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REHABILITATION AFTER MYOCARDIAL INFARCTION

A Controlled Study

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ABSTRACT. The effects of a rehabilitation programme one year after myocardial infarction (MI) were investigated in 171 patients under 65 years of age. These patients were allocated at random to rehabilitation and control groups before discharge from hospital. The groups were comparable with regard to age, sex and clinical data. The programme included physical exercise, counselling of patients and relatives, and social measures over a 3-month period during the convalescent stage. One year after MI patients in the rehabilitation group showed lower systolic blood pressure at rest and lower diastolic pressure on submaximal exercise than controls. No differences were found with regard to mean work capacity, days off work, return to work, psychological status, and understanding of the illness. At 12 months all patients were less physically and socially active than before MI, they were more dependent on their relatives than before, and they had poor understanding of their illness.

Key words: Myocardial infarction, rehabilitation, exercise therapy, health education, exercise test, anxiety, socioeconomic factors

The primary treatment of myocardial infarction (MI) has become increasingly advanced, but aftercare has not developed at the same pace. The patient often finds striking discrepancy between the intensive care given in the acute stage of the illness an the limited measures offered afterwards. His condition is marked not only by somatic but also by psychological and social problems. To resolve or mitigate these, comprehensive intervention rehabilitation programmes for patients with myocardial infarction are proposed (19, 30).

Most studies on cardiac rehabilitation claim that rehabilitated patients show greater work capacity, fewer psychological problems, and more frequent return to work than controls (4, 7, 8, 9, 14, 26).

However, some authors report the same work capacity in treated patients and controls (15, 16, 24). Others have found (31) that patients age 40–50 with normal initial work capacity did not improve their total work capacity during a rehabilitation programme, while patients with low initial capacity did so. After an 18-month programme of physical conditioning no significant difference was found in blood pressure, weight, serum cholesterol, or smoking habits between exercised and sedentary control groups of middle-aged, coronary-prone men (29). Nor did predischarge consultation on the resumption of work, sexual activity and driving an automobile have any effects on how quickly patients resumed these activities after their MI (18).

This study was designed to elucidate the effects of a rehabilitation program at a follow-up one year after MI with respect to clinical, social, psychological factors, and the patient's understanding of his illness and its treatment.

MATERIAL

All 171 patients under 65 years of age with MI treated at the intermediate-care ward of the cardiological unit during the period October 1973–January 1975 were, while in hospital, allocated at random to either the rehabilitation (81) or the control (90) group (Fig. 1). At discharge the cardiologist decided whether the patient was fit to take part in the rehabilitation program. Forty-five patients were excluded for reasons given in Table I. Fifty-two of the rehabilitation group took part in the treatment programme. Seven who were invited to take part declined; 6 of these were seen at follow-up examination, and were included in the rehabilitation group because the control group probably also comprised a comparable number of patients who would no doubt also have declined further treatment.

Those patients who developed a new infarction during the investigation period were excluded, because the follow-up interview was focused on experiences of MI at time of the entry to the study. The three patients classified under 'Others' in Fig. 1 in the rehabilitation group showed other predominant states, viz. arterial occlusive disease with gangrene and severe pain, polymyalgia arteritica, and language difficulties. 'Others' in the control group included two patients who had taken part in a small pilot study

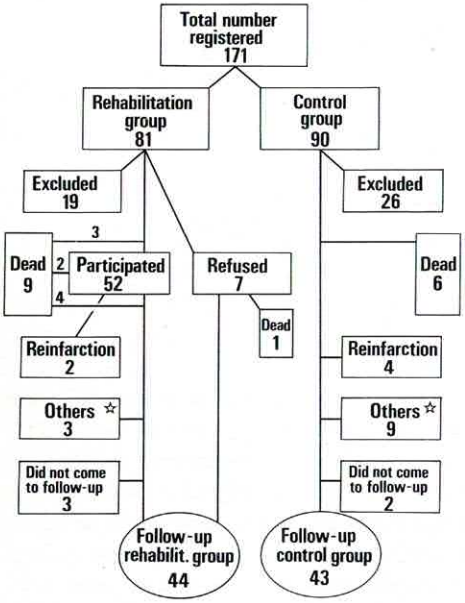

Fig. 1. Patient series. *For details, see text.

and seven 'drop-ins': three inadequately informed and 4 who received the same treatment as patients in rehabilitation group for psychological reasons. The patients' occupations and family conditions were similar in the two groups.

Table I. *Patients excluded from the rehabilitation programme, as assessed at discharge from hospital after infarction*

Contra-indication	Rehabilitation group	Control group
Cardiovascular disease	10	12
Severe cardiac failure	7	7
PMI-syndrome	2	1
Aortic regurgitation	1	0
Cerebral infarct hemiparesis	0	4
Orthopoedic states	4	3
Diseases of hip	2	1
Status post-poliomyelitis	1	0
Amputation of lower extremity	1	2
Other somatic disease	3	1
Diabetes mellitus with retinopathy	1	0
Hyperthyroidism	1	0
Hypothyroidism	0	1
Hyperparathyroidism	1	0
Mental illness	1	5
Anxiety neurosis	1	1
Low intelligence	0	1
Alcoholism	0	1
Schizophrenia	0	2
Living more than 50 km from the hospital	1	5
Total	19	26

METHODS

The treatment of the MI-patients during the hospital stay followed the conventional pattern. At discharge the cardiologist gave all patients individual instructions, and recommended most of them to attend their local doctor after one month. Younger patients and those with serious complications were followed up at the cardiological unit: 38 persons, 24 belonging to rehab group and 14 controls. Patients included in and fit for the rehabilitation group were invited to take part in the special treatment program.

Rehabilitation program

The program comprised the following measure:

Out-patient examination at the Department of Rehabilitation Medicine;
Physical training supervised by a physiotherapist;
Counselling, individually and in groups;
Counselling of members of the family;
Social measures, including certificates to National Insurance, employer, and local employment authority.

The time schedule is shown in Fig. 2. At the examination at the rehabilitation clinic a detailed history, including family and occupational history and the patient's attitudes to his illness, was taken. An exercise tolerance test on an electrically braked bicycle ergometer (Siemens-Elema) with increasing loads every 6 minutes and continuous ECG-recording was done. As a rule 40 Watts (W) was used as the initial load with 30 W increases at 6-min intervals. The test was stopped when the patient felt that he was unable to continue because of anginal pain, dyspnoea or fatigue or when marked ECG changes, arrhythmia, or decreasing blood pressure appeared. His rating of perceived exertion (RPE) (6) was noted. The blood pressure before, on each load, and after the test was measured by cuff.

Physical training followed under the supervision of a specially trained physiotherapist attached to the cardiological unit and already acquainted with the patient. The exercises consisted of interval training of large muscle groups on a mechanically braked ergometer bicycle (Monark Ergometercykel), calisthenics, and jogging for 30 min twice weekly over a period of 3 months. The intensity of the exercises was graded individually on the basis of the findings at the exercise tolerance test, and a maximum heart rate at exercise was prescribed (26). ECG surveillance was not done routinely. The heart rate during the training sessions amounted to 90% of the maximum heart rate at the exercise tolerance test.

Counselling was given at medical examinations, at physiotherapy sessions, and at a special class for patients and members of their families. In this class we informally talked about the causes, course, and treatment of myocardial infarction. Points taken up regularly included the

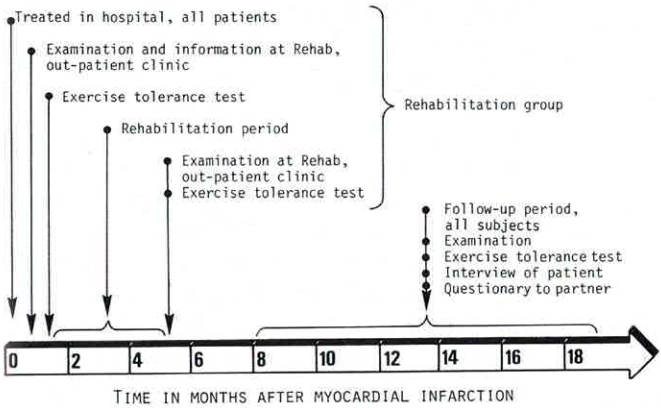

Fig. 2. Time course of the investigation.

anatomy of the heart, drug treatment, psychological reactions, mode of life, return to work, and social benefits. The intention was to supply practical information and not to go into theoretical matters. The patients were thus counselled to avoid gaining weight, to stop smoking, to keep on with physical exercise, and to resume leisure activities as much as possible. The goal was to reduce the patients' anxiety and to present information as encouragingly as possible. We tried to eliminate unnecessary bans and limitations of activity, and to prevent coddling by the family.

The patient's return to work was discussed throughout the period of rehabilitation, i.e. whether this was to take place after a brief period of retraining at the place of work while still officially on sick leave, or in the form of part-time employment combined with partial sick leave. In the rehabilitation group medical certificates were issued to the employer in four cases, suggesting modifications in the patient's work. Medical reports were sent to the works doctor in eight cases, to the Social Insurance Office in 11 cases, and to Disablement Resettlement Officer in two cases.

The rehabilitation period was concluded with an other exercise tolerance test, and medical examination. A detailed report of the course of the illness, performance on exercise tolerance test, drug therapy, and plans for maintenance treatment was sent to the patient's doctor.

Follow-up investigation

Follow-up investigation was carried out on an average 14 months (range 8–19 months) after the MI in both groups. The investigation comprised history and clinical findings, exercise tolerance test, questioning about how the patient experienced the illness, psychological tests (Minnesota Multiphasic Personality Inventory, MMPI), a short testing of knowledge of cardiac infarction and its treatment, and a questionary to the patient's partner.

The exercise tolerance test at follow-up was performed with one-minute steps of 10 W. For practical purposes this test and the test described earlier have equal validity as a measure of the circulatory capacity (32). Five patients in the rehabilitation group and four in the control group did now want to perform an exercise tolerance test.

For practical reasons psychological tests were performed only in a subgroup of patients (23 in rehabilitation group, 22 in control group). A detailed report of the interviews and psychological tests performed in half of the series is published elsewhere (3).

The material was statistically analysed by cross tabulation, χ_2-test and Student's t-test.

RESULTS

Medical factors

After discharge from hospital and to the follow-up investigation, 10 of the rehabilitation patients and 6 controls died. Two and 4 respectively suffered reinfarction. Forty-four 'rehabilitation' patients and 43 controls took part in the follow-up examination. No significant differences with regard to age, sex, number of infarcts, highest S-GOT value, heart size on X-ray, or number of days in hospital existed between the two groups (Table II).

No differences are seen in the late clinical course with regard to number of admissions, angina pectoris, cardiac decompensation, arrhythmias, or other complications. The patients' function according to New York Heart Association (NYHA) norms is shown in Table III.

The rehabilitation group showed a lower mean systolic blood pressure at rest before exercise tolerance test and lower diastolic blood pressure at highest load than controls (Table IV).

The patients in the rehabilitation group performed on average 22 W (31%) heavier work at the end of the training period, and 45 W (63%) at the follow-up (Table IV). Betareceptor-blockade was used to the same extent after the initial 3-month treatment perod and at the follow up examina-

Table II. *Various data at time of infarction in patients from rehabilitation and control groups who were subsequently investigated at follow-up examination*

	Rehabilitation group ($n=44$)	Control group ($n=43$)
Age mean ± SD	55.3±6.6	57.1±6.6
range	39–65	39–65
Sex men/women	38/6	36/7
Infarct no. 1/2/3	39/4/1	38/4/1
S-GOT U (max. conc.) mean ± SD	153±93	151±110
Heart size on X-ray/ Body surface, ml/m² mean ± SD	469±81	503±99
Duration of in-patient care, days mean ± SD	17±4.7	16±4.7

tion. The physical capacity at follow-up was identical in both groups.

Social factors

Nine patients in both groups said they were financially less well off than before the infarct, one of the rehabilitation group and 2 of the controls being considerably worse off. In most cases, however, National Insurance appears to compensate the patients for their loss of income.

Patients in the rehabilitation group had on average 177 full sick leave days and 58 partial sick leave days. Corresponding numbers for controls were 172 resp 91 days (Fig. 3). Among patients working before the MI 75% of 'rehabilitation' patients and 72.5% of the controls returned to work (Table V). Younger patients (≤56 years old) resumed work more often than did older (≥57 years old) patients ($p<0.02$). Patients with slight angina pectoris did not return to work significantly more than patients with marked angina ($p>0.05$). More than 60% of patients in both groups stated that they were satisfied or very satisfied with their present occupation; only 20% were dissatisfied.

The patients in the training group not returning to work had in 3 cases severe angina pectoris, in 3 cases angina pectoris combined with chronic bronchitis, diabetes mellitus and cerebral ischaemia, and finally in one case low back pain, cerebral infarction and recurrent mental disease.

Mode of life

During the observation period, patients in the rehabilitation group gained 1.1 kg (mean) in weight and the controls 1.5 kg. Similar reduction in smoking took place in both groups, roughly one-third giving up smoking altogether after the infarction and one-third greatly reducing tobacco consumption.

At the time of follow-up examination 19 patients in the rehabilitation group and 17 of the controls were taking daily exercise (Table VI), most commonly in the form of a walk or cycling. A few played tennis or bowling or took part in gymnastics. Many patients—and especially their relatives—reported a considerable reduction in the patient's activity compared with the period before the MI (Tables VI–VII).

Psychological aspects

At the follow-up the physician roughly assessed the patient's psychological status on a 5-degree scale (Table VIII). The reported consumption of sedatives, tranquillizers, and hypnotics was similar in both groups, 10–15% of all patients taking such drugs regularly.

No significant differences were found with regard to depression and hypochondria ratings in The Minnesota Multiphasic Personality Inventory between 23 patients in the rehabilitation group 22 controls: both groups were assignable to the middle of the normal zone of the depression scale and the upper normal zone of the hypochondria scale. On direct questioning about anxiety of exertion, for the future (Table IX), and for reinfarction, about 60%, 75%, and 50% answered 'never' in both groups. When the partner was asked whether the patient seemed anxious about these matters, more differentiated answers were obtained, but there was no difference between the two groups (Table IX).

Patients' understanding of the illness

A short questionnaire with chiefly multiple-choice questions was presented in order to test the pa-

Table III. *Functional level (NYHA) at follow-up*

	Rehabilitation group ($n=44$)	Control group ($n=43$)	Total ($=87$)
I	9	10	19
II	21	20	41
III	14	11	25
IV	0	2	2

Table IV. *Results of exercise tolerance test at follow-up*

	Rehabilitation group ($n=39$)			Control group ($n=39$)	
	Before treatment	After treatment	Follow-up	Follow-up	$p<$
Weeks after infarction, mean	9	25	67	68	
β-blockade, number of patients	9	22	23	21	
Resting pulse, mean ± SD	75±13	70±12	69±11	70±14	
Max. pulse during exercise tolerance test, mean ± SD	125±20	123±25	126±26	130±21	
Resting blood pressure, mmHg, mean ± SD					
syst	139±18		134±15	144±20	0.01
diast	86±10		84±9	87±11	0.17
Maximum blood-pressure during exercise tolerance test, mmHg, mean ± SD					
syst	178±27		180±30	193±28	0.06
diast	92±13		87±13	95±11	0.004
W_{max}, Watt, mean ± SD	72±27	94±32	117±33	118±42	0.89

tients' knowledge. There was no difference in distribution of correct answers between rehabilitation and control groups.

Physical training is also said to teach patients their limitations. At the time of the follow-up examinations many in the rehabilitation group were still nervous about physical exertion (Table X). There was a tendency to less confidence in physical exertion in the rehabilitation group than among the controls ($p<0.14$). Active participators in both groups claim, however, better confidence in physical exertion than non-active.

Interview with relatives

At the time of the follow-up examination 38 relatives of rehabilitation patients and 36 relatives of controls were interviewed. No differences emerged between the two groups. Partners showed more anxiety and worried more about the future than did patients (Table IX). They described patients as being more dependent on their relations. Patients were given more consideration than before MI. These features were more pronounced during convalescence than later. Several partners admitted that they were constantly afraid of a new infarct. These psychological reactions were not correlated to the severity of the disease or the patient's physical performance. Partners particularly desired regular consultations, information, and encouragement from the medical staff.

DISCUSSION

Material

The feasibility of a physical training program after MI is thoroughly discussed in a Swedish thesis (26). In this study one fourth of the patients were excluded from the training, when the exercises started three months after MI. The exclusion was due to cardiac reasons in 12%, poor cooperation in 7%, and to other disabilities in 5%. The number of excluded patients in our study (Table I) agrees fairly well with this thesis. In spite of attempts to include every patient presenting during the period in question the original group was reduced to nearly half at follow-up owing to somatic, mental and practical complications. As in other studies (19) it proved difficult to keep the groups 'clean'. Controls

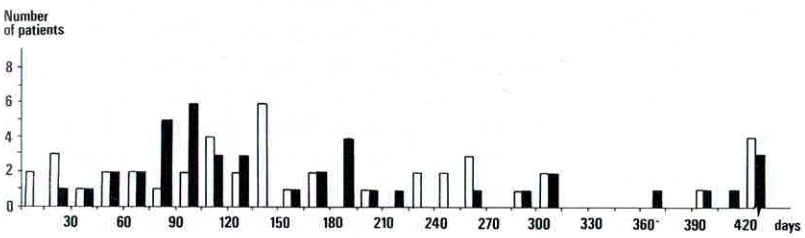

Fig. 3. Sick leave, full days. □, Patient in rehabilitation group; ■, patient in control group.

Table V. *Return to work among patients at work before infarction*

	Rehabilitation group (n=36)	Control group (n=40)
Same work, no modification	7	12
Same work, modified	17	13
Other work, same employer	1	3
Other work, new employer	2	0
Vocational rehabilitation	0	1
	n=27 (75%)	n=29 (72.5%)

Table VII. *Leisure-time exertion (gardening, looking after car, shovelling snow, etc.) at follow-up compared with time before infarction, as testified by patients and relatives*

	Rehabilitation group		Control group	
	Patient (n=44)	Relative (n=38)	Patient (n=43)	Relative (n=36)
Much less	18	15	14	14
Rather less	10	12	14	11
Unchanged	12	11	13	10
Rather more	1	0	0	1
Much more	0	0	0	0

were of course able to take exercise and to get information from other sources. Some patients in both groups belonged to a sports club with good opportunities for physical exercise.

The patient series were too small and disparate to elucidate effects on morbidity and mortality.

Compliance

All patients who started the training program completed it, and attendance at follow-up was good. In Kentala's study (16) 29 of his 61 patients participated adequately up to the 5-month examination, and only 10 continued until the 1-year follow-up. After a year 11 of 81 controls maintained physical activity of full training level. In Sanne's study the drop-out rate caused by practical difficulties and poor motivation was highest after about 4 months of training (26). Only 29% of those who started, still trained at the hospital after 2 years. In a Hamburg investigation (10) about 40% of infarction patients were regarded as suitable for out-patient rehabilitation groups. Despite invitations and optimal opportunities for exercise at sports clubs only 30% of these patients took part. The good attendance rate in our study is probably due to the short and limited treatment period, during which costs, transports and poor motivation are less obstacles than during long-term treatment.

Table VI. *The patients' habits to exercise at follow-up, as testified by patients and relations*

	Rehabilitation group		Control group	
	Patient (n=44)	Relative (n=38)	Patient (n=43)	Relative (n=36)
Never	4	9	6	13
1–2 times/ month	3	1	2	1
1–3 times/ week	15	18	15	11
Daily	19	9	17	8

Methods

The most significant factor with regard to increase in work capacity is said to be the intensity of physical training followed by the frequency (23). Exercise training of cardiac patients is recommended with an intensity of 70–85% of the maximum heart rate three times a week (22). In a Danish investigation (28) selected symptom-free male postinfarction patients were tested and exercised with maximum intensity. After one year the work capacity increased by 101% to 257 W in the exercise group and by 28% to 170 W in the controls. The work capacity after physical training was 30–40% higher than that usually found after submaximal training of postinfarction patients.

Our patients increased their maximal work performed by 63% but the figures did not differ from those of controls at follow-up. In our study the exercise tolerance test before the treatment period was worked up to a moderate level of perceived exertion—RPE-scale about 15. The intensity of training was kept 5–20 beats under the maximum heart rate at the exercise tolerance test. This intensity was considered to be safe but did probably not reach the recommended 70–85%. For practical reasons the patients could only train twice a week. Only 3 'rehabilitated' patients performed better after the training period than at follow-up. The

Table VIII. *Assessment of mental status at follow-up*

	Rehabilitation group ($n=44$)	Control group ($n=43$)
I Nothing exceptional	16	21
II Slight psychological distress	21	18
III Moderate psychological distress	6	3
IV Considerable psychological distress	1	1
V Marked psychological distress	0	0

Table IX. *Anxiety about the future as testified by patients and relations at follow-up*

	Rehabilitation group		Control group	
	Patient ($n=44$)	Relative ($n=38$)	Patient ($n=43$)	Relative ($n=36$)
Often	2	2	2	2
Sometimes	6	17	8	15
Rarely	4	11	4	11
Never	32	8	29	8

others in the rehabilitation group continued to 'improve' their capacity 10–70 W to the follow-up. Part of this 'improvement' is probably due to harder exercise tolerance testing than before.

In one Swedish study there was a 16% increase in work capacity among postinfarction patients who exercised to fatigue without cardiac limitations (26). Postinfarction patients who stopped exercising because of angina pectoris increased their maximum working tolerance by 53%. The control group showed the same physical work capacity one year after the MI as 3 months after.

In a Finnish investigation of men under 65 years trained after infarction (16) no difference was seen in maximum work capacity 12 months after MI between patients allocated to physical training and control groups. The series was the regrouped into a high-level and a low-level physical activity group. Working capacity in the former increased by 56% and in the latter by 26%.

In Sanne's study (26) patients were classified in active and inactive according to their history 3 months after MI. The maximal work intensity, oxygen uptake, pulmonary ventilation, and oxygen pulse were all significantly higher in the active group.

Regrouping of our patients at follow-up into physically active and passive persons discloses no difference in working capacity on exercise tolerance testing at follow-up (119±36 W and 118±39 W). No difference emerges with regard to angina pectoris or feeling of physical fitness.

The most probable explanations to the lack of difference in work capacity in our groups would be training of too low intensity and patients not going on training after the treatment period.

Return to work

Return to work depends on many factors, e.g. the patients physiological and psychological status, his age, education, profession, possible social benefits and the labour market situation. In a review on vocational rehabilitation after first myocardial infarction (13) the author states, 'the better the patient perceives his health to be, the more likely he is to be working after discharge'.

Our series of patients is probably too small to allow analysis of the factors determining resumption of work. The non-working patients in our study had such severe medical and social problems that vocational rehabilitation would not have yielded results. The rate of return to work in this study, about 75%, tallies with findings in other Scandinavian investigations. In a Swedish study (27) 63% of patients with heavy work and 78% of those with light work returned to their original jobs after rehabilitation. In a Finnish investigation (16) 68% were reported to have returned to work irrespective of whether or not they had undergone rehabilitation. In a Copenhagen study (17) 76.6% of male patients and 64% of female patients who received no special rehabilitation had returned to work after more than 2 years. More than 70% of Norwegian postmyocardial patients resumed work one year after MI (5). In

Table X. *'How confident are you about the amount of physical exertion you can manage?'*

	Rehabilitation group ($n=44$)	Control group ($n=43$)
Very uncertain	7	9
Rather uncertain	24	13
Fairly confident	11	18
Completely confident	2	3

another Norwegian study (25) information and encouragement during hospital stay and systematic follow-up with stimulation for return to work was given. Of employed patients 95% below the age of 50, 80% between 50 and 59 and 75% between 60 and 69 returned to work. The absence from work including hospital stay was 8 weeks or less in 50%.

Cardiac rehabilitation is criticized as delaying return to work (1). It is probable that this was the case for some of our patients.

Mode of life

In Coronary Heart Disease and Pattern of Living the authors say: 'Smoking habits appeared very important, both as an indication of dependence before infarction and resistance to, or acceptance of, change after infarction' (11). The data in our study accord with results from other studies and anti-smoking clinics: 1/3–1/2 of smokers giving up smoking in treatment group (2, 11). Better results—63.2% giving up the smoking habit—are reported after intensive anti-smoking approach including home visits (11).

In our study many infarction patients became more inactive and cut down leisure activities and social intercourse. There are many explanations to this reduction, the physical symptoms of the disease, e.g. angina pectoris, dyspnoea, fatigue, anxiety of the patient (compare ref. 26), ignorance of the patient, overprotection of the family, etc. In a long-term Scottish investigation (11) it was found that infarction patients dramatically reduced social and physical activities, and that this phenomenon persists after 5 years. Attempts to encourage 'rehabilitation' patients to be more active were apparently not succesful.

Psychological factors

MI patients are stated to achieve higher ratings on MMPI's depression, hysteria, and hypochondria scales, and after rehabilitation striking reduction has been noted in the depression and hypochondria scales (13). In agreement with a Yugoslavian study we found no difference in depression or hypochondria ratings between treated patients and controls at follow-up (21).

Patients' understanding of the illness

There are several explanations for the patients' lack of knowledge—too little information given, or inability to absorb information. Knowledge retained even after an ambitious several-day course was limited (20). The patients' understanding of the disease is also reflected in their modes of life, where patients in the rehabilitation group did not differ from controls, for instance as regards smoking habits. It is astonishing that 2 patients out of 3 declared that they had got enough information. Only a few wanted more information.

CONCLUSION

A rehabilitation on program including physical training, information, counselling and social measures during the first 5 months after an acute MI did not change the outcome 8–19 months after the MI considering physical fitness, return to work, psychological factors and understanding of their illness compared with a control group. The patient in the convalescent period is characterized by physical and psychological limitations, anxiety and lack of confidence on part of both patient and partner and poor knowledge of the disease. These reactions are undoubtedly natural to some extent, having regard to the gravity of the illness, and cannot be entirely mitigated.

The ambulant care and rehabilitation resources available in Linköping seem to be so well established that the programme described here apparently offers no further advantages for the average patient. But some patients need special measures. It is essential to select those who need these measures, e.g. coronary by-pass surgery, physical training, social and psychological support and vocational advice. These measures should be provided at the right moment and on an adequate level. Then cardiac rehabilitation will be as advanced as the treatment during the CCU stay.

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REFERENCES

1. Acker, J. E.: Pros and Cons of Organized Rehabilitation. *In* Critical Evaluation of Cardiac Rehabilitation (ed. J. J. Kellerman & H. Denolin), Biblthca cardiol, No. 36, pp. 114–117. Karger, Basel, 1977.

2. Ander, S.: Prognosfaktorer för att sluta röka i en grupp män med hjärtinfarkt. Report from Department of Psychology, University of Gothenburg, 1973: 24.
3. Auer, J. & Lundberg, K.: Ett försök till utvärdering av psykiska, fysiska och sociala effekter av ett rehabiliteringsprogram hos patienter med genomgången hjärtinfarkt. Report from Department of Education, University of Linköping, 1977.
4. Bergström, K., Bjerulf, A. & Eriksson, U.: Work capacity and heart and blood volumes before and after physical training in male patients after myocardial infarction. Scand J Rehab Med *6:* 51–64, 1974.
5. Bolstad, A. & Maeland, J. G.: Rehabilitering av coronare hjertepasienter i Hordaland fylke. Report from Department of Preventive and Social Medicine, University of Bergen, 1978.
6. Borg, G. A. V.: Physical Performance and Perceived Exertion. Studia Psychol et Paedagogica XI. Gleerup, Lund, 1962.
7. Bruce, R. A.: The Benefits of Physical Training for Patients with Coronary Heart Disease. *In* Controversy in Internal Medicine, vol. 2 (ed. F. Ingelfinger), pp. 145–161. Saunders, Philadelphia, 1974.
8. Bruce, R. A. & Lerman, J.: Exercise Testing and Training in Relation to Myocardial Infarction. Postgrad Med *57:* 59–65, 1975.
9. Degré, S., Degré-Coustry, C., Hoylaerts, M., Grevisse, M. & Denolin, H.: Therapeutic effects of physical training in coronary heart disease. Cardiol *62:* 206–217, 1977.
10. Donat, K. & Krasemann, E. O.: Die Herzinfarktrehabilitation nach dem „Hamburger Modell". Herz/Kreisl *8:* 301–305, 1976.
11. Finlayson, A. & McEwen, J.: Coronary Heart Disease and Patterns of Living. Croom Helm, London, 1977.
12. Fisher, S.: Unmet Needs in Psychological Evaluation of Intervention Programs. *In* Exercise Testing and Exercise Training in Coronary Heart Disease (ed. J. P. Naughton & H. K. Hellerstein), pp. 289–296. Academic Press, New York, 1973.
13. Garrity, T. F.: Vocational adjustment after first myocardial infarctions; comparative assessment of several variables suggested in the literature. Soc Sci Med *7:* 705–717, 1973.
14. Kallio, V.: Results of Rehabilitation in Coronary Patients. Adv Cardiol *24:* 153–163, 1978.
15. Kelbaek, H., Eskildsen, P., Hansen, P. F., Godtfredsen J.: Spontaneous and/or training-induced haemodynamic changes after myocardial infarction. Int J Cardiol *1:* 205–213, 1981.
16. Kentala, E.: Physical Fitness and Feasibility of Physical Rehabilitation after Myocardial Infarction in Men of Working Age. Ann Clin Res *4:* Suppl. 9, 1972.
17. Kjøller, E.: Resumption of work after acute myocardial infarction. Acta Med Scand *199:* 379–385, 1976.
18. Kushnir, B., Fox, K. M., Tomlinson, I. W. & Aber, C. P.: The effect of a pre-discharge consultation on the resumption of work, sexual activity, and driving following acute myocardial infarction. Scand J Rehab Med *8:* 155–159, 1976.
19. Lamm, G. & Dorossiev, D. L.: World Health Organization Collaborative Study on Rehabilitation and Comprehensive Secondary Prevention of Patients after Acute Myocardial Infarction. Adv Cardiol *24:* 179–186, 1978.
20. Lind, E., Edhag, O. & Theorell, T.: Is group information in the rehabilitation after a myocardial infarction 'psychotherapy'? Ninth international congress of psychotherapy, Oslo, 1973.
21. Martic, M.: Results of Psychological Testing of Coronarypath in a Longitudinal Study of the Following Up of Effects of Training. *In* Psychological Approach to the Rehabilitation of Coronary Patients (ed. U. Stocksmeier), pp. 89–95. Springer-Verlag. Berlin, 1976.
22. Merriman, J. E.: Exercise Prescription for Apparently Healthy Individuals and for Cardiac Patients. *In* Exercise and the Heart (ed. N. Wenger), pp. 81–92. F. A. Davis, Philadelphia, 1978.
23. Nordesjö, L.-O.: The effect of quantitated training on the capacity for short and prolonged work. Acta Physiol Scand, Suppl. *405,* 1974.
24. Palatsi, I.: Feasibility of physical training after myocardial infarction and its effect on return to work, morbidity and mortality. Acta Med Scand. Suppl *599,* 1976.
25. Saeterhaug, A., Scheistroen, T. & Rokseth, R.: The result of a simple rehabilitation programme after acute myocardial infarction. Tidskr Nor Laegeforen *99:* 1078–1082+1099, 1979.
26. Sanne, H.: Exercise Tolerance and Physical Training of Nonselected Patients after Myocardial Infarction. Acta Med Scand, Suppl. *551,* 1973.
27. Sanne, H.: Vilka patienter behöver speciella stödåtgärder efter hjärtinfarkt? Forskning och Praktik, Sandoz *8:* 121–124, 1976.
28. Saunamäki, K. I.: Feasibility and Effect of Physical Training with Maximum Intensity in Men after Acute Myocardial Infarction. Scand J Rehab Med *10:* 155–162, 1978.
29. Taylor, H. L., Buskirk, E. R. & Remington, R. D.: Exercise in controlled trials of the prevention of coronary heart disease. Fed Proc *32:* 1623–1627, 1973.
30. Theorell, T.3 Psykisk »rehabilitering» efter hjärtinfarkt. Läkartidn *74:* 2001–2003, 1977.
31. Vecchio, C., Opasich, C., Cobelli, F. et al.: Analysis of some factors conditioning the physical aspects of the rehabilitation after myocardial infarction. G Ital Cardiol *9:* 572–584, 1979.
32. Åström, H. & Jonsson, B.: Design of exercise test, with special reference to heart patients. Brit Heart J *38:* 289–296, 1976.

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