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Cardiac Rehabilitation Enhancing Programs in Patients with Myocardial Infarction: A literature Review

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Background: Cardiac rehabilitation (CR) is a process that involves a multidisciplinary team of health professionals in order to optimize the status of patients' physical, psychological, social, and vocational well being. The CR program has been proven to influence health outcomes in patients with cardiac diseases, particularly myocardial infarction (MI) and stable angina. However, patients' compliance with cardiac rehabilitation programs remains a challenge.
Purpose: The purpose of this study is to review and identify interventions that enhance cardiac rehabilitation behaviors in MI patients.
Method: A literature review was conducted by analyzing related research reports published since 2000 to 2012. Only English language articles were included.
Result: There were 10 experimental studies and 2 meta-analysis studies. Interventions widely used to enhance cardiac rehabilitation behaviors in MI patients were self-efficacy and self management derived programs. These programs involved interventions that enhance cardiac rehabilitation behaviors, including training exercise, behavioral change, education and psychological support, and lifestyle changing strategies. None have reported the use of culturally tailored intervention. Four phases of cardiac rehabilitation were accepted as each phase represents a different aspect of care: inpatient care, early post discharge period, exercise training, and long term follow up. Critical factors for patients in maintaining an optimum health condition after a cardiac event are, in order, status of patient's physical, psychological, social, and vocational well being.
Conclusion: Cardiac Rehabilitation program has been shown to improve quality of life and decrease mortality in MI patients. The development of culturally specific interventions to increase cardiac rehabilitation behaviors will provide a significant improvement for cardiac patient's care that ultimately results in better health outcomes. Health care professionals should be involved in CR programs in order to enhance patients' performance in CR behaviors; moreover, further study is also needed to examine the existing intervention studies to improve the CR program.

Keywords: cardiac rehabilitation, attendance, behaviors, outcomes, secondary prevention and myocardial infarction (MI).

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Background

Cardiovascular diseases (CVD) continue to be the number one killer worldwide. They are responsible for 30% of all deaths, with an estimated 17.5 million deaths each year (WHO, 2009). In developing countries, cardiovascular diseases (CVD) are estimated to account for seven out of 10 deaths. In terms of the proportion of total deaths from all-causes, CVD in the Asia–Pacific region ranges from less than 20% in countries such as Thailand, Philippines and Indonesia to 20–30% in urban China, Hong Kong, Japan, Korea and Malaysia (Khor, 2001). In Indonesia, myocardial infarction disease is the first cause of death with a mortality rate of 220 000 (14%) in 2002. In 2007, the number of heart patients who underwent inpatient and outpatient care in hospitals is 239,548 inhabitants. Care Fatality Rate (CFR) was highest in myocardial infarction (13.49%) (Depkes, 2009).

Cardiac rehabilitation is a process where there is a multidisciplinary team of health professionals involved in encouraging and supporting patients with heart disease after cardiac events to obtain the treatment in achieving and maintaining a healthy heart by optimizing the status of patients' physical, psychological, social (Nazarko, 2008), and vocational well being (Cooper, Jackson, Weinman, & Horne, 2002; Sims et al., 2007). Cardiac rehabilitation (CR) should be able to give patients the opportunity to recover from heart diseases or at least from an acute cardiac event as well as be able to follow the development of their illness at a new stage.

Cardiac rehabilitation aims to promote secondary prevention and improve the quality of life by reducing risks of re-infarction, managing symptoms, and allowing clients to regain control of their lives (Tod, Lacey, & Mcneill, 2002). This process is an important part of the CR programs that typically include some components such as medical evaluation, education, exercise training, cardiac risk-factor modification, counseling, and psychosocial support (Adams et al., 2007; Angelish, Bunker, & Schoo, 2008; Fraser & Wendy, 2010; Lau-Walker,

2004; Lett et al., 2009; Stead, 2009; Sundarajan, Bunker, Begg, Marshall, & McBurney, 2004; Tod, Lacey, & McNeill, 2002; Wenger, 2008) which can significantly reduce cardiac risks and symptoms, improve functional capacity, increase psychological well-being and further reduce cardiac events (Ades, 2001; Fernandez, Salamonson, Griffiths, Juergens, & Davidson, 2008).

Systematic literature reviews of randomized controlled trials has shown that patients who attend cardiac rehabilitation after myocardial infarction have a 25% less chance in all-cause mortality (Clark, Whelan, Barbour, & Macintyre, 2005; Sundarajan, Bunker, Begg, Marshall, & McBurney, 2004). Cardiac rehabilitation progress consists of four phases: phase one is hospital care, assessment and discharge; phase two is post-discharge, screen for anxiety and depression, and treat if present; phase three is structured exercise program and rehabilitation; and finally, phase four is long-term maintenance (Blair, Thompson, & Angus, 2010; McKee, 2008; Nazarko, 2008; Stead, 2009; Williams & Hopper, 2003).

Even though the positive effects of participation in cardiac rehabilitation programs have long been established, cardiac rehabilitation attendance rates are low, and are local rather than population-based (Sundarajan et al., 2004). Evidence show that some factors influence cardiac rehabilitation behaviors (Angelish et al., 2008), such as age (Sundarajan et al., 2004), gender, physician recommendation (Ades et al., 2000; Barber et al., 2001; Barker et al., 2009; Cooper et al., 2002; Jolly et al., 2003; Shanks et al., 2007), scarcity of resources (Tod et al., 2002), socioeconomic status (Ramm et al., 2001), personal belief (Clark et al., 2004), social support (Pasquali et al., 2001), distance to travel (Angelish et al., 2008), and psychological health care (Colley et al., 2009).

Despite the available evidence showing the benefit of cardiac rehabilitation, rate of patients performing cardiac rehabilitation behaviors are still low (Beswick et al., 2005; Blair, Leslie, Thompson, & Angus, 2010; Colley, Whitfi, & Grayer, 2009; Sundarajan, Bunker, Begg, Marshall, & McBurney, 2004) and many patients fail to attend cardiac rehabilitation programs

(Cooper, Jackson, Weinman, & Horne, 2002). Therefore, in this study, the author reviews various articles to identify whether there are any interventions to enhance cardiac rehabilitation behavior among patients with myocardial infarction.

Objective

Existing cardiac rehabilitation (CR) evidence was systematically evaluated to identify studies of interventions that enhance cardiac rehabilitation behavior among patients with myocardial infarction. Various interventions were identified and discussed in this study to evaluate which one of the interventions were appropriate in enhancing cardiac rehabilitation behavior among patients with certain conditions after a cardiac event. Those interventions will provide recommendations for nursing practices to improve uptake and adherence in cardiac rehabilitation.

Methods

A search was conducted in the electronic databases: CINAHL, PubMed, Science Direct, Cochrane library, and ProQuest. In addition, the author also uses universal case entry website like a Google-scholar and other official website. Reference lists of articles were also searched in order to identify additional suitable papers. The research used English-language studies published since 2000-2011. The keywords that the author used in this study to obtain the accurate information consist of cardiac rehabilitation, attendance, behaviors, outcomes, secondary prevention and myocardial infarction (MI).

Results

The total number of articles identified and reviewed by the author was ten published experimental studies and two meta-analyses studies to determine the intervention used to

enhance cardiac rehabilitation behavior in patients with myocardial infarction. Seven out of the 10 experimental studies (70%) were randomized controlled trial (RCT) studies (Barlow, Turner, & Gilchrist, 2009; Barzagani, Besharat, Ehsan, Nejatian, & Hosseini, 2011; Furber, Butler, Phongsavan, Mark, & Bauman, 2010; Hiltunen et al., 2005; Lewin, Furze, Robinson, & Griffith, 2002; Scholz, Knoll, Sniehotta, & Schwarzwer, 2006; Jiang, Sit, & Wong, 2007), while three out of 10 studies (30%) were quasi experimental studies (Song, 2003; Song & Lee, 2001a; Song & Lee, 2001b).

In terms of the two meta-analyses studies, the first meta-analysis study evaluates interventions to improve uptake, adherence and professional compliance in cardiac rehabilitation (Beswick et al., 2005). There are some interventions to improve adherence in cardiac rehabilitation such as formal patient commitment, spouse or family involvement, self-management intervention (including assessment, problem identification, and goal setting), educational intervention, and psychological intervention. The second study examines the efficacy of exercise-based cardiac rehabilitation among post-MI patients (Lawler, Filion, & Eisenberg, 2011). Most exercise interventions were in the form of walking for 30 minutes to 1 hour and cycling with a bicycle ergometer for 20 to 30 minutes. The interventions were conducted in hospital/group- based CR, home-based CR, and mixed (among patients undergoing both hospital/group based CR and home-based CR). The result of the studies has shown a statistically significant reduction in re-infarction, cardiac mortality, cardiovascular mortality, and all cause mortality with exercised-based CR.

Five out of 10 studies were group-based (50%), one study was individual-based (10%) and four studies (40%) were group-based in hospital followed by individual-based at home or after the patients were discharged from the hospital. The indicators used to measure the outcome of each study have the same of categories such as health behaviors (waling performance, diet adherence, medication adherence, and smoking cessation), physiological

risk parameters (serum lipids, blood pressure, and body weight), health status, self-efficacy, psychological well being, self-management behaviors, motivation, and quality of life. From the 10 experimental studies, two studies were conducted in the USA (Barlow, Turner, & Gilchrist, 2009; Hiltunen et al., 2005), two studies in Europe (UK & Germany) (Lewin, Furze, Robinson, & Griffith, 2002; Scholz, Knoll, Sniehotta, & Schwarzwer, 2006), five studies in Asia (Iran, China, & Korea) (Barzagani, Besharat, Ehsan, Nejatian, & Hosseini, 2011; Jiang, Sit, & Wong, 2007; Song, 2003; Song & Lee, 2001a; Song & Lee, 2001b), and one study in Australia (Furber, Butler, Phongsavan, Mark, & Bauman, 2010).

Target population

The target population for each intervention study were patients with myocardial infarction (MI) and post coronary artery bypass graft (CABG) surgery that have been referred for cardiac rehabilitation. The number of subjects enrolled in the quasi study ranged from 45 to 114 nonrandom assignments, whereas the RCT study ranged from 142 to 300 randomly assigned to either the interventional group or the control group. All studies consist of both female and male subjects. The mean age of the subjects ranged from 58 to 76 years old. All studies exclude patients who have a history of unstable angina, severe complications such as uncontrolled arrhythmias or heart failure, and other conditions that could be exacerbated by the interventions.

Settings

To enhance cardiac rehabilitation behavior, the interventions were conducted in various settings and locations including in the outpatient department (OPD) cardiac rehabilitation center, home-based cardiac rehabilitation, and the combination between hospital-based and home-based cardiac rehabilitation. The most common setting occurred in

two places: in the hospital where the patient is admitted and then continues to the patient's home after being discharged from the hospital and followed-up by health care professionals.

Intervention to enhance cardiac rehabilitation behaviors

Educational intervention

Information provided during the educational intervention includes heart patho-physiology, cardiac risk factor modification, medication management, diet prescription, physical exercise, stress management and smoking cessation. A study by Lewin, Furze, Robinson, and Griffith (2002) stated that prior to educational intervention; nurses need to identify patients' risk factors for coronary heart disease from clinical data and patient's history. Then, patients should be given the chance to ask questions about their risk factors and about the cardiovascular disease in general. They were also encouraged to discuss how it affects their lives. Nurses answer each question that the patients ask during the session.

Education was given individually by the rehabilitation team of medical doctor, dietitian, and nurse educator with each topic in a separate session. Each session consisted of questioning and answering, sharing and discussion. Jiang, Sit, and Wong (2007) study involved the family during the education intervention, the patients were asked to recall their own experiences on the topic, to think about what they did before, and any behaviors or attitudes that have to be changed and how to change them. The duration usually lasts for 50 minutes per session. In-hospital individualized education sessions were provided at the patient's room. Materials were given to the patients after educational session such as a healthy heart manual, work-book, audio-taped relaxation program, brochures, and booklet as a self-help tool for the patient.

Self-efficacy

Self-efficacy derived program consists of four sources of self-efficacy: (1) mastery experience, (2) vicarious experience, (3) verbal persuasion, and (4) physiological and affective state (Bandura, 1997). Mastery experience is delivered through the use of an exercise and activity diary and heart rate check, encouragement of smoking cessation, exercise demonstration and practice, discussions on physical activities currently performed and on the capabilities from the past, and by reminding the person of their strengths from past experiences. Vicarious experience is conducted through booklet review, individual consultation, mutual feeling among patients in order to motivate each other, introducing others who are similar and have successfully recovered, as well as by providing anticipatory guidance to reduce barriers.

Verbal persuasion is given by understanding an individual's health risk related to their current lifestyle and setting personal goal to change their behaviors, identifying the barriers and developing strategies to overcome barriers in order to improve their health behaviors, focusing on progress, giving support and encouragement, reviewing expected progress based on cardiac guidelines, and identifying strategies on how to achieve goals. Finally, physiological and affective state is offered through encouraging abdominal breathing for relaxation, helping to reframe symptoms and how they may be a part of recovery process, correcting false or unrealistic expectations and interpretations, reducing stress through stress management techniques, and providing information on recovery process.

Self-management

Self- management derived program involves three processes including self-monitoring, self-reinforcement, and self- evaluation (Kanfer & Gaelick-Buys, 1991). After educational intervention is given, the researcher and the patient set the behavioral goals per day for physical exercise, smoking cessation, medication adherence, diet adherence, and

physiological risk control. Goal setting is part of the intervention program and is similar to a therapeutic contract that is suggested in the self-management method (Kanfer & Gaelick-Buys, 1991). The patients self-manage behaviors in a goal directed manner. Self-evaluation and self- reinforcement are conducted based on the daily log for each activity the patient performs. Self-monitoring is conducted in patients' follow-up sessions in order to monitor, facilitate, and reinforce the self- management practice of the patients (Jiang, Sit, & Wong, 2007). During the follow-up, any success with the goals the patients had set was rewarded with praise and encouragement; they will also be asked if they wished to extend the goal (Lewin, Furze, Robinson, & Griffith, 2002).

Duration of interventions

Each study has different duration of intervention. It depends on how long the study was conducted from the baseline assessment until the completion of the program, not including the post-test data. The duration of the intervention can be divided into three categories: short term (less than 6 months or 24 weeks), medium (6 months until 12 months or 24-48 weeks), and long term (12 months or more than 48 weeks). Based on the 10 studies, 6 studies were short term, 4 studies were medium term, and there was no long term study conducted.

Generally, the short term duration studies measured the effectiveness of the intervention in a short time period. Most of studies have shown that scores were significantly higher in the intervention group than in the control group. The result of each study can be summarized as follows: improvements in cardiac risk factor modification (Jiang, Sit, & Wong, 2007; Song & Lee, 2001a), increased performance in health behaviors (Furber, Butler, Phongsavan, Mark, & Bauman, 2010; Hiltunen et al., 2005; Jiang, Sit, & Wong, 2007; Song & Lee, 2001b; Song, 2003), improvements in quality of life (Song, 2003), increased self-efficacy

(Barzagani, Besharat, Ehsan, Nejatian, & Hosseini, 2011; Song, 2003), and improvements in psychological status (Lewin, Furze, Robinson, & Griffith, 2002; Scholz, Knoll, Sniehotta, & Schwarzwer, 2006).

On the other hand, Barlow, Turner, & Gilchrist (2009) found that there is no statistically significant effects of course attendance although a pattern of small improvements among intervention participants was observed, this was because expert patient program (EPP) may have a role to play in the long term when the motivation to maintain exercise and healthy diet may be a challenge. Moreover, even though a study by Song (2003) shows a significant increase in total self-efficacy score, health behaviors score, and improvement in the quality of life, the four weeks time period of observation is a relatively short period of time in terms of identifying the long term effects of the program on self-efficacy, health behaviors, and quality of life. The study measured health behaviors not through observation but through self-administered questionnaire where biases could affect results.

Follow-up strategies

Based on the ten studies, the researchers used different strategies for following-up interventions. Almost all studies used the telephone as the equipment for patients' follow-up and few of them were combined with other media such as: face to face, email or internet, and home visit. A study that used both telephone calls and face to face (supervised) meeting was presented by Barlow, Turner, & Gilchrist (2009), three studies used face to face or supervised sessions (Lewin, Furze, Robinson, & Griffith, 2002; Song & Lee, 2001a; Song & Lee, 2001b), one study used face to face (supervised) and home visit (Scholz, Knoll, Sniehotta, & Schwarzwer, 2006), two studies used home visit and telephone call (Hiltunen et al., 2005; Jiang, Sit, & Wong, 2007), one study used telephone call and email (Furber, Butler, Phongsavan, Mark, & Bauman, 2010), and two studies only used telephone call (Barzagani,

Besharat, Ehsan, Nejatian, & Hosseini, 2011; Song, 2003).

A systematic review of Eakin, Lawler, Vandelanotte, & Owen (2007) study has shown that telephone call is not only a follow up strategy but can also be used as a primary intervention method. They reviewed twenty-six studies which used telephone intervention for physical activity and dietary behavior change. Other intervention components that supported the telephone call were face-to-face and print material, activity log, and pedometer. The frequency of telephone call differs in each study, generally, they used weekly calls, monthly calls, and 16 calls over 6 months, 16 calls over 12 months, and can be less or more frequent. Harkness et al. (2005) found that telephone call may have improved patient attendance at CR after a cardiac event, evidence shows that phone call became a simple reminder of the appointment for the patient, phone call also provides an opportunity to advocate the positive effects of CR, as well as an opportunity to identify and develop strategies to overcome barriers to CR participation (Harkness et al., 2005).

Discussion

The purpose of the reviewed study was to identify the intervention studies that enhance cardiac rehabilitation behavior in patients with myocardial infarction. The intervention consists of self-efficacy and self management derived programs. The entire program has proven to encourage and support patients to be actively involved in cardiac rehabilitation programs. Based on the review, educational intervention was an important element of the self-efficacy and self-management program. The purpose of the educational session was to provide knowledge, skill, and resource information to MI patients as a way of enhancing their behavioral practice in cardiac rehabilitation.

Self-efficacy has four major concerns including mastery experience, vicarious experience, verbal persuasion, and physiological and affective state. Mastery experience and

verbal persuasion in combination with patient education are important in helping patients set and achieve realistic short and long-term goals, in developing plans, and implementing problem-solving strategies. Vicarious experience and reinterpretation of symptoms were less frequent. Vicarious experience requires similar quality of role model and reinterpretation symptoms requires the patient's ability to express feelings which may become difficult for some patients. Self-management is similar with self-efficacy in terms of goal setting. The patient keep doing each activity that has been set and use a log record for goal-directed self-monitoring, self-evaluation, and self-reinforcement of daily behaviors performance.

The success of each program depends on the follow up strategies for intervention. Generally, the telephone is used because it is simple and quicker than any other method of strategies for follow-up. Telephone follow-up by hospital health professionals is seen as a good method for exchanging information, providing health education and quality of life after-care services for patients discharged with acute myocardial infarction from hospital to home (Hanssen, Nordrehaug, Eide, & Hanestad, 2009). Computer assisted email or internet, can also ease communication between healths care provider and patients, and however, due to the limited number of people using this technology, it cannot be fully implemented. Home visit is the best strategy for patient follow-up, patients and health care providers can directly meet face to face and the patient's progress can be seen clearly. The disadvantages of home visits is that it takes a long time, the far distance between the patients' residence with health centers, and the shortages of health workers which will become an obstacle in implementing home visits. However, for patients with no telephone or other equipments, home visit is a good strategy for follow-up intervention (Jolly et al., 2003).

Conclusion

In conclusion, the reviewed ten studies which identify the intervention to enhance cardiac rehabilitation behavior among patients with myocardial infarction found that even though they used various ways to encourage patient's behavior as well as different strategies for follow-up, the results show a significant improvement in health behavior and the three interventions (educational intervention, enhancing self-efficacy, and self-management behavior) were effective for patient who participate in cardiac rehabilitation after cardiac events. The duration of intervention can influence the outcome at the end of program because the length of time for intervention can motivate the patient in maintaining behavior in accordance to the cardiac rehabilitation programs. Follow up strategies for intervention has been able to follow the progress of technology, especially in western countries where telephones and internets are used. However, it does not rule out further studies which may find that home visit to be more effective in cardiac rehabilitation programs.

Recommendation

Myocardial infarction is a disease that must be prevented and treated. Cardiac rehabilitation presents one alternative to recover patient's condition after a cardiac event. Even though some studies have shown the benefit of cardiac rehabilitation, there are still some barriers which influence patient's behavior and the cardiac rehabilitation program. It is not easy to change cardiac rehabilitation behavior due to several factors that are usually related to the patients. In addition, behavior change itself is difficult but some interventions that are provided in this study may be useful for all health professional involved in direct patient contact (e.g. doctors, nurses, allied health professionals) in improving cardiac rehabilitation behavior among patients with myocardial infarction.

Alternative approaches need to be considered for cardiac rehabilitation, health care

professional must prioritize appropriate program for patients in accordance with the patient needs and minimize factors that influence behaviors counter to cardiac rehabilitation. The use of community centers such as home-based program can be an effective way for some patients who cannot attend hospital-based programs. The telephone call follow up strategy is important to monitor the progress of the program and the patient conditions during cardiac rehabilitation, and it must be continuously conducted until the program is finished to achieve the desired outcomes.

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