

Maintenance of Exercise After Phase II Cardiac Rehabilitation

A Randomized Controlled Trial

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Appendix A

Description of the Intervention and Program Evaluation

Maintenance Counseling (MC) Group

Following randomization, the Intervention Coordinator reviewed the patient's exercise prescription s/he received at cardiac rehabilitation (CR) discharge. The participant was given home logs to monitor exercise participation and a pedometer (Digiwalker, Yamax Corporation, Tokyo, Japan) to wear during exercise activities that involved walking. Each participant was encouraged to adhere to the exercise prescription (type of activity, frequency, intensity, and duration). The exercise prescriptions included both aerobic and in some instances, resistance training. The focus of the counseling calls was to promote adherence to exercise prescribed for aerobic activities (e.g., walking, use of stair steppers, biking).

Each participant received calls over 6 months (weekly over the first 2 months, bi-weekly for the next 2 months, and monthly for the last 2 months, a total of 14 calls) from the Intervention Coordinator to monitor exercise participation, identify relevant health problems, problem-solve any barriers to maintaining exercise, reinforce participants for their efforts and set exercise goals. Activity counseling was tailored to each participant's motivational readiness.¹ For the purposes of this study, Action stage was defined as exercising at levels consistent with the exercise prescription provided at CR discharge. Maintenance stage was defined as exercising per prescription for more than 6 months. Those who were exercising per prescription (i.e., in Action) were guided on finding ways to make exercise enjoyable, anticipate slips from an exercise routine, and finding ways to recover from slips so as to maintain regular exercise. Those participants who exercised but not at the levels recommended at CR discharge (i.e., in Preparation stage of motivational readiness) were encouraged to increase the frequency and duration to achieve the recommendations prescribed for them at CR discharge. Specific components from motivational interviewing (assessment of the importance of exercise, confidence in staying active, reflective listening, empathy, affirming and reinforcing commitment) were also included in the calls. Participants reported on the exercise recorded on home logs and received feedback. If participants reported physical symptoms such as chest pain, they were referred to their physician for clearance to resume study participation. After the 6-month program, bi-monthly phone calls were provided for the remaining 6 months to prompt and reinforce regular physical activity.

Participants were mailed a tip-sheet on exercise (that covered behavioral topics such as setting goals and staying motivated, and exercise-specific topics such as injury prevention, overtraining, and exercising at home); and one on cardiovascular health (topics covered included managing stress, and social support) for each call during the 6-month program. Finally, a feedback letter summarizing the participant's exercise progress was sent to them at Weeks 4, 8, 12, 16, and 20. Participants who reported no exercise

were sent a letter that summarized their barriers to exercise and encouraged them to think about the benefits of becoming physically active.

Intervention staff (educational backgrounds included: bachelor’s degrees in gerontology and exercise science and a masters’ degree in public health) received approximately 15–20 hours of training on the theoretic bases for the intervention, physical activity promotion, and motivational interviewing techniques via didactics, and role plays with peer and supervisor feedback. Refresher training was provided periodically during the intervention phase.

Contact Control (CC) Group. To control for frequency of contact with the two groups, these participants also received the same number of calls as MC participants (weekly over the first 2 months, bi-weekly for the next 2 months, and monthly for the last 2 months, a total of 14 calls). After Month 6, these participants also received bi-monthly calls over the remaining 6 months. During these calls, the Symptom Questionnaire was administered² to monitor problems such as headaches that can affect normal activity of daily life. The goal of the calls was to match the frequency of contact with MC. There was no attempt made to match the duration of the telephone contact between groups. The group also received tip-sheets on cardiovascular health (the same as those provided to MC participants). After completing the final follow-up assessment, participants received the exercise tip-sheets.

Intervention delivery. All telephone calls to participants to both groups were audio-taped and 25% of the calls were reviewed to ensure fidelity to protocol and to detect any contamination. Content of calls were assessed by checklists and the process components by rating scales. Feedback was provided to those conducting the intervention in written and oral form. There were no instances of contamination across groups.

Program Evaluation

At 6 months, both groups evaluated the programs they had received on a post-intervention questionnaire. Both rating scales and open-ended questions were used to obtain data. Mean satisfaction with the study (1–5 scale; 1=not at all satisfied, 5=very satisfied) was rated at 4.55 (SD=0.66) by the MC group vs 4.06 (SD=1.10) by the CC group ($p=0.03$). Ninety-five percent of the MC group vs 100% of the CC group reported that the number of calls was “about right” and 93% of the MC group vs 98% of the CC group reported that the length of the calls was “just right.”

Ratings by the MC group ($n=44$) on the various components of the program on 1–5 rating scales (1=not at all helpful, 5=very helpful) were as follows:

Program components	Mean rating (SD)
Calls	4.40 (0.93)
Pedometers	3.89 (1.14)
Weekly exercise logs	4.42 (0.98)
Exercise ti-sheets	4.02 (0.86)
Exercise progress reports	4.12 (0.94)
Cardiac newsletters	4.07 (0.87)

Mean ratings of the study staff on 1–5 scales (1=not at all, 5=extremely) can be seen below:

	MC group ($n=44$)	CC group ($n=48$)
Helpfulness of staff	4.64 (0.69)	4.52 (0.66)
Staff were caring	4.68 (0.56)	4.66 (0.52)
Staff were collaborative	4.60 (0.69)	4.46 (0.75)

CC, contact control; MC, maintenance counseling

Mean ratings of the cardiac newsletters on 1–5 scales (1=not at all, 5=very) received by both groups can be seen below:

	MC group (n=44)	CC group (n=48)
Relevant	3.98 (0.78)	4.05 (0.86)
Useful	4.12 (0.89)	4.09 (0.89)
Interesting	4.37 (0.69)	4.25 (0.87)

CC, contact control; MC, maintenance counseling

Appendix B

Regression-adjusted means at 6- and 12-month follow-up

Outcome	Group	Base	Follow-up	
			6 months	12 months
			M (95% CI)	M (95% CI)
PAR exercise (minutes/week)	Counseling	216	210 (170, 250)	240 (198, 282)
	Control	216	178 (142, 215)	160 (122, 199)
	(Difference)		32 (-23, 86)	80 (22, 137)
PAR METs (kcal/kg/hour)	Counseling	233	234 (232, 236)	235 (233, 238)
	Control	233	231 (229, 234)	230 (228, 232)
	(Difference)		3 (0, 6)	5 (2, 8)
SF-36	Counseling	78.8	80.9 (76.1, 85.7)	81.8 (76.9, 86.6)
	Control	78.8	79.7 (75.5, 83.9)	73.9 (69.6, 78.3)
	(Difference)		1.2 (-5.2, 7.6)	7.9 (1.3, 14.4)
Stress test VO ₂ peak (ml/kg/minute)	Counseling	30.3	30.5 (29.6, 31.4)	
	Control	30.3	30.5 (29.7, 31.3)	
	(Difference)		0 (-1.1, 1.1)	

Note: The longitudinal trajectories of both study arms use the overall mean of each outcome at baseline as a common starting point. Values in boldface denote within-group changes from baseline to follow-up, significant at alpha=0.05.

PAR, physical activity recall; SF-36, Medical Outcomes Study 36-Item Short Form Health Survey

Appendix C

Regression-adjusted proportions by stratum at 6- and 12-month follow-up

Outcome	Baseline	Group	Follow-up			
			6 months		12 months	
			Prop	95% CI	Prop	95% CI
Physical activity guidelines	PAR <150	Counseling	0.35	(0.19, 0.55)	0.47	(0.27, 0.69)
		Control	0.26	(0.15, 0.42)	0.29	(0.15, 0.48)
		(Difference)	0.09	(-0.07, 0.26)	0.18	(-0.03, 0.39)
	PAR ≥150	Counseling	0.73	(0.60, 0.84)	0.82	(0.67, 0.91)
		Control	0.65	(0.51, 0.77)	0.67	(0.49, 0.81)
		(Difference)	0.08	(-0.08, 0.25)	0.15	(-0.02, 0.32)
Stage (men)	Con/prep	Counseling	0.47	(0.25, 0.70)	0.36	(0.14, 0.65)
		Control	0.32	(0.15, 0.56)	0.18	(0.06, 0.42)
		(Difference)	0.15	(-0.03, 0.32)	0.18	(0.02, 0.36)
	A/M	Counseling	0.67	(0.52, 0.80)	0.59	(0.43, 0.74)
		Control	0.52	(0.38, 0.65)	0.36	(0.23, 0.52)
		(Difference)	0.15	(-0.03, 0.32)	0.23	(0.03, 0.41)
Stage (women)	Con/prep	Counseling	0.23	(0.07, 0.53)	0.38	(0.14, 0.70)
		Control	0.13	(0.04, 0.37)	0.20	(0.06, 0.47)
		(Difference)	0.10	(-0.02, 0.25)	0.18	(0.02, 0.37)
	A/M	Counseling	0.41	(0.19, 0.67)	0.61	(0.37, 0.81)
		Control	0.27	(0.12, 0.49)	0.39	(0.20, 0.61)
		(Difference)	0.14	(-0.02, 0.32)	0.22	(0.03, 0.40)

Note: Physical activity guidelines analyses have been stratified by PAR levels at baseline, dichotomized at 150 minutes/week.

Stage of motivational readiness for exercise analyses have been stratified by gender and baseline stage: Con/Prep vs A/M.

A/M, action/maintenance; con/prep, contemplation/preparation; PAR, physical activity recall; prop, proportion

References for Appendixes A, B, and C

1. Marcus BH, Simkin L. The stages of exercise behavior. *J Sports Med* 1993;33:83–8.
2. Winningham M. Developing the Symptom Activity 27: An instrument to evaluate perception of symptom effects on activity. *Oncol Nurs Forum* 1993;20:330.