The Effect of a Short One-on-One Nursing Intervention on Knowledge, Attitudes and Beliefs Related to Response to Acute Coronary Syndrome in People with Coronary Heart Disease: A Randomized Controlled Trial

Sharon McKinley, PhD, RN [a]

Kathleen Dracup, DNSc, RN [b]

Debra K Moser, DNSc, RN [c]

Barbara Riegel, DNSc, RN [d]

Lynn V Doering, DNSc, RN [e]

Hendrika Meischke, PhD [f]

Leanne M Aitken, PhD, RN [g]

Tom Buckley, MN, RN [a]

Andrea Marshall, PhD, RN [h]

Michele Pelter, PhD, RN [i]

a Universty of Tehnology Sydney and Northern Sydney Central Coast Health, NSW, Australia, b University of California, San Francisco, c University of Kentucky, Lexington, d University of Pennsylvania, e University of California, Los Angeles, f University of Washington, g Griffith University, Qld, Australia, h University of Sydney, NSW, Australia, i University of Nevada, Reno, NV.

Corresponding author:

Sharon McKinley

University of Technology Sydney and Northern Sydney Central Coast Health

Critical Care Nursing Professorial Unit, Level 6

Royal North Shore Hospital

St Leonards NSW 2065

AUSTRALIA

Phone: 61-2-99268281

Fax: 61-2-94398418

Email: sharon.mckinley@uts.edu.au

ABSTRACT

Background: Coronary heart disease and acute coronary syndrome remain significant public health problems. The effect of acute coronary syndrome on mortality and morbidity is largely dependent on the time from symptom onset to the time of reperfusion, but patient delay in presenting for treatment is the main reason timely reperfusion is not received.

Objectives: We tested the effect of an education and counseling intervention on knowledge, attitudes and beliefs about acute coronary syndrome symptoms and the appropriate response to symptoms, and identified patient characteristics associated with changes in knowledge, attitudes and beliefs over time.

Methods: We conducted a 2-group randomized controlled trial in 3,522 people with coronary heart disease. The intervention group received a 40 minute, one-on-one education and counseling session. The control group received usual care. Knowledge, attitudes and beliefs were measured at baseline, 3 and 12 months using the Acute Coronary Syndrome Response Index and analyzed with repeated measures analysis of variance.

Results: Knowledge, attitudes and beliefs scores increased significantly from baseline in the intervention group compared to the control group at 3 months, and these differences were sustained at 12 months ($p = .0005$ for all). Higher perceived control over cardiac illness was associated with more positive attitudes ($p<.0005$) and higher state anxiety was associated with lower levels of knowledge ($p<.05$), attitudes ($p<.05$) and beliefs ($p<.0005$).

Conclusion: A relatively short education and counseling intervention increased knowledge, attitudes and beliefs about acute coronary syndrome and response to acute coronary syndrome symptoms in individuals with coronary heart disease. Higher perceived control over cardiac

illness was associated with more positive attitudes and higher state anxiety was associated with lower levels of knowledge, attitudes and beliefs about responding to the health threat of possible acute coronary syndrome.

What is already known about this topic?

- Mortality and morbidity related to acute coronary syndrome are reduced if reperfusion therapy is received early after symptom onset.

- Reperfusion therapy is often delayed or not received because patients delay in deciding to seek treatment for symptoms of acute coronary syndrome.

- Most interventions to reduce prehospital delay in acute coronary syndrome have targeted the general population using mass media campaigns and have been of limited effectiveness.

What this paper adds?

- A relatively short one-on-one education and counseling intervention designed to reduce delay in seeking treatment for acute coronary syndrome symptoms increased knowledge about the nature of cardiac symptoms and the correct steps to take, and also positively influenced attitudes and beliefs about seeking care in patients who are at high risk for a future acute coronary syndrome event.

- Higher perceived control over cardiac illness was associated with more positive attitudes.

- Higher state anxiety was associated with lower levels of knowledge, attitudes and beliefs about responding to the health threat of possible acute coronary syndrome.

1. Introduction

Coronary heart disease (CHD) remains a significant public health problem in the developed world. In 2004 in the United States (US) 15.8 million adults had CHD; it is estimated that in one year 700,000 Americans will have an acute myocardial infarction (AMI), and approximately 38% of those will die within a year (Rosamund et al., 2008). In-hospital mortality for AMI approaches 5% (Fox et al., 2007).

The effect of an AMI on mortality is largely dependent on the time from symptom onset to the time of reperfusion. Reperfusion therapy with either percutaneous coronary intervention or fibrinolytic drugs leads to lower mortality and fewer complications (Asseburg et al., 2007). Maximum benefit is achieved when reperfusion is performed in acute coronary syndrome (ACS) within 60 minutes of symptom onset (Moser et al., 2006). The benefit from both reperfusion techniques decreases markedly if they are received more than 3 hours after symptom onset, although there may be some benefit up to 12 hours after symptoms start (Ting, Yang and Rihal, 2006).

The largest contributor to delayed time to receipt of reperfusion for ACS is patient delay in recognizing symptoms and deciding to seek treatment, in contrast to time of transport to a hospital and time from arrival at the hospital to commencement of reperfusion, both of which are quite short by comparison (Moser et al., 2006; Newby et al., 1996; Dracup et al., 1997). Patient delay times remain unacceptably long in the US and in other countries, with times of greater than 4 hours for 40% or more of patients (McGinn et al, 2005; McKinley et al., 2004; Isaksson et al., 2007). In an effort to reduce patient prehospital delay times, we conducted a randomized controlled trial of a one-on-one education and counseling intervention designed for patients at risk for AMI, with the primary aim of promoting timely response to symptoms and reducing

delay times over the 2-year period of follow-up (Dracup et al., 2006). A secondary aim, reported here, was to investigate the effect of the study intervention on knowledge, attitudes and beliefs about heart disease and ACS symptoms. The specific objectives in relation to this aim were: 1) To compare knowledge, attitudes and beliefs about ACS and ACS symptoms, and the appropriate response to symptoms, at 3 and 12 months in patients at risk of ACS who received the educational and counseling intervention, and those who did not receive the intervention; 2) To identify patient characteristics associated with differences between the intervention and control groups in knowledge, attitudes and beliefs up to 12 months after enrolment in the study.

2. Methods

We conducted a randomized controlled trial on the effect of an intervention to reduce delay in seeking treatment in response to ACS symptoms on knowledge, attitudes and beliefs about ACS symptoms and appropriate response to symptoms in patients with CHD. The design and methods of the multicenter study, previously described in detail (Dracup et al., 2006), are summarized below. Study participants completed an instrument package at baseline and 3 and 12 months after the intervention that included questions on knowledge, attitudes and beliefs about ACS symptoms and appropriate response to symptoms. Approval for the study was obtained from the Institutional Review Boards, Human Research Ethics Committees, or equivalent of each of the investigators' institutions and study sites at which patients were recruited.

2.1. Study settings and patients

The study was conducted from six centers: the University of California, San Francisco (data and project coordinating center); University of California, Los Angeles; University of Washington; University of Kentucky; University of Pennsylvania; and University of Technology Sydney, Australia. Participants were recruited from multiple hospital cardiovascular and coronary

catheterization units and in a variety of outpatient clinics and medical practices in the community. Participation was solicited by several means including letters from patients' healthcare providers, signs in clinics, and radio announcements. Patients were eligible for the study if they had a diagnosis of CHD, confirmed by their physician and/or medical record, and lived independently (i.e., not in an institutional setting). Exclusion criteria were: 1) complicating serious comorbidity such as a major psychiatric illness or chronic renal failure, 2) untreated malignancy or neurological disorder that impaired cognition, 3) inability to understand spoken English and unable to respond to English language questions on the data collection instruments, and 4) major and uncorrected hearing loss. Patients who agreed to participate in the study attended interviews at the hospital, clinic or office where baseline data were collected.

2.2. The intervention

The intervention was based on Leventhal's self-regulatory model of illness behavior (Leventhal, Safar and Panagis, 1981; Leventhal and Cameron, 1987) and addressed the three areas recommended by the National Heart Lung and Blood Institute Working Group on Educational Strategies to Prevent Prehospital Delay in Patients at High Risk for Acute Myocardial Infarction: i) information, ii) emotional issues and iii) social factors (Dracup et al., 1997).

Information. Patients were given information about typical symptoms, possible variability in symptom presentation and the fact that onset may be gradual and intermittent, rather than classic sudden crushing chest pain. Patients were advised to take appropriate actions, i.e. take nitroglycerin tablets (if prescribed) and aspirin (if not contraindicated), and call an ambulance immediately. Patients were given the National Heart Attack Alert Program advisory form to post at home (available at www.nhlbi.nih.gov/health/public/heart/mi/core_bk.htm).

Emotional component. Patients were assisted in anticipating emotional responses to ACS symptoms and acknowledging that these responses could delay the receipt of treatment. The rewards of seeking treatment quickly were emphasized, i.e. preservation of heart muscle and increased chance of survival. They were told that denial or suppression of the serious nature of symptoms is common but contributes to treatment delay and that attribution of symptoms to a body system other than the heart is common. Emotional issues were addressed partially through the use of scenarios featuring individuals who resembled the patient. Through role-playing, patients were asked to anticipate emotions they might have when they experience symptoms of ACS and guided through the appropriate action steps. Patients rehearsed their response to the onset of cardiac symptoms with the nurse to increase the likelihood of responding appropriately even when experiencing emotional reactions such as anxiety.

Social Factors. Patients were advised to consult immediately with their spouse or significant other in the case of symptoms. When present with the patient, the spouse or a significant other (family member or friend) was invited to attend the intervention session and were "deputized" to act as the decision maker if the patient hesitated to call the EMS number within 15 minutes of symptom onset.

The intervention was delivered in an individualized, one-on-one session of approximately 40 minutes with the patient (and significant other when possible). Using a script, an experienced cardiovascular nurse with postgraduate qualifications at each site used a flipchart with the main points listed and pictures illustrating the process of coronary occlusion and how reperfusion therapies restore blood flow to the myocardium. The information sheet (the advisory form), personalized for the patient's use and completed at the end of the intervention session, was

provided. Patients were asked to place it in a prominent place in the home (e.g. near their telephone).

The intervention was standardized so that each patient received the same information components, but personalized to them, and the same reinforcement information. The intervention was delivered in a quiet, private outpatient setting, for example a room in the clinic office, the patient's home or the research office. The fidelity of the intervention was monitored by audiotaping its delivery with every 20th participant, with institutional approval and participant informed consent. The audiotapes were listened to by the investigator who had delivered the intervention and adjustments made to the delivery when necessary. One month following the initial intervention session the nurse called the patient and reviewed the main points from the initial session. She or he asked if the individual had experienced any cardiac symptoms in the intervening month and, if yes, determined the decision-making process used, reinforcing the need for fast action and EMS. The usual length of the phone call was 10 – 15 minutes.

2.3. Protocol

Patients meeting the eligibility criteria were invited to participate in the study using the patient information sheet approved by the investigators' respective institutions. Consenting patients were randomized to experimental or control group using series of sequential study numbers that were assigned *a priori* by computer randomization in blocks of 100 by site and concealed in opaque envelopes. Following informed consent, an envelope was opened and the assignment of each study number revealed. The control group received usual instructions about symptoms and care seeking from their healthcare provider, who may or may not have been advised of the study by the patients. The experimental group received usual care plus the nurse-administered education and counseling intervention described above.

Data on: clinical history and sociodemographic characteristics; knowledge, attitudes and beliefs about ACS; anxiety, depression and perceived control were collected at baseline (after randomization but prior to learning of group assignment) and at 3 and 12 months after enrolment. Study personnel conducting data collection were blinded to group assignment. Baseline data collection was done in face-to-face interviews with patients in each group, and subsequent data were collected by telephone after the patients had received a mailed copy of the compiled data collection instruments, an approach that has been shown to provide results closely comparable to face-to-face interviews (Senior et al., 2007).

2.4. Materials

The following instruments were used to collect data:

2.4.1. ACS Response Index

The ACS Response Index was adapted from instruments originally used in the Rapid Early Action for Coronary Treatment (REACT) study (Leupker et al, 2000) with permission of the REACT investigators. The ACS Response index has 3 separate scales for knowledge, attitudes and beliefs. The Knowledge Scale lists 21 dichotomous (true/false) items for symptoms of ACS, 6 of which are incorrect. True responses to the incorrect symptoms are assigned zero and the correct responses are summed, giving scores ranging from 0 to 21 for knowledge which are converted to percent correct for analysis purposes. The Attitudes Scale has 5 items measuring symptom recognition (e.g. How sure are you that you could recognize symptoms of a heart attack in yourself?) and help-seeking (e.g. How sure are you that you could get help for yourself if you thought you were having a heart attack?). Patients respond on a 4-point Likert-type scale anchored with 1 (not at all) to 4 (very sure). Scores on the Attitudes Scale range from 5 to 20. The Beliefs Scale has 7 items measuring expectations (e.g. I would be embarrassed to go to the

hospital if I thought I was having a heart attack but I wasn't) and action (e.g. If I thought I was having a heart attack I would go to the hospital right away). Items on the Beliefs Scale are evaluated on a 4-point Likert-type scale anchored with 1 (strongly agree) to 4 (strongly disagree). Scores range from 7 to 28. Testing for internal consistency showed coefficient alphas of .82, .76 and .71 respectively for the Knowledge, Attitudes and Beliefs scales (Riegel et al., 2007).

2.4.2. Anxiety and depression

The Multiple Affect Adjective Checklist (MAACL) (Zukerman and Lubin, 1965) was used to measure state anxiety and depression. The MAACL consists of 132 alphabetically ordered adjectives that are either negative (e.g. fearful) or positive (e.g. joyful). Responses to relevant negative adjectives are summed and positive adjectives are subtracted to calculate scores for state anxiety (range 0-21) and depression (range 0-40). Concurrent validity has been established with a variety of self-report instruments and clinical interviews (Zukerman, Lubin and Robins, 1965). In this study coefficient alpha was .79 for anxiety and .86 for depression.

2.4.3. Perceived control

The Cardiac Attitudes Scale – Revised is a revised version of the Cardiac Attitudes Scale (Moser et al., 2008). It consists of 8 belief statements measuring perceived control in the context of cardiac disease to which responses are given on a 5-point Likert scale. Responses for each item are summed, giving a possible range of 8 to 40, with a higher score indicating a higher level of perceived control. Assessment of instrument reliability by internal consistency in the present study showed a Cronbach's alpha of 0.73.

2.4.4. Clinical history and sociodemographic characteristics:

Ischemic heart disease was confirmed by the patient's treating physician and/or the medical record. In the clinical history section of the baseline data instrument package participants

reported on previous cardiac history, comorbidities and cardiac risk factors. Patients also reported their height and weight, involvement of a cardiologist in their care and attendance at any sort of cardiac rehabilitation program. Sociodemographic characteristics recorded at baseline were age, gender, ethnicity, education levels, employment status, marital status, health insurance status and whether or not the individual was insured for ambulance use and emergency department attendance.

2.5. Statistical methods

Data at each study site were entered into a specifically designed database which was imported into SPSS V14 (Chicago, Il) and merged for analysis. The sample size for the study was determined for the primary outcome variable of delay time from ACS symptom onset to hospital presentation in patients who experienced ACS during the 2 year study follow-up period (Dracup et al., 2006. All statistical tests were two-tailed tests with $p < .05$ considered statistically significant.

Descriptive statistics were used to characterize study participants and check for data accuracy, and histograms were used to check the normality of distributions of continuous variables. Baseline characteristics were compared between groups using chi-square tests for categorical data and independent t tests for continuous data. Between group differences in knowledge, attitudes and beliefs over time were compared using repeated measures analysis of variance (ANOVA).

Associations between group assignment (control vs. intervention) and predictors of knowledge, attitudes and beliefs over time were examined using repeated measures ANCOVA for the continuous variables age, body mass index, anxiety, depression and perceived control. Baseline attitudes and beliefs were also included as covariates for knowledge, baseline

knowledge and beliefs as covariates for attitudes, and baseline knowledge and attitudes as covariates for beliefs. Repeated measures factorial ANOVA was used to identify associations between knowledge, attitudes and beliefs and the categorical variables: history of angina, myocardial infarction, percutaneous coronary intervention, coronary artery bypass grafting, stroke, peripheral vascular disease, diabetes, hypertension; current and past tobacco smoking; gender, ethnicity, marital status, employment status and education level; health insurance status, ambulance insurance and insurance for emergency department visits; family presence at baseline visit; attending a cardiologist; attended cardiac rehabilitation. Variables included in the analyses – sociodemographic characteristics, CHD risk factors and past CHD events/interventions – were considered theoretically relevant to the outcome measures:.

3. Results

3.1. Respondents

A total of 3,522 patients with CHD who enrolled in the study were randomized to control or intervention groups, with 2,787 retained in the study at 12 months and included in the data analysis (Figure 1). Patient characteristics according to study group are shown in Table 1. Patients had a mean (SD) age of 67.2 (11.0) years and mean (SD) BMI of 27.5 (5.0) kg/m$^{2.}$ Groups were similar at baseline except for small differences in the proportion of females, the number insured for ambulance use and the number who had attended a cardiac rehabilitation program. The proportions of patients with self-reported risk factors for CHD and previous cardiovascular diagnoses were high in both groups. Most had a cardiologist involved in their care and many reported symptoms of anxiety (MAACL Anxiety subscale $\geq$ 7) and depression (MAACL Depression subscale $\geq$ 11). With a possible range of scores of 8 to 40, patients in both groups had moderately high levels of perceived control (control = 30.40 $\pm$ 4.01, intervention =

30.18 ± 4.27, p = .11). In the control group, 21.3% of study participants had a family member present with them during the baseline study visit, compared to 24.4% in the intervention group (p = .076).

The characteristics at baseline of participants on whom there was no follow-up at 12 months are also shown in Table 1. Participants lost to follow-up were younger, less likely to be married or Caucasian, had higher levels of education and private health insurance, and a worse cardiac risk factor profile, including more frequent symptoms of depression. Compared to the intervention group, control group patients lost to follow-up had marginally higher perceived control scores (30.11±4.10 vs 29.02±4.68, p=.002) and were less likely to have anxiety symptoms (42.6% vs 51.5%, p=.029). There were no other statistically significant differences between groups on patients with no 12 month follow-up.

3.2. Knowledge, attitudes and beliefs

The knowledge, attitudes and beliefs scores were normally distributed at each time point. Knowledge, attitudes and beliefs scores on the ACS Response Index increased significantly in the intervention group at 3 months and remained higher than control group scores at 12 months (Table 2). Between group comparisons using repeated measures ANCOVA for continuous variables showed that:

i) Knowledge remained significantly higher in the intervention group over time after controlling for covariates (p < .0005); higher baseline attitudes scores (p < .0005) and baseline beliefs scores (p < .0005) were significantly associated with better knowledge; older age (p < .0005) and higher baseline anxiety (p = .048) were associated with lower knowledge scores.

ii) Attitudes remained significantly higher in the intervention group over time after controlling for covariates (p < .0005); higher baseline knowledge scores (p < .0005), baseline

beliefs scores (p < .0005) and perceived control (p < .0005) were significantly associated with more positive attitudes; older age (p < .0005) and higher baseline anxiety (p = .048) were associated with lower attitudes scores.

iii) Beliefs also remained significantly higher in the intervention group over time after controlling for covariates (p = .006); higher baseline knowledge scores (p < .0005) and baseline attitudes scores (p < .0005) were significantly associated with higher beliefs scores; older age (p = .004) and higher baseline anxiety (p < .0005) were again negatively associated with beliefs scores.

Repeated measures factorial ANOVA for categorical variables showed that:

i) Knowledge increased over time if patients had attended cardiac rehabilitation in the past (p = .002), were female (p < .0005), were in paid employment (p < .0005), had higher levels of education (p = .003) and had any private health insurance (vs. government only or no insurance; p = .047). Time, study group membership and history of stroke had interaction effects on knowledge (decreased knowledge; p = .022), as did time, study group membership and being insured for the ambulance (increased knowledge; p = .034).

ii) Attitude scores increased over time when a family member was present during the baseline visit (p = .017), and when the patient had a history of angina (p = .017) or percutaneous coronary intervention (p = .036). There were interaction effects on attitudes of time, study group membership and having any private health insurance (p = .017) and a history of percutaneous coronary intervention (p = .025), both of which were associated with higher attitudes scores.

iii) Beliefs scores increased over time when patients had a history of angina (p = .014) and had been to cardiac rehabilitation (p = .019), but there were no significant interaction effects between time, study group membership and any factors studied.

4. Discussion and conclusion

4.1. Discussion

The overall goal of the intervention tested in the study was to reduce the unacceptably long prehospital delay times in ACS documented over the past 2 decades (McGinn et al, 2005; McKinley et al., 2004; Isaksson et al., 2007). We have previously reported that the intervention increased knowledge in 200 patients with CHD (Buckley et al., 2007). The findings reported here further support the proposition that a relatively short one-on-one education and counseling intervention designed to reduce delay in seeking treatment for ACS symptoms significantly increased knowledge, attitudes and beliefs about ACS in members of the community with CHD. The study also showed that the improvements in these intermediate outcomes were sustained to 12 months after the intervention was received. Better knowledge of ACS symptoms has sometimes been found to be associated with shorter prehospital delay times (Goldberg, Gurwitz and Gore, 1999; Meischke et al., 1995) and sometimes not (Carney, Fitzsimons and Dempster, 2002; Goff et al., 2004). Nevertheless enhancing knowledge must be considered an essential first step to promoting appropriate patient behavior in responding to ACS symptoms.

In the present study there was a small and nonsignificant trend towards shorter delay times in the patients who received the education and counseling intervention (median = 2.20 hr, IQR 1.18-4.69 hr), compared to the control group (median = 2.25 hr, IQR 1.18-5.28 hr) (Dracup et al., 2007). This is likely related to the small effect sizes (d) of approximately 0.2 (Cohen, 1997) observed in knowledge, attitudes and beliefs. Referring to the theoretical framework for the intervention tested in the study (Figure 2), higher perceived control was found to be associated with more positive attitudes. In contrast, higher state anxiety measured at baseline prior to delivery of the intervention was associated with lower levels of knowledge, attitudes and beliefs

about responding to the health threat of possible ACS. The lack of effect on delay times suggests that the small but significant changes were not powerful enough to lead to behavior change. A more intensive intervention may be needed to help patients sort through the difficult symptom presentation of ACS (cognitive response), as well as the emotions that attend to a potentially life-threatening diagnosis (emotional response). The small percent change suggests that the right elements are in the intervention but that they were not powerful enough to affect behavior. For the intervention to have an effect on behavior in reducing delay times compared to the control group, it appears that it should include stronger strategies in the emotional component to specifically reduce anxiety and to increase perceived control over the health threat.

The study showed that knowledge, attitudes and beliefs were each associated with improvements in the other, reinforcing the importance of focusing on all three and not knowledge alone. Improvements in individuals' attitudes and beliefs about possible heart attack symptoms are not usually explicitly targeted and evaluated in studies of interventions to reduce delay. They were targeted in the design of the REACT study (Raczynski et al., 1999), but the impact of the intervention on attitudes and beliefs has not been reported.

Most interventions to reduce prehospital delay have targeted the general population using mass media campaigns (Kainth et al., 2004). Few interventions have used one-on-one delivery of the information and few investigators have evaluated intermediate outcomes that potentially influence patient treatment-seeking behavior in response to ACS symptoms. An exception was the REACT trial (Leupker et al., 2000) in which there was a one-on-one education component nested within the 4-pronged intervention, and evaluation of knowledge was conducted. A one-on-one education was delivered primarily by the study patients' local health care providers in the intervention communities (Raczynski et al., 1999). The REACT investigators reported the effect

of the 18-month long community intervention on knowledge of heart attack symptoms, studied in

4 telephone surveys at baseline and at 6, 12 and 18 months following initiation of the intervention

(Goff et al., 2004). The study intervention increased the number of correct heart attack symptoms

identified by respondents, as well as the proportion who reported more than 3 correct symptoms.

Notwithstanding these positive effects on knowledge from the REACT intervention, the

investigators considered the effect modest and the post-intervention level of knowledge to be

suboptimal (Goff et al., 2004), although that interpretation was published subsequent to the

results of the lack of effect of the REACT intervention on delay times, with no differences found

in median delay times between the intervention and reference communities (Leupker et al.,

2000).

The intervention in this clinical trial operationalized the recommendations of the US

National Heart Attack Alert Program (NHAAP) (Dracup et al., 1997) aimed at achieving shorter

patient delay times in response to ACS symptoms and receipt of early reperfusion and other life

saving therapies. Those recommendations are based on firm theoretical foundations and the best

empirical evidence available. The results of the present study suggest that the strategies

recommended by NHAAP of targeting people with known CHD and delivering a one-on-one

message are sound. In order to achieve further improvements in knowledge, attitudes and beliefs

about responding to ACS symptoms it may be desirable to identify clinical and demographic

subgroups within the CHD population such as those who were found in this study to be less

responsive to the education and counseling intervention. Our results suggest that, for example,

people at risk for ACS who have lower levels of education and less health insurance, together

with more anxious individuals and those who have not attended an organized cardiac

rehabilitation program, should be especially targeted for interventions to reduce delay in seeking treatment for ACS symptoms.

The strengths of this study lie in the use of a rigorous trial design that provides confidence that the observed differences in outcomes resulted from the intervention tested; there was no evidence of a testing effect from the baseline administration of the ACS-Response Index. The sample size was large, with approximately 80% of participants retained at 12 months follow-up. The demographic, cardiac risk factor and cardiac history profiles of participants were similar to others published on the CHD population, as were the prevalence of anxiety and depression (Lesperance et al., 2007). Limitations were the use of self-report to obtain data on cardiac history and risk factors, and the failure to record the number of adjustments investigators made to the delivery of the intervention during self-monitoring of its fidelity at each study site. As the intervention was relatively short however, and did not require adherence by participants or investigators over a long period of time, the effect of this limited monitoring on the study outcomes was likely minimal.

4.2. Conclusion

A relatively short, one-on-one education and counseling intervention designed to reduce delay in seeking treatment for ACS symptoms significantly increased knowledge, attitudes and beliefs about ACS in individuals with CHD, albeit with small percent changes, and the improvements in these outcomes were sustained to 12 months after the intervention was received. Knowledge attitudes and beliefs were each positively associated with the other, while higher perceived control over cardiac illness was associated with more positive attitudes and higher state anxiety was associated with lower levels of knowledge, attitudes and beliefs about responding to the health threat of possible acute coronary syndrome.

References

Asseburg, C., Vergel, Y.B., Palmer, S., Fenwick, E., de Belder, M., Abrams, K.R., Sculpher, M., 2007. Assessing the effectiveness of primary angioplasty compared with thrombolysis and its relationship to time delay: a Bayesian evidence synthesis. Heart. 93, 1244-1250.

Buckley, T., McKinley, S., Gallagher, R., Dracup, K., Moser, D.K., Aitken, L.M., 2007. The effect of education and counselling on knowledge, attitudes and beliefs about responses to acute myocardial infarction symptoms. Eur J Cardiovasc Nurs. 6, 105-111.

Carney, R., Fitzsimons, D., Dempster, M., 2002. Why people experiencing acute myocardial infarction delay seeking medical assistance. Eur J Cardiovasc Nurs. 1, 237-242.

Cohen, J., 1977. Statistical Power Analysis For The Behavioral Sciences. Academic Press, New York.

Dracup, K., Alonzo, A.A., Atkins, J.M., Bennett, N.M., Braslow, A., Clark, L.T., Eisenberg, M., Ferdinand, K.C., Frye, R., Green, L., Hil,l M.N., Kennedy, J.W,, Kline-Rogers, E., Moser, D.K., Ornato, J.P., Pitt, B., Scott, J.D., Selker, H.P., Silva, S.J., Thies, W., Weaver, W.D,, Wenger, N.K., White, S.K., 1997. The physician's role in minimizing prehospital delay in patients at high risk for acute myocardial infarction: recommendations from the National Heart Attack Alert Program. Working Group on Educational Strategies To Prevent Prehospital Delay in Patients at High Risk for Acute Myocardial Infarction. Ann Intern Med. 126, 645-651.

Dracup, K., McKinley, S., Riegel, B., Mieschke, H., Doering, L.V., Moser, D.K., 2006. A nursing intervention to reduce prehospital delay in acute coronary syndrome: a randomized clinical trial. J Cardiovasc Nurs. 21, 186-193.

Dracup, K., McKinley, S., Riegel, B., Meischke, H., Doering, L.V., Moser, D., Pelter, M.M., 2007. A randomized controlled trial to reduce prehospital delay to treatment in Acute Coronary Syndrome (Abstract). Circulation. 116: II_388-b.

Fox, K.A., Steg, P.G., Eagle, K.A., Goodman, S.G., Anderson, F.A, Granger, C.B,, Flather, M.D., Budaj, A., Quill, A., Gore, J.M,; GRACE Investigators, 2007. Decline in rates of death and heart failure in acute coronary syndromes,1999-2006. JAMA. 297, 1892-1900.

Goff, D.C., Mitchell, P., Finnegan, J., Pandey, D., Bittner, V., Feldman, H., Meischke, H., Goldberg, R.J., Luepker, R.V., Raczynski, J.M., Cooper, L., Mann C.; REACT Study Group, 2004. Knowledge of heart attack symptoms in 20 US communities. Results from the Rapid Early Action for Coronary Treatment Community Trial. Prev Med. 38, 85-93.

Goldberg, R.J., Gurwitz, J.H,, Gore, J.M., 1999. Duration of, and temporal trends (1994-1997) in, prehospital delay in patients with acute myocardial infarction: the second National Registry of Myocardial Infarction. Arch Intern Med. 159, 2141-2147.

Isaksson, R.M., Holmgren, L., Lundblad, D., Brulin, C., Eliasson, M., 2008. Time trends in symptoms and prehospital delay time in women vs. men with myocardial infarction over a 15-year period. The Northern Sweden MONICA Study. Eur J Cardiovasc Nurs. 7, 152-158.

Kainth, A., Hewit,t A., Sowden, A., Duffy, S., Pattenden, J., Lewin, R., Watt, I., Thompson, D., 2004 Systematic review of interventions to reduce delay in patients with suspected heart attack. Emerg Med 21, 506-8.

Lesperance, F., Frasure-Smith, N., Koszycki, D., Laliberté, M.A., van Zyl, L.T., Baker, B., Swenson, J.R., Ghatavi, K., Abramson, B.L., Dorian, P., Guertin, M.C.; CREATE Investigators, 2007. Effects of citalopram and interpersonal psychotherapy on depression in patients with coronary artery disease: the Canadian Cardiac Randomized Evaluation of Antidepressant and Psychotherapy Efficacy (CREATE) trial. JAMA 297, 367-379

Leventhal, H., Cameron, L., 1987. Behavioral theories and the problem of compliance. Patient Educ Couns. 10, 117-138.

Leventhal, H., Safer, M.A., Panagis, D.M., 1981 The impact of communications on the self-regulation of health beliefs, decisions and behavior. Health Educ Q. 10, 4-28.

Luepker, R.V., Raczynski, J.M., Osganian, S., Goldberg, R.J., Finnegan, J.R., Hedges, J.R., Goff, D.C., Eisenberg, M.S,, Zapka, J.G., Feldman, H.A., Labarthe, D.R., McGovern, P.G., Cornell, C.E., Proschan, M.A., Simons-Morton, D.G., 2000. Effect of a community intervention on

patient delay and emergency medical service use in acute coronary heart disease: The Rapid Early Action for Coronary Treatment (REACT) Trial. JAMA 284, 60-67.

McGinn, A.P., Rosamond, W.D., Goff, D.C., Taylor, H.A., Miles, J.S., Chambless, L., 2005. Trends in prehospital delay time and use of emergency medical services for acute myocardial infarction: experience in 4 US communities from 1987-2000. Am Heart J. 150, 392-400.

McKinley, S., Dracup, K., Moser, D.K., Ball, C., Yamasaki, K., Kim, C.J., Barnett, M., 2004. International comparison of factors associated with delay in presentation for AMI treatment. Eur J Cardiovasc Nurs. 3, 225-230.

Meischke, H., Eisenberg, M.S., Schaeffer, S.M., Damon, S.K., Larsen, M.P., Henwood, D.K., 1995. Utilization of emergency medical services for symptoms of acute myocardial infarction. Heart Lung. 24, 11-18.

Moser, D.K,, Kimble, L.P., Alberts, M.J., Alonzo, A., Croft, J.B., Dracup, K., Evenson, K.R., Go, A.S., Hand, M.M., Kothari, R.U., Mensah, G.A., Morris, D.L., Pancioli, A.M., Riegel, B., Zerwic, J.J., 2006. Reducing delay in seeking treatment by patients with acute coronary syndrome and stroke: a scientific statement from the American Heart Association Council on cardiovascular nursing and stroke council. Circulation 114, 168-182.

Moser, D.K., Riegel, B., McKinley, S., Doering, L.V., Meischke, H., Heo, S., Lennie, T.A., Dracup, K., 2008. The Control Attitudes Scale-Revised: Psychometric evaluation in three groups of cardiac patients. Nursing Research. Accepted for publication 23 Sept., 2008.

Newby, L.K., Rutsch, W.R., Califf, R.M., Simoons, M.L., Aylward, P.E., Armstrong, P.W., Woodlief, L.H., Lee, K.L., Topol, E.J., Van de Werf, F., 1996. Time from symptom onset to treatment and outcomes after thrombolytic therapy. GUSTO-1 Investigators. J Am Coll Cardiol. 27, 1646-1655.

Raczynski, J.M., Finnegan, J.R., Zapka, J.G. Meischke, H., Meshack, A., Stone, E.J., Bracht, N., Sellers, D.E., Daya, M., Robbins, M., McAlister, A., Simons-Morton, D., 1999. REACT theory-based intervention to reduce treatment-seeking delay for acute myocardial infarction. Rapid Early Action for Coronary Treatment. Am J Prev Med. 16, 325-34.

Riegel, B., McKinley, S., Moser, D.K., Meischke, H., Doering, L., Dracup K., 2007. Psychometric evaluation of the acute coronary syndrome (ACS) Response Index. Res Nurs Health. 30, 584-594.

Rosamond, W., Flegal, K., Furie, K., Go, A., Greenlund, K,. Haase, N., Hailpern, S.M., Ho, M., Howard, V., Kissela, B., Kittner, S., Lloyd-Jones, D., McDermott, M., Meigs, J., Moy, C., Nichol, G., O'Donnell, C., Roger, V., Sorlie, P., Steinberger, J., Thom, T., Wilson, M., Hong, Y.; American Heart Association Statistics Committee and Stroke Statistics Subcommittee, 2008.

Heart disease and stroke statistics--2008 update: a report from the American Heart Association

Statistics Committee and Stroke Statistics Subcommittee. Circulation 117, e25-146.

Senior, A.C., Kunik, M.E., Rhoades, H.M., Novy, D.M., Wilson, N.L., Stanley, M.A., 2007.

Utility of telephone assessments in an older adult population. Psychol Aging. 22, 392-397.

Ting, H.H., Yang, E.H., Rihal, C.S., 2006. Narrative review: reperfusion strategies for ST-

segment elevation myocardial infarction. Ann Intern Med. 145, 610-617.

Zuckerman, M., Lubin, B., 1965. Manual for the Multiple Affect Adjective Checklist. Edits, San

Diego.

Zuckerman, M., Lubin, B., Robins, S., 1965. Validation of the multiple affect adjective checklist

in clinical situations. J Consult Psychol. 28, 418-425.

Table 1. Baseline characteristics of study participants by group and of those lost to follow-up at

12 months.

Characteristic	Control N (%)	Interventioin N (%)	P *	No 12 month follow-up N (%)	P †
Female gender	528 (30.3)	601 (33.8)	.023	207 (33.9)	.274
Age					
- < 65 yrs	662 (38.0)	690 (38.8)	.856	310 (51.0)	.0005
- 65 -79 yrs	875 (50.2)	876 (49.3)		232 (38.1)	
- ≥80 yrs	206 (11.8)	211 (11.9)		66 (10.9)	
Currently married	1217 (71.1)	1251 (71.5)	.795	390 (65.5)	.001
Education					
- High school or less	600 (34.4)	598 (33.2)	.963	175 (28.7)	.002
- Beyond high school	1142 (65.6)	1178 (66.3)		435 (71.3)	
Ethnicity					
- Caucasian	1590 (91.1)	1617 (91)	.900	528 (86.6)	.0005
- Other	155 (8.9)	160 (9.0)		82 (13.4)	
Health insurance					
- Government only or uninsured	884 (50.8)	890 (50.4)	.809	266 (44.0)	.0005
- Any private insurance	856 (49.2)	876 (50.6)		338 (56.0)	
Insured for ambulance	1345 (89.6)	1344 (87.3)	.044	438 (87.6)	.526
Insured for emergency dept. visit	1598 (95.9)	1633 (95.7)	.775	543 (95.1)	.344

Clinical history					
- Angina	1027 (60.5)	1029 (59.7)	.619	308 (51.8)	.0005
- Heart attack	950 (55.9)	944 (54.6)	.438	333 (55.8)	.762
- Percutaneous coronary intervention	868 (50.1)	875 (49.8)	.866	300 (49.5)	.825
- Coronary artery bypass grafts	819 (47.1)	799 (45.0)	.228	254 (41.8)	.022
- Peripheral vascular disease	196 (11.8)	171 (10.1)	.108	71 (12.0)	.342
- Stroke	167 (9.7)	186 (10.6)	.380	71 (11.8)	.144
- Diabetes	374 (21.6)	385 (21.8)	.889	163 (26.9)	.001
- High cholesterol	1153 (67.2)	1135 (65.4)	.260	437 (73.3)	.0005
- Hypertension	958 (55.5)	986 (56.3)	.646	392 (65.0)	.0005
- Current smoker	117 (6.7)	110 (6.2)	.525	78 (12.8)	.0005
- Sedentary	566 (32.7)	587 (33.2)	.743	234 (38.9)	.001
- Body mass index					
< 25 kg/m^2	562 (34.1)	549 (32.4)	.082	179 (30.7)	.0005
25 < 30 kg/m^2	692 (42.0)	683 (40.3)		218 (37.3)	
≥30 kg/m^2	393 (23.9)	461 (27.2)		187 (32.0)	
- Attending a cardiologist	1461 (84.1)	1472 (83.3)	.520	523 (86.2)	.066
- Attended cardiac rehabilitation	898 (54.2)	865 (50.8)	.048	289 (49.3)	.089
Anxiety symptoms (MAACL ≥ 7)	737 (43.1)	750 (43.0)	.979	279 (46.6)	.055
Depressive symptoms (MAACL ≥ 11)	1058 (61.8)	1068 (61.3)	.734	397 (66.3)	.009

* Chi-square for Control vs Intervention at baseline

† Chi-square for participants with no 12 month follow-up vs those followed up at 12 months

Table 2. ACS Response Index scores for knowledge, attitudes and beliefs at study entry, 3

months and 12 months

	Control Mean (SD)	Intervention Mean (SD)	P *
Knowledge %			.0005
- baseline	70.90 (11.23)	70.79 (11.52)	
- 3 months	69.19 (12.19)	73.74 (11.16)	
- 12 months	69.24 (12.42)	72.85 (11.79)	
Attitudes			.0005
- baseline	14.43 (2.53)	14.59 (2.57)	
- 3 months	14.72 (2.55)	15.30 (2.38)	
- 12 months	14.80 (2.46)	15.25 (2.33)	
Beliefs			.0005
- baseline	22.68 (3.35)	22.81 (3.24)	
- 3 months	23.30 (3.36)	23.72 (3.33)	
- 12 months	23.26 (3.46)	23.87 (3.24)	

* P for between group differences over time – repeated measures analysis of variance
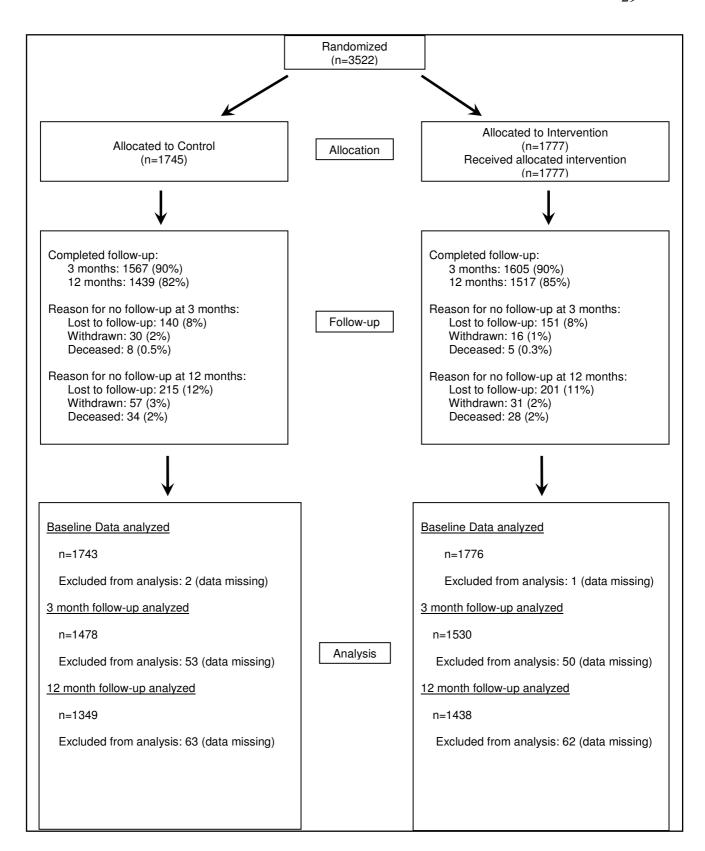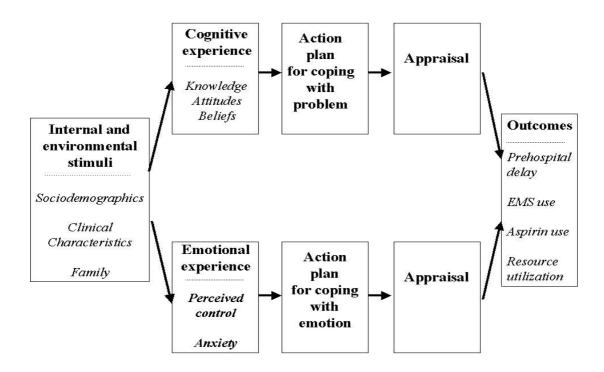
Figure I. Diagram of flow of participants through the study

Figure 2. The self-regulatory model of illness behavior [13].