

CARDIAC REHABILITATION

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D. NIEMAN

OPSOMMING

Hoewel miokardiale infarksie dikwels noodlottig is, oorleef baie pasiënte die akute stadium. 'n Rehabilitasieprogram is noodsaaklik en die verpleegkundige behoort hierby betrokke te raak, veral terwyl die pasiënt nog gehospitaliseer is.

Rehabilitasie tydens hospitalisasie behels pasiënte-onderrig en progressiewe beweeglikheid.

Die pasiënt moet onderrig word oor die oorsake van sy toestand, risikofaktore, dieet en medikasies. Sy gesin behoort ook by die onderrig betrek te word.

Weens die nadelige gevolge van bedrus moet rehabilitasie vroeë gegradeerde aktiwiteite insluit. Aktiwiteit kan by wyse van METS voorgeskryf word. Inligting oor aktiwiteit na ontslag uit die hospitaal moet gegee word. Die pasiënt kan ook na 'n oefenprogram verwys word.

INTRODUCTION

In the Republic of South Africa, ischaemic heart disease is the main cause of death amongst Whites in the age group 20 – 65 years. The percentage for ischaemic heart disease of all deaths from diseases of the circulatory system for Whites in the age group 25 – 34 is 63% for males and 21% for females. In the age group 35 – 44 the percentages are 77% for males and 34% for females (22, p.1025).

Although myocardial infarction has a poor prognosis, a large number of patients survive the acute phase. Therefore it is imperative that the psychological, physiological and social consequences of the disease to these patients should be reduced maximally (7, pp. 1,2). According to Matheson *et al*, cardiac rehabilitation entails the following:

- Preventive life-style change that includes the modification of risk factors (thus potentially modifying the course of disease), and
- The restoration of the cardiac patient to his optimal level of functioning within the boundaries of the above life-style change. Cardiac rehabilitation is basically an organised approach to comprehensive care where the heart and the patient are both considered. (16, p.367).

The aims of a rehabilitation programme are:

Improving the *quality* of life by

- patient and family education;
- return to work.

Improving the *quantity* of life by

- identifying and modifying risk factors;
- optimising medical treatment. (18, p.238).

In order to achieve these goals a team-approach is essential. A rehabilitation team may include: the patient, physician, nursing staff, physiotherapist, occupational therapist, dietician, clinical psychologist, social worker, physical therapist, prevocational counsellor.

Programmes are usually divided into in-patient and out-patient phases. Rehabilitation should start on the first day in hospital and extend to maintenance of the patient in the community. (19: p.1126).

This article deals mainly with in-patient rehabilitation, which includes patient education and progressive ambulation.

PATIENT EDUCATION

Compared to other health professionals, nurses are with patients for the longest period of time and should therefore become intensely involved in health education.

Patient education is essential – because patients *want* information and because recovery appears to be accelerated in patients who are

provided with a rehabilitation programme. In many cases, delay in returning to work can be related to social or psychological factors such as anxiety and depression which are partly due to lack of instruction and reassurance (10, pp. 8,9).

In one study it was concluded that 75% of patients felt insufficiently informed about the cause and prognosis of their disease while only 20-30% of general practitioners and 10% of hospital practitioners were willing to explain (12, p.150).

Another study showed that only 0,6% of myocardial infarction patients' knowledge of the management of their disease was contributed by nurses (10, p.3).

Patients in the acute care setting are likely to have very high anxiety levels, which interfere with thinking and concentration. Teaching seems most valuable when initiated after transfer from the critical care unit. Information and guidance can be given in the critical care unit but without expecting the patient to remember what he has been told.

Since studies have shown that patients forget much of what they are taught, instruction should be spaced over a period of days and should be repeated, if necessary. Studies by the United States Navy showed that visual displays are 22 times more powerful than auditory signals in transmitting impulses to the brain. Therefore

audiovisual aids, drawings and written instructions will reinforce verbal teaching (10, pp.18-22).

Nursing staff must *plan* a teaching programme, including the content to be taught, methods, and the audio-visual materials.

A variety of teaching plans are advocated by established rehabilitation centres but essentially the content is the same.

Kos suggests the use of a nursing history/assessment in the form of a rehabilitation index (See Table 1). This provides the patient with an opportunity to verbalise his needs and the nurse with a picture of the patient which is as meaningful and complete as possible (15, pp.598-599).

Niccoli uses the following outline as a checklist which is placed at the foot of the patient's bed. Topics need not be discussed in an orderly fashion, but individualised as the patient's need is identified. Space for notations on items that have been covered must be provided.

General medical information

The atherosclerotic coronary heart disease process.

The acute clinical event. Define: myocardial infarction and angina pectoris.

The healing process

Related anatomy and physiology — how the heart functions.

Risk factor identification and modification

Smoking.

Hypertension.

Fat — body blood.

Diet.

Personality — stress.

Diabetes.

Physical inactivity.

Medications

Patients' medications.

For each give: Name, dose, schedule, action, purpose, side effects.

Nitroglycerin: How and when to use, action, side effects.

Diet

Cholesterol.

Carbohydrate.

Calories.

Sodium.

Caffeine.

Alcohol.

Exercise

Plan for return to activities.

Pulse taking.

Exercise prescription.

Guidelines for patient

Warning symptoms.

Work simplification.

Activities.

Special instructions such as concerning: driving, housekeeping, gardening, hobbies.

Follow-up care (18, pp. 243,246).

Guidelines for teaching some of the above-mentioned topics.

Anatomy, physiology, functions of the heart.

Show illustrations of the blood supply to the myocardium. Explain that there are two important coronary arteries, a left and a right. Patients are often under the impression that the aorta is the *blocked* blood vessel; and that the problem exists inside the heart rather than in the *shell of the heart muscle*. Explain that the main function of the heart is to pump blood to the system.

Atherosclerosis

Discuss the process and that it occurs over years. Explain that fat accumulates, blocking up arteries like rust in a pipe. Explain the heart's requirement of oxygen and how inadequate circulation can compromise this.

Myocardial infarction and angina

Explain that the coronary arteries may become *plugged up* completely due to accumulation of fat in the arteries, or due to a clot or piece of fatty plaque which breaks loose from the vessel wall.

Define terms such as *heart attack* and *coronary* and that they represent death of or damage to the heart muscle due to inadequate oxygenation.

TABLE 1
REHABILITATION INDEX OF THE MYOCARDIAL INFARCTION PATIENT

A. Determining where the patient is:

1. How do you picture what has happened to your heart?
2. What are the factors in your life which you feel may have contributed to your life which you feel may have contributed to your problem? (Diet, smoking, worry, weight, overexertion, underactivity?).
3. When you overdo, do you have any warnings?
4. Do you know what causes them?
5. Do you take medications for these symptoms?
6. Do you know what causes relief with the medication?
7. Are there any other measures that relieve them?
8. What has your doctor discussed with you about activity and exercise when you return home?
9. What are the meals and snacks you normally eat and enjoy?
10. What are the types of worry or aggravation that bother you?
11. What are your immediate concerns?

12. What type of personality do you feel you have?

B. Determining where the patient wants to go:

1. What has your doctor told you about your future?
2. How do you see your illness?
3. What is your plan for gradually increasing activity and exercise?
4. What do you feel would be desirable changes in your diet?
5. How do you feel about returning to work?
6. How do you usually release pent-up energy? (Physical activity?)

C. How the patient will get there?

1. What are your plans for the future? Do they go along with your doctor's suggestions?
2. Are there any changes you can make in your work-pattern to make it easier or more efficient?
3. What is your plan for strengthening your heart?

(15, p.598)

Garcia recommends the following plan of instruction which is initiated in the post-coronary care unit or phase:

Day 1. Provide a period of catharsis as the patient relates his experience. (Rehabilitation index used at this stage).

Day 2. Explain anatomy, physiology and functions of the heart. Explain the *heart attack* itself.

Day 3. Explain importance of rest.

Day 4. Explain resumption of activity.

Day 5. Explain the effects of smoking.

Day 6. Explain diet and medications (10, pp.26-34).

Rehabilitation overview

Definition

Goals, such as comfortable, independent convalescence by discharge.

Rehabilitation team.

Duration of hospitalisation.

Activity progression in hospital.

Psycho-social aspects

Reactions to the acute event. (Intervention to assist with coping).

Financial problems.

Family problems.

Vocational considerations.

Community resources.

Discuss the differences and significance of angina (ischaemia) as opposed to damage (infarction). (Pain lasting longer than 15 minutes at rest usually indicates more than just angina).

The healing process and the importance of rest.

Like tissue elsewhere in the body the heart heals by scar formation. Emphasise that healing takes six to twelve weeks and that the scar remains like a bit of plastic that will not cause harm, but does not participate in pumping. Many Patients do not experience much chest discomfort during convalescence and do not understand why activity should be restricted. Explain that the heart needs rest in order to heal, that this means three to four days in bed except when using the commode – whereafter activity may be increased gradually. At this stage it is useful to give the reassurance that many patients return to work within six to eight weeks. (If the patient's occupation requires extensive activity, such as lifting heavy objects, return to work is usually delayed for three to four months or a change of work may be advocated).

Risk Factors

Hypertension – Discuss the importance of regular medical examinations. If the patient is on hypotensive drugs, stress the importance of compliance.

Smoking – Explain that nicotine causes vasoconstriction and an increase in the heart rate, blood pressure and the force of contraction of the heart and therefore increased workload and oxygen demand. Some patients may be able to compensate by an increase in the rate of coronary blood flow, but patients with severe coronary heart disease are unable to do this, despite increased cardiac output.

The effects of nicotine on catecholamine release is thought to increase cholesterol, triglycerides, platelet stickiness and aggregation (9, p.362; 10, p.32).

Cigarette smoke contains carbon monoxide which causes an increase in caboxyhemoglobin saturation. The affinity of Hb for carbon monoxidé is 200 times greater than for oxygen. This results in decreased release of oxygen to the tissues.

Carbon monoxide has also been implicated experimentally to increase permeability and accumulation of lipids in the arterial wall, as well as platelet stickiness – contributing to thrombus formation (9, p.363).

Stress – Friedman and Rosenman describe two personality types. The coronary-prone individual – Type A, is aggressive, competitive, obsessively ambitious, constantly battling deadlines, hard driving. (One of their sub-

TABLE 2 Stress Index	
	Yes No
I have an intense, sustained drive to get ahead.	
I'm anxious to reach my goals, but am uncertain what they are.	
I feel a need to compete and win.	
I have a strong desire for recognition.	
I am always involved in too many things at once.	
I'm always clock-racing – on edge about meeting deadlines.	
I have a drive to speed things up – get them done faster.	
I'm extraordinarily alert, mentally and physically.	
(15, p.595)	

jects liked to use two electric razors simultaneously to cut shaving time in half!) The non-coronary prone person is Type B. A stress index, such as the one provided in Table 2 can be used to help identify Type A. In necropsy studies performed on 25 deaths from ischaemic heart disease (I.H.D.), 22 patients were characterised as Type A. The extent of I.H.D. in Type A men was 6 times greater than in Type B men.

In a study by Rahe, life-change data for 279 myocardial infarct patients showed significant elevations in the magnitude of life changes during the six months prior to infarction. William Osler states: *It's more important to know what sort of patient has a disease than what sort of disease a patient has* (20, pp.331, 332). By identifying and discussing specific problems, the patient may obtain a realistic view, develop coping mechanisms and plan behaviour modification.

The nurse can advise patients to avoid upsetting situations and an accumulation of stress factors by spacing activities, setting aside time for relaxation (such as a short walk during lunch break) and to be prepared for boredom, depression and weakness which may be experienced.

Diet

Obese or not, myocardial infarct patients must be cautioned against eating huge meals. Blood is shunted to the gut during digestion, compromising coronary circulation and leading to chest pain and discomfort.

If dietary changes are necessary the help of a dietician can be enlisted. Based on laboratory findings of triglyceride and cholesterol levels, carbohydrates and cholesterol intake may need to be reduced. Food restricted in a low cholesterol and low saturated fat diet include:

- Super/Prime beef, liver, heart, kidney;
- fish – shellfish, sardines, kippers;
- all cheeses with the exception of cottage cheese;
- solid fats, butter (40% polyunsaturate margarine is allowed);
- milk – whole, condensed, evaporated – and ice cream;

- eggs (1 – 2 per week only);
- nuts – peanuts, cashew.

Explain that salt restriction prevents accumulation of fluid and the resulting increased cardiac work load. Discuss the stimulant effect (myocardial irritation and arrhythmias) of coffee and tea and advise restriction of use. Explain that whereas moderate amounts of alcohol (2 glasses, depending also on the individual) produces beneficial vasodilation, excessive quantities may be poorly tolerated.

Medications

Specific instructions about each medication should be given. Standard forms can be compiled for commonly used medications such as the example provided in Table 3.

TABLE 3 Example of a medication instruction sheet	
NAME:	NITROGLYCERIN
WHAT IT DOES:	Helps your chest pain go away.
REMEMBER:	Do not wait until the chest pain is bad; take the pill when the chest pain starts.
	Put the pill under your tongue and let it melt. If possible, sit or lie down and relax for a few minutes. If the pain is not relieved in _ minutes, take another.
	Always take your nitroglycerin with you wherever you go.
	Keep the pills in a coloured tightly closed bottle. Light will cause the pills to become weak.
	Get a new bottle of pills every three months, since these pills get old and lose their strength.
	Don't take more than _ pills without calling your doctor.
	This is not a habit forming drug.
CALL YOUR DOCTOR IF:	You need more than _ pills to stop your pain each time.
	Your pain does not stop.
DIRECTIONS:	
	(5 p.2193)

Several authors describe the usefulness of group sessions, during which patients learn from the experiences and questions of others as well as receiving emotional support from each other (2, p.528; 21, p.445; 8, p.448). It seems that group sessions are particularly beneficial when conducted after discharge on a once-a-week basis for six weeks.

EDUCATION OF THE FAMILY

In a study on the *sick role* by Monteiro, 10% of the patients said that people did not expect them to be active and believed that activity could precipitate an attack. Family members expected patients to take it easy. This gives rise to a conflict situation – the physician says he is ready to return to work but the family disagrees (10, pp.10). Education of the significant family members is essential to prevent sabotage of the patient's rehabilitation. Informed family members can also remind patients of treatment whenever it is forgotten, and are better equipped to provide support.

Baden identifies the objectives of including families in teaching programmes as follows:

- to help families overcome fears and to correct misconceptions about heart disease;
- to promote an understanding of drug therapy, diet and activity in relation to the individual capabilities of the patient;
- to foster an awareness of signs and symptoms which could be manifestations of trouble;
- to help families to identify and deal with stress-provoking situations and learn methods of support. (1, pp.566, 567).

Some courses for family members include the teaching of cardiopulmonary resuscitation and the writer certainly found that this gave the wives a feeling of security. The film *Pulse of Life** is very useful, as well as practice-sessions on *Resusci-Anne* or other models.

PHYSICAL RECONDITIONING

The effects of exercise

For years, up to eight weeks of total bed rest was advocated after a myocardial infarction. Winslow *et al* describe the deconditioning effects which resulted from putting college students to bed for 20 days. Thereafter they were subjected to a training program for eight weeks. Cardiovascular measurements were taken before and after the bedrest as well as during

training. Maximal oxygen uptake (VO_2 max), which represents the maximal rate of oxygen delivery to the tissues and is the best measure of fitness, decreased 20 to 46% during bedrest – primarily due to decreased stroke volume. The heart rate at a specific workload increased from a mean of 125 before to 164 after bedrest and decreased to 115 after training. The changes brought about by bedrest caused increased myocardial oxygen consumption (21, p.440).

It is obvious that deconditioning can be particularly hazardous for the myocardial infarct patient. Early, graded activity is also beneficial because the patient is reassured that he is not an invalid. As quoted by Kallio early activation is the *most potent antidote we know to the mental distress of post-coronary convalescence* (14, p.154).

What are the physiological effects of physical conditioning? While controversy still remains it would seem that the decreased heart rate and lowered blood pressure resulting from physical conditioning reduce myocardial oxygen consumption thus increasing work capacity. Patients with angina pectoris also benefit – being able to do more work before the onset of angina (14, p.54).

It has been suggested that exercise reduces some plasma lipids (17, p.71). Decreased triglycerides seem more common than a reduction in cholesterol although dietary changes and weight loss may account for much of the decrease. Animal studies have shown an increase in the cross-sectional diameter of the coronary arteries, the development of coronary collaterals and an increase in the capillary to ventricular muscle fibre ratio. Cardiac muscle hypertrophies as a result of conditioning (6, p.437). In humans it has not been demonstrated conclusively that exercise alters coronary anatomy, but the coronary arteries of a veteran marathon runner have been found to be two to three times larger than normal (17, p.34).

The two basic categories of exercise are isometric (static) and dynamic (aerobic). With isometric exercise there is continuous contraction of a muscle group with no muscle shortening such as when arms are placed over the head with the shoulder girdle fixed (hanging up washing, painting; lifting and pushing heavy objects). Isometric exercise produces a great increase in blood pressure and should not be performed by myocardial infarct patients. Forearm isometrics while carrying a

suitcase explains *airport angina* in individuals with a compromised coronary circulation.

Dynamic exercise involves changes in muscle length and joint movement as with walking, jogging, cycling, swimming, and is to be preferred for myocardial infarct patients. It is the only form of exercise for which there is evidence of a role in the primary or secondary prevention of coronary disease (6, p.436; 10, p.41).

Activity during hospitalisation

Energy expenditure can be measured in METS and activity progression after myocardial infarction can be based on this.

One MET represents the basal energy requirement (oxygen consumed) per kilogram per minute at rest which is approximately 3.5 ml/kg/min. Other activities can be expressed as multiples of the MET. Table 4 shows the mean energy cost in MET of various activities. Complete bedrest and shaving require 1 MET, using the commode requires three times as much basal energy or 3 METS, using a bedpan requires 4 METS, playing squash 8-9 METS (21, p.441).

TABLE 4 Mean Energy COST in MET of Various Activities

Activity	MET
Sleeping	0.8
Awake, lying at ease	0.9
Sitting at ease	1.0
Standing at ease, desk work, typing	1.2-2.0
Walking on level surface at 3 mph	2.1
Uphill (5 percent grade) at 3 mph	4.0
Upstairs, rapidly	6.0
Sexual activity	
Foreplay	3.5
Orgasm	4.7-5.5
Bicycling at 5.5 mph	3.2
9.5 mph	5.0
Volleyball (six-man non-competitive team)	3-4
Golf (pulling golf cart)	3-4
Golf (carrying clubs)	4-5
Tennis doubles	4-5
Raking leaves	4-5
Tennis singles	6-7
Water-skiing	6-7
Basketball (light)	7-8
Basketball (vigorous)	8-9
Handball (competitive)	10+
Bedside commode	3.2-3.5
Bedpan	4.7

* Obtainable from the National Occupational Safety Association, Pretoria.

Prescription of progressive activity after myocardial infarction necessitates and understanding of myocardial healing. Mallory and White describe the following stages:

- Day 7-8: Myocardial softening with leucocytic infiltration, release of proteolytic enzymes and dissolution of necrotic cells. Activity should be minimised as scar formation has not begun. (1-2 METS tolerated).
- Second week: Necrotic cells are removed and scar formation begins, followed by scar maturation. (3 METS tolerated).
- Healing and scar maturation is completed in 6-12 weeks depending on the amount of damage (3, pp.227,228).

The American Heart Association classifies organic heart disease into two groupings which are the functional and therapeutic classifications.

Functional classification

Table 5 shows the correlation between the functional classification and METS.

Having classified the patient and referring to a list of activities related to METS, (Table 4) a reasonable prescription for activities can be determined in the absence of sophisticated stress-testing equipment. This is especially useful for supplying patients with a guide upon discharge - instead of saying: "take it easy". Referring to the graded activities in Table 6 it can be seen that the activities in the coronary care unit require 1-2 METS except when the bedpan and commode are used.

Therapeutic classification

This classification is based on the amount of effort possible without discomfort, the nature and severity of defects and the prognosis. It may also serve as a prescription for the permissible amount of physical activity for patients with cardiac disease. (See Table 7)

A suggested progressive activity rehabilitation program which must be individualised according to the patient's needs and condition is provided in Table 8. Contra-indications to this program are shock, congestive heart failure, ventricular arrhythmias, and angina (18, p.24).

Activity after discharge from hospital

On discharge from hospital, the following suggestions on the modification of activities are extremely helpful:

		METS
I	No limitation, no symptoms with ordinary activity	7
II	Slight limitation. Comfortable at rest. Symptoms with ordinary activity.	5-6
III	Marked limitation. Comfortable at rest. Symptoms with less than ordinary activity.	3-4
IV	Discomfort with any activity. May have symptoms at rest.	1-2

- Plan the day's/week's work. Spread out hard tasks. Alternate an easy task with a hard one. Space activities, rest in between.
- If you get tired stop and rest. Don't push yourself to wash the last dishes or watch the late T.V.
- Try not to hurry - plan in order to get things done without becoming tense or rushed.
- Plan a rest period twice a day (no need to go to bed, just rest).
- Get 6-8 hours sleep.
- Avoid activities which tense the body such as:
 - straining when having a bowel movement (eat roughage);
 - lifting heavy things such as children or groceries;
 - pushing or pulling anything heavy;
 - trying to open a window which is stuck or to unscrew a jar lid.
- Walk daily as much as in hospital. Plan the walk, avoid steps, hills or walking in wind, cold or heat. Housework:
 - finish one side of the bed and one room at a time;
 - don't move furniture;

Level of Activity	MET	Daily Living Activities	MET
I. Complete bed rest	1	May turn self	1
		Watch T.V. and listen to radio.	
		Complete bath (when stable)	1
II. Complete bed rest	1	May be shaved	1
		Feed self	1
		Lift onto bedside	3
		Commode or bedpan (specify bedside commode or bedpan on doctor's orders)	4
III. Complete bed rest	1	Read newspaper	1
		Wash face and hands	2
		and brush teeth	2
IV. Dangle feet 5 minutes - T.I.D.	1	Shave self	2
		Make up face	2
		Comb hair	2
		Up on bedside commode	3
V. Dangle feet 10 minutes - T.I.D.	1	Same	
VI. In bedside chair 10 minutes - T.I.D.	1	Same	
VII. Up in chair 15 minutes - Q.I.D.	1	Begin partial bath	2
VIII. Up in chair 15 minutes - Q.I.D.	1	Progressive bath	2
		Bathroom privileges	2
Walk 1-2 minutes in room each time up	2	if bathroom adjoining,	
		if not, bathroom in wheelchair	
IX. Walk in hall 5 minutes each time up	2	Self care	
		Dressing, undressing, etc.	
X. Up lib	2	Same	

TABLE 7 THERAPEUTIC CLASSIFICATION

CLASS A	No restriction of physical activity.
CLASS B	Ordinary activity not restricted, but advised against unusually severe/competitive effort.
CLASS C	Ordinary activity moderately restricted, more strenuous efforts discontinued.
CLASS D	Ordinary physical activity markedly restricted.
CLASS E	Should be at complete rest, confined to bed or chair.

(10, p64)

- sit down when ironing, washing dishes, preparing meals;
- keep clothes to be ironed near the ironing board to prevent getting up; don't work with arms above shoulders, rearrange things in cupboards to below waist;
- don't wash windows or hang clothes.
- Avoid situations, people or topics of conversation which upset you.

- Rest after a meal before doing exercise.
- On long car trips, stop every hour and walk around as this prevents clots forming (11,1977).

Sex Counselling

A discussion on sexual activities is frequently overlooked in rehabilitation although it is an important aspect of the marital relationship. The actual physical energy expenditure during

sexual intercourse is 3-4 METS – lower than the demands of most jobs. Wives are especially anxious about resuming activity, but recurrent infarction or sudden death during sexual activity seems mostly related to extra-marital affairs, after the consumption of a large meal and a lot of alcohol. Cole *et al* recommend that the following suggestions be made to patients:

- sexual activities can usually be resumed 6-12 weeks after myocardial infarction (after consulting with the doctor);
- if angina occurs stop and take nitroglycerin beforehand next time;
- avoid when tired;
- not after a big meal or too much alcohol;
- room temperature not too hot or cold;
- positions: side by side/partner on top (4, pp.124-127).

Post-hospitalisation Reconditioning

While literature suggests that continuous physical exercise programmes keep patients fit for work, controversy remains regarding the protective effects against reinfarction and mortality (14, pp.157,158).

Not all myocardial infarct patients are candidates for reconditioning. Major criteria against reconditioning include poorly controlled dysrhythmias, congestive cardiac failure and angina readily provoked by effort (17, p.36).

In most programmes rehabilitation is started 6-8 weeks after discharge and after a stress E.C.G. has been taken. Ideally, exercise should take place in a supervised environment where pulse, blood pressure and if possible, an E.C.G. can be taken. Equipment for definitive therapy must be available to provide for complications.

Exercises vary from one rehabilitation centre to the next. Some centres use the bicycle-ergometer (usually mechanically braked) where frictional force is developed on or within the driving wheel and a scale and pointer indicate the approximate work performed by one rotation of the wheel. The bicycle is connected to a counter which records the number of wheel rotations permitting an estimation of total work output (17, p.81). A treadmill may also be used as well as simple calisthenics. Exercise is graded and should include warm-up, workout and cool-down phases.

For the coronary patient to obtain the most benefit at the lowest risk, the workload intensity should be 75% of the V_O₂ max (maximal rate of O₂ delivery to tissues).

A pulse rate of 70-85% of the age-predicted (or exercise determined) maximum heart rate will produce a

TABLE 8 REHABILITATION PROGRAM

Acute Phase	1-4 days	1-2 METS
Complete bed rest until pain remits		
1st to 4th day	<ol style="list-style-type: none"> 1) Orientation to rehabilitation program 2) Bedside commode 3) Feed self 4) Active foot exercises 5) Partial A.M. care (wash hands, face, brush teeth) 6) May sit in chair at bedside for bed making 7) May stand to be weighed 8) O.T. activity 9) Dangle for feeding and A.M. care 10) Sit in chair (15-30 min.) up to 3 times daily 	
Semiacute Phase	5-10 days	2-3 METS
5th and 6th day	<ol style="list-style-type: none"> 1) Walk to bathroom 2) Up in chair 3-4 times daily as tolerated 3) Sponge bath self (seated) 4) Walk in room 5) O.T. work simplification/activity 	
7th and 8th day	<ol style="list-style-type: none"> 1) Continue up in chair as tolerated 2) Sponge bath (standing) 3) Standing self-care – shaving, combing, etc. 4) Walk 60 feet 5) Walk in room ad lib 6) O.T. Clinic – wheelchair 	
9th and 10th day	<ol style="list-style-type: none"> 1) Bathe in tub or shower (initially transported by wheelchair) 2) Progressive ambulation on ward 	
Convalescent Phase	11-14 days	3-6 METS
	<ol style="list-style-type: none"> 1) Continue all other prior activities 2) Continue walking in hall as tolerated 3) Stairs before discharge as needed 	

**TABLE 9:
AGE-PREDICTED MAXIMUM PULSE RATES**

	Predicted maximum pulse rate	85% max
20-29	193	166
30-39	185	152
40-49	176	150
50-59	168	143
60-69	161	132
70-79	153	130

conditioning effect (a pulse rate of 85% of the maximum rate correlates with 75% V_{O₂}) (3, pp.232,233). Table 9 provides the age-predicted maximum pulse rates. A patient aged 40 can, for example, be allowed to reach a pulse rate of 150 during exercise.

The pulse is taken continuously during and after exercise. Exercise is discontinued when symptoms (angina,

ectopics or dyspnoea) develop. After reassessment the patient can be allowed to exercise until the heart rate reaches 85% of the rate at which the symptoms previously occurred.

To provide adequate conditioning the patient should probably exercise for at least 30 minutes, four to five times per week. (3, p. 233).

Many rehabilitation programs also include jogging on athletic fields or in the home environment. Swimming is advocated in some centres.

Involving family members in the exercise sessions demonstrates safe levels of activity for the patient and alleviates anxiety (6 p. 40).

CONCLUSION

Cardiac rehabilitation is an essential component of the total patient care for victims of ischaemic heart disease. The nurse, *can* and *must* participate. As stated by Denolin: *we look forward to the time when the term rehabilitation will disappear, that it ceases to be a particular discipline, and instead becomes integrated into the complete and classic treatment of our patients* (7, p.u.).

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BOOK REVIEW

BOEKRESENSIE

SEE HOW THEY GROW – MONITORING CHILD GROWTH FOR APPROPRIATE HEALTH CARE IN DEVELOPING COUNTRIES.

by David Morley and Margaret Woodland.
MacMillan. London. 1979.

(Represented in South Africa by MacMillan, S. A.)
Approximate price: R16,55

This is a lovely book. If through some misfortune, it were impossible for me to introduce nursing students to no more than a total of any six textbooks throughout their training, this would be one of them – and especially so, for community health nursing students. In only 240 clear and attractively illustrated pages the authors really tell a nurse all she need remember about the monitoring of the growth of a child from birth to 3 years, and a lot else besides.

The joy of this book is that the authors' personal care and concern for the well-being of the child shines through on every page, all written in beautiful clear and simple language, which does not in any way imply a superficial approach to the subject.

Rather, the clarity and simplicity of language are present because of the authors's realisation that the health of the child,

particularly in developing countries, depends on the full understanding on the part of primary health workers of the significance of their work in the community.

The major emphasis of the book is the underlining of the extreme importance of adequate monitoring of child growth and the recording of these serial observations on growth and development charts which are simple to use and easy to understand. The physical layout of such charts is discussed in worthwhile detail, as are the shape of growth curves in specific childhood diseases such as malnutrition and the common infectious conditions. The last chapter of this book is usefully devoted to behavioural, social and intellectual development of the child; the title of the chapter *Adequate physical growth is not enough: the child requires a stimulating and loving environment* is self-explanatory.

Unlike many textbooks, this is not a work to frighten a student with too much information. The authors' own practical experience in this field is clearly apparent throughout the book, expressed in attainable and sensible goals for all health workers; they do not make the mistake of imagining that the content is relevant only to the unsophisticated worker in a developing region. It could be read with benefit by all involved in health care, from doctor to first-year student nurse.

B. N. HUNT.