideline encompasses the following tools and activities.

10.2 RESOURCE IMPLICATIONS OF KEY RECOMMENDATIONS

No recommendations are considered likely to reach the £5 million threshold which warrants resource impact analysis.

Healthcare professionals will require accredited training to carry out screening of psychological distress and further accredited training and continuous supervision if they are to deliver low-intensity psychological interventions. Healthcare professionals who deliver exercise training for patients with multimorbidity will also require accredited training.

10.3 AUDITING CURRENT PRACTICE

A first step in implementing a clinical practice guideline is to gain an understanding of current clinical practice. Audit tools designed around guideline recommendations can assist in this process. Audit tools should be comprehensive but not time consuming to use. Successful implementation and audit of guideline recommendations requires good communication between staff and multidisciplinary team working.

The guideline development group has identified the following as key points to audit to assist with the implementation of this guideline:

The percentage of eligible patients who:

- have a care plan based on an individual assessment and a repeat assessment of outcomes
- complete a screening test for anxiety and depression and how often it is offered throughout their rehabilitation
- have clinically significant anxiety and depression who are offered an appropriate level of stepped-care intervention
- are offered smoking cessation interventions (where appropriate)
- are provided with smoking cessation interventions
- are offered a dietary intervention
- are offered an individualised exercise assessment
- have an exercise component in their individualised care plan.

11 The evidence base

11.1 SYSTEMATIC LITERATURE REVIEW

The evidence base for this guideline was synthesised in accordance with SIGN methodology. A systematic review of the literature was carried out using an explicit search strategy devised by a SIGN Evidence and Information Scientist. Databases searched include Medline, Embase, Cinahl, PsycINFO and the Cochrane Library. The year range covered was 2000–2016. Internet searches were carried out on various websites including the US National Guidelines Clearinghouse. The main searches were supplemented by material identified by individual members of the development group. Each of the selected papers was evaluated by two Evidence and Information Scientists using standard SIGN methodological checklists before conclusions were considered as evidence by the guideline development group.

11.1.1 LITERATURE SEARCH FOR PATIENT ISSUES

At the start of the guideline development process, a SIGN Evidence and Information Scientist conducted a literature search for qualitative and quantitative studies that addressed patient issues of relevance to patients in CR. Databases searched include Medline, Embase, Cinahl and PsycINFO, and the results were summarised by the SIGN Patient Involvement Officer and presented to the guideline development group.

11.1.2 LITERATURE SEARCH FOR COST-EFFECTIVENESS EVIDENCE

The guideline development group identified key questions with potential cost-effectiveness implications, based on the following criteria, where it was judged particularly important to gain an understanding of the additional costs and benefits of different treatment strategies:

- treatments which may have a significant resource impact
- opportunities for significant disinvestment or resource release
- the potential need for significant service redesign
- cost-effectiveness evidence could aid implementation of a recommendation.

A systematic literature search for economic evidence for these questions was carried out by a SIGN Evidence and Information Scientist covering the years 2000–2016. Databases searched include Medline, Embase, NHS Economic Evaluation Database (NHS EED) and Health Economics Evaluation Database (HEED). Each of the selected papers was evaluated by a Health Economist, and considered for clinical relevance by guideline group members.

Interventions are considered to be cost effective if they fall below the commonly-accepted UK threshold of £20,000 per Quality-Adjusted Life Year (QALY).

11.2 RECOMMENDATIONS FOR RESEARCH

The guideline development group was not able to identify sufficient evidence to answer all of the key questions asked in this guideline *(see Annex 1)*. The following areas for further research have been identified:

- the impact of GPs or practice nurses referring patients in the community to CR programmes on uptake and engagement
- strategies for engaging with hard to reach groups to improve uptake of CR
- the impact of a CR programme on those with multiple conditions, with emphasis on recovery, adjustment and self management
- the cost and clinical effectiveness of care management models to improve self management and modify health behaviours to improve both physical health conditions and quality of life
- the impact of partners or carers' involvement in CR for both patient and carers' outcomes

- the efficacy of collaborative care management which incorporates mental health treatment, problem solving and exercise, and optimal medical treatment to modify health behaviours to improve both physical and mental health conditions
- a study into the influence of peer support in assisting recovery from a cardiac event
- RCTs of vocational interventions within the CR setting to improve return to work rates
- the optimal dose and frequency of a supervised exercise programme versus unsupervised exercise, considering age and baseline fitness.
- the use of pedometers, activity monitors or apps to encourage long-term maintenance of exercise in patients in CR
- behavioural interventions to support adherence to a Mediterranean diet
- long-term (>12 months follow up) RCTs to measure the efficacy of internet-based weight-loss interventions
- studies looking at the effect of poor cognition and memory impairment on CR adherence and participation
- the efficacy and safety of non-medical prescribing in CR
- RCTs of interventions to improve medication concordance, using objective measures for concordance such as prescription monitoring, and recruiting patients due to low concordance.

11.3 REVIEW AND UPDATING

This guideline was published in 2017 and will be considered for review in three years. The review history, and any updates to the guideline in the interim period, will be noted in the review report, which is available in the supporting material section for this guideline on the SIGN website: **www.sign.ac.uk**

Comments on new evidence that would update this guideline are welcome and should be sent to the SIGN Executive, Gyle Square, 1 South Gyle Crescent, Edinburgh, EH12 9EB (email: sign@sign.ac.uk).

12 Development of the guideline

12.1 INTRODUCTION

SIGN is a collaborative network of clinicians, other healthcare professionals and patient organisations and is part of Healthcare Improvement Scotland. SIGN guidelines are developed by multidisciplinary groups of practising healthcare professionals using a standard methodology based on a systematic review of the evidence. Further details about SIGN and the guideline development methodology are contained in 'SIGN 50: A Guideline Developer's Handbook', available at www.sign.ac.uk

This guideline was developed according to the 2015 edition of SIGN 50.

12.2 THE GUIDELINE DEVELOPMENT GROUP

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Ms Ailsa Stein	*Programme Manager, SIGN*
Mrs Mima Traill	*Cardiovascular Disease Clinical Development Co-ordinator Scotland, British Heart Foundation*
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The membership of the guideline development group was confirmed following consultation with the member organisations of SIGN. All members of the guideline development group made declarations of interest. A register of interests is available in the supporting material section for this guideline at www.sign.ac.uk

Guideline development and literature review expertise, support and facilitation were provided by the SIGN Executive and Healthcare Improvement Scotland staff. All members of the SIGN Executive make yearly declarations of interest. A register of interests is available on the contacts page of the SIGN website www.sign.ac.uk

Euan Bremner	*Project Officer*
Claire Daly	*Distribution and Office Co-ordinator*
Karen Graham	*Patient Involvement Officer*
Karen King	*Distribution and Office Co-ordinator*
Stuart Neville	*Publications Designer*
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Carolyn Sleith	*Evidence and Information Scientist, Healthcare Improvement Scotland*

12.2.1 ACKNOWLEDGEMENTS

SIGN is grateful to the following contributor for his expert advice in the development of this guideline:

Mr Steve McGlynn	*Principal Pharmacist, Department of Pharmaceutical Sciences, Strathclyde Institute for Biomedical Sciences, Glasgow*

12.3 THE STEERING GROUP

A steering group comprising the chairs of the six SIGN CHD guidelines and other invited experts was established to oversee the progress of the guideline development. This group met regularly throughout the development of the guidelines.

Professor Sir Lewis Ritchie, OBE *(Chair)*	*Mackenzie Professor and Head of Department, Department of General Practice and Primary Care, University of Aberdeen*
Mrs Corinne Booth	*Senior Health Economist, Healthcare Improvement Scotland*
Mr James Cant	*(until February 2017) Director, British Heart Foundation Scotland*
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12.4 CONSULTATION AND PEER REVIEW

12.4.1 PUBLIC CONSULTATION

The draft guideline was available on the SIGN website for a month to allow all interested parties to comment. All contributors made declarations of interest and further details of these are available on request from the SIGN Executive.

12.4.2 SPECIALIST REVIEWERS INVITED TO COMMENT ON THIS DRAFT

This guideline was also reviewed in draft form by the following independent expert referees, who were asked to comment primarily on the comprehensiveness and accuracy of interpretation of the evidence base supporting the recommendations in the guideline. The guideline group addresses every comment made by an external reviewer, and must justify any disagreement with the reviewers' comments. All expert referees made declarations of interest and further details of these are available on request from the SIGN Executive.

SIGN is very grateful to all of these experts for their contribution to the guideline.

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12.4.3 SIGN EDITORIAL GROUP

As a final quality control check, the guideline is reviewed by an editorial group comprising the relevant specialty representatives on SIGN Council to ensure that the specialist reviewers' comments have been addressed adequately and that any risk of bias in the guideline development process as a whole has been minimised. The editorial group for this guideline was as follows. All members of SIGN Council make yearly declarations of interest. A register of interests is available on the SIGN Council Membership page of the SIGN website www.sign.ac.uk

Dr Roberta James	*SIGN Programme Lead; Co-Editor*
Professor John Kinsella	*Chair of SIGN; Co-Editor*
Ms Caroline Rapu	*Royal College of Nursing*
Dr David Stephens	*Royal College of General Practitioners*

Abbreviations

ACS	acute coronary syndrome
ARR	absolute risk reduction
BACPR	British Association for Cardiovascular Prevention and Rehabilitation
BDI	Becks Depression Inventory
BMI	body mass index
bpm	beats per minute
CABG	coronary artery bypass grafting
CBT	cognitive behavioural therapy
CHD	coronary heart disease
CI	confidence interval
CR	cardiac rehabilitation
CVD	cardiovascular disease
d	Cohen's d effect size
GAD	Generalised Anxiety Disorder
GP	general practitioner
GTN	glyceryl trinitrate
HADS	Hospital Anxiety and Depression Scale
HF	heart failure
HF-PEF	HF with preserved ejection fraction
HR	hazard ratio
MI	myocardial infarction
MTA	multiple technology appraisal
NICE	National Institute for Health and Care Excellence
NNT	number needed to treat
NRT	nicotine replacement therapy
PCI	percutaneous coronary intervention
PHQ	Patient Health Questionnaire
QALY	quality-adjusted life year
QoL	quality of life
RCT	randomised controlled trials
RR	relative risk
SAQ	Seattle Angina Questionnaire
SIGN	Scottish Intercollegiate Guidelines Network
SMC	Scottish Medicines Consortium
SMD	standardised mean difference
SMT	stress management training
WLP	weight loss programme
WMD	weighted mean difference

Annex 1

Key questions addressed in this update

This guideline is based on a series of structured key questions that define the target population, the intervention, diagnostic test, or exposure under investigation, the comparison(s) used and the outcomes used to measure efficacy, effectiveness, or risk. These questions form the basis of the systematic literature search.

Guideline section	Key question	
1.1	1	Are cardiac rehabilitation programmes effective in improving outcomes in cardiac patients? Comparison: no cardiac rehabilitation Outcomes: cardiovascular (CV) mortality, all cause mortality, hospital readmission rates, morbidity, QoL, mental health, return to work
3.1	2	Is there any evidence that GP/practice nurse referral of cardiac patients in the community into cardiac rehabilitation programmes increases patient uptake? Interventions: GP/practice nurse referral, primary care referral Comparison: cardiologist referral, acute care referral Outcomes: patient uptake, attendance, completion, referral rate
3.2	19	What is the most effective way to improve engagement with and access to cardiac rehabilitation programmes? Population: patients referred to cardiac rehabilitation programmes Subgroups: • ethnic minorities • women • deprived populations • working age adults • rural communities Interventions: reduction in barriers to engagement or access, home-based rehabilitation Comparison: no targeted interventions, centre-based rehabilitation Outcomes: patient engagement, patient adherence, long-term maintenance behaviour, self-referral rates, CV outcomes
3.2	5	What is the evidence that cardiac rehabilitation programmes promote self efficacy in cardiac patients? Interventions: • exercise only • exercise and education • comprehensive (exercise, education, diet and psychosocial) Comparison: no rehabilitation programme Outcomes: self efficacy, self management, patient-reported outcome measures
3.3	15	What evidence is there that carer/partner involvement in a cardiac rehabilitation programme improves adherence and facilitates rehabilitation in cardiac patients? Outcomes: patient adherence, patient satisfaction, mood, lifestyle changes, physical improvements, CV morbidity, CV mortality, carer outcomes (lifestyle change, mental health)

4	21	Is a generic rehabilitation programme for patients with long-term conditions effective and safe for patients with cardiac conditions? Intervention: generic (non-condition-specific) rehabilitation programme Comparison: cardiac rehabilitation programme Outcomes: cardiac events, CV risk factor reduction, mortality, morbidity, QoL
4.2	3	Are cardiac rehabilitation programmes based on individual assessment of need more clinically effective and/or more cost effective than those based on delivery of a fixed programme of rehabilitation? Population: patients in acute care who have experienced a cardiac event, patients diagnosed with a cardiac condition Outcomes: patient uptake, attendance, completion, QoL, lifestyle change, CV mortality, CV morbidity, hospital readmissions, medication concordance, GP attendance
4.2	4	What is the evidence that a case-management approach is clinically and cost effective in cardiac rehabilitation? Interventions: case management, supported self management, patient-centred self management Comparison: medical, nursing or allied health professions treatment-led models Outcomes: morbidity, mortality, QoL (self-report levels), patient adherence, behaviour change (including exercise and diet), activity levels (non-sedentary behaviour), patient satisfaction
5.2	11	What is the evidence that brief smoking cessation interventions are clinically effective? Comparison: no smoking cessation intervention Outcomes: quit rate, smoking cessation
5.3	6	What are the most effective frequency and duration for an exercise component of a cardiac rehabilitation programme? Interventions: supported exercise programme with a frequency of one or more times per week and a duration of one or more weeks Comparison: twice a week for 10 weeks Outcomes: CV fitness and function, CV morbidity, CV mortality, hospital readmission, patient adherence, maintenance, QoL, lifestyle change or more active lifestyle, reduction in depression
5.3.1	7	Does using technologies (eg telemedicine, pedometers, activity monitors, apps, etc) improve patient engagement with cardiac rehabilitation exercise programmes and long-term maintenance of lifestyle changes? Interventions: social media, telemedicine, pedometers, activity monitors, apps Comparison: usual care Outcomes: CV fitness and function, CV morbidity and mortality, patient adherence or maintenance, QoL, lifestyle change or more active lifestyle, reduction in depression, engagement with or attendance by hard to reach groups
5.4.1	8	What evidence is there that healthy eating advice from a dietician is more effective than healthy eating advice from another healthcare professional? Outcomes: weight loss, long-term dietary change, CV morbidity, CV mortality, healthier food choices

5.4.1	10	What dietary interventions are effective in helping cardiac patients to achieve current recommendations for healthy eating? Interventions: diet scoring tools, food labelling, food purchasing advice, healthy cooking, food samples Comparison: dietary advice Outcomes: dietary change, behaviour change, lifestyle change
5.4.2	9	In cardiac rehabilitation patients, what evidence is there that commercial weight loss programmes are clinically effective and/or cost effective? Interventions: commercial weight loss programmes (Weight Watchers, Scottish Slimmers, Slimming World, etc), NHS weight management programme or counterweight programme Comparison: no intervention or between interventions Outcomes: weight loss/management, long-term weight maintenance, patient satisfaction, lifestyle change
5.5	18	What interventions are effective in promoting long-term maintenance of behaviour change in cardiac rehabilitation patients? Interventions: peer support, transition/discharge planning, handover (acute to community), shared care, addressing misconceptions, importance, confidence and readiness to change Comparison: educational interventions, no intervention or exercise only Outcomes: long-term maintenance behaviour, patient engagement, cardiac events, cardiac mortality, mood (reduced depression and anxiety)
6.2	12	What is the evidence that a tiered approach to managing anxiety, depression, stress or low mood as part of cardiac rehabilitation programmes is clinically effective? Population: patients in cardiac rehabilitation with symptoms or diagnoses of anxiety, depression, stress or low mood Interventions: tiered approach (according to symptom severity) to the management of mood disorders, psychologist in team, psychology element of rehabilitation programme Comparison: referral to community psychological services, antidepressants, exercise only cardiac rehabilitation Outcomes: reduced anxiety, depression, stress, low mood, cardiac morbidity, cardiac mortality, patient satisfaction, reduced emergency department attendance, reduced hospital stay, reduced GP referral
6.3	13	Is there evidence that shared completion of screening assessments for anxiety, depression, stress or low mood is more accurate or effective than patient self completion of screening assessments? Population: cardiac patients with suspected anxiety, depression, stress or low mood Intervention: patient-nurse, patient-clinician completion of screening assessment Outcomes: accurate diagnosis, reduced anxiety, depression, stress, low mood

6.4	14	What psychological interventions are effective in supporting cardiac patients participating in a rehabilitation programme? Interventions: cognitive behavioural therapy, acceptance and commitment therapy, peer support, relaxation therapy, behavioural interventions, counselling, mindfulness, psychosocial therapies Comparison: exercise only rehabilitation programme, no intervention Outcomes: mortality, return to work, QoL, reduction in hospital admissions, lifestyle change, adherence, mood and anxiety
7	20	Does a vocational rehabilitation component in a cardiac rehabilitation programme improve return to work rates and cardiac outcomes? Population: patients in cardiac rehabilitation who are returning to employment Interventions: vocational rehabilitation, including work hardening, enhanced work interventions, guided self management Comparison: no vocational rehabilitation, usual care/general advice Outcomes: return to work rate, mortality, morbidity, QoL, sickness absence rates, financial benefits, stress or depression, sustained employment, cost effectiveness
8.2	16	What is the evidence that non-medical prescribing is clinically and cost-effective and safe in cardiac rehabilitation programmes? Comparison: physician prescribing Outcomes: medication concordance, prescribing errors, adverse events, appropriate prescribing
8.3	17	What interventions improve patient concordance with medication during and following a cardiac rehabilitation programme? Interventions: increasing knowledge and understanding of medication and symptom control, cognitive/memory strategies/rehabilitation, changing health beliefs Comparison: usual care Outcomes: medication concordance, adverse events
No evidence identified	22	What is the effectiveness and safety of antidepressants in patients with depression or anxiety undergoing cardiac rehabilitation? Interventions: antidepressants, combination of antidepressants and psychosocial therapies Comparison: other antidepressants, psychosocial interventions, combination of antidepressants and psychosocial therapies, no intervention Outcomes: reduced anxiety, depression, stress or low mood, adverse events

Annex 2

UK physical activity guidelines

Start Active, Stay Active is a report on physical activity for health from the four home countries' Chief Medical Officers.[38] It presents recommendations on the volume, duration, frequency and type of physical activity required throughout life to achieve general health benefits.

Annex 3

Eatwell guide

This guide defines government recommendations on eating healthily and achieving a balanced diet.[58]

References

1 Information Services Division (ISD). Scottish Heart Disease Statistics Year Ending 31 March 2015. Edinburgh: NHS National Services Scotland; 2016. [cited 24 Apr 2017]. Available from url: https://isdscotland.scot.nhs.uk/Health-Topics/Heart-Disease/Publications/2016-01-26/2016-01-26-Heart-Disease-Report.pdf

2 Scottish Government. Heart Disease Improvement Plan. Edinburgh: Scottish Government; 2014. [cited 25 Apr 2017]. Available from url: http://www.gov.scot/Resource/0045/00458289.pdf

3 Cardiac Rehabilitation Sub Group. Vision for Cardiac Rehabilitation for 2020. Edinburgh: Scottish Government; 2014. [cited 25 Apr 2017]. Available from url: http://www.shfnf.co.uk/cardiac-rehabilitation-vision-2020/

4 British Association for Cardiovascular Prevention and Rehabilitation (BACPR). The BACPR Standards and Core Components for Cardiovascular Disease Prevention and Rehabilitation London: British Cardiovascular Society; 2017. [cited 12 Jun 17]. Available from url: http://www.bacpr.com/resources/AC6_BACPRStandards&CoreComponents2017.pdf

5 Anderson L, Thompson David R, Oldridge N, Zwisler A-D, Rees K, Martin N, et al. Exercise-based cardiac rehabilitation for coronary heart disease. Cochrane Database Syst Rev 2016;

6 Rauch B, Davos CH, Doherty P, Saure D, Metzendorf MI, Salzwedel A, et al. The prognostic effect of cardiac rehabilitation in the era of acute revascularisation and statin therapy: A systematic review and meta-analysis of randomized and non-randomized studies - The Cardiac Rehabilitation Outcome Study (CROS). Eur J Prev Cardiol 2016;23(18):1914-39.

7 Scottish Government. A route map to the 2020 Vision for Health and Social Care. Scottish Government; 2011. [cited 25 Apr 2017]. Available from url: http://www.gov.scot/Resource/0042/00423188.pdf

8 Scottish Intercollegiate Guideline Network (SIGN). Risk estimation and the prevention of cardiovascular disease. Edinburgh: SIGN; 2017. (SIGN publication no.149). [cited 26 Jul 2017]. Available from url: http://www.sign.ac.uk/our-guidelines.html

9 Scottish Intercollegiate Guideline Network (SIGN). Management of chronic heart failure. Edinburgh: SIGN; 2016. (SIGN publication no.147). [cited 25 Apr 2017]. Available from url: http://www.sign.ac.uk/guidelines/fulltext/147/index.html

10 Scottish Intercollegiate Guideline Network (SIGN). Acute coronary syndrome. Edinburgh: SIGN; 2016. (SIGN publication no.148). [cited 25 Apr 2017]. Available from url: http://www.sign.ac.uk/guidelines/fulltext/148/index.html

11 Doherty P. The National Audit of Cardiac Rehabilitation Annual Statistical Report. London; 2014. [cited 25 Apr 2017]. Available from url: http://www.cardiacrehabilitation.org.uk/docs/2014.pdf

12 Ghisi GL, Polyzotis P, Oh P, Pakosh M, Grace SL. Physician factors affecting cardiac rehabilitation referral and patient enrollment: a systematic review. Clin Cardiol 2013;36(6):323-35.

13 Doherty P. The National Audit of Cardiac Rehabilitation Annual Statistical Report London: British Heart Foundation; 2016. [cited 25 Apr 2017]. Available from url: https://www.bhf.org.uk/NACR2016

14 Karmali KN, Davies P, Taylor F, Beswick A, Martin N, Ebrahim S. Promoting patient uptake and adherence in cardiac rehabilitation. Cochrane Database of Systematic Reviews 2014, Issue 6.

15 Dressler C, Pattenden J, Atkin K, Lewin RJ. Interventions to increase the uptake of cardiac rehabilitation: Systematic review. Br J Cardiac Nurs 2012;7(7):338-45.

16 Taylor RS, Dalal H, Jolly K, Zawada A, Dean SG, Cowie A, et al. Home-based versus centre-based cardiac rehabilitation. Cochrane Database of Systematic Reviews 2015, Issue 8.

17 Reid RD, Morrin LI, Higginson LA, Wielgosz A, Blanchard C, Beaton LJ, et al. Motivational counselling for physical activity in patients with coronary artery disease not participating in cardiac rehabilitation. Eur J Prev Cardiol 2012(2):161-6.

18 Blanchard C, Arthur HM, Gunn E. Self-efficacy and outcome expectations in cardiac rehabilitation: associations with women's physical activity. Rehabil Psychol 2015;60(1):59-66.

19 Cheng TY, Boey KW. The effectiveness of a cardiac rehabilitation program on self-efficacy and exercise tolerance. Clin Nurs Res 2002;11(1):10-21.

20 Dohnke B, Nowossadeck E, Muller-Fahrnow W. Motivation and participation in a phase III cardiac rehabilitation programme: an application of the Health Action Process Approach. Res Sports Med 2010;18(4):219-35.

21 Howarter AD, Bennett KK, Barber CE, Gessner SN, Clark JM. Exercise self-efficacy and symptoms of depression after cardiac rehabilitation: predicting changes over time using a piecewise growth curve analysis. J Cardiovasc Nurs 2014;29(2):168-77.

22 Janssen V, De Gucht V, van Exel H, Maes S. Beyond resolutions? A randomized controlled trial of a self-regulation lifestyle programme for post-cardiac rehabilitation patients. Eur J Prev Cardiol 2013;20(3):431-41.

23 Maddison R, Pfaeffli L, Stewart R, Kerr A, Jiang Y, Rawstorn J, et al. The HEART mobile phone trial: the partial mediating effects of self-efficacy on physical activity among cardiac patients. Front Public Health 2014;2:56.

24 Jackson AM, McKinstry B, Gregory S, Stone J, Kovacs A, Doherty S. The influence of significant others upon participation in cardiac rehabilitation and coronary heart disease self-help groups. Int J Therap Rehabil 2011;18(8):450-61.

25 Astin F, Atkin K, Darr A. Family support and cardiac rehabilitation: a comparative study of the experiences of South Asian and White-European patients and their carer's living in the United Kingdom. Eur J Cardiovasc Nurs 2008;7(1):43-51.

26 de Roda AB, Moreno ES, Montero IV, Churnin S. Support groups and cardiac rehabilitation: effects of partner participation on anxiety and depression. Span J Psychol 2014;17:E10.

27 Clark AM, Catto S, Bowman G, Macintyre PD. Design matters in secondary prevention: individualization and supervised exercise improves the effectiveness of cardiac rehabilitation. Eur J Cardiovasc Prev Rehabil 2011;18(5):761-9.

28 Agency for Healthcare Research and Quality. Outpatient case management for adults with medical illness and complex care needs. Rockville, MD; 2013. (Number 99). [cited 26 Apr 2017]. Available from url: http://www.effectivehealthcare.ahrq.gov/ehc/products/240/733/CER99_OutpatientCaseManagement_FinalReport_20130102.pdf

29 Stokes J, Panagioti M, Alam R, Checkland K, Cheraghi-Sohi S, Bower P. Effectiveness of Case Management for 'At Risk' Patients in Primary Care: A Systematic Review and Meta-Analysis. PLoS One 2015;10(7):e0132340.

30 Wulff CN, Thygesen M, Sondergaard J, Vedsted P. Case management used to optimize cancer care pathways: a systematic review. BMC Health Serv Res 2008;8:227.

31 Coulter A, Entwistle VA, Eccles A, Ryan S, Shepperd S, Perera R. Personalised care planning for adults with chronic or long-term health conditions. Cochrane Database of Systematic Reviews 2015, Issue 3.

32 Barth J, Jacob T, Daha I, Critchley JA. Psychosocial interventions for smoking cessation in patients with coronary heart disease. Cochrane Database of Systematic Reviews 2015, Issue 7.

33 Fernandez R, Griffiths R, Everett B, Davidson P, Salamonson Y, Andrew S. Effectiveness of brief structured interventions on risk factor modification for patients with coronary heart disease: a systematic review. Int J Evid Based Healthc 2007;5(4):370-405.

34 Kotb A, Hsieh S, Wells GA. The effect of telephone support interventions on coronary artery disease (CAD) patient outcomes during cardiac rehabilitation: a systematic review and meta-analysis. PLoS One 2014;9(5):e96581.

35 Rigotti NA, Clair C, Munafò MR, Stead LF. Interventions for smoking cessation in hospitalised patients. Cochrane Database of Systematic Reviews 2012, Issue 5.

36 Rice VH, Hartmann-Boyce J, Stead, LF. Nursing interventions for smoking cessation. Cochrane Database of Systematic Reviews 2013, Issue 8.

37 Stead LF, Koilpillai P, Lancaster T. Additional behavioural support as an adjunct to pharmacotherapy for smoking cessation. Cochrane Database of Systematic Reviews 2015, Issue 10.

38 Department of Health Physical Activity Health Improvement and Protection,. Start Active Stay Active: A report on physical activity from the four home countries' Chief Medical Officers. London; 2011. [cited 26 Apr 2017]. Available from url: http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216370/dh_128210.pdf

39 World Health Organization (WHO). Physical activity. [cited 26 Apr 2017]. Available from url: http://www.who.int/mediacentre/factsheets/fs385/en/

40 Anderson L, Taylor RS. Cardiac rehabilitation for people with heart disease: an overview of Cochrane systematic reviews. Cochrane Database of Systematic Reviews 2014, Issue 12.

41 Brown A, Taylor R, Noorani H, Stone J, Skidmore B. Exercise-based cardiac rehabilitation programs for coronary artery disease: a systematic clinical and economic review. Ottawa: Canadian Coordinating Office for Health Technology Assessment (CCOHTA); 2003. (Technology Report Number 34). [cited 26 Apr 2017]. Available from url: https://www.cadth.ca/sites/default/files/pdf/147_cardiac_rehab_tr_e.pdf

42 Shepherd CW, While AE. Cardiac rehabilitation and quality of life: a systematic review. Int J Nurs Stud 2012;49(6):755-71.

43 Taylor RS, Sagar VA, Davies EJ, Briscoe S, Coats AJ, Dalal H, et al. Exercise-based rehabilitation for heart failure. Cochrane Database of Systematic Reviews 2014, Issue 4.

44 Haykowsky M, Scott J, Esch B, Schopflocher D, Myers J, Paterson I, et al. A meta-analysis of the effects of exercise training on left ventricular remodeling following myocardial infarction: start early and go longer for greatest exercise benefits on remodeling. Trials 2011;12:92.

45 Chan E, Giallauria F, Vigorito C, Smart NA. Exercise training in heart failure patients with preserved ejection fraction: a systematic review and meta-analysis. Monaldi Arch Chest Dis 2016;86(1-2):759.

46 Pandey A, Parashar A, Kumbhani DJ, Agarwal S, Garg J, Kitzman D, et al. Exercise training in patients with heart failure and preserved ejection fraction: meta-analysis of randomized control trials. Circ Heart Fail 2015;8(1):33-40.

47 Seron P, Lanas F, Rios E, Bonfill X, Alonso-Coello P. Evaluation of the quality of clinical guidelines for cardiac rehabilitation: a critical review. J Cardiopulm Rehabil Prev 2015;35(1):1-12.

48 Clark RA, Conway A, Poulsen V, Keech W, Tirimacco R, Tideman P. Alternative models of cardiac rehabilitation: a systematic review. Eur J Prev Cardiol 2015;22(1):35-74.

49 Huang K, Liu W, He D, Huang B, Xiao D, Peng Y, et al. Telehealth interventions versus center-based cardiac rehabilitation of coronary artery disease: A systematic review and meta-analysis. Eur J Prev Cardiol 2015;22(8):959-71.

50 Maddison R, Pfaeffli L, Whittaker R, Stewart R, Kerr A, Jiang Y, et al. A mobile phone intervention increases physical activity in people with cardiovascular disease: results from the HEART randomized controlled trial. Eur J Prev Cardiol 2015;22(6):701-9.

51 Butler L, Furber S, Phongsavan P, Mark A, Bauman A. Effects of a pedometer-based intervention on physical activity levels after cardiac rehabilitation: A randomized controlled trial. J Cardiopulm Rehabil Prev 2009;29(2):105-14.

52 Verheijden Klompstra L, Jaarsma T, Stromberg A. Exergaming in older adults: A scoping review and implementation potential for patients with heart failure. Eur J Cardiovasc Nurs 2014;13(5):388-98.

53 Devi R, Powell J, Singh S. A web-based program improves physical activity outcomes in a primary care angina population: Randomized controlled trial. J Med Internet Res 2014;16(9):e186.

54 Lear SA, Singer J, Banner-Lukaris D, Horvat D, Park JE, Bates J, et al. Randomized trial of a virtual cardiac rehabilitation program delivered at a distance via the internet. Circ Cardiovasc Qual Outcomes 2014;7(6):952-9.

55 Reid RD, Morrin LI, Beaton LJ, Papadakis S, Kocourek J, McDonnell L, et al. Randomized trial of an internet-based computer-tailored expert system for physical activity in patients with heart disease. Eur J Prev Cardiol 2012;19(6):1357-64.

56 Desroches S, Lapointe A, Ratté S, Gravel K, Légaré F, Turcotte S. Interventions to enhance adherence to dietary advice for preventing and managing chronic diseases in adults. Cochrane Database of Systematic Reviews 2013, Issue 2.

57 Hartmann-Boyce J, Johns DJ, Jebb SA, Summerbell C, Aveyard P, Behavioural Weight Management Review Group. Behavioural weight management programmes for adults assessed by trials conducted in everyday contexts: systematic review and meta-analysis. Obes Rev 2014;15(11):920-32.

58 Public Health England. Eatwell guide. [cited 26 Apr 2017]. Available from url: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/528193/Eatwell_guide_colour.pdf

59 Scottish Intercollegiate Guidelines Network (SIGN). Management of obesity. Edinburgh: SIGN; 2010. (SIGN publication no. 115). [cited 25 Apr 2017]. Available from url: http://www.sign.ac.uk/guidelines/fulltext/115/index.html

60 Cohen A, Assyag P, Boyer-Chatenet L, Cohen-Solal A, Perdrix C, Dalichampt M, et al. An education program for risk factor management after an acute coronary syndrome a randomized clinical trial. JAMA Intern Med 2014;174(1):40-8.

61 Schryver T, Smith C. Participants' willingness to consume soy foods for lowering cholesterol and receive counselling on cardiovascular disease by nutrition professionals. Public Health Nutr 2006;9(7):866-74.

62 Gudzune KA, Doshi RS, Mehta AK, Chaudhry ZW, Jacobs DK, Vakil RM, et al. Efficacy of commercial weight-loss programs: an updated systematic review. Ann Intern Med 2015;162(7):501-12.

63 Fuller NR, Colaqiuri S, Schofield D, Olson AD, Shrestha R, Holzapfel C, et al. A within-trial cost-effectiveness analysis of primary care referral to a commercial provider for weight loss treatment, relative to standard care—an international randomised controlled trial. Int J Obes (Lond) 2013;37(6):828–34.

64 Meads DM, Hulme CT, Hall P, Hill AJ. Cost-effectiveness of primary-care referral to a UK commercial weight loss programme. Clin Obes 2014;4(6):324-32.

65 Aldcroft SA, Taylor NF, Blackstock FC, O'Halloran PD. Psychoeducational rehabilitation for health behavior change in coronary artery disease: a systematic review of controlled trials. J Cardiopulm Rehabil Prev 2011;31(5):273-81.

66 Radhakrishnan K. The efficacy of tailored interventions for self-management outcomes of type 2 diabetes, hypertension or heart disease: a systematic review. J Adv Nurs 2012;68(3):496-510.

67 Ferrier S, Blanchard CM, Vallis M, Giacomantonio N. Behavioural interventions to increase the physical activity of cardiac patients: a review. Eur J Cardiovasc Prev Rehabil 2011;18(1):15-32.

68 ter Hoeve N, Huisstede BM, Stam HJ, van Domburg RT, Sunamura M, van den Berg-Emons RJ. Does cardiac rehabilitation after an acute cardiac syndrome lead to changes in physical activity habits? Systematic review. Phys Ther 2015;95(2):167-79.

69 Tierney S, Mamas M, Skelton D, Woods S, Rutter MK, Gibson M, et al. What can we learn from patients with heart failure about exercise adherence? A systematic review of qualitative papers. Health Psychol 2011;30(4):401-10.

70 Heron N, Kee F, Donnelly M, Cardwell C, Tully MA, Cupples ME. Behaviour change techniques in home-based cardiac rehabilitation: a systematic review. Br J Gen Pract 2016;66(651):e747-57.

71 Meijer A, Conradi HJ, Bos EH, Anselmino M, Carney RM, Denollet J, et al. Adjusted prognostic association of depression following myocardial infarction with mortality and cardiovascular events: individual patient data meta-analysis. Br J Psychiatry 2013;203(2):90-102.

72 Frasure-Smith N, Lesperance F, Gravel G, Masson A, Juneau M, Talajic M, et al. Depression and health-care costs during the first year following myocardial infarction. J Psychosom Res 2000;48(4-5):471-8.

73 Levin LA, Perk J, Hedback B. Cardiac rehabilitation--a cost analysis. J Intern Med 1991;230(5):427-34.

74 Sullivan M, Simon G, Spertus J, Russo J. Depression-related costs in heart failure care. Arch Intern Med 2002;162(16):1860-6.

75 Chauvet-Gelinier JC, Trojak B, Verges-Patois B, Cottin Y, Bonin B. Review on depression and coronary heart disease. Arch Cardiovasc Dis 2013;106(2):103-10.

76 Eggermont LH, de Boer K, Muller M, Jaschke AC, Kamp O, Scherder EJ. Cardiac disease and cognitive impairment: a systematic review. Heart 2012;98(18):1334-40.

77 van Oijen M, de Jong FJ, Witteman JC, Hofman A, Koudstaal PJ, Breteler MM. Atherosclerosis and risk for dementia. Ann Neurol 2007;61(5):403-10.

78 Kwok CS, Loke YK, Hale R, Potter JF, Myint PK. Atrial fibrillation and incidence of dementia: a systematic review and meta-analysis. Neurology 2011;76(10):914-22.

79 Freiheit EA, Hogan DB, Eliasziw M, Patten SB, Demchuk AM, Faris P, et al. A dynamic view of depressive symptoms and neurocognitive change among patients with coronary artery disease. Arch Gen Psychiatry 2012;69(3):244-55.

80 Tully PJ, Cosh SM, Baune BT. A review of the affects of worry and generalized anxiety disorder upon cardiovascular health and coronary heart disease. Psychol Health Med 2013;18(6):627-44.

81 Blumenthal JA, Sherwood A, Smith PJ, Watkins L, Mabe S, Kraus WE, et al. Enhancing cardiac rehabilitation with stress management training: A randomized, clinical efficacy trial. Circulation 2016;133(14):1341-50.

82 Richardson S, Shaffer JA, Falzon L, Krupka D, Davidson KW, Edmondson D. Meta-analysis of perceived stress and its association with incident coronary heart disease. Am J Cardiol 2012;110(12):1711-6.

83 National Institute for Health and Care Excellence (NICE). Depression in adults with a chronic physical health problem: recognition and management. London: NICE; 2009. (CG91). [cited 26 Apr 2017]. Available from url: https://www.nice.org.uk/guidance/cg91

84 NHS Education for Scotland. The Matrix (2015) A Guide to Delivering Evidence-Based Psychological Therapies in Scotland. [cited 26 Apr 2017]. Available from url: http://www.nes.scot.nhs.uk/education-and-training/by-discipline/psychology/the-matrix-(2015)-a-guide-to-delivering-evidence-based-psychological-therapies-in-scotland.aspx

85 Beach SR, Januzzi JL, Mastromauro CA, Healy BC, Beale EE, Celano CM, et al. Patient Health Questionnaire-9 score and adverse cardiac outcomes in patients hospitalized for acute cardiac disease. J Psychosom Res 2013;75(5):409-13.

86 Bhatt KN, Kalogeropoulos AP, Dunbar SB, Butler J, Georgiopoulou VV. Depression in heart failure: Can PHQ-9 help? Int J Cardiol 2016;221:246-50.

87 Lahlou-Laforet K, Ledru F, Niarra R, Consoli SM, PANIC Investigators. Validity of Beck Depression Inventory for the assessment of depressive mood in chronic heart failure patients. J Affect Disord 2015;184:256-60.

88 Fischer HF, Klug C, Roeper K, Blozik E, Edelmann F, Eisele M, et al. Screening for mental disorders in heart failure patients using computer-adaptive tests. Qual Lif Res 2014;23(5):1609-18.

89 Whalley B, Thompson DR, Taylor RS. Psychological interventions for coronary heart disease: Cochrane systematic review and meta-analysis. Int J Behav Med 2014;21(1):109-21.

90 Rutledge T, Redwine LS, Linke SE, Mills PJ. A meta-analysis of mental health treatments and cardiac rehabilitation for improving clinical outcomes and depression among patients with coronary heart disease. Psychosom Med 2013;75(4):335-49.

91 Murphy BM, Worcester MU, Higgins RO, Elliott PC, Le Grande MR, Mitchell F, et al. Reduction in 2-year recurrent risk score and improved behavioral outcomes after participation in the "Beating Heart Problems" self-management program: results of a randomized controlled trial. J Cardiopulm Rehabil Prev. 2013;33(4):220-8.

92 Scottish Intercollegiate Guideline Network (SIGN). Non-pharmaceutical management of depression in adults. Edinburgh; 2010. (114). [cited 28 Apr 2017]. Available from url: http://www.sign.ac.uk/pdf/sign114.pdf

93 McGillion M, O'Keefe-McCarthy S, Carroll SL, Victor JC, Cosman T, Cook A, et al. Impact of self-management interventions on stable angina symptoms and health-related quality of life: a meta-analysis. BMC Cardiovasc Disord 2014;14:14.

94 Freedland KE, Carney RM, Rich MW, Steinmeyer BC , Rubin EH. Cognitive Behavior Therapy for Depression and Self-Care in Heart Failure Patients: A Randomized Clinical Trial. JAMA Intern Med. 2015;175(11):1773-82.

95 Kwekkeboom KL, Bratzke LC. A systematic review of relaxation, meditation, and guided imagery strategies for symptom management in heart failure. J Cardiovasc Nurs 2015;31(5):457-86.

96 Doering LV, McGuire A, Eastwood JA, Chen B, Bodán RC, Czer LS, et al. Cognitive behavioral therapy for depression improves pain and perceived control in cardiac surgery patients. Eur J Cardiovasc Nurs 2015;15(6):417-24.

97 van Dixhoorn J, White A. Relaxation therapy for rehabilitation and prevention in ischaemic heart disease: a systematic review and meta-analysis. Eur J Cardiovasc Prev Rehabil 2005;12(3):193-202.

98 Nyklicek I, Dijksman SC, Lenders PJ, Fonteijn WA, Koolen JJ. A brief mindfulness based intervention for increase in emotional well-being and quality of life in percutaneous coronary intervention (PCI) patients: the MindfulHeart randomized controlled trial. J Behav Med 2014;37(1):135-44.

99 Waddell G, Burton AK, Kendall NAS. Vocational rehabilitation: what works, for whom and when? ; 2013. [cited 01 May 2017]. Available from url: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209474/hwwb-vocational-rehabilitation.pdf

100 Drory Y, Kravetz S, Koren-Morag N, Goldbourt U, Israel Study Group on First Acute Myocardial Infarction. Resumption and maintenance of employment after a first acute myocardial infarction: sociodemographic, vocational and medical predictors. Cardiology 2005;103(1):37-43.

101 Isaaz K, Coudrot M, Sabry MH, Cerisier A, Lamaud M, Robin C, et al. Return to work after acute ST-segment elevation myocardial infarction in the modern era of reperfusion by direct percutaneous coronary intervention. Arch Cardiovasc Dis 2010;103(5):310-6.

102 Mittag O, Kolenda KD, Nordman KJ, Bernien J, Maurischat C. Return to work after myocardial infarction/coronary artery bypass grafting: patients' and physicians' initial viewpoints and outcome 12 months later. Soc Sci Med 2001;52(9):1441-50.

103 O'Hagan FT, Thomas SG. Work adjustment in cardiovascular disease: job characteristics and social support. J Cardiopulm Rehabil Prev 2011;31(6):358-64.

104 Samkange-Zeeb F, Altenhoner T, Berg G, Schott T. Predicting non-return to work in patients attending cardiac rehabilitation. Int J Rehabil Res 2006;29(1):43-9.

105 Worcester MU, Elliott PC, Turner A, Pereira JJ, Murphy BM, Le Grande MR, et al. Resumption of work after acute coronary syndrome or coronary artery bypass graft surgery. Heart Lung Circ 2014;23(5):444-53.

106 O'Hagan FT, Coutu MF, Thomas SG, Mertens DJ. Work reintegration and cardiovascular disease: medical and rehabilitation influences. J Occup Rehabil 2012;22(2):270-81.

107 Petrie KJ, Cameron LD, Ellis CJ, Buick D, Weinman J. Changing illness perceptions after myocardial infarction: an early intervention randomized controlled trial. Psychosom Med 2002;64(4):580-6.

108 Mital A, Shrey DE, Govindaraju M, Broderick TM, Colon-Brown K, Gustin BW. Accelerating the return to work (RTW) chances of coronary heart disease (CHD) patients: part 1--development and validation of a training programme. Disabil Rehabil 2000;22(13-14):604-20.

109 Fiabane E, Giorgi I, Candura SM, Argentero P. Psychological and Work Stress Assessment of Patients following Angioplasty or Heart Surgery: Results of 1-year Follow-up Study. Stress health 2015;31(5):393-402.

110 Scafa F, Calsamiglia G, Tonini S, Lumelli D, Lanfranco A, Gentile E, et al. Return to work after coronary angioplasty or heart surgery: a 5-year experience with the "CardioWork" protocol. J Occup Environ Med 2012;54(12):1545-9.

111 Cholowski K, Cantwell R. Predictors of medication compliance among older heart failure patients. Int J Older People Nurs 2007;2(4):250-62.

112 Molloy GJ, Gao C, Johnston DW, Johnston M, Witham MD, Struthers AD, et al. Adherence to angiotensin-converting-enzyme inhibitors and illness beliefs in older heart failure patients. Eur J Heart Fail 2009;11(7):715-20.

113 Bhanbhro S, Drennan VM, Grant R, Harris R. Assessing the contribution of prescribing in primary care by nurses and professionals allied to medicine: a systematic review of literature. BMC Health Serv Res 2011;11:330.

114 Drennan J, Naughton C, Allen D, Hyde A, O'Boyle K, Felle P, et al. Patients' level of satisfaction and self-reports of intention to comply following consultation with nurses and midwives with prescriptive authority: a cross-sectional survey. Int J Nurs Stud 2011;48(7):808-17.

115 Gielen SC, Dekker J, Francke AL, Mistiaen P, Kroezen M. The effects of nurse prescribing: a systematic review. Int J Nurs Stud 2014;51(7):1048-61.

116 Naughton C, Drennan J, Hyde A, Allen D, O'Boyle K, Felle P, et al. An evaluation of the appropriateness and safety of nurse and midwife prescribing in Ireland. J Adv Nurs 2013;69(7):1478-88.

117 Conway B, Ferguson D. The role of independent nurse prescribers in a cardiac rehabilitation service. Br J Cardiac Nurs 2011;6(8):406-7.

118 Nieuwlaat R, Wilczynski N, Navarro T, Hobson N, Jeffery R, Keepanasseril A, et al. Interventions for enhancing medication adherence. Cochrane Database of Systematic Reviews 2014, Issue 11.

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