

Development of a health related lifestyle self management (HeLM) intervention for patients with coronary heart disease

ABSTRACT

Risk factor modification following an acute coronary event is imperative and intervention strategies are continuously being developed to assist patients with behaviour change and consequently reduce the risk of further coronary episodes. This paper describes the development of the health related lifestyle self management (HeLM) intervention which is a brief structured intervention embedded within the Transtheoretical model of behaviour change. The HeLM intervention was developed by undertaking three discrete yet interrelated studies and consisted of the following components: goal-setting, the HeLM Booklet, feedback of personal risk, team building and communication with the patient's family physician, three supportive telephone calls, a refrigerator magnet, and a health diary for self-monitoring. The HeLM intervention has been successfully implemented in 50 patients with acute coronary syndrome following discharge from hospital and has demonstrated to be feasible and practical and could easily be delivered by health care professionals.

Key words

Brief intervention, self-management, coronary heart disease, risk factor modification, tele-health

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Introduction

Coronary heart disease (CHD) remains the leading cardiovascular cause of mortality and morbidity globally.¹ The associated costs resulting from the physical and psychosocial disabilities places a significant burden on both the patients and the community.² Failure to modify risk factors contributing to CHD, such as low physical activity levels,³ hypertension,³ dyslipidaemia,³ smoking,^{3,4} hyperglycemia,³ and obesity³ are associated with CHD progression and an increased incidence of mortality and morbidity. Therefore it is essential for patients with known CHD to adopt recommended lifestyle and behavioural changes to ameliorate the modifiable risk factors and minimize the progression of CHD.⁵

Cardiac rehabilitation remains the gold standard for all patients with CHD, as it enables returning to an active and satisfying life, reduces mortality by 35% and also prevents the occurrence of recurrent cardiac events.⁶ Despite these benefits, participation and adherence to cardiac rehabilitation programs remains low.^{7,8} Barriers to participation in these programs included limited availability and accessibility, program length (ranging from 4 weeks to 1 year), distance from home or work, time conflicts, lack of physician/ family support and transportation and scheduling of classes.^{7,9} Various strategies to increase participation rates and promote adherence to cardiac rehabilitation programs, including the introduction of evening classes, provision of transport and home based cardiac rehabilitation,⁹ have been implemented with limited success. Poor attendance at cardiac rehabilitation programs

clearly indicates that alternate strategies for the delivery of information relating to cardiac risk factors and support for these patients is essential.

New intervention strategies are continuously being developed, such as individualized coaching¹⁰ and modular approaches¹¹ for cardiovascular risk factor modification.

Trialling models of interventions that have been demonstrated to be effective in other clinical settings is one way of addressing this problem. A brief intervention^{12,13} is another method that has been used to motivate people to adopt healthy behaviours. A brief intervention (BI) is a simple and effective tool consisting of a time-limited¹⁴ structured advice focusing on changing and/or increasing desirable patient behaviour.¹⁴ The main aim of BI is to impact on patients' motivation to change, following which patients may continue to change their behaviour with minimal additional assistance and thereby reduce their risk factors for further CHD.

Researchers have demonstrated beneficial outcomes of brief interventions for patients with alcohol problems,^{15,16} HIV,¹⁷ diabetes,¹⁸ and stroke¹⁴ related risk behaviours.

This paper describes the development of the health related lifestyle self management (HeLM) intervention which is a brief structured intervention embedded within the Transtheoretical model of behaviour change.

Theoretical frame work

Adopting health promoting behaviours is greatly dependent on the patient's motivation, readiness to change existing risk factor related behaviour, and self-efficacy.¹⁹ In the process of adopting health-promoting behaviours that reduce the risk of a further coronary event, such as smoking cessation or participation in physical activity, people generally go through several different stages before a new behaviour

becomes a habit.²⁰ Therefore, the HeLM intervention was embedded in the Transtheoretical model (TTM) of behaviour change, the core dimensions of which are stages, processes, decisional balance and self-efficacy. The stages of readiness for change include (1) pre-contemplation: patients are not considering changing behaviours that can have a positive outcome on their health; (2) contemplation: patients are considering changing their behaviour (3) preparation: patients have intention to change and are undertaking behavioural efforts; (4) action: behaviour changed (5) maintenance: maintained healthy behaviour for more than 6 months (Figure 1)²⁰.

People are not all at the same stage of readiness to change and some individuals can relapse to a previous stage several times before reaching the final stage of behaviour modification.²¹ Overcoming the relapse require the individual to analyse how the slip happened and use it as an opportunity to learn how to anticipate high-risk situations more effectively. Progression from one stage to another involves decisional balance,²⁰ where the individual is required to weigh the positive and negative aspects of a risk-related behaviour.²⁰ According to the TTM, if the consequences of the risk-related behaviour outweigh the benefits, individuals experience less ambivalence and are more likely to take action to change the behaviour.²⁰

Processes of change are the activities that people use to progress through the stages and reduce the resistance to relapse. These processes involve experiential and behavioural activities including increasing awareness, emotional arousal, social reappraisal, environmental opportunities, self reappraisal, stimulus control, support, rewards and commitment.²¹ Self-efficacy involves the confidence of the individual in

their ability to change to healthy behaviours. It also evaluates the individual's capacity to relapse when faced with high-risk situations.²¹

Tailoring interventions strategies to the individual's stage of change have produced improved outcomes.^{14,22} Intervention strategies directed at behavioural and attitudinal change produce greater results than traditional educational approaches to health promotion, particularly when tailored to the individual's readiness to change.²¹ The TTM is well-suited to developing tailored interventions based on individualised assessments along with other strategies for behaviour change.

Motivational support

Motivational support is a method that focuses on the individual involved in the behaviour change to facilitate the progress along the different stages of change²³ Six elements have been identified that summarizes the quintessence of the interventions commonly tested under the terms "BI" and "motivational interviewing"³² and these have structured under the acronym FRAMES. These elements include feedback, responsibility, advice, menu, empathy, and self-efficacy. The HeLM intervention was therefore embedded in the transtheoretical model (TTM) of behaviour change²⁰ and motivational support.¹⁴

Following a review of the literature and interviews with health professionals, three key CHD risk factors were targeted for intervention: smoking cessation, physical inactivity and fat intake. Smoking was a targeted risk factor because it accounts for approximately 13% of Australian deaths annually.²⁴ Smoking cessation has both dose dependent and reversible improvements on endothelial function.²⁵ Physical activity

was targeted because 44% of the Australian adult population do not participate in a level of physical activity that is sufficient to achieve a health benefit.²⁶ There is also substantial evidence of a relation between lack of physical activity and increased body weight, hypertension and diabetes.²⁷ Saturated fat intake was targeted due to the strong published evidence in a number of studies showing the benefits of healthy foods, including low saturated fat diets^{28,29} and fruit and vegetables, on curtailing the progression of CHD.^{30,31} Numerous studies have demonstrated that dietary pattern, in particular dietary fat, is associated with a higher risk of CHD and overall mortality.^{28,29} Interventions based upon theoretical models have a greater chance of success in changing behaviour.

Development of the HeLM intervention

Effective interventions are those developed based on evidence obtained from research literature, experts and patients. Therefore for the development of the HeLM intervention, a systematic review of brief structured interventions for lifestyle modification for patients with CHD was undertaken.³² The systematic review undertaken according to guidelines set out by the Cochrane Collaboration³³ and the Joanna Briggs Institute.³⁴ Cardiac rehabilitation coordinators (n=20) from across NSW were interviewed to identify barriers to participation in cardiac rehabilitation programs.³⁵ Also as an important step participants were surveyed to profile their cardiac risk factor status, knowledge relating to CHD and its risk factors and participation in cardiac rehabilitation programs following an interventional cardiology procedure.³⁶ The findings from these studies that were used for the development of the HeLM intervention are presented in Table 1.

The HeLM intervention

The HeLM intervention was developed based on findings presented in Table 1 and was embedded within the TTM of behaviour change²⁰ and motivational support.¹⁴ The intervention consisted of the following components: goal-setting, the HeLM Booklet, personalised risk factor card and patient feedback form, team building and communication with patients family physicians, three supportive telephone calls, a refrigerator magnet, and a health diary. Each of these is described below.

Goal-setting

Goal-setting is an established strategy used both explicitly and implicitly in behaviour modification programs where the patients set optimistic yet realistic goals that facilitate health behaviour change and maintenance.³⁷ In the HeLM intervention, goal-setting was undertaken according to the SMART principles, which have been demonstrated to enable individuals to stay motivated and achieve their goals.³⁸ The acronym SMART stands for Specific, Measurable, Achievable, Realistic and Time.

Patients were asked to write down specific goals they would like to achieve. For example, losing weight was considered as a general goal and a specific goal would be a target weight of 65 kg in one month. They also had to maintain a record of their current smoking, physical activity and dietary habits for a week so that they could measure the difference at follow-up. Patients were instructed to set goals that were flexible in order to accommodate any unexpected challenges. Setting realistic goals is the key to goal attainment. Patients were instructed to set a goal that they believed they could accomplish and to identify the conditions necessary to achieve the goal. Setting a deadline for the achievement of a goal demonstrates a sense of urgency therefore patients were encouraged to set realistic timelines to achieve the goal.

Take the HeLM booklet

The *Take the HeLM* booklet was based on the TTM²¹ of behaviour change and was developed as a self-help resource to provide skills training for modification of health risk-related behaviour relating to smoking, physical activity and saturated fat intake.

The 50 page booklet was designed to have a colour-coded section corresponding to each of the five stages of change for each of the health risk-related behaviours.

Specific strategies that the patients could activate in order to progress to the next stage were listed in each stage of change section. This method ensured that the information in the booklet was tailored to the patient.²¹

Content of the booklet

The first section of the booklet covered the meaning of and the risk factors for coronary heart disease. Patients were asked to identify the risk factors that applied to them. The second section of the booklet was a short quiz that enabled the patients to identify their stage of change. The third section of the booklet was related to information and strategies corresponding to the stage of change for each of the health risk factors, namely smoking, physical activity and fat intake. This section was designed to enable the individual to weigh the positive and negative aspects of a risk-related behaviour (decisional balance). It also included experiential and behavioural activities (processes for change) that individuals could use to progress through the various stages of change. Content validity of the booklet was assessed by a reference group consisting of experts in cardiac rehabilitation, smoking cessation, physiotherapy, dietetics and clinical cardiology. Comprehensibility of the information was assessed by calculating the Flesch Reading Ease score³⁹ and the Flesch-Kincaid Grade Level score. The readability of the HeLM booklet was targeted at a 6th Grade level as findings from a previous study demonstrated that the majority of patients had

left school before secondary education and 47.8% had neither completed secondary school nor attained any subsequent qualifications.³⁶ The HeLM booklet was subsequently given to a 6th Grade student aged 13 years and three patients for assessment of readability. With the assistance of a graphic designer, the visual aspects of the HeLM booklet including the length, format, graphics and layout were refined.⁴⁰

Feedback of personal risk

Risk factor card

Based on the patient's physical and laboratory data individual risk factor cards were generated that included the values for all their cardiovascular risk factors along with the normal values for comparison. All abnormal values were highlighted. A five year mortality risk score and the risk of developing CHD or having a recurrent CHD event was calculated and presented from the results obtained using a cardio risk calculator provided by Merck, Sharpe & Dohme.

Personalized letter

Participants were mailed a personalised letter providing feedback about their existing habits relating to smoking, exercise and diet and how they felt about modifying these risk-related behaviours. This feedback enabled them to read the appropriate section of the HeLM booklet for strategies for risk modification.

Team building and communication with general practitioners

The family physician of participants received a copy of the Reducing Risk in heart disease⁴¹ guidelines, participant's risk factor status, and the goal that the participant has agreed to achieve. The family physicians were required to provide support for

these patients and reinforce lifestyle changes and inform participants of the exact values of their biomedical parameters to empower them.

Three supportive telephone calls

The HeLM intervention included three supportive phone calls during the six-week intervention period. The phone calls were delivered one week, three weeks and five weeks following discharge from the hospital. Each call was limited to 15-20 minutes and was based on the evidence obtained from a systematic review of 17 RCTs³² In this review, the mean length of time and the number of sessions of the BI across the trials was 22.6 minutes and 3.2 sessions.

These phone calls strictly focused on providing motivational support and encouragement and to monitor progress. The telephone support was based on the participant's stage of change and was provided using a guide that consisted of questions and statements for each of the stage of change. e.g. If the patient was in the Contemplation Stage the goal was to assist them in developing intentions to change and move towards the Action stage. Therefore the RA reviewed reasons for physical activity, provided relevant information on risks and benefits of participation and non-participation in physical activity and asked patient about their concerns and issues related to physical activity. The telephone calls involved *i) Responsibility* Emphasis was placed on personal responsibility for change as "perceived control" is an important aspect of motivation for behaviour change and maintenance.³² The information booklet also included a log for patients to record their cholesterol and blood pressure levels as well as physical activity levels and smoking habits. *ii) Advice:* Participants were provided simple comprehensible advice to modify risk factors. *iii) Menu:* Patients were provided with a menu of evidence-based self-help

resources to prevent relapse and maintain lifestyle management. Patients were given information about a cardiac rehabilitation centre nearest to their place of work or home. *iv) Empathy:* Patients were treated in an empathic and understanding manner. Feedback and telephone support was not aggressive, confrontational, dictatorial and intimidating. *v) Self-efficacy:* Patients were assisted to identify barriers and facilitate the integration of lifestyle change. Feedback was provided through praise, positive encouragement, and guidance with problem solving. Rather than emphasizing helplessness or powerlessness, self-efficacy was encouraged.

Training of the interviewer

Findings from the systematic review³² demonstrated that motivational brief interventions can be delivered successfully by trained nurses, dieticians, RAs and health care workers. Although it would be ideal to have a registered psychologist deliver the intervention given the domain of cognitive behaviour therapy (CBT), in order to be feasible in the clinical setting, the intervention was delivered by a social worker who had previous experience in motivational interviewing. Each stage was linked to a motivational script and stage-relevant clinical content to enable the delivery of consistent information^{42,43} The RA also undertook a comprehensive course in motivational interviewing at the Alcohol and Drug Service, New South Wales Health.

Refrigerator magnet

Visual cues have been reported to be an effective method to remind individuals and to reinforce the information that is learnt.⁴⁴ Therefore participants were given a refrigerator magnet that provided information on things that needed to be done in an emergency

Health diary for self-monitoring

Self-monitoring enables patients to recognise signs and symptoms and triggers, all of which assist in self-management. Patients were therefore given a health diary where they could self-monitor their results, e.g. blood pressure, cholesterol, weight, and physical activity, with room to document subsequent values.

In summary the HeLM intervention was designed to

- 1) be a brief structured intervention based on motivational support
- 2) have three telephone calls over a 6-week period each lasting 15-30 minutes for motivational support
- 3) have telephone support delivered by a health professional who received training in motivational interviewing.
- 4) be delivered through the mail and by telephone so that patients could access the intervention in their own time.
- 5) be independent of local resources (When implemented in clinical practice the HeLM intervention will involve initial set up costs).
- 6) provide an avenue for communication between the coordinator and the patient's family physician.

Discussion

This study describes the development of a Health related Lifestyle modification (HeLM) Intervention in patients with CHD. A key strength of this study is the empirically derived conceptually congruent intervention. The HeLM intervention was developed on the principles of evidence-based practice, namely a systematic review of the literature,³² clinician expertise³⁵ and patient information and preferences³⁶. In addition, since the underlying cause of ACS is a chronic disease, namely CHD, the intervention was designed to promote self-management, which is an important element for the management of chronic disease.^{45,46} Reviews of the effectiveness of chronic disease management interventions indicate that interventions based on behaviour change models are more likely to be effective than those that are not.⁴⁶ Therefore, the HeLM intervention was embedded in the principles of the TTM and brief interventions. The HeLM intervention consisted of the HeLM booklet, goal-setting, personalised risk factor card and telephone support as vital features to enable patients to change behaviour. The HeLM booklet enabled participants to self-assess their stage of change and also consisted of strategies to promote behaviour modification according to the stage of change for each risk factor. Goal-setting is another important element of chronic disease management,⁴⁷ therefore the HeLM intervention involved setting both short- and long-term goals collaboratively with the patient. Other effective features of chronic disease management, such as team building and communication with GPs,⁴⁵ providing a written action plan⁴⁵ (in the form of a fridge magnet) feed back of personal risk and the use of health diaries,⁴⁵ were also included in the HeLM intervention. Empowering patients about their risk factor status using personalised risk factor cards based on scientific evidence has not been previously reported and is a promising area for future research.

Positive aspects of the HeLM intervention are that it covers smoking, physical activity, and diet and offers multiple options which may benefit compliance. In order to enhance risk factor related behaviour change interventions need to be tailored to the individual. In addition, providing factual information such as the Risk factor card, positive encouragement can enhance self efficacy so that patients feel empowered to be an active participant in their own healthcare.

One of the greatest challenges of cardiac care is to integrate comprehensive risk factor modification strategies into clinical practice. Although various strategies for risk factor modification have been demonstrated to be effective in clinical trials,^{29,48} these may not prove equally effective in clinical practice due to a paucity of resources, particularly personnel. The HeLM intervention is a short, practical postal-delivered intervention combined with telephone support by a trained health professional. This intervention can be easily delivered by nurses, GPs or other health professionals who have received appropriate training. This study highlights the importance of evidence based clinically practical method for the development of evidence based interventions for risk factor modification. Although the HeLM intervention appears to be useful, its effectiveness needs to be investigated in a larger RCT. Nevertheless, it is crucial that a united front among health care workers is maintained to combat this global epidemic of CHD.

Conclusions The HeLM intervention is highly significant both nationally and internationally as it is a sequential and theoretical developed strategy that could reach CHD patients who have thus far eluded traditional cardiac rehabilitation programs and support them in making the necessary lifestyle changes. The HeLM intervention overcomes the traditional barriers to participation in cardiac rehabilitation programs as it is brief, motivational, uses limited resources, is able to be used by patients in their own time and is delivered in a non-confrontational manner. The HeLM intervention may also be an adjunct to traditional CR and have a synergistic effect in facilitating health-promoting behaviours in CHD patients. Further research to test the effectiveness of the HeLM intervention in risk factor related behaviour modification and risk reduction is needed. Findings from this study will help inform future research on the impact of individualised support using the HeLM techniques in promoting lifestyle changes in CHD patients.

Figure 1 The theoretical framework

(Adapted from Prochaska JO, Velicer WF. The transtheoretical model of health behavior change

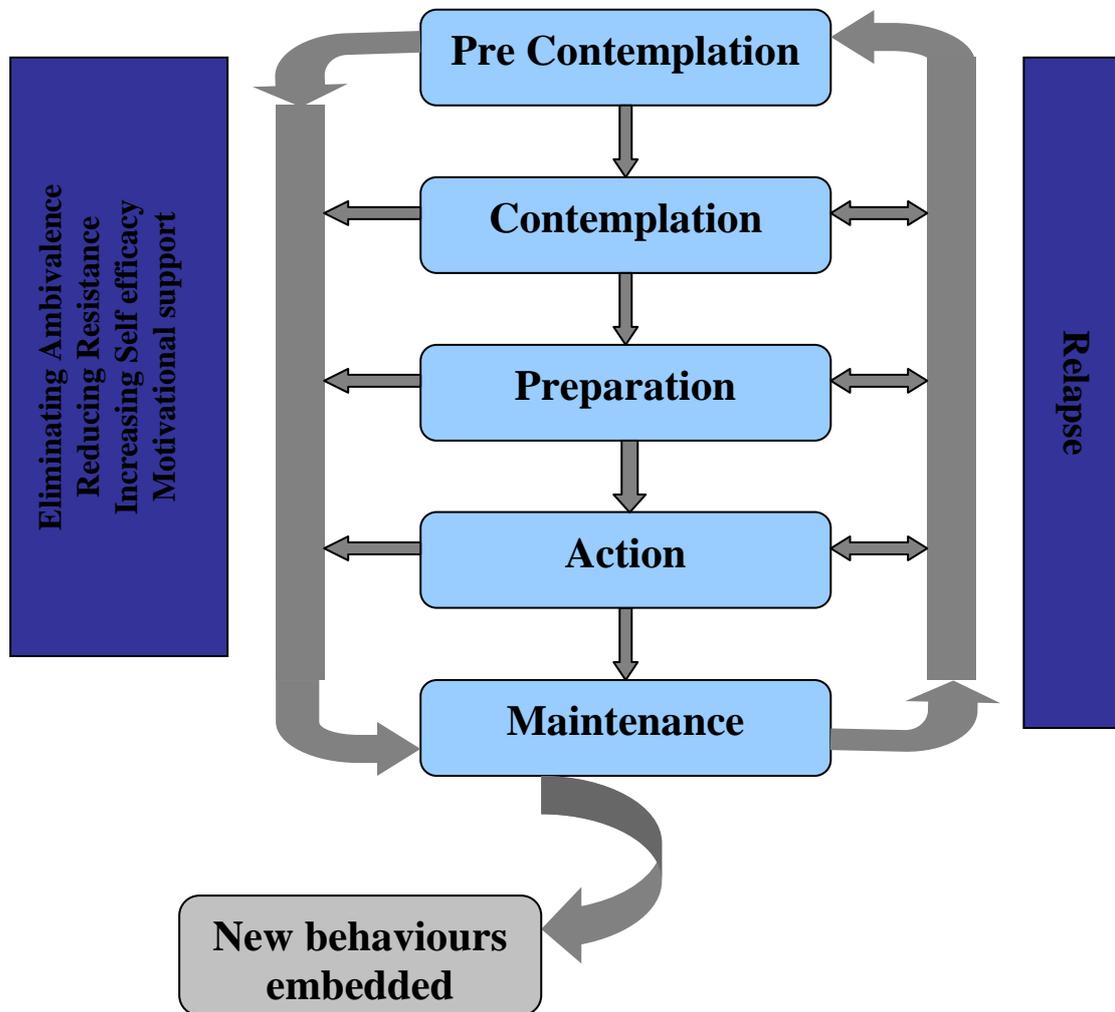


Table 1 Findings from the systematic review, Interviews with cardiac rehabilitation coordinators and surveys of patients

Findings from the systematic review

- there was evidence of a benefit of brief structured interventions for risk factor reduction. However further investigations are warranted to support the evidence
- three to six telephone support calls over a six month period, each lasting 15-30 minutes, could be effective in risk factor reduction
- brief motivational support can be delivered by persons trained in motivational interviewing

Findings from the interviews with CARDIAC REHABILITATION coordinators

- CARDIAC REHABILITATION coordinators face numerous obstacles, including health service, professional and patient related barriers to delivering services
- CARDIAC REHABILITATION coordinators were committed to providing evidence-based care through alternate methods of service delivery and community engagement

Findings from the survey of patients post-PCI

- 70% of participants had at least two modifiable risk factors
- approximately 80% of participants were classified as overweight
- participants had limited knowledge relating to CHD
- there was a lack of awareness regarding modifiable risk factors
- the accessibility of a CARDIAC REHABILITATION program were important

- there were less than optimal participation rates in **CARDIAC REHABILITATION** programs

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