

Effects of a Brief Motivational Interviewing Intervention on Adherence of Patients Undergoing Therapy in a Phase II Cardiac Rehabilitation Program

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Abstract

Patients who complete a structured cardiac rehabilitation program improve physical capacity and reduce distress. However, adherence to program completion ranges widely, and non-completion of cardiac rehabilitation jeopardizes the potential benefits. This study tests the effects of a brief motivational interviewing and relaxation intervention on completion of cardiac rehabilitation in patients referred to the program after a major cardiac event. One hundred four patients were recruited into this study and randomized to the control or a four session intervention group. Patients who completed the intervention were more likely to complete cardiac rehabilitation; specifically the number of sessions completed was significantly greater ($p < 0.042$) compared to controls. In addition to the intervention, baseline depression and anxiety are important predictors of dropout from rehabilitation. When entering the program, later completers had significantly lower depression ($p < 0.009$) and anxiety ($p < 0.036$) scores on standardized psychological inventories in contrast to those patients who later dropped out of rehabilitation. There were no differences in entry diagnosis or number of feet walked between later completers and non-completers. Patients in both the intervention and control groups who completed rehabilitation sustained important physical and psychological benefits. They were able to walk a greater distance and reduced their scores on the anxiety and depression inventories.

Key Words: cardiac rehabilitation, anxiety, depression, relaxation, motivational interviewing

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Section 1 – Introduction

Cardiovascular disease is responsible for about one third of all deaths and is the leading cause of morbidity and mortality in the United States [1]. Gender, race, socioeconomic status and psychological health or ill health modulate hereditary risk factors, affect severity of illness and predict treatment outcomes. Specifically, depression and anxiety correlate with the likelihood of recurrence of myocardial infarction or worsening heart disease [2,3]. Multiple hypotheses have been advanced to explain the mechanisms linking mood or anxiety with cardiovascular disease; the most widely studied are chronic inflammation, autonomic imbalance (sympathetic nervous system dominance), platelet aggregation, hyperactivity of the stress response system, and allostatic load. Behavioral and socioeconomic pathways include sedentary lifestyle, unhealthy eating, or living in stressful environments [4,5].

Patients who sustain a major cardiac event, such as myocardial infarction, who require coronary artery bypass graft, or suffer with congestive heart failure are usually referred to cardiac rehabilitation (rehab). Previous studies have shown the effectiveness of cardiac rehab programs in improving physical and emotional status for patients with a variety of heart conditions [6]. A Cochrane Review demonstrated that structured exercise-based cardiac rehab is associated with a decreased risk of

cardiovascular mortality, significant reductions in the risk of hospitalization, and improved health-related quality of life [7]. Specific physiologic effects include increased heart rate variability, improved ventricular filling and decreased resting systolic blood pressure. In addition to the direct physical benefits such as increasing a patient's ability to walk farther [8], completion of exercise-based cardiac rehab has been shown to decrease depressive symptoms by 50-70% [9]. However, despite the myriad advantages of these programs over unstructured exercise programs or casual recommendations for exercise, some patients' inconsistent attendance mitigates achievement of the expected benefits.

There are multiple and varied reasons given by patients who discontinue their participation in rehab programs which require three weekly sessions of 60 – 90 minutes each. Several investigations have shown that high levels of depression and anxiety predict patient drop out from rehab [10,11]. Other studies have demonstrated that patients' belief that they do not need structured cardiac rehab is a significant factor in patient non-adherence [12]. Other factors that are associated with higher rates of drop out include being single and dependence on others for transportation [13,14]. Thus it is important to design and test the effects of interventions that could potentially increase adherence to cardiac rehab and thus improve the percentage of patients who complete the prescribed

therapy of three times a week for twelve weeks.

The effects of a brief motivational interviewing and relaxation intervention on the dropout rate in cardiac rehab was reported. Patients who participated in four sessions of motivational interviewing and stress management-relaxation in addition to standard cardiac rehab completed an average of 30 sessions of cardiac rehab, compared to six completed rehab sessions in the group who stopped attending the intervention. In addition, the finding that anxiety and depression at baseline testing were important predictors of patient drop out was reaffirmed[15]. Other studies have demonstrated that motivational interviewing in cardiac rehab helps to increase the physical activity level of patients at 5 month follow up and reduce stress and dietary fat intake at 12 week follow up, further demonstrating the efficacy of this psychological tool [16].

The current investigation sought to increase patient completion of cardiac rehabilitation by helping patients to identify their own motivation for completion of rehab and teaching simple relaxation skills to help reduce distress. The power of positive psychology was emphasized and reflection on the benefits of cardiac

rehabilitation was encouraged. We hypothesized that participating in a motivational interviewing intervention program would be associated with decreased dropout rates for the cardiac rehabilitation program and lower overall anxiety and depression as compared to a control group who participated in only the standard structured cardiac rehab program.

Section 2 – Methods

Section 2.1 – Participants

Participants for this study were recruited from a university medical center phase II cardiac rehabilitation program. Patients are referred to the phase II cardiac rehab program with one of six primary diagnoses: myocardial infarction (MI), coronary artery bypass graft (CABG) surgery, stable angina, chronic heart failure (CHF with a LVEF < - 35%), Percutaneous Coronary Intervention (PCI), or other, which included cardiac valve surgery (e.g. mitral valve replacement) and cardiac transplant. Patients were considered eligible for the intervention study if they had completed fewer than 16 sessions in cardiac rehabilitation and met the diagnostic criteria mentioned above. Data was collected from 52 intervention patients and 52 control patients of average age 63.8 years (SD 13.0). There were 54 males and 50 females.

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Ref. Table 1: Descriptive Statistics. Values are means (SD)

	Total Sample N = 104	Intervention Group N = 52	Control Group N = 52	P value
Age	63.6 (13.1)	64.0 (13.0)	63.3 (13.3)	NS
Female Gender	50 (48%)	28 (53.9%)	22 (42.3%)	NS
BMI	31.3 (6.8)	31.5 (6.14)	31.1 (7.4)	NS
Diagnosis				NS
MI	21 (20.2%)	10 (19.2%)	11 (21.2%)	
CABG	14 (13.5%)	7 (13.5%)	7 (13.5%)	
Angina	7 (6.7%)	6 (11.5%)	1 (1.9 %)	
CHF	19 (18.3%)	8 (15.4%)	11 (21.2%)	
PCI	26 (25.0%)	16 (30.8%)	10 (19.2%)	
Other	17 (16.3%)	5 (9.6%)	12 (23.1%)	
SF-36 Physical	35.2 (9.9)	33.2 (9.7)	37.1 (9.7)	NS
SF-36 Mental	47.9 (11.9)	47.5 (12.0)	48.2 (11.8)	NS
pre-BAI	9.0 (9.9)	10.9 (11.3)	7.14 (7.9)	NS
pre-BDI	9.5 (8.6)	11.1 (9.5)	7.9 (7.4)	NS
WT	2493.8 (792.5)	2338.3 (742.2)	2667.9 (819.4)	NS

Abbreviation Key: MI: myocardial infarction; CABG: coronary artery bypass graft; CHF: congestive heart failure; PCI: percutaneous coronary intervention; BDI-II, Beck Depression Inventory-II; BAI, Beck Anxiety Inventory; SF-36 MH: SF-36 version 2 Mental Component Summary; SF-36 PH: SF-36 version 2 Physical Component Summary; WT: 12 minute walk test in feet.

Section 2.2 – Procedure

The University Medical Center Institutional Review Board approved the study and all patients signed the consent form. At the first clinic session, height, weight, body-mass index (BMI), abdominal girth, resting blood pressure, and resting heart rate were obtained. A 12-minute walk test was performed by each patient during the same session to assess overall functional capacity. Several psychological inventories (described below) were also administered at that time. All measures were repeated upon completion of cardiac rehab. The intervention program was explained to the patients and consent obtained prior to attendance at the first intervention session. Participants attended one intervention session per week until completion of the four group sessions.

Section 2.3 – Measures

Assessments included a test for distance walked in twelve minutes (WT), the Beck Depression Inventory-II (BDI-II) [17] to assess mood, the Beck Anxiety Inventory [18] to measure anxiety (BAI) and the SF-36 a Quality of Life (QOL) instrument to assess

patients' perception of their physical and psychological health [19,20]. Higher scores on the anxiety and depression measures suggested higher levels of depression and anxiety respectively. Lower scores on the SF-36 indicate lower QOL. Moderately elevated to high scores on either the BAI or the BDI-II were discussed with the patient, and their primary care physician was notified. The 12 minute walk test was performed to assess distance walked to the nearest 50 feet around a small indoor track. The distance walked in twelve minutes correlates very well with a patient's functional capacity as determined by a cardiopulmonary exercise (CPX) test [6].

Section 2.4 – Intervention

The intervention included four 30 minute group sessions, conducted consecutively over four weeks. Patients were admitted to the intervention on a rolling basis; they could begin with any of the four sessions. The bulk of each session consisted of motivational interviewing, with a five to ten minute relaxation exercise at the end of the session. Details are provided in Table 2.

Ref. Table 2

Description of the Intervention Sessions

	Motivational interviewing component	Stress management component
Session 1	Identify patients own reasons for attending cardiac rehab; identify personal strengths	Mindful breathing
Session 2	Explore ways to manage negative thoughts	Progressive relaxation (slow tense-relax) of the muscles of the upper body
Session 3	Address barriers to completion	Mindful breathing
Session 4	Create a personal plan to accomplish rehab goals	Progressive relaxation (slow tense-relax of the muscles of the upper and lower body)

The motivational interviewing portion was designed to promote change talk, reinforce positive thinking, and foster healthy lifestyle changes. Specific motivational interviewing topics included identifying illogical health beliefs, managing negative thoughts, building self-efficacy, and goal setting [12,21, 22]. The stress-management relaxation portion provided patients with skills in mindful breathing and progressive relaxation [23]. Slow breathing and progressive relaxation were chosen based on the response of patients in our previous study and other supporting literature [15,24,25]. Patients were given a script for each relaxation technique. Practice was encouraged and informally monitored at each session.

Section 2.5 – Statistical Analysis

Hypothesis testing included X^2 testing for categorical dependent variables. T-tests and ANOVA tests were utilized for continuous dependent variables. Non-parametric tests were utilized when a non-normal distribution was present. SPSS 15.0 was utilized for all statistical analysis.

Section 2.6 – Results

One hundred and eight patients admitted to a Phase II 36-session cardiac rehab program were recruited for this study. Four declined participation and there is no further information available on these patients. One hundred and four patients were randomized to either the 4 session motivational interviewing intervention in addition to the traditional cardiac

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rehabilitation program (n = 52) or the standard care of cardiac rehabilitation alone (n = 52). The groups did not differ in age, gender, pre-rehab BMI, or precipitating

cardiac diagnosis upon admission to the program. The descriptive statistics for the two groups is shown in Table 3.

Ref. Table 3: Cardiac Rehabilitation Program Completion

	Intervention	Control	P - value
	n = 52	n = 52	
Number of Sessions Completed	28.4 (10.5)	23.3 (14.6)	p=0.042
Percentage of Sessions Completed	79.5%	63.4%	p=0.027
Program Completion			
Completers	32 (61.5%)	26 (50%)	NS
Non Completers – Personal Choice	15 (28.8%)	19 (38%)	NS
Non Completers Medical Reason	5 (9.6%)	4 (8%)	NS
Non Completers Other Reason	0 (0%)	3 (6%)	NS

Both the intervention and control groups' baseline depression and anxiety scores were in the mild range and there was no significant difference between the groups. SF-36 on both the mental health composite and the physical health composite at baseline showed mild functional impairment. There were no significant differences in the SF-36 scores at baseline

between the groups. The intervention group's distance walked in feet on the twelve minute walk distance at the beginning of cardiac rehab was shorter than the control group's distance walked (2338.3 feet vs. 2667.9 feet, p = 0.051), nearing statistical significance.

Patients completing the motivational interviewing intervention attended a larger number of cardiac rehabilitation sessions compared to the controls, with the intervention group completing an average of 28.4 sessions vs. 23.3 sessions for the control group, ($p=0.028$). The percentage of sessions completed by the intervention group was also significantly higher than the controls (79.5% and 63.4% respectively) ($p=0.027$). A higher percentage of patients in the intervention group than the control group completed the cardiac rehabilitation program

(61.5% vs. 50.0%), but this finding did not achieve significance.

Within the intervention group, individuals who attended the full intervention protocol completed a higher number of cardiac rehabilitation sessions, (33.1) vs. patients who did not complete the intervention (20.9) $p<0.001$. In addition, those attending all four intervention sessions attended more cardiac rehabilitation appointments than those patients who attended 3 or fewer intervention sessions, 91.2% vs. 57.7%, ($p=0.004$). (table 4)

Ref. Table 4: Intervention Completion and Cardiac Rehab Program Compliance

	Intervention Completed (4 sessions) (n = 33)	Drop out of Intervention (less than 4 sessions) (n = 19)	
% of CR Sessions Completed	91.2% (17.8)	57.7% (33.2)	$p = 0.004$
Number of Sessions Completed	32.8 (6.4)	20.8 (11.9)	$p = 0.004$

Patients who completed the cardiac rehabilitation program had significantly lower pre-test scores of anxiety and depression than those who dropped out before completing the full 36 sessions ($p=0.036$ and $p=0.009$, respectively). Comparison of pre-test anxiety and

depression scores in completers v. non-completers are detailed in table 5.

Ref. Table 5: Comparison of baseline anxiety, depression, SF-36 scores and WT in completers and non-completers of cardiac rehab

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Ref. Table 5: Comparison of baseline anxiety, depression, SF-36 scores and WT in completers and non-completers of cardiac rehab

	Completers (n = 58)	Non-completers (n = 33)	p-value
BDI-II	7.71 (7.4)	12.64 (9.9)	0.009
BAI	7.52 (8.3)	12.1 (12.1)	0.036
SF-36 MH	48.8 (11.5)	45.8 (12.7)	NS
SF-36 PH	35.5 (10.1)	34.7 (10.2)	NS
WT	2458.2 (700.9)	2706.7 (751.4)	0.14

Abbreviation Key: BDI-II, Beck Depression Inventory-II; BAI, Beck Anxiety Inventory; SF-36 MH: SF-36 version 2 Mental Component Summary; SF-36 PH: SF-36 version 2 Physical Component Summary; WT: 12 minute walk test in feet.

There was no significant difference in BAI or BDI-II scores among completers in the intervention and control groups. Furthermore, change in scores on the BAI, BDI-II, SF-36 Mental Health composite and SF-36 Physical Health composite did not differ between completers whether in the intervention or control groups.

Section 2.7 – Discussion

This intervention was planned as part of an ongoing effort to increase completion rates in a University Medical Center Phase II cardiac rehabilitation program. The intervention had two main components, motivational interviewing (MI) to encourage adherence, and relaxation to mitigate the effect of anxiety as a barrier to treatment adherence. A previous study contained approximately equal time spent in MI and relaxation [15]. The current intervention, with more time devoted to the MI component was associated with greater

impact on the number of rehab sessions completed. In addition, when comparing patients who discontinued for reasons of noncompliance, patients who completed the intervention attended a higher number of rehab sessions than controls before dropout. In addition, patients who attended, but did not complete the intervention attended fewer sessions than patients who completed the intervention. Increased levels of anxiety and depression were found to be significant predictors of drop-out, which is consistent with prior evidence [10, 26]. Younger age was also found to be a significant predictor of drop out, presumably because younger patients have work and home responsibilities which interfere with their ability to attend three rehab sessions per week. All completers of cardiac rehab increased the number of feet walked, improved quality of life and decreased anxiety and depression.

Motivational interviewing has been shown to be effective in promoting many types of behavioral change [16,27]. When patients identify their own reasons for attending sessions and progress is reinforced, they tend to develop a sense of mastery. In addition, learning mindful breathing and simple relaxation skills to control muscle tension helps patients to overcome some of their fear resulting in improved mood [28]. Home practice of relaxation, along with the educational sessions on nutrition provided as part of rehab emphasize self management, choosing healthier foods and reducing body tension [29]. Cardiac rehab programs have often used motivational interviewing techniques to improve patient adherence, but there is no manualized program for how such an intervention should be administered. The frequency and duration of encounters, as well as the components of each motivational interviewing session vary across the literature. One study found that six two and a half hour sessions of motivational interviewing (total 15 hours) were sufficient to improve clinical outcomes [30]. However, this level of time commitment is often unrealistic in clinical practice, particularly in younger patients as mentioned above. Other studies have demonstrated shorter sessions to be similarly effective, if properly inclusive of cognitive skills training and relaxation techniques [24]. A recent study demonstrated that stress management training using cognitive behavioral therapy (CBT) techniques incorporated into cardiac rehab was

associated with lower distress and most importantly improved clinical outcomes over five years [31]. CBT deals with irrational, negative beliefs and encourages patients to develop a more positive, realistic assessment of their ability to manage their health [32].

The results of the current study support and expand previous research in this area. Future research may be directed to providing ongoing psychological support for patients with serious cardiovascular disease to test whether further improvement in depression and anxiety can be achieved. In addition, regular follow-up after the formal structured rehab program could result in useful data on continued exercise and elucidate effects of rehab on morbidity and mortality.

Section 2.8 – Limitations

There are several limitations to this study. Patients were recruited into the intervention on a continuous basis, and did not complete the four sessions in the same order. Patients were encouraged to practice the mindful breathing and relaxation skills, but fidelity to this recommendation was not formally monitored. Psychological tests including the BAI and BDI-II were re-administered upon completion of the rehab program, and thus were not available for patients who dropped out.

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