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THE ROLE OF REHABILITATION AS AN ADJUNCT TO MEDICATION IN ACUTE CORONARY SYNDROMES

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ABSTRACT

Purpose: The aim of this paper is to assess the impact of cardiac rehabilitation through a systematic review comparing cardiac rehabilitation to pharmacological treatment assessing the benefits and risks associated with it. Through examining cardiac rehabilitation, this dissertation clarifies the importance behind such strategies by summarising the evidence of benefit. **Method:** The types of evidence used for this research include both primary and secondary sources. The question of the effectiveness of cardiac rehabilitation is addressed by arguing that if the implementation of cardiac rehabilitation were improved the benefits would be higher. This study combines the findings of several studies to draw reliable conclusions supported by evidence than the component studies alone. **Findings:** Considering the evidence, area's, which require questioning, include the introduction of an online programme for patients to conduct the programme in the comfort of their own home compensating for the time used when attending appointments. Other areas include educating patients on the benefits of cardiac rehabilitation to motivate patients to attend. **Conclusion:** Despite the evidence, cardiac rehabilitation remains questioned; areas that require exposal include improving attendance, referral rates and introducing new areas of delivery.

INTRODUCTION

In recent years, obesity has developed into a global epidemic.[1] In addition to the dangerous health risks associated with obesity such as diabetes and hypertension, there are substantial financial consequences for healthcare providers like the UK National Health Service (NHS). Many people do not appreciate the health benefits that can be gained through physical exercise along with proper nutrition. Regular physical activity can improve health outcomes for chronic diseases while also helping to strengthen bones, stabilise joints and reduction in body fat.[1] Commonly, those who are not physically active have raised risk for high blood pressure, high cholesterol, type 2 diabetes and heart disease.[2]

Cardiovascular disease is a serious health issue affecting over three million people in the UK and costing an estimated UK£30 billion to the NHS, 70% of which costs were due to hospitalisation resulting from sub-optimal management of the condition.[2] Mortality due to myocardial infarction has fallen from 7 in every 10 people (1960) to currently 3 in 10 (101,423 people).[1][2] In terms of the treatment for MI, conventional treatment includes an angiotensin-converting inhibitor (ACE), dual antiplatelet therapy, beta blocker and a statin.[3] Many patients believed that this treatment is sufficient and easier than an exercise programme or diet.

The promotion of non-pharmacological treatment is demanding and challenging as it falls under behaviour change, particularly when the evidence of their effectiveness is not always available or confirmed. A further complication is that it can be difficult for one person in a household to change if the others present will not. Mastnak (2015) found that usually, medication fits with people's idea of illness, while diet and lifestyle carry a measure of blame; therefore, patients are less willing to accept them.[4] Due to the measure of blame, only 20% of people received a minimal degree of adequate advice on non-pharmacological measures. The World Health Organization (2007) defined cardiac rehabilitation (CR) as "the sum of activities required, influencing the underlying cause of the disease, so that people may preserve a normal place in the community".[5] CR can be beneficial in all conditions listed in table 1.

Table 1: Patient groups who will benefit from cardiac rehabilitation (NICE, 2013).

Chronic heart failure
Post Myocardial Infarction
Coronary angioplasty
Heart transplant
Implantation of a cardiac device (ICD)

CR involves a programme of exercise and education delivered by a specialist, to improve overall recovery (function and mobility). It includes components of health education, exercise, condition management and advice on risk reduction (Table 2).

Table 2: Core components of Cardiac rehabilitation (NICE, 2013).

Diet – advice a Mediterranean style diet
Reduce alcohol consumption
Regular physical activity
Smoking cessation
Weight management

In the UK, CR is provided in supervised groups either in outpatient clinics or community settings, normally commencing two to four weeks after an MI.[2] CR teams include doctors, nurses, exercise specialists, occupational therapists, dieticians and mental health specialists. A supervised program over approximately eight weeks is typically offered where the health outcomes can be measured and explained to patient. Despite CR being recommended by the National Institute for Health and Care Excellence (NICE) (2013) these services are not always utilised, which highlights the need for better communication between the CR team and primary care services to ensure an effective referral system is in place. Poor uptake has been higher in women, the elderly, ethnic minority groups and lower socio-economic groups.[6] Additional barriers are listed in table 3.

Table 3: Barriers to cardiac rehabilitation (NICE, 2013).

Poor adherence to appointment and self-care
Lack of endorsement by health care professionals
Obesity
Comorbidities
Smoking
Alcohol
Transport
Depression

According to Mastnak (2011), CR programmes have been demonstrated to be effective in reducing mortality, improving health and quality of life, reducing the length of hospital stays and reducing hospital readmissions. Some risks have also been identified, as sudden introduction of exercise, undertaking longer session than intended or inappropriately high intensity exercise may worsen cardiac conditions. Further, the benefits of a 20-30% improvement overall, can only be achieved if patients are willing to attend all designed sessions.[7]

Anderson *et al*. (2016) in a systematic review of 63 trials with post-MI and post revascularisation patients, concluded that small reductions in mortality and hospital admissions were identified in those who underwent CR.[8]

Powell *et al*. (2018) in their systematic review concluded that the poor uptake of CR lies within the referral system as it was believed many eligible patients were not given the opportunity, however, between exercise and no exercise groups, there was no difference found apart from a small reduction in mortality.[9]

Sumner *et al*. (2017) conducted a review of the effectiveness of CR comparing non-attendees to attendees. They found that the focus is not on the referral but on the promotion of the benefits, identifying that the lack of participation is due to the lack of knowledge and stating that "future work should seek to clarify how patient and service level factors determine the likelihood of improving cardiac mortality and reduced hospital readmissions".[10]

Momsen *et al*. (2017) found that regardless of having a referral, participation rates remained low in females which was believed to be due to a lack of social or emotional support and patient education; recommending that home-based programmes may need to be considered.[11] Mampuya (2012) conducted a meta-analysis of eleven exercise rehabilitation randomised trials focusing on reduction in all-cause mortality.[12] Outcomes found that CR was safe and effective in improving mortality despite evidence of it being underused but due to human error such as lack of minority participants results were not valid to provide an evidential conclusion. Suggestions were made such as improving referral and participation to ensure more patients benefit from the service.

Thompson and Lewin (2000) reported that MI patients should be offered access to CR and should be monitored to facilitate this. They identified the key to improving CR as "individual assessment, careful formulation of treatment, effective delivery, and systematic evaluation".[6] They showed strong evidence of the benefits including a reduction in cardiac mortality, while generally these figures increase yearly. It was also reported that poor education plays a big part in nonattendance at CR appointments.[12]

Dibben *et al*. (2018) looked at 40 randomised controlled trials concluded that CR provided positive outcomes, but in the long term, there was insufficient evidence.[13] They also reported negative aspects; for instance, it was found that CR alone was insufficient to maintain patient activity levels as participating patients were of too wide a spread of age and physical ability. Mastnak (2015) concluded that optimising long-term CR must be based upon an individual's perspective as every participant's lifestyle is different. In terms of participant's views, some patients believed the programme did not contribute to weight loss, smoking cessation and alcohol reduction was therefore not entirely useful. On the other hand, other patients enjoyed the experience and felt social inclusion, self-confidence and psychological support was needed after a traumatic experience.[4]

Savage *et al*. (2011) observed that despite advances in the CR program a substantial number of patients do not enrol when referred; the leading contenders being women, ethnic minorities and individuals with comorbidities.[14] This closely agrees with Momsen *et al*. (2017). Anderson *et al*. (2016) found that even though mortality figures were reduced, the results could not be generalised as evidence for all age groups, ethnicity and genders.

Search strategy

A primary search of the Cochrane Library, PubMed, World Health Organisation, Government United Kingdom, The Department of Health and journal sources such as Science Direct, British Medical Journal and the Public Library of Science was conducted. Keywords such as <coronary heart disease> and <cardiac rehabilitation> and <myocardial infarction> was conducted. The critical appraisal skills programme checklist (CASP) was used to select papers that could be further analysed. Articles dated from 2000-2019 and in English were selected. Inclusion criteria: adults, age range: 18-60 but ages above 60 will be considered and male and female participants.

Exclusion criteria: Children, Pregnant females, Elderly 70+, studies including patients with multiple health conditions.

The search identified fifteen articles which could inform this review but only five articles were selected and compared. The average age of trial participants ranged from 18-69 years including both male and females, but females accounted for a minority of the participants (Table 4).

Table 4: Summary of key study designs.

Study	Number of studies and participants	Study design	Primary outcomes
Anderson *et al.*, 2016	16 trials 3872 participants	Randomised controlled trials of cardiac rehabilitation with at least six months' follow-up, compared to no exercise trials.	Reduction in mortality, hospital admissions and improved quality of life.
Powell *et al.*, 2018	22 trials 4834 participants	Randomised controlled trials of exercise-based cardiac rehabilitation compared to no exercise control.	Reduction in hospital admissions in those with exercise-based cardiac rehabilitation.
Sumner *et al.*, 2017	8 trials 9836 participants	A systematic review of non-randomised controlled studies.	Cardiac rehabilitation was found to reduce the risk of all-cause and cardiac-related mortality and improve health-related quality of Life.
Clark *et al.*, 2005	11 trials 2285 participants	12-week participation: randomised controlled study on patients in the cardiac rehabilitation programme.	Improvement in quality of life and reduction in mortality.
Dibben *et al.*, 2018	40 trials 6480 participants	Randomized controlled trials (RCTs) comparing cardiac rehabilitation to no cardiac rehabilitation in adults.	Moderate increase in quality of life.

Findings

The five studies' authors shared similar views of the benefits of CR programs, highlighting that improving referrals and attendance is essential. Anderson et al. (2016) concluded that improvement due to CR was insignificant. Powell et al. (2018) found that the problem was caused by the referral system while Sumner et al. (2017) identified that the cause was not the referral system but the patients' attendance. Momsen et al. (2017) suggested the use of an automated referral system at the initiation of the therapy may improve attendance. Thompson and Lewin (2000) identified the requirement for individual assessment of patients, as they possess individual perceptions that may differ from those of health professionals. Therefore, the CR program must be tailored to meet specific patient needs. Dibben et al. (2018) found insufficient evidence of the benefits of the program in the long-term; again, the difference was not statistically significant. Mastnak (2015) concurred with Thompson and Lewin (2000) to optimise providing the program on an individual perspective while Savage et al. (2011) identified the need to target minority groups such as women and ethnic minorities. A meta-analysis conducted by Clark (2005) found that mortality was reduced, but there were many limitations including lack of results in women, elderly and ethnic minority groups.[15] In terms of feedback from patients, a negative aspect was that many were concerned about not being able to get time off work or whether they would have to travel to an unknown location.[11] Other patients wanted a different approach to the program as many people could not spare time there were suggestions of an online program or to increase the time aspect of the program from six to eight weeks to over a year allowing for patients to conduct the program in their own time.[6] In terms of improvements for the education aspect, there was a focus on behavioural change and consultant endorsement due to high demand, capacity and provider issues.[8] NICE (2017) developed and tested an online cardiac rehabilitation awareness and self-directed activities programme. When the outcomes were analysed, they found that technology would enable the CR service to effectively cope with consumer demands in the future allowing an internet-based access to

knowledge. The internet-based project aimed to provide credible information and to provide a forum for shared knowledge for both patients and healthcare professionals. Patients felt autonomous as more than 65%[3] of them completed the internet programme and admitted they would not have attended an outpatient CR program. Furthermore, staff time was more efficiently used as attendance improved from 44% to 57% with completion rates now at 73%.[3] In terms of cost, the current cost of the online programme was around £330 while the conventional approach is closer to £700.[3]

Another cost-saving benefit is associated with the cost associated with readmissions[3] as many patients do not attend outpatient cardiac rehabilitation appointments on the first appointment. NICE (2017) reported this new approach will ensure patients are better informed; reducing their chance of reoccurrence. For the online program to run efficiently, anonymous patient testimonials and consultant endorsements will be used to encourage patients to take part in CR assessments and tailor the program to their needs. In addition to benefits, limitations of CR have also been identified such as for those with co-morbidities of heart failure or angina who tend to have a higher risk but are not considered to be eligible for the program. This reinforces the need to tailor to these patient's needs. Further, the benefits can only be gained if patients are willing to attend the sessions as referral to the program is only one component the second one relies on the patient as participation typically is only 20-30%.[7]

In terms of patient perceptions, many patients are not aware of the health benefits; therefore, it is perceived as an unnecessary outpatients' appointment so many do not attend.[4] Furthermore, after an MI secondary issues such as anxiety and depression[13] are also frequent and must be managed, as since this is often not adequately addressed it can be one of the reasons why patients do not attend CR.

NICE (2013) released an article on the role of CR. The core of the guidance was offering CR as quickly as possible to patients who suffered a myocardial infarction (MI) to support them with their recovery and easing them back normal activities. An issue which was emphasised was commencing the program within ten days of discharge from the hospital, but it was found that this actually only happens in around 46%.[16][17] of people. The results also tend to vary between outpatients and inpatients which can also become a factor of the limited evidence behind CR.

Within the literature, the perceived problems were addressed with ideas such as allowing patients autonomy around the venue and time of day including the patient's home as an option. Furthermore, the National Audit for Cardiac Rehabilitation (2012) published an annual report on the outcomes of CR with an excellent online program included. The outcomes of this online program included a rise in the number of patients offered CR and a reduction in patient's readmissions for another cardiac event in the twelve months after the program.[7] Importantly, patients were pleased with the service received as they perceived a positive outcome and patient participation was autonomous. The challenges they faced were finding accurate eligible data. The number of patients invited to CR was encouraging at 98%, but many patients failed to attend or dropped out, meaning only 38% were recorded for analysis.[7] In terms of the cost in 2009-2010, the cost of CR was over £477 for staff costs, but this has increased over the years to costs over £1000.[7] It was also found that, newly diagnosed patients were not being identified as data was mislaid and fewer were being offered the service. It was concluded there should be a focus on the service being offered rather than completion of the program and readmission data. The patients also stated the need for feedback forms to inform staff of improvements and to receive their perceptions and observations of the limitations of the service.[11] The National Audit for Cardiac Rehabilitation (2012) report also suggested the introduction of an online programme could demonstrate cost reductions. The report concluded that each gained "Quality Adjusted Life Year (QALY) would cost around be about £8,000, which is well below the £20,000-£30,000 per QALY level usually considered in the NHS to be affordable.[11] A further estimate was provided showing that even if the cardiovascular risk in the UK were reduced by 1%, it would produce savings of £260 million per year.[7]

CONCLUSIONS

CR has progressed over the years from a simple program managed by a physiotherapist only to a multi-disciplinary program including smoking cessation, weight management, blood pressure reduction, glucose control, improved cholesterol levels, risk stratification and stress management. The education aspect involves a structured teaching program to educate patients about their condition; the goal is to allow patients to become responsible for and autonomous in their treatment and lifestyle changes.

CR is usually conducted over eight weeks starting two to four weeks after patients have left hospital and patients are allocated to a centre close to their homes. The concept of CR is well-intentioned, but issues have been identified which have not yet been fully rectified. Studies showed, low referral rate, low attendance figures and lack of evaluation of the benefits. The literature has suggested many solutions to the problem such as introducing an online self-directed programme to give the patients a sense of autonomy and increase the chances of participation. Other initiatives included home exercise booklets to address non-attendance, as people are much more comfortable to do exercise in the comfort of their home allowing for no travelling, no time off work or arranging a babysitter. Many patients felt the need for further education before attending the session as

many did not want to take time off work or travel to a location to attend the programme if it is not effective, hence the new approach of health promotion is required. The main benefit to the Department of Health is cost-effectiveness, therefore, having data to support the benefits behind CR will motivate patients into feeling confidence in the program and encourage participation.

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