Effect of motivational interviewing on the clinical and psychological outcomes and health-related quality of life of cardiac rehabilitation patients with poor motivation

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KEY MESSAGES

1. The low compliance rate and high dropout rate in traditional cardiac rehabilitation programme reflect the challenges to patients in maintaining a healthy lifestyle to prevent heart disease.
2. Motivational interviewing is effective in cardiac rehabilitation by increasing physical activity level of patients at 5 months, and reducing stress and dietary fat intake at 12 weeks.
3. Motivational interviewing did not significantly improve clinical and psychological outcomes of patients, but showed benefits in terms of the bodily pain subscale, general health subscale, and role emotional subscale of health-related quality-of-life outcomes.
4. Patients attending the cardiac rehabilitation programme demonstrated short-term (3-month) and long-term (12-month) improvements in clinical outcomes (exercise capacity, total cholesterol level, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglyceride), psychological (anxiety and depression) and quality of life (all subscales of the SF-36) outcomes.

Hong Kong Med J 2014;20(Suppl 3):S15-9
HHSRF project number: 05060481

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Introduction

Hypertension, smoking, obesity, and abnormal lipid concentrations are all modifiable risk factors for coronary heart disease. The modification can be achieved through cardiac rehabilitation (CR). The benefits of CR include improvements in functional abilities and reductions in symptoms, and reductions in cardiovascular mortality, morbidity, and coronary risk factors.[1] These benefits are dependent on programme participation and long-term adherence to exercise, and behavioural changes. The low compliance rate and high dropout rate in traditional CR reflect the challenges to patients in maintaining a healthy lifestyle.

Motivational interviewing (MI) is effective in promoting behavioural changes in patients with substance abuse and smoking.[2,3] It is effective in CR by increasing physical activity level of patients at 5 months,[4] and reducing stress and dietary fat intake at 12 weeks.[5]

Methods

This study was conducted from November 2007 to April 2010. It investigated the effects of MI on clinical and psychological outcomes, as well as health-related quality of life on poorly motivated cardiac patients receiving CR, using a randomised controlled trial. A total of 146 cardiac patients with low motivation attending a CR programme were randomised into a control or intervention group. Controls received usual CR care and the intervention group received usual care plus 10 sessions (each lasting 30 to 45 minutes) of MI (in weeks 1, 3, 5, and 7, and then once per month till 6 months, and then once at 9 and 12 months).

The MI interventions were delivered by trained research nurses. The interventions matched with the patient's stage of change. For participants in the action or maintenance stage, MI was used to strengthen the commitment to behavioural changes and for those who were in the precontemplation, contemplation, and preparation stage, MI focused on building motivation for change. Three initial MI sessions and one session per month for the following 4 months were supervised by the principal investigator together with co-investigators (the clinical psychologist, and the mental health nurse)

to ensure consistency and appropriateness. In order to blind the group allocation, data were collected by another research assistant.

Clinical outcomes included blood pressure, body mass index, total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglyceride, metabolic equivalent, tobacco use, drug compliance, readmission rate, and dropout rate. Psychological outcomes were depression and anxiety levels (measured by the Hospital Anxiety and Depression Scale), self-efficacy (measured by the General Self-efficacy Scale), and health-related quality of life (measured by the SF-36 Health Survey).

Data were collected at the beginning of the CR programme and months 3, 6, 9, and 12. Readmission

TABLE 1. Baseline characteristics among those who completed the study (n=116)*

Characteristic	All (n=116)	Control (n=64)	Intervention (n=52)	P value†
Age (years)	66.6 (9.9)	66.2 (11.0)	67.2 (8.5)	0.609
Body weight (kg)	64.3 (11.9)	64.1 (13.1)	64.4 (10.3)	0.895
Body height (cm)	158.5 (8.7)	158.1 (9.3)	158.9 (8.0)	0.594
Body mass index (kg/m^2)	25.6 (4.1)	25.7 (4.3)	25.5 (3.8)	0.804
Sex				0.178
Female	35 (30.2%)	16 (25.0%)	19 (36.5%)	
Male	81 (69.8%)	48 (75.0%)	33 (63.5%)	
Education level				0.549
No formal education	15 (13.2%)	9 (14.1%)	6 (12.0%)	
Primary	42 (36.8%)	20 (31.3%)	22 (44.0%)	
Secondary	38 (33.3%)	24 (37.5%)	14 (28.0%)	
College or above	19 (16.7%)	11 (17.2%)	8 (16.0%)	
Marital status				0.418
Single/divorced/widowed	24 (20.7%)	15 (23.4%)	9 (17.3%)	
Married	92 (79.3%)	49 (76.6%)	43 (82.7%)	
Monthly family income (HK$)				0.045
<10 000	44 (38.6%)	21 (33.9%)	23 (44.2%)	
10 000-20 000	30 (26.3%)	13 (21.0%)	17 (32.7%)	
>20 000	40 (35.1%)	28 (45.2%)	12 (23.1%)	
Working status				0.509
Currently working	23 (19.8%)	15 (23.4%)	8 (15.4%)	
Unemployed	4 (3.4%)	3 (4.7%)	1 (1.9%)	
Retired	71 (61.2%)	38 (59.4%)	33 (63.5%)	
Housewife	18 (15.5%)	8 (12.5%)	10 (19.2%)	
Hypertension				0.448
No	40 (34.5%)	24 (37.5%)	16 (30.8%)	
Yes	76 (65.5%)	40 (62.5%)	36 (69.2%)	
Diabetes				0.157
No	75 (64.7%)	45 (70.3%)	30 (57.7%)	
Yes	41 (35.3%)	19 (29.7%)	22 (42.3%)	
Hypolipidaemia				0.911
No	24 (20.7%)	13 (20.3%)	11 (21.2%)	
Yes	92 (79.3%)	51 (79.7%)	41 (78.8%)	
Current smoker				0.999
No	108 (93.1%)	60 (93.8%)	48 (92.3%)	
Yes	8 (6.9%)	4 (6.3%)	4 (7.7%)	

* Data are presented as median (interquartile range) or frequency (%)

† Categorical and continuous variables were compared using Pearson Chi-square test and T-test, respectively, whereas Fisher's exact test was used for working status and current smoker statistics

and dropout rates were collected at 12 months. Patient satisfaction evaluation and two focus-group interviews were conducted at 6 months.

Results

A total of 116 subjects (64 controls and 52 in intervention group; 81 males) completed the study. Their median age was 66.6 (interquartile range, 9.9) years. The two groups did not differ significantly in terms of demographics (Table 1), nor did those who did and did not complete the study.

The two groups did not differ significantly in terms of readmission during the 12-month period (P=0.637) and cessation of smoking (P=0.429). There were more dropouts in the intervention than control group (21 vs 9, P=0.014). The control and intervention groups differed significantly across time in terms of exercise capacity (measured by metabolic equivalent of task) [3.7 vs 4.1, P=0.04] and bodily pain subscale (81 vs 69.5, P=0.022) and vitality subscale (60.3 vs 53.8, P=0.031) of the SF-36. In both groups, metabolic equivalent of task values, total cholesterol, and low-density lipoprotein cholesterol levels improved significantly at 3, 6, 9, and 12 months. High-density lipoprotein cholesterol and triglyceride improved significantly only at 9 and 12 months. Similarly, all participants had significant improvements in anxiety, depression, and subscales in SF-36 across time.

The intervention group had significantly better results in the bodily pain subscale at 6, 9, and 12 months, the general health subscale at 3 months, and

TABLE 2. Generalised estimation equation models for comparison of the repeated measures outcome variables between the two groups

Variable	All (n=116)	Control (n=64)	Intervention (n=52)	P value
Bodily pain subscale score				
Group	-10.58	-19.65	-1.50	0.022
Month 3	6.84	0.86	12.83	0.025
Month 6	7.78	2.92	12.65	0.002
Month 9	8.13	3.30	12.96	0.001
Month 12	5.93	0.10	11.75	0.046
Group*Month 3	8.77	-0.92	18.47	0.076
Group*Month 6	10.25	1.18	19.33	0.027
Group*Month 9	9.62	0.48	18.75	0.039
Group*Month 12	11.66	2.03	21.30	0.018
General health subscale score				
Group	1.04	-5.40	7.49	0.751
Month 3	1.27	-2.62	5.17	0.522
Month 6	4.87	1.14	8.61	0.010
Month 9	4.85	1.08	8.63	0.012
Month 12	4.49	0.28	8.71	0.037
Group*Month 3	5.98	0.77	11.19	0.025
Group*Month 6	2.30	-3.52	8.11	0.438
Group*Month 9	3.03	-3.11	9.18	0.334
Group*Month 12	5.12	-1.17	11.41	0.111
Role emotional subscale score				
Group	-3.01	-12.71	6.69	0.543
Month 3	4.46	-0.76	9.68	0.094
Month 6	7.57	2.37	12.77	0.004
Month 9	6.45	-0.28	13.17	0.060
Month 12	4.94	-2.58	12.45	0.198
Group*Month 3	10.93	2.13	19.73	0.015
Group*Month 6	8.14	-1.18	17.45	0.087
Group*Month 9	13.68	3.61	23.75	0.008
Group*Month 12	15.29	4.76	25.83	0.004

the role emotional subscale at 3, 9, and 12 months (Table 2). The satisfaction level of the control and intervention groups did not differ significantly (7.8 vs 8.0, t=–0.244, P=0.812). The five categories identified in the focus group interviews evaluating the CR and MI were: (1) physical constraints after development of the cardiac problem, (2) awareness of the factors affecting health, (3) motivation to change in order to maintain health, (4) the need of psychological support, and (5) the effectiveness of the programme to patients.

Discussion

In this study, there were significant differences between the two groups in terms of metabolic equivalent of task (at all four time intervals), triglyceride (at 9 months), bodily pain subscale (at 6, 9, and 12 months) general health subscale (at 3 months), and role emotional subscale (at 3, 9, and 12 months). For metabolic equivalent of task, the control group had a significantly lower value at baseline. Although participants in both groups had improved exercise capacity, the improvement was significantly higher in the interventional group in terms of the triglyceride level, bodily pain subscale, general health subscale, and role emotional subscale. The effects of MI could only be reflected by improvement in certain subscales of health-related quality of life. No definite improvement in clinical outcomes was noted.

The dropout rate was higher in the intervention than control group (29% vs 12.3%). The non-significant differences in other outcomes might be due to the dilution effect from this high dropout rate. To determine sample size for future studies, the effect sizes of similar outcomes of two cardiac MI studies and the present study were compared (Table 3). In view of the small effect sizes, a larger sample size is needed to provide a clear difference between participants in each group of trial.

Regarding qualitative input, all participants appreciated the CR programme, and participants from the intervention group appreciated the importance of changes and motivation to keep a healthy lifestyle, but this was not reflected by statistical results. The focus group interviews identified physical fatigue and weakness as the major causes of not showing up for scheduled sessions. Four (25%) of the potential participants could not attend the interview sessions due to work commitments. This implied that work commitments and/or unable to take time off hindered participation in CR programmes as well as the MI sessions. As observed by the research nurses, many participants also wanted to go home to fulfil their family roles immediately after the CR programme, instead of staying behind for MI sessions. This might be another reason for dropouts.

In view of the cost of the MI, its burden on patients, and its insignificant resultant benefits, this intervention is not recommended. However, the short-term and long-term effects of the CR programme on clinical, psychological and health-

TABLE 3. Comparisons of effect sizes of three motivational interviewing studies on cardiac patients

Outcome variables	Effect size		
	The present study	Brodie et al (2008)	Hardcastle et al (2008)
Body mass index	0.17	0.13	-
Systolic blood pressure	0.02	0.10	-
Diastolic blood pressure	0.03	0.17	-
Cholesterol level	0.09	0.10	-
High-density lipoprotein	0.02	0.05	-
Low-density lipoprotein	0.03	0.08	-
Triglycerides	0.31	0.01	-
SF-36			
General health perceptions	0.10	-	0.48
Physical functioning	0.21	-	0.56
Role limitations due to emotional problems	0.17	-	0.73
Bodily pain	0.27	-	0.52
Mental health	0.10	-	0.48
Vitality	0.07	-	0.86
Role limitation due to physical functioning	0.11	-	1.47
Social functioning	0.11	-	0.81

related quality of life were favourable, and should be recommended for all cardiac patients in Hong Kong. Extending the hours for CR service and using a buddy system may help reduce the dropout rate.

Acknowledgement

This study was supported by the Health and Health Services Research Fund, Food and Health Bureau, Hong Kong SAR Government (#05060481).

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