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THE EFFECTS OF EARLY EDUCATIONAL INTERVENTION ON PATIENTS WITH ACUTE CORONARY SYNDROME (ACS): A REVIEW

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ABSTRACT

Participation in cardiac rehabilitation program (CRP) had proven to promote a healthy lifestyle to improve quality of life after cardiac event. Early educational intervention is very important to prepare the patient before discharged home due to the poor enrolment in the CRP. The aims of this review are to describe the early educational interventions offered to the patients with ACS and to review its effectiveness. A literature review was conducted by analyzing related research studies published since 2009 to 2018. There were eight studies included in this review. Alternative approaches need to be considered for cardiac rehabilitation, where appropriate programs for patients that suits with the patients' needs especially while the patients are still in the hospital. The early educational intervention that inculcates the self-efficacy enhancement should be considered to guide the patients to manage themselves at home and lead a healthy lifestyle to prevent the recurrence of the disease.

Keywords: Inpatient Education, Early Education, Acute Coronary Syndrome

INTRODUCTION

According to Malaysia National Cardiovascular Disease-Acute Coronary Syndrome (NCVD-ACS) Registry 2011-2013, ACS caused in-hospital mortality rate of 7.6% and 30 days-mortality rate of 9% out of 14,763 patients admitted. The mean age was 59 years (SD 12), with 24% under the age of 50 years and 76% of patients were male (National Cardiovascular Disease Database (NCVD), 2013). Surprisingly, 65.2% of the patients admitted already had a history of myocardial infarction. There were 12% of them readmitted and diagnosed as STEMI, 24% as NSTEMI and 29.2% readmitted due to unstable angina (NCVD, 2013). Thus, rehabilitation as a secondary prevention should be focused on these patients in order to prevent the recurrent of myocardial infarction and further deteriorating the health status of the patients.

CRP following a cardiovascular event is a Class I recommendation highlighted by the European Society of Cardiology, the American Heart Association, and the American College of Cardiology (Galve *et al.*, 2014). While in Malaysia, it is recommended that strategies for secondary prevention for post STEMI which are smoking cessation and exercise both have level of evidence B (data derived from a single randomized clinical trial or large nonrandomized studies) and grade of recommendation of I (conditions for which there is evidence and/or general agreement that a given procedure/therapy is beneficial, useful and/or effective) (Malaysian Ministry of Health, 2014).

Although many studies proved the benefits of CRP (Oldridge, Höfer, & Mcgee, 2012; Dunlay, Pack, Thomas, Killian, & Roger, 2014; Chernomordik *et al.*, 2017 and Dunlay *et al.*, 2014), unfortunately, it remains considerably underutilized mainly because of referral problems and poor participation (Engen-Verheul, H., De-Vries, H., Kemps, H., Kraaijenhagen, R., De Keizer, N., Peek, N. 2013; Mampuya, 2012 and Turk-Adawi, K., Oldridge, N.B., Tarima, S.S., Stason, W.B., Shepard, D.S. 2014). (Beauchamp *et al.* 2013 and Lemstra *et al.* 2013) reported less than half of the participants completed the CRP. While, in Malaysia, the status of the attendance and referral to the CRP is under-reported and unclear.

Poor enrollment and attendance makes the Phase 1 of CRP or inpatient CRP is very crucial as the participants is still in the hospital and the early educational intervention is possible. However, the shorter hospital stay with modern cardiac treatment makes it difficult to conduct formal inpatient early educational program.

Thus, Phase I are mostly limited to early mobilization to make self-care possible by discharge, and brief counselling about the nature of the illness, the treatment, risk factors management and follow-up planning. This literature review is focusing on the inpatient educational intervention offered to the patients with Acute Coronary Syndrome (ACS) and the outcomes of the intervention.

METHODOLOGY

Literature search strategies

The aims of this literature review are to analyse, summarize, and synthesize the nature of the early educational interventions offered to the patients with Acute Coronary Syndrome and the outcome of the interventions. The literature review search process is guided by specific objectives.

Objective of literature review

1. To describe the early educational interventions offered to the patients with ACS

2. To examine the outcomes after the early patient education intervention on patients with ACS

Search strategies

Four main online searched databases were used for the literature search; EBSCO Host Database, CINAHL, PubMed, and Scopus. The search strategy incorporated three concepts: a) acute coronary syndrome (ACS) and myocardial infarction (MI) using the "OR/AND" operator, b) intervention combining early education, inpatient education, patient education, cardiac rehabilitation with the "OR/AND" operator and c) outcomes of interest combining behaviour change, lifestyle change, physical activity, physiological outcomes with operator "OR/AND".

Inclusion and exclusion criteria

The inclusion criteria for in this literature search includes; full-text article, published from 2009 to 2018, in English language, experimental, prospective or observational study design, population of the study is coronary heart disease, acute coronary syndrome, and myocardial infarction. Meanwhile, the exclusion criteria include; the population studied is chronic heart failure patients, exploratory qualitative study, home-based intervention, outpatient intervention and non-educational intervention i.e. exercise training. Initially, there were 1,088 articles identified during the search process, based on title screening. However, in the final stage only eight articles are included for further review based on The Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Cohort studies, JBI Critical Appraisal Checklist for quasi-experimental studies and JBI Critical Appraisal Checklist for randomized control trial studies.

RESULTS

There were eight studies included in this review from the year 2010 to 2017 (Table 1). Four studies were from European countries, which were from German (Meng *et al.*, 2014), Canada (Harbman, 2014), Switzerland (Weibel, Massarotto, Hediger, & Mahrer-imhof, 2014), and United Kingdom (Lau-Walker, Landy, & Murrells, 2016) (Table 1). Two of the studies were from Turkey (Irmak & Fesci, 2010 and Uysal & Özcan, 2012). There were another two studies from South East Asia which were from Thailand (Vibulchai, Thanasilp, & Preechawong, 2016) and Malaysia (Anchah *et al.*, 2017) (Table 1). There are three randomized control trial study (Uysal & Özcan, 2012; Vibulchai *et al.*, 2016 and Weibel *et al.*, 2014), three quasi-experimental (Anchah *et al.*, 2017; Irmak & Fesci, 2010 and Meng *et al.*, 2014) and two cohort prospective study (Harbman, 2014 and Lau-Walker *et al.*, 2016) (Table 1).

Table 1: The early educational interventions to ACS patients

Author/ Year/ Country	Participants	Research design	Intervention	Control	Theoretical based	Led by
Uysal & Özcan, 2012 Turkey	90 AMI patients	Randomized control trial	Patients were individually trained on the fifth to seventh days before discharge for an hour. Thentelephone counselling regarding information on measures for decreasing cardiovascular risks at the 4th and 8th week after discharge were conducted.	A home training kit given to participants. No telephone counselling and training given.	Not mentioned	Nurse

Vibulchai, Thanasilp, & Preechawong 2016 Thailand	66 CAD patients	Randomized control trial	Self-efficacy enhancement program for cardiac rehabilitation (SEPCR) - three individualized in -hospital education sessions and three weekly sessions of telephone counselling	Two sessions of CR during hospitalization	Self-efficacy theory	Nurse
Weibel, Massarotto, Hediger, & Mahrer-imhof 2014 Switzerland	40 ACS patients	Pilot randomized control trial	Two interventions added to the standard care. First intervention is the assessment using Cardiac Patient Learning Needs Inventory (CPLNI) and education given based on the needs assessed. Second intervention was educational intervention on the day before discharge regarding individual risk factors, current cardiac medication and personal disease management barriers and facilitators.	Information given to patients by physician on daily rounds and information booklet.	Self-efficacy theory	Nurse
Irmak & Fesci 2010 Turkey	36 AMI patients	One-group pretest-posttest quasi experimental design	Six individual education sessions initiated in the hospital on the third day after MI and continued after discharge during home visits and completed in 3 days.	Not applicable	Not mentioned	Nurse
Anchah *et al.* 2017 Malaysia	112 ACS patients	Quasi-experimental	Clinical pharmacy services added to the standard phase I CRP protocol with intensive drug counselling sessions, medication adherence, and basic knowledge on managing their angina include: lifestyle modifications and pharmacological treat ments to reduce cardiovascular risks	Usual care, not attending CRP.	Not mentioned	Pharmacists
Meng *et al.* 2013 German	434 CHD patients	Quasi-experimental, sequential cohort design study	Patient-oriented program 'Curriculum Coronary Heart Disease' 5 sessions of 45min each in small groups.	Lecture based education	Health Action Process Approach	Physician Psychologist Physiotherapist
Harbman 2014 Canada	65 AMI patients	Prospective cohort study	Patient-centred comprehensive cardiovascular assessments and education, counselling and treatment recommendations related to heart attack recovery and secondary prevention care before discharge from hospital and on e week, two weeks, six	Nutritional counselling and discharge teaching by registered nurse.	Not mentioned	Nurse
Lau-Walker, Landy & Murrells 2016 United Kingdom	74 AMI patients	Longitudinal survey	The Personalised Patient Educational Protocol (PPEP) was designed to facilitate systematic nurse -patient interaction to clarify patients' interpretation of health promotion advice and strengthen their capacity to manage suggested health behaviour and lifestyle changes.	Not applicable	Not mentioned	Nurses

Target population

The target population for the intervention were patients with acute coronary syndrome that includes myocardial infarction, coronary heart disease or coronary artery disease. The number of participants enrolled in the studies ranged from 36 to 434 participants in the quasi experimental and longitudinal studies, and 40 to 136 participants in the randomized control trial studies. The target population exclude patients with heart failure and post Coronary Artery Bypass Graft surgery.

Setting

To ensure the educational intervention is given as early as possible, all studies initiated the interventions in the ward itself. There were studies conducted in few sessions in the hospital before the participants were discharged home . The other four studies conducted the early educational intervention before discharge, and then the participants came back to the hospital for the rehabilitation sessions, and a study that continued the intervention at home by telephone counselling .

Follow up duration

The duration of follow up also plays an important role in measuring the effects of the intervention. Studies by Anchah *et al*. (2017) and Meng *et al*. (2014) had the longest duration measured which is up to one year. The other study measured the effects at 4 weeks (Vibulchai *et al.*, 2016), 3 months (Harbman, 2014; Lau-Walker *et al.*, 2016; Uysal & Özcan, 2012) and 6 months (Irmak & Fesci, 2010).

The early educational intervention

Nurse-led intervention

The intervention was delivered mostly by nurses (Harbman, 2014; Irmak and Fesci, 2010; Lau-Walker *et al.*, 2016; Uysal & Özcan, 2012; Vibulchai *et al.*, 2016 and Weibel *et al.*, 2014), one study by pharmacists (Anchah *et al.*, 2017) and another one study by multidisciplinary personnel include physiotherapy, physician and psychologist (Meng *et al.*, 2014). All studies also an individually-targeted education except study done by (Meng *et al*. 2014) where the intervention delivered in a small group of participants.

Theory-based intervention

There were three studies that used theory-driven intervention. Two studies used Self-efficacy theory (Vibulchai *et al.*, 2016 and Weibel *et al.*, 2014). Vibulchai et al. (2016) designed the intervention based on Bandura self-efficacy to enhance self-efficacy for independent exercise and activities of daily living (ADL) performance using self-efficacy sources (i.e. enactive mastery experience, vicarious experience, verbal persuasion, and physiological and emotional states) and collaboration with a family member who provided support. While Weibel *et al*. (2014) used the goal of the intervention as improving patients' knowledge of their disease and treatment as well as strengthen patient's belief in their own capabilities to cope with the illness and plan for their future after discharge. (Meng et al., 2014) inculcate the theory of Health Action Process Approach as a guide to the intervention. (Meng et al. 2014) developed a patient-oriented program called 'Curriculum Coronary Heart Disease', where there are five sessions of 45 min each in small groups delivered by multidisciplinary personnel, which were a physician, a psychologist and a physiotherapist as compared to the usual care where the participants were given a lecture-based education.

Follow up duration

The duration of follow up also plays an important role in measuring the effects of the intervention. Studies by (Anchah et al. 2017 and Meng et al. 2014) had the longest duration measured which is up to one year. The other study measured the effects at 4 weeks (Vibulchai et al., 2016), 3 months (Harbman, 2014; Lau-Walker et al., 2016 and Uysal & Özcan, 2012) and 6 months (Irmak & Fesci, 2010).

The outcomes of the early educational intervention during cardiac rehabilitation

There were many outcomes measuring the effectiveness of the educational interventions. However, in this study, the researcher will discuss on the significant positive outcomes from the educational intervention (Table 2).

Author/ Year/ Country	Measurement	Measurement point	Main findings
Uysal & Özcan, 2012 Turkey	**Clinical data** • BMI • Waist circumference • Blood pressure **Lifestyle** • Smoking • Physical activity • Consume animal fat **Myocardial Infarction Dimensional Assessment Scale (MIDAS)** **SF-36 Quality of life**	• Before intervention • 3 months	• A significant difference in the intervention group in both the MIDAS and the SF-36 quality of life scales' third month of evaluations in comparison with the baseline values (P< 0.000) • Improvement was observed in comparison with the control group in terms of quitting smoking, physical activity, body mass index, waist circumference • A significant difference was observed in the third month of evaluation
Vibulchai, Thanasilp, & Preechawong 2016 Thailand	**Lifestyle** • Smoking • Physical activity • Eating habit • **The Duke Activity Status Index** **Maintain Function subscale of the Cardiac Self-efficacy Scale (CSES)**	• Before discharge • 4 weeks after discharge	**Maintain function subscale of Cardiac self-efficacy** • The experimental group exhibited a significantly higher total self-efficacy score than the control group **Functional status** • The experimental group exhibited a significantly higher total functional status score than the control group
Weibel, Massarotto, Hediger, & Mahrer-imhof 2014 Switzerland	**Lifestyle** • **S**moking **Cardiac Self - efficacy scale** **Hospital Anxiety and Depression Scale** **Attendance to rehabilitation**	• Before intervention • Before discharge • 3 weeks telephone follow up	When controlling for anxiety and depression, the intervention group showed significant better self -efficacy scores on the ability to control the symptoms (p=0.034). When controlling additionally for age, no significant differences could be detected. The attendance of a rehabilitation programme was higher in the intervention group. The participants in the intervention group reported high satisfaction with the early education

Irmak & Fesci 2010 Turkey	**Lifestyle** • Smoking • Eating habit • Exercise **Drug therapy compliance** **Clinical measurement** • Blood pressure, • BMI • Lipid (total cholesterol, LDL, HDL and triglycerides)	• Before intervention • 6months after discharge	**Lifestyles** • There is significant difference in smoking habit, caring food habit and regular exercise habit before and after the program **Risk factors measure** • There is significant difference in blood pressure, BMI, and lipid before and after the program
Anchah *et al.* 2017 Malaysia	**SF-36 Quality of life** **Clinical data** • Weight • BMI • Waist/hip • Systolic on admission • Diastolic on admission • Heart rate on admission • Ejection fraction **Lifestyle** • Smoking	• Before intervention • 6 months • 12 months	**Quality of life** • Pharmaceutical care intervention significantly improved quality of life • The Modified CRP group consistently showed better QoL, was more highly motivated and benefitted most from the CRP
Meng *et al*. 2013 German	**Illness knowledge** **Modified version of the Godin Leisure -Time Exercise Questionnaire** **Healthy diet** **A nine -item modified version of the self -report Food List** **Medication adherence - German version of the Medication Adherence Report Scale (MARS - D)**	• Before intervention • Before discharge • 6 months • 12 months after discharge	**Illness knowledge** • There is significant difference in illness knowledge between group. **Physical activity** • There is significant difference between group **Healthy diet** • There is no significant difference between group **Medication adherence** • There is no significant difference between group

Harbman 2014 Canada	**Outcomes/ goals achievement** • Smoking status • Systolic BP • Diastolic BP • Lipid (LDL cholesterol, HDL cholesterol, and triglycerides) • Involvement in physical activity • Attendance at CRP • Glycated haemoglobin • Medication used	• Before discharge • 1 week • 2 weeks • 6 weeks • 3 months after discharge	**Target goals** • Significantly improved achievement of the target goals (smoking cessation, reduce blood pressure , attendance at cardiac rehabilitation, improve physical activity, achieving a glycated haemoglobin < 7% in those with diabetes, triglyceride levels, statin use at follow-up)
Lau-Walker, Landy, & Murrells 2016 United Kingdom	**The Hospital Anxiety and Depression Scale** **The Dartmouth COOP Quality of Life Questionnaire** **The total activity measure (TAM)** **The Cardiac Diet Self - Efficacy Instrument** **Cardiac Exercise Self - Efficacy Instrument** **The Brief Illness Perception Questionnaire (BIPQ)**	• Before discharge • 3 months after discharge	**Emotional state** • There is no significant difference after 3 months in the emotio nal state of the participants **Quality of life** • There is significant difference after 3 months on 'General Health' subscales but no difference in other 2 subscales **Physical exercise** • There is no significant difference after 3 months **Self-efficacy** • There is no significant difference after 3 months **Illness belief** • There is significant difference after 3 months on 'Understanding' subscales but no difference in other 9 subscales

Behavioral and lifestyle changes

The behavioral changes that measured in the studies were the main components of the healthy lifestyle that proven can help to prevent the recurrence of the disease. The behavior that mainly included was smoking habit, physical activity, exercise habit, and dietary intake. It showed that the participants significantly changed in the smoking habit and physical activity but not in the dietary intake.

Physiological risk factors

The physiological measures were mainly the cardiac risk factors as also suggested by the Clinical Practice Guideline Primary and Secondary prevention of CVD

by Malaysian Ministry of Health (Ministry of Health, 2017). The physiological risk factors measured to investigate the effect of the early educational intervention include blood pressure, body mass index, serum lipid, waist circumference and glycated haemoglobin <7%. These physiological risk factors were significantly improved before and after intervention as well as between comparison groups.

Self-efficacy

According to (Bandura, 1998), all behavioural changes are mediated by self-efficacy, where a person with low self-efficacy is less likely to have confidence to carry out a new health behaviour, or try to change an embedded behaviour. Thus, self-efficacy should be measured together with the behavioural change. There were two studies that measure the Cardiac Self Efficacy Scale (CSES) where both were randomized control trial study (Vibulchai *et al.*, 2016; Weibel *et al.*, 2014) and both studies reported significant difference in the self-efficacy between intervention and control group.

Other outcomes

The other outcomes measured in the studies included that showed significant difference were quality of life and illness knowledge. Whereas medication adherence, anxiety and depression and emotional state of the participant showed no significant difference after the intervention.

DISCUSSION

The purpose of the study reviewed was to describe the early educational intervention offered to the patients with ACS and the outcomes from the intervention. The method of the educational intervention played an important role in determining the success of the program, especially measuring the behavioural changes of the participants. All studies included in this review were mainly inpatient educational intervention, where the intervention initiated during hospitalization and most of the interventions were held in the hospital itself.

Only one study by (Vibulchai, 2016) had incorporated the in-hospital education with the telephone counselling sessions that based on the self-efficacy enhancement after the participants discharged from the hospital. The intervention from the study showed significantly higher self-efficacy and functional status four weeks after discharged, compared to the normal cardiac rehabilitation program. (Eakin, *et al.*, 2007) had systematically reviewed twenty-six studies that used telephone intervention for physical activity and dietary behaviour change agreed that telephone call can be used as a primary intervention in giving education to the patients. However, (Vibulchai, 2016) only measure the outcomes as early as four weeks after discharge. However, there is a need to measure a long-term effect of the early educational intervention on cardiac self-efficacy whether the self-efficacy will further build over time or not.

The duration of the follow up can affect the outcomes measured from the intervention. Weibel (2014) had the shortest time where the cardiac-self efficacy and anxiety and depression were measured at baseline before the inpatient education given in the ward, and prior to discharge. Although the study showed a significantly better score of self-efficacy in the ability to control the symptoms in the intervention group, it is as expected as the duration between the intervention and the endpoint was very short. However, this study is a pilot RCT study and the author did realize the need of long-term follow up. Besides, this study only measures the anxiety and depression of the patient, not the change of the behavior.

The significant improvement in behavioural measure marked the effectiveness of the educational intervention delivered to the participants. Physical activity is one of the behavioural measures that mostly tested and showed significant changes before and after the intervention as well as between comparison groups. Smoking cessation is one of the behavioural changes that easily measured and showed significant change before and after the intervention as well as between comparison groups. However, both of the behavioural changes measured are self-reported by the participants. Thus, measuring the behavioural change itself in a study may or may not manifest the effectiveness of the intervention.

The addition of the physiological measures in the study to support the behavioural change that mainly measured by self-reporting is somehow recommended. The physiological measures were mainly the cardiac risk factors as also suggested by the Clinical Practice Guideline Primary and Secondary prevention of CVD by Malaysian Ministry of Health (Ministry of Health, 2017) that include blood pressure (systolic and diastolic), body mass index, serum lipid, waist circumference and glycated haemoglobin <7%.

RECOMMENDATIONS

From the literatures examined, there is a need to investigate the effectiveness of the early inpatient educational intervention on self-efficacy in view of build the confidence to improve their healthy behaviour. The literature also showed that early educational intervention produces significant effect on physical activity. Thus, as a future recommendation, it is needed to test whether the significant effect have any relationship with the self-efficacy of the participant. Furthermore, it is also recommended to incorporate the measure of the physiological values if the physical activity is self-reported by the participants.

CONCLUSION

Acute coronary syndrome is a disease that must be treated and prevented from recurrence. Cardiac rehabilitation is a secondary prevention strategy that helps the patients to recover from the cardiac events. Even though studies have shown the benefit of cardiac rehabilitation, there are still some barriers that make the cardiac rehabilitation underutilized and even in some countries not well established. Alternative approaches need to be considered for cardiac rehabilitation, where appropriate programs for patients that suits with the patient needs especially while the patients are still in the hospital. The early educational intervention that inculcates the self-efficacy enhancement should be considered to guide the patients to manage themselves at home and lead a healthy lifestyle to prevent the recurrence of the disease. The telephone call strategy for follow up as well as for educations is important to maintain the continuity of the program and monitoring of the progress during cardiac rehabilitation.

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